Catoptric theatres: on devices of atmospheric staging

Article

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rich in temporal and embodied implications. By this reading, interiors have always been augmented and augmenting (in the sense of the Latin“augmentare”: to increase, enlarge, or enrich). This IDEA Journal issue considers this mode of ‘folding inward’ as a condition of an interior’sspecificity. Whether it be a small structure such as a tramping hut or a tiny house, a large complex interior environment such as an airport or shopping mall, handmade with local materials such as Samoan fale, or the result of manufacturing processes assembling artificial and prefabricated elements as in the case of a spacecraft, boat or train, interiors are augmented, mediated, generated or embellished by technologies. The effect of these technologies is not neutral; one’s experience of an interior is significantly influenced by the affective resonance of its technologies.

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catoptric theatres: on devices of atmospheric staging

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abstract

Alluding to the *Theatrum Catoptricum* described by Athanasius Kircher in *Ars Magna Lucis at Umbrae* (1646), this article aims to present glass and mirrors, not as mere objects or materials, but as perceptual and spatial devices, defining a technology of immersion. Imbued with a dazzling energy, mirrors and glass appear to defy both spatial logic and the logic of the eye, triggering new ways of observing, channelling and manipulating light, thus redefining the role played by the immaterial in the production and experience of space. With their framing, amplifying, multiplying or distorting qualities, mirrors and glass also entail a shift of emphasis away from materiality as a merely tectonic or expressive medium, towards matter as an activator and catalyst of effects and experiences.

Unravelling the magical force and transformative quality of glass and mirrors requires an inquisitive journey, spanning different disciplines as well as historical, socio-cultural and technological contexts. Reflecting the myriad effects and affects of mirrors and glass, a kaleidoscopic range of examples will establish multidirectional dialogues. Although from different eras, the selected works, each one a 'catoptric theatre,' will provide the opportunity, not only to reimagine spatial relationships and boundaries, but also to decode the essence of atmospheric staging, suggesting a material pre-history to contemporary concerns for atmosphere and its production. From the enchanting effects of the Baroque Gallery of (fragmented) Mirrors at Villa Palagonia in Bagheria, via Sir John Soane's unprecedented use of tinted glass and mirrors in his House-Museum in London, to the twentieth century light modulating machines of László Moholy-Nagy, Adolf Luther's kaleidoscopic assemblages, and twentieth-century architect Ludwig Mies van der Rohe's belief in the performative nature of glass, the reader will discover multiplicities of meanings and ambiguities of reflections, exploring their atmospheric potentiality.

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mirror world

> For although this mirror world may have many aspects, indeed infinitely many, it remains ambiguous, double-edged. It blinks: it is always this one — and never nothing — out of which another immediately arises. The space that transforms itself does so in the bosom of nothingness.[01]
>
> —Walter Benjamin

The dualism of the mirror generates a multiplicity of associations. One could follow Lacanian thoughts on specularised subjectivity and the ‘fragmented’ body, or the fascinations of Surrealists.[02] One might get trapped like Narcissus in self-reflection, or be transported to the underworld like Jean Cocteau’s poet drawn by the power of memory and imagination.[03] Although the mirror has infinite aspects, as hinted in the opening quote, it is not my intention to investigate its full dialectical spectrum in depth. Instead, the mirror (and glass) will serve as a tool to explore the seductive ‘motif’ of reflection that belongs to the interior, as suggested by Benjamin, revealing the interior’s affective and ‘augmenting’ nature.[04]

Imbued with a dazzling energy, mirrors and glass appear to defy both spatial logic and the logic of the eye, opening up new thresholds of reality through paradoxical relationships between the material and immaterial, the visible and invisible, as well as the interdependence of transparency, reflection and opacity. Associated by Umberto Eco with ‘procatoptric staging,’ mirrors and reflections invite re-examination of their role in the experience and production of space.[05] Eco’s conceptualisation of procatoptric staging implies not only a certain theatricality of catoptric phenomena, but also a tactical arrangement of reflectors, exploiting the perceptual, spatial and instrumental aspects of mirroring. In such a strategical arrangement, mirrors are understood not as mere objects or materials, but rather as viewing and channelling devices that act as ‘catoptric prostheses’ extending or limiting the eye’s range of action.[06] With their framing, amplifying, multiplying or distorting qualities, mirrors become, therefore, part of a complex system for staging specific situations. They can be used to edit and conceal, but also to reveal, blurring both spatial boundaries and the dividing line between what really exists and what appears to our sensorium. It is precisely for its transformative and ambiguous nature, as stated by Jean Baudrillard, that glass ‘sums up the idea of atmosphere.’[07] Thus, expanding on Eco’s principles, and taking as a point of departure the notion of *staging* also used by Gernot Böhme to describe the deliberate creation of atmospheres, my intention is to present glass and mirrors as perceptual and spatial devices defining a technology of immersion.[08]

Unravelling the magical force embedded in glass and mirrors requires an inquisitive journey, spanning different disciplines as well as historical, socio-cultural and technological contexts. However, in taking the reader on this journey, the paper also follows the logic of a catoptric assemblage, avoiding a linear historiographical narrative.

Conceived as a series of immersive 'stage-sets,' it replicates the myriad effects and affects of glass and mirrors through a kaleidoscopic range of examples, establishing multidirectional dialogues. The thematic framing of each section offers glimpses of different types of catoptric arrangements, exploring their atmospheric potentiality. Travelling from seventeenth-century devices of wonder and entertainment based on optical illusion to twentieth-century kaleidoscopic assemblages exposes a productive entanglement between the material and the immaterial, imbuing objects and spaces with life, and revealing processes in which atmospheric staging becomes a tool for increasing phenomenal awareness. Building on that relationship, eighteenth-century conceptions of space trigger new ways of using mirrors and glass as part of a complex system for modulating interior environments, augmenting the experiential potential of space by bridging the meteorological and the affective. As the journey unfolds, the emphasis moves from mirrors as a means of perceiving and channelling, to mirroring as a production of space, in which illusory effects of dissolution, fragmentation and amalgamation render space, not as a static entity, but as a dynamic force-field, translating optical conditions into embodied and multi-sensory experiences and confusing the orthodox perception of interiority. By *looking through the glass* or *slipping through the looking-glass*, the selected works, each one a catoptric theatre, not only redefine spatial relationships and boundaries, but also decode the essence of atmospheric staging.

catoptric theatres

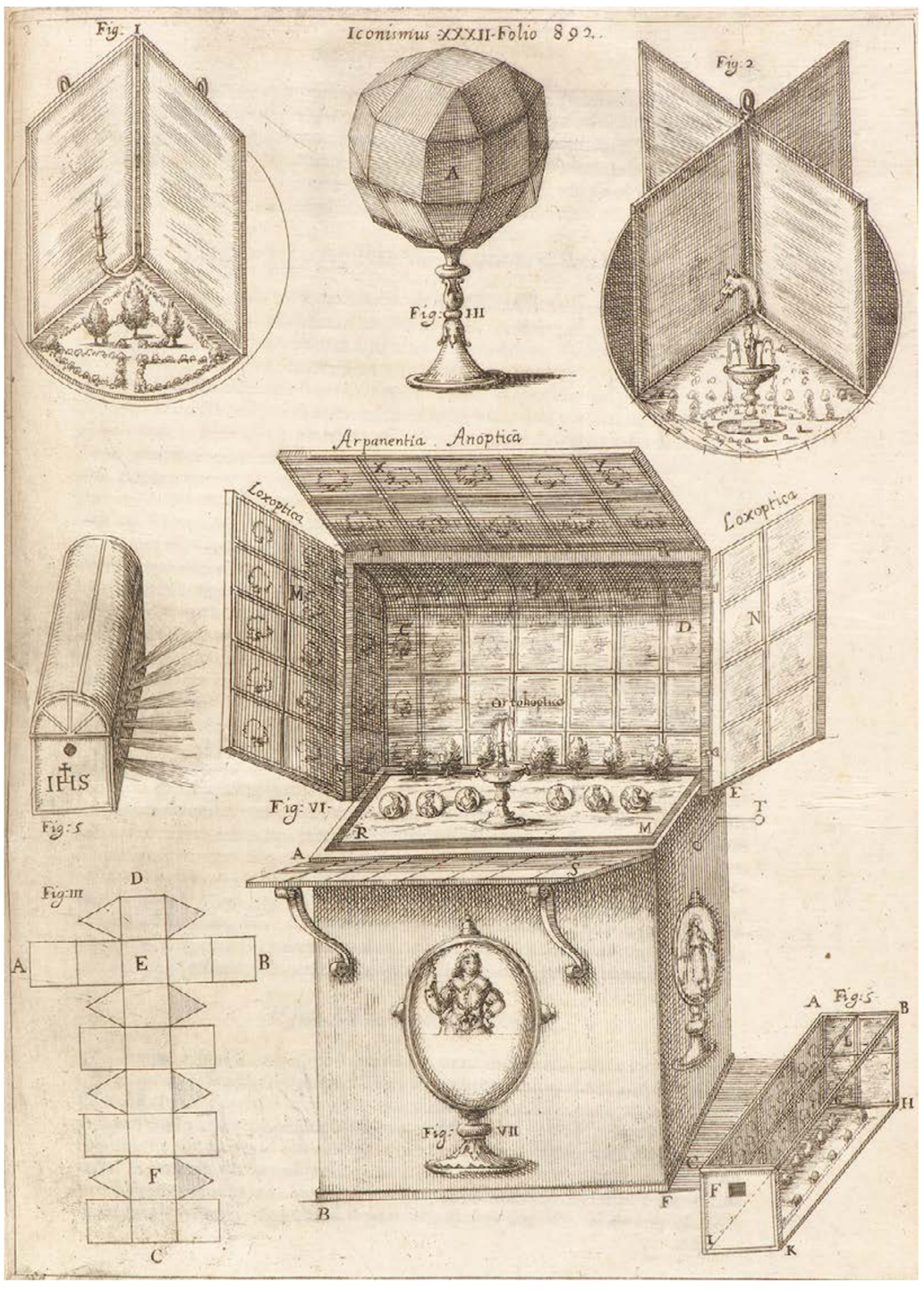


Figure 01:
Catoptric Theatre. From Athanasius Kircher, *Ars Magna Lucis et Umbrae...* (1646).

Interestingly, the conceptual foundations of Eco's procatoptric devices can be found in the seventeenth century. In 1646, Athanasius Kircher's fascination for optics culminated in a seminal treatise, *Ars Magna Lucis at Umbrae* (*The Great Work of Light and Shadow*).[09] Kircher was admired for his extraordinary intellect and imagination, which were reflected in one of the most extensive 'cabinets of curiosities' of his time. Not only did Kircher's

collection include a heterogeneity of natural specimens, antiquities and ethnographic artefacts, but it also encompassed a variety of inventions conceived as scientific instruments as well as machines of wonder and entertainment.[10] In his treatise on light and shadow, Kircher depicted diverse optical devices translating physical laws of reflection and refraction into spectacular effects of illusion. Among them, the most striking one was a cabinet-sized device known as *Theatrum Catoptricum* (*The Catoptric Theatre*) (Figure 01). Compact, yet with expansive qualities, this kaleidoscopic receptacle was equipped with movable panels covered on the inside in nearly one hundred square-shaped mirrors.[11] The foldable elements were activated by a handle. Once opened, the interior disclosed objects placed on a horizontal 'stage,' and multiplied into infinite images, a theatre of illusion. Suspended between scientific and aesthetic conjuring, Kircher's *Catoptric Theatre* defined a particular realm of performances. It drew the observer into a 'virtual' environment, which relied on technically aided sensory illusion and materially augmented embodiment, becoming a precursor of technologies of immersion. Not only did it blur spatial boundaries as well as the limits between the real and the imaginary, but it also transformed inert matter into a shimmering atmosphere, inviting interaction.[12] Aware of the spectacular and affective power of mirrors and reflections, Kircher hinted at an alternative title and reading of his treatise: *The Magnetic Art of Light and Shadow*.[13]

One could suggest that Kircher's immersive box embodied a new understanding of space as dynamic and fluid, composed of myriad particles, which became a creative foundation for its human-scaled descendants: catoptric chambers, perpetual galleries, and halls of mirrors that proliferated during the Baroque era. As insightfully noted by Otto Friedrich Bollnow, the Baroque interior can be seen as an epitome of a 'turbulent endlessness of space' evoked by its material and formal exuberance as well as the production of light effects and optical illusions through the use of reflections.[14] It revealed a liminal space between the physical density of the immaterial and the contingent insubstantiality of materiality, which constitute the essence of atmospheric staging.

Figures 02 and 03:
Adolf Luther and Werner Ruhnau, Flachglas AG. Gelsenkirchen. Photo © Author. Courtesy, Adolf Luther Stiftung Krefeld.

Despite the time that separates them, such a turbulent endlessness of space was also perceptible on entering the reception area of the office building in Gelsenkirchen, built originally for Flachglas AG (1982-85)—then one of the most important glass producers in Western Germany. Walls composed of pivoting glass striped panels, as well as a constellation of concave mirrors and other reflective surfaces, produced a magical amalgam of interior and exterior and a sense of fragmentation within continuity (Figures 02 and 03). Like Kircher’s *Catoptric Theatre*, the interior emerged from a fusion of the fixed and the ephemeral, the visible and the invisible, as well as the real and the virtual. While moving through the interior, the visitor was trapped in the interplay of transparencies and reflections, being immersed in a liquid-like space imbued at the same time with a peculiar material density, in which immateriality acquired a virtually palpable existence (Figure 04).

Figure 04:
Adolf Luther and Werner Ruhnau, Flachglas AG. Gelsenkirchen. Photo © Author. Courtesy, Adolf Luther Stiftung Krefeld.

In this 'design with the enchanting reflection of the glass'—as announced in the title of the contemporary brochure about the company—the architect Werner Ruhnau worked with the artist Adolf Luther.[15]

Luther was a former member of Group ZERO, which was founded in 1957 by Heinz Mack and Otto Piene. Their fervent artistic activity was stimulated by technological advances and new materials: metals, plastics, resins, and mechanisms turned into vibrant environments, exploring new forms of perception and interaction. A revealing coincidence pointed out by Joachim Krausse is worth mentioning here. Krausse suggested that terms such 'environment' or 'ambience' had been introduced into art in the 1960s, exactly at the time when László Moholy-Nagy's *Lichtrequisit einer elektrischen Bühne* (*Light Prop for an Electric Stage*) (1930) was reconstructed.[16]

Known under the name *The Light-Space-Modulator*, Moholy-Nagy's machine, made from transparent, translucent and opaque materials: shiny metal, plastic and glass, was a kind of catoptric theatre (Figure 05). It multiplied, mixed, deflected and reflected light, which in turn animated the surrounding space. As explained by Moholy-Nagy, the two-dimensional surfaces 'slowly changed and dissolved into an infinite number of controlled details,' through which the modulator was transformed from an object of contemplation into a mediating device between the environment and the observer.[17] For Moholy-Nagy, space was 'a dynamic-constructive energy-system,' with the beholder 'actually becoming an active factor in the play of forces.'[18] It was a system in which the concentration on optics (the sense of vision) was a vehicle for the experience of time-space convergence—a contingent construction requiring emotional and bodily engagement.

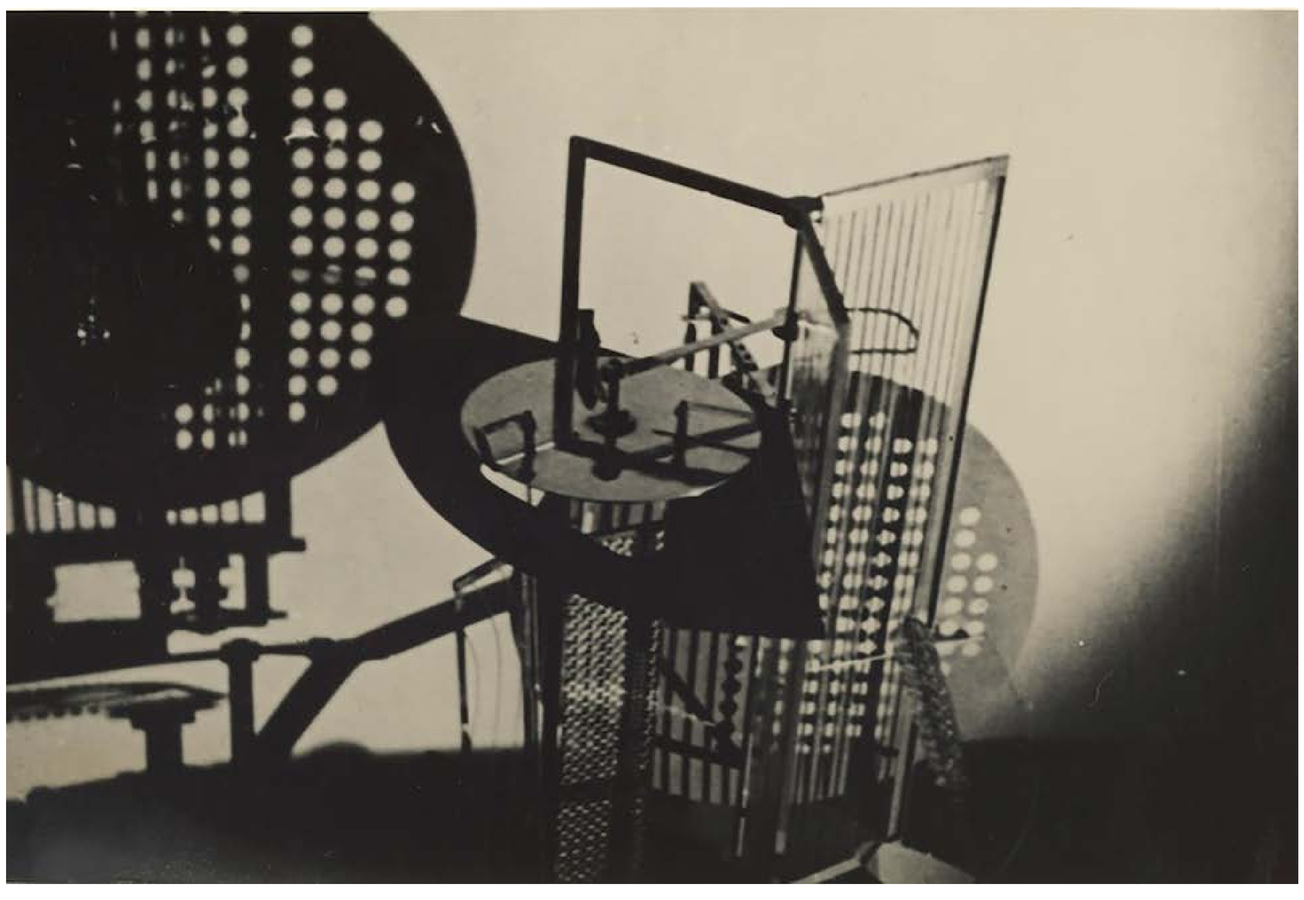


Figure 05:
László Moholy-Nagy, *Light-Space Modulator* a.k.a. *Light Prop for an Electric Stage* (1930). Photo © Estate of László Moholy-Nagy, The Moholy-Nagy Foundation.

Figure 06:
Adolf Luther, Mirror and Glass Objects. Adolf Luther Foundation, Krefeld. Photo © Author. Courtesy, Adolf Luther Stiftung Krefeld.

Similarly, in his evocative manifesto, ‘Paths to Paradise’ (1958), Piene identified artworks with ‘mirrors whose powers affect man, streams freely pouring forth into space.’[19] The idea of pouring energy into space was also central to Luther and inspired by writings of the physicist Louis Victor de Broglie, whose theory of the wave-like behaviour of particles was a cornerstone of quantum mechanics. Emerging from these theories, the intersection of energy and matter led Luther to experiment with glass, lenses and mirrors, in their heterogeneity of types: plain, concave, convex, synthetic and vitreous, and ‘made light his subject as pure energy in space’ (Figure 06).[20]

Light, space and matter appeared to Luther as enmeshed in a relational and variational continuum, stimulating his interest in the productive intermingling between art and architecture. In the 1970s, Luther expanded his ‘mirror objects’ into large-scale works entitled *Integrations,* exploring the idea of ‘sensitisation and dematerialisation in architecture.’[21] Even though, in his search for dematerialisation, Luther also experimented with lasers and smoke, his work was deeply rooted in material alchemy. The dissolution of the ‘inertia and weight of architectural constructions [...] into an atmospheric movement of light’ was a ‘materialised dematerialisation.’[22]

The words of the Futurist Umberto Boccioni are relevant here, as he insightfully pointed out that although atmosphere is culturally regarded as intangible, it 'is a materiality that exists between objects.'[23] Following his interest in the dynamism of forms, Boccioni enhanced atmosphere 'by using all the various effects which light, shadows, and streams of energy have on it.'[24] It was for this atmospheric awareness that, in the context of the *Ambiente/Arte* exhibition at the 1976 Venice Biennale, its curator Germano Celant traced the roots of 'environmental' art to the Futurists.[25]

One became aware of the impact of such energy on space in the complex of the Schloss Nordkirchen, which houses nowadays the Fachhochschule für Finanzen Nordrhein-Westfalen. At the entrance to the canteen, Luther's 4-metre high and 21-metre long *Spherical Concave Mirror Wall* (1971-1972), conceived as a matrix of serial elements, collected and distorted images from inside and outside, constantly adding new layers and filters. Like in Kircher's *Catoptric Theatre*, miniature spectacles appeared within a flickering veil of coloured reflections. They disclosed themselves with the movement of the visitor, filling the space with a shimmering atmosphere (Figures 07 and 08).

In Luther's works, movement both revealed and generated phenomena, in which seeing not only implied *receiving*, but also *producing*, engaging with the observer on both cognitive and somatic levels. In this sense, the giant wall, which resembled the compound eye of an insect, was not an instrument of mere optical multiplication. It was a viewing device, which, by enabling dialectical engagement between the beholder and the surroundings, was transformed into a relational apparatus, increasing both bodily and environmental awareness. The human body constantly negotiated its position, projecting its movements onto the surface and forming a radiant and dappled mist. The illusory haze acquired even greater density through its own reflections in the polished surface of the black stony floor, and in the façade facing the mirror wall, bringing to the fore the agency of materials as central to the construction of atmosphere (Figure 09).

Recalling art historian Klaus Honnef, one could suggest that Luther, like Kircher, used 'rational tools' to produce 'experiences that fascinate and enchant.'[26] In fact, their catoptric theatres were devices of wonder, which, through optical play, visualised phenomena, blurring the boundaries between science and aesthetics, the visible and invisible, the material and immaterial, acknowledging the complex relations through which atmospheres are disclosed and to which they give rise. However, to further explore the realm of wonder unravelling these relationships, it seems appropriate to follow Alice...

Figures 07 and 08:
Adolf Luther, *Spherical Concave Mirror Wall*, Schloß Nordkirchen. Photo © Author. Courtesy, Adolf Luther Stiftung Krefeld.

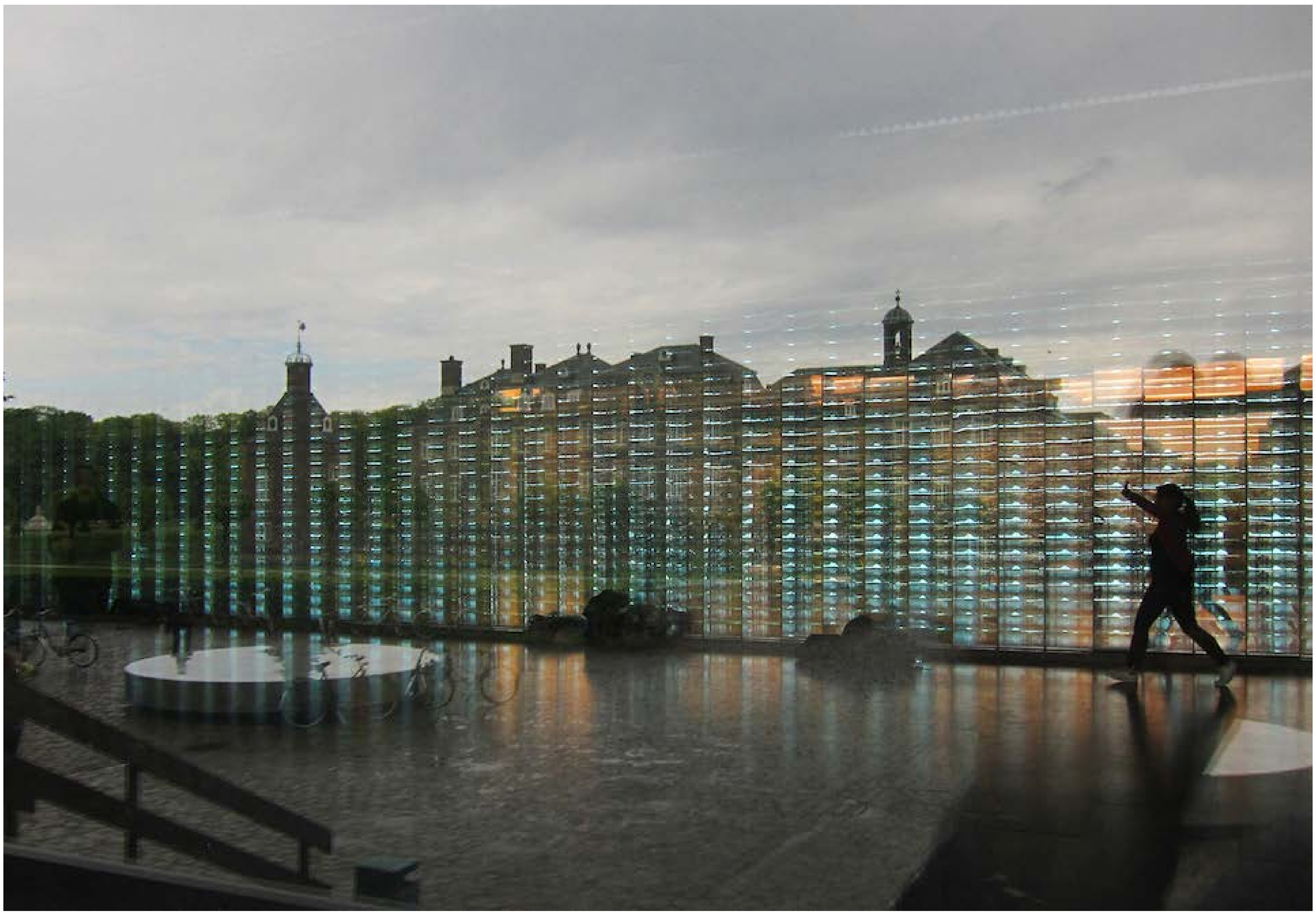


Figure 09:
Adolf Luther, *Spherical Concave Mirror Wall*, Schloß Nordkirchen. Photo © Author. Courtesy, Adolf Luther Stiftung Krefeld.

the garden of atmospheres and what alice found there

> Let’s pretend the glass has got all soft like gauze, so that we can get through. Why, it’s turning into a sort of mist now, I declare! It’ll be easy enough to get through’—She was up on the chimney-piece while she said this, though she hardly knew how she had got there. And certainly the glass *was* beginning to melt away, just like a bright silvery mist.[27]
>
> —Lewis Carroll

It was Gilles Deleuze who, building on Bergsonian lines of thought, associated Carroll’s works, that is, Alice’s adventures, with ‘pure events,’ revealing ‘the secret dualism hidden in sensible and material bodies themselves,’ which are always in the process of *becoming*.[28] By replacing static conceptions of the material universe with conceptions of dynamic processes, the notion of becoming opens up unforeseen influences, multiple relations, and unexpected experiences. As suggested by Henri Bergson himself, it re-enacts the material world as a continual flux felt through our bodies.[29] Such an affective

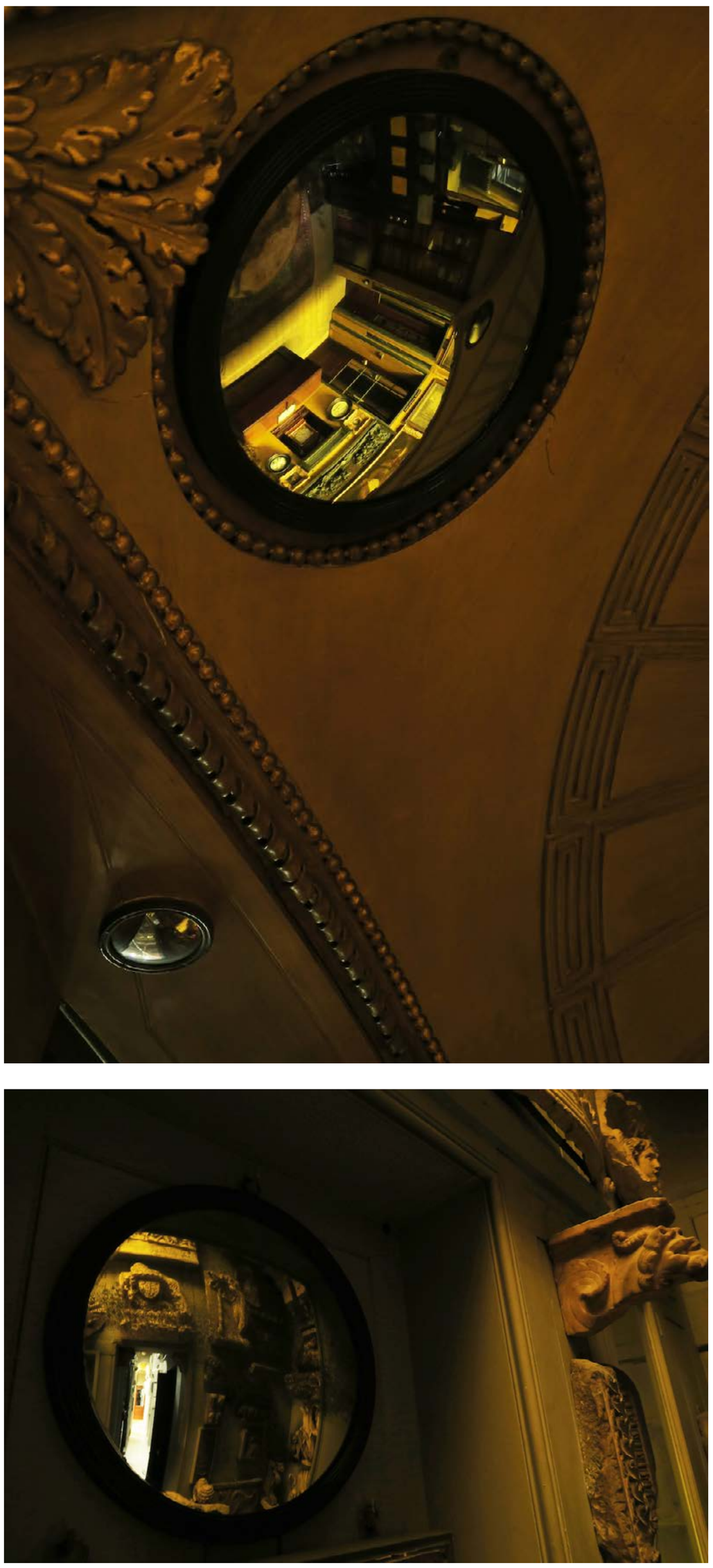
flux characterises atmosphere, which emerges from a coalescence of material and immaterial bodies.

Surprisingly, a similar world of events was described by Christian Cay Lorenz Hirschfeld in *Theorie der Gartenkunst* (*Theory of Garden Art)* (1779-85), which Böhme recognised as an instrumental taxonomy of atmospheres.[30] In it, Hirschfeld presented landscapes and gardens as spatial-temporal configurations that cannot be dissociated from an experiencing subject and are 'full of accidental occurrences.'[31] Interestingly, in unfolding his thoughts, Hirschfeld also presented the illusory as a vehicle for enhancing experience, for making the garden transform into a 'pleasant spectacle.'[32] However, Hirschfeld's understanding of the illusory and in the case of the glass and mirrors, the spectacle transcends *trompe l'oeil*. As Baudrillard noted, illusion is not a simulation of 'something that takes place beyond the reflection of things' but a reality that can make 'an impression of virtuality.'[33]

Hirschfeld wrote his treatise on gardens when ecstasies, senses and sentiments were permeating theories of the sublime and the picturesque. It was also the time when terms such as 'stage,' 'scene,' and 'scenery' were adopted by architectural discourse from garden theory, imbuing space with theatricality.[34] It was also in the context of the eighteenth-century's aesthetic debate about architecture that the notion of 'character' claimed attention, moving discourse from the merely allegorical or compositional aspects of the buildings towards the effects that built forms produced on the observer. By rendering architecture as a device for evoking feelings and emotions, space was suddenly charged with atmospheric potential.

Identified by Adrian Forty as 'probably the most enthusiastic exponent of "character"', Sir John Soane conceived his House-Museum at Lincoln's Inn Fields in London (1792-1837) as a collection of unfolding stage-sets of immersive spatiality, similar to that of the picturesque garden.[35] It was 'an almost infinite succession of [...] fanciful effects'—a 'spectacular theatre' activated to the greatest extent by glass and mirrors.[36] By the time that Soane was building his house, mirrors were indispensable elements of interior decoration, as well as the epitome of industrial advances. However, at Lincoln's Inn Fields, all kinds of looking glasses and mirrors—convex, flat or tinted, striped or panelled, situated on walls or in the ceiling, on the sides of the lanterns or doorways, window mullions, and jambs, furniture, or even in the fireplace—were more than a mere demonstration of trends and fashions (Figure 10). Mirrors and glass in Soane's House-Museum might be seen as both interior devices of the picturesque and modulators of environmental conditions. As hinted by the contemporary novelist Elizabeth Cleghorn Gaskell, mirrors and glass were used during the Victorian era 'to reflect the light, and answer the same purpose as water in a landscape.'[37]

In Soane's idiosyncratic way of thinking space, mirrors and glass constituted a complex system that splashed reflected light—both natural and artificial (the latter originally



Figures 10 and 11:
Sir John Soane, House-Museum, London. Convex mirrors. Photo © Author. Courtesy, The Trustees of Sir John Soane's Museum.

proceeding from candles and fires)—filling the space with sparkles and reflections and transporting brilliance even into the darkest recesses (Figure 11). Installed in the most unexpected places and angled in specific ways, they operated within the same logic of reflection that enabled the creation of the catoptric theatres as well as magic displays and proto-cinematographic devices of the period. They imbued space and objects with life and, together with coloured glass, as suggested by Jonathan Hill, became tools for interior 'weathering.'[38]

Analysing Soane's fascination with reflections, David Watkin traced connections with the interiors of Charles Percier and Pierre François Léonard Fontaine, which Soane visited in Paris in 1819, and whose *Recueil de décorations intérieures* (1801) provided inspirations for the use of mirrors that produced illusory effects of an endless sequence of spaces.[39] Yet, Soane's deployment of mirrors and glass not only expanded and confused spatial boundaries but also created intimacy. As Baudrillard asserted: 'The more mirrors there are, the more glorious is the intimacy of the room, albeit more turned in upon itself.'[40] Soane also increased the effect of intimacy by playing with scale. Some convex mirrors were only a few inches wide and drew the visitor into their microscopic realms. Here, the use of miniature convex mirrors suggests another analogy between Soane's house and the landscape. It could be seen as an allusion to the 'Claude Glass,' a lens for viewing scenery popular in the eighteenth century, which 'condensed' the landscape by rendering its reflection onto its often round, tinted, and slightly convex surface.[41]

Figure 12:
Sir John Soane, House-Museum, London. View to the Breakfast Room with a reflection of the Dome Area. Photo © Author. Courtesy, The Trustees of Sir John Soane’s Museum.

Nevertheless, such a comparison carries a certain contradiction. The Claude Glass was effectively a viewing instrument that embodied contemplative distance between the viewer and the object (the landscape)—it framed, manipulated and separated.[42] In opposition to the distancing nature of the Claude Glass, Soane’s use of mirrors aimed to ‘arrest attention,’ to involve the visitor, implying immersion and aesthetic engagement.[43]

Similar to a garden, Soane’s House-Museum was conceived as a place of peripatetic action. Once inside, the visitor wandered, glimpsing one space through another, discovering an almost infinite mirrored extension (Figure 12). Also, the constellations of mirrors created a sense of fragmentation within continuity. As noted by Gillian Darley, the produced effects were the ‘very opposite to those glittering rococo rooms of southern Italy, with their painted decoration on glass dissolving space

and turning walls into air.'[44] However, it is southern Italy and one of the earliest examples of the Sicilian Baroque that holds another key to Soane's use of tinted glass and mirrors. In April 1779, during his Grand Tour, Soane visited Villa Palagonia in Bagheria (1705-1749), having been intrigued by the description of that enchanted place in Patrick Brydone's *Tour through Sicily and Malta* (1775). Built in 1705 from designs by Tommaso Napoli for Don Ferdinando Gravina, Prince of Palagonia, the villa was transformed in 1749 by his eccentric grandson Francesco Ferdinando Gravina Agliata. Its interior was adorned with glass and mirrors, and the exterior with grotesque sculptures, gaining its fame as *Villa dei Mostri* (*The Villa of the Monsters*). Although Soane criticised its ornate decorations and opulent collections of objects—which one could provocatively suggest created a material assemblage and an impression of excess similar to that of his own house—he admired an unorthodox use of coloured glass and mirrors in its interiors. It was the great salon with its high arched kaleidoscopic ceiling entirely covered in mirrors that made a deep impact on Soane (Figure 13).

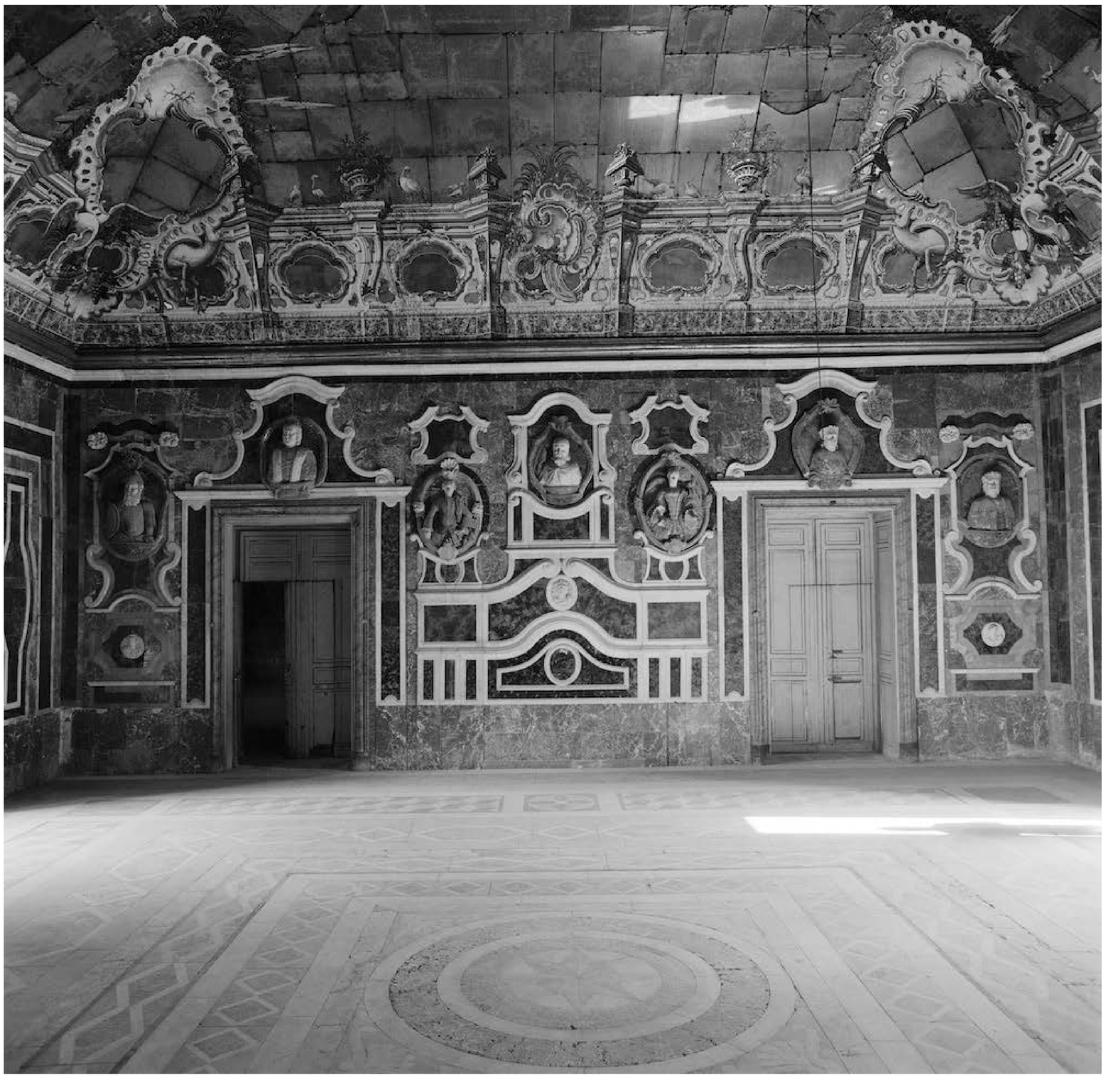


Figure 13:
Villa Palagonia, Bagheria, Italy (1715-1749). Photo © Ferdinando Scianna, Magnum Photos (1972) PAR435290.

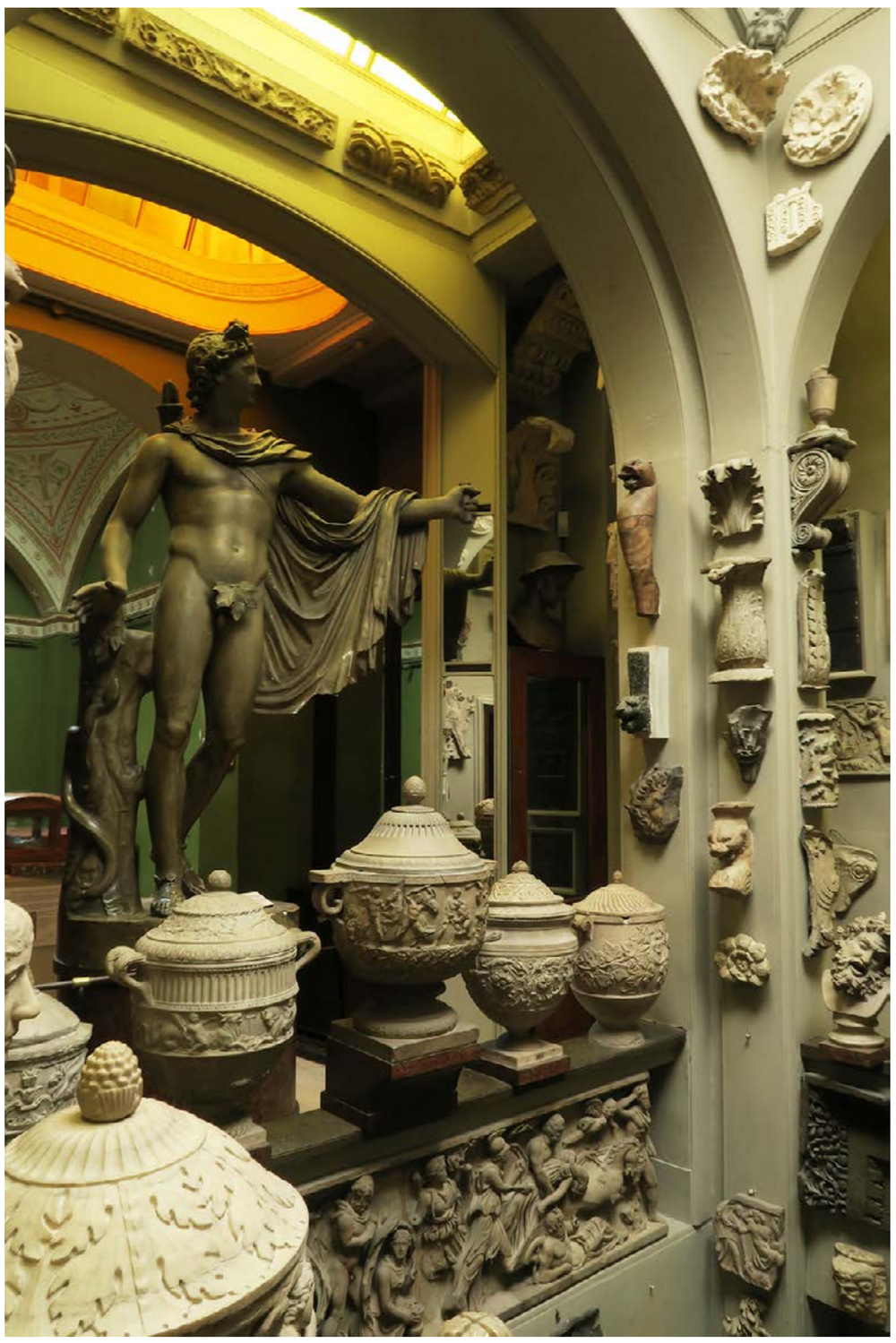


Figure 14:
Sir John Soane, House-Museum, London. Dome Area. Photo © Author. Courtesy, The Trustees of Sir John Soane’s Museum.

As Brydone noticed, it was a catoptric theatre:

> The effect that [mirrors] produce (as each of them makes a small angle with the other) is exactly that of multiplying glass; […] The windows […] are composed of a variety of glass of every different colour, mixed without any sort of order or regularity. Blue, red, green, yellow, purple, violet. — So that at each window, you may have the heavens and earth of whatever colour you chuse [sic], only by looking through the pane that pleases you.[45]

Soane certainly chose the color that pleased him. To evoke Mediterranean light, he bathed his inner garden in a ‘golden glow’ by inserting yellow and amber glass in both the windows and the skylights (Figure 14).[46] Animated by ‘the most exquisite hues’ and ‘magical effects,’ spaces and objects in Soane’s House-Museum coalesced into an immersive environment of labyrinthine and magnetic nature.[47]

trialectics of transparency: literal, phenomenal and *affective*

For Deleuze, effects are incorporeal entities that result from bodies, which affect each other, melt and interact. Following Deleuze, one also discovers that events not only occur at the surface, but they envelope like 'a film without volume'—'the faint incorporeal mist.'[48] This is a similar haze to that produced by Luther's *Concave Mirror Wall,* and to the one evoked by Vladimir Nabokov in the introductory lines to his novel *Transparent Things* (1971): 'A thin veneer of immediate reality [which] is spread over natural and artificial matter'—the film of paradoxes.[49]

'Paradoxical symmetries,' 'materialised dematerialisation,' and 'theatre of effects' are some of the tropes that frame discussions around the works of Ludwig Mies van der Rohe.[50] They encapsulate his concern for the contingent quality of spaces and materials and the performative character of glass. In 1921, Mies argued for new approaches in the use of glass, which were exemplified in his unbuilt design for the Friedrichstraße Glass Skyscraper in Berlin. It was a celebration of glass on an unprecedented scale. As Mies pointed out, his idiosyncratic use of glass did not aim to create 'an effect of light and shadow […] but a rich interplay of light reflections'—a fleeting appearance.[51] To achieve such an effect, Mies not only proposed an expressive silhouette of the building but also 'angled the respective façade fronts slightly towards each other to avoid the danger of an effect of lifelessness that often occurs when one employs large glass panels.'[52]

Surprisingly, in Mies's description one can find echoes of the catoptric interior of Villa Palagonia, as evoked in Susan Sontag's historical novel *The Volcano Lover* (1992). Describing the visit of Sir William Hamilton (and drawing heavily on Brydone's accounts), Sontag suggested that the multiplying and distorting effects produced by the 'canopy of broken mirrors' were 'preferable to the monotony that would result from covering so vast a room with unbroken expanses of glass.'[53]

A similar kaleidoscopic universe was achieved in Mies's buildings, not through actual fragmentation, but through juxtaposition of polished surfaces and glass panels, producing a restless oscillation and mutual reflection between them. Glass panels shift from transparency to reflection as they respond to light conditions, both blurring boundaries and constituting a canvas for objects, people, and surroundings reflected in them. In Mies's New National Gallery in Berlin (1962-1968), glass acquires a quasi de-familiarizing role in relation to its surroundings, by means of the interplay between the transparent and the reflective, the actual and the illusory, the seen and the unseen (Figures 15 and 16).

Figures 15 and 16:
Ludwig Mies van der Rohe, New National Gallery, Berlin. Illusory reflections. Photo © Author. Courtesy, Nationalgalerie Staatliche Museen zu Berlin.

In a similar vein, Josep Quetglas identified The German Pavilion (1929)—designed by Mies with Lilly Reich for the Barcelona International Exhibition—with ‘The Palace of Reflections’ that trapped the visitor in a ‘forest of intertwined images.’[54] Although space remained physically immobile, it moved with the visitor, who, on entering the pavilion, was suspended between layers of reflections—the effect captured so brilliantly by Robin Evans in the photograph of its reconstruction (1986) (Figure 17).

Through reflection, a thin surface of glass loses its two-dimensional condition and is imbued with an endless depth. The reflection has also an uncontrollable force and shifts attention to the other side of the glass, drawing in a direction that one actually cannot follow. A kind of ‘osmotic effect’ which Rainer Maria Rilke noticed in mirrors and which Quetglas built upon while analysing The German Pavilion.[55] Similarly, in a detailed study of glass in the context of the Victorian era and the Crystal Palace designed by Joseph Paxton and Charles Fox for the 1851 Great Exhibition in London, Isobel Armstrong identified glass as both a medium and a barrier of a ‘pellucid transitivity’ that ‘represents at the same time the first gradation of opacity.’[56] It was this pellucid transitivity that created a spectral image of the Crystal Palace. In Mies’s

Figure 17:
Robin Evans’ reflection in the glass of the Barcelona Pavilion – Reconstruction (1986). Photo © Robin Evans, Architectural Association Archives, London.

works, glass also acted as both a medium and a barrier, acquiring a seemingly opaque density through reflections, as if negating its transparency. It bears instead a certain resemblance to a mist or steam, which change their density in response to the environment—revealing and hiding the interior as well as enveloping the visitor in a film of paradoxes.

As the title of the seminal essays on ‘Transparency: Literal and Phenomenal’ (1963, 1971) suggests, Colin Rowe and Robert Slutzky distinguished between two types of transparency that, to some extent, correspond to what Sol LeWitt contrasted as ‘perceptual’ vs ‘conceptual.’[57] Accordingly, the perceptual and the literal are associated with the visible—the physical condition. In contrast, the conceptual and the phenomenal are attributed rather to the ideated—the understanding of the process and spatial logic. While the former is related to the explicit, the latter opens up

the possibility of multiple spatial readings and manifestations of the hidden. However, such a distinction is questionable. Not only does it operate within the mind/body dichotomy, but also consigns both literal and phenomenal transparency primarily to the engagement of the eye—the sense of vision (seeing vs reading), excluding other experiences to which they give rise. However, while advancing in our journey, it has become evident that literal transparency no longer seems to be so explicit. It traps the viewer in multiplicities of meanings and ambiguities of reflections.

'[T]he eye travels up and down,' wrote Rowe and Slutzky, scanning either the surface or space in order to unravel its composition or organisation.[58] Following Henri Lefebvre who stressed 'the destructive (because reductive) effects of the predominance of the readable and visible,' one could ascribe a deprivation of any physical and sensorial consistency to Rowe's and Slutzky's literal and phenomenal transparency.[59] For Lefebvre, who, examines mirrors and reflections not only in a variety of symbolic contexts, but also in proper spatial settings, reflection entails bodily encounters, structuring a dialectical engagement between the subject and the material world.[60] Paradoxically, even the act of 'scanning,' which was presented by Rowe and Slutzky as a merely mental activity, might be associated with a fully embodied experience.

In 'Prolegomena to a Psychology of Architecture' (1886), Heinrich Wölfflin, whose notion of mood is often considered as a precursor of atmosphere, critically asserted that 'the architectural impression, far from being some kind of "reckoning by the eye," was essentially based on a direct bodily feeling.'[61] Similarly, Bergson stated that there was 'nothing more in the visual perception of the order of things in space than a suggestion of tactile perception.'[62] Following such a logic, Jonathan Crary's observations on the paintings of Jean-Baptiste-Siméon Chardin can be illustrative here, as they represented 'the eighteenth-century preoccupation with ensuring transparency over opacity.'[63] Analysing Chardin's *Boy Blowing Bubbles* from around 1734, in which opaque liquid is transformed into a transparent soap bubble, Crary identified 'the flickering heaviness of the atmosphere' in Chardin's work with 'a medium in which vision performs like the sense of touch, passing through space of which no fraction is empty.'[64] As suggested by Crary, it is the coidentity of idea and matter and the inextricable relation between the optical and the tactile that constitute an embodied knowledge. Thus, regardless of whether referring to literal or phenomenal transparency, everything 'contains, after its kind, an invitation to act,' as Bergson emphasised, sending to our body, 'as would a mirror, its eventual influence.'[65]

We might say, then, that glass, with its shifting qualities (transparency, reflection and refraction) and performance (absorption, mirroring, distortion), embodies a haptic dynamic, since space is constantly negotiated on its three-dimensional surface, defining spatial choreographies in an inextricable relation to the topography of the body. It was with such a performative and affective character in mind that Stan Allen identified

Mies's work with the 'theatre of effects,' which, like Hirschfeld's 'pleasant spectacle' and Soane's 'spectacular theatre,' transcended the realm of the visible through its invitation to movement and interaction. What all these theatrical associations bring to the fore is the creation of an apparatus that activates an immersive condition. It is the atmosphere.

magic of materials

There is, however, one more paradox in Rowe and Slutzky's classification of transparency. Whereas they associate literal transparency with buildings such as the aforementioned Crystal Palace, the contemporary accounts presented it as 'perhaps the only building in the world in which atmosphere [was] perceptible,' emphasising its 'fairy-like brilliancy' and 'haze.'[66] In 1941, Sigfried Giedion compared the Crystal Palace with the airy atmosphere of *Simplon Pass*, from around 1848, by the Romantic painter J.M.W. Turner (a friend of Soane), who is widely known for his expression 'atmosphere is my style.'[67] Giedion noted that the 'insubstantial and hovering effect' recognisable in Turner's painting also occurred in the Crystal Palace, but 'through the agency of the transparent glass surfaces and iron structural members.'[68] In a similar vein, in 1907, Alfred Gotthold Meyer found 'the sensuous perception' of the Crystal Palace in earlier precedents such as the Versailles Hall of Mirrors (1684).[69] Demarcated by glass surfaces dissolved in lustre, like other catoptric theatres, they merged interior and exterior, confusing the orthodox experience of interiority.

Although from diverse eras, the above examples indicate the recurring fascination for the immersive power of glass and mirrors, suggesting a material pre-history to the contemporary concerns for atmosphere and its production. They represent not only the mediation of materiality in the making of atmosphere, but also the shift of emphasis away from materiality as a merely tectonic or expressive medium, towards matter as an activator and catalyst of effects and experiences. Through its constant *becoming*—its potential for transformation, its causal interaction and magnetic power—the material world is key to atmospheric staging. Accordingly, Böhme refers to the *magic* embedded in materials that establish sets of relations and signs, conjure up a notion of involvement, beckon our sensorium, and incite responsive patterns of behaviour.[70] This association expands the spectrum of material attributes towards atmospheric qualities, which are not fixed, but relational and processual. It develops intensities—ones that make Alice jump up on to the mantelpiece to explore a not necessarily alternative world…

acknowledgements

This paper is rooted in my fascination with glass and mirrors, expanding on ideas discussed in the fourth chapter of my PhD thesis entitled ‘Active Materiality. The Agency of Matter from the Phenomenological Perspective’ (ETSAM UPM 2016).

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notes

01 Walter Benjamin, 'Mirrors,' in *The Arcades Project*, ed. Rolf Tiedemann, trans. Howard Eiland and Kevin McLaughlin (New York: Harvard University Press, 2002), 542.

02 See: Jacques Lacan, 'The Mirror Stage as a Formative of the I Function as Revealed in Psychoanalytic Experience,' in *Écrits: The First Complete Edition in English*, trans. Bruce Fink, Héloïse Fink and Russel Grigg (New York, London: W. W. Norton & Company, 2006), 75–81.

03 For Cocteau the mirror plays an important role in his writings and his cinematographic works. I refer here to the film *Le Sang d'un Poète (The Blood of a Poet)* (1930).

04 Benjamin, 'Mirrors,' 542.

05 Umberto Eco, 'Mirrors,' in *Semiotics and the Philosophy of Language* by Umberto Eco (Bloomington: Indiana University Press, 1986), 220.

06 Eco, 'Mirrors,' 208, 210.

07 Jean Baudrillard, *The System of Objects*, trans. James Benedict (London, New York: Verso, 1996), 41.

08 See, for instance: Gernot Böhme, 'Atmosphere as the Subject Matter of Architecture,' in *Herzog & de Meuron. Natural History*, ed. Philip Ursprung (Zurich: Canadian Center for Architecture and Lars Müller Publishers, 2005), 388–406.

09 Athanasius Kircher, *Ars magna Lucis et Umbræ in decem libros digesta, etc*. (Rome: Sumptibus Hermanni Scheus, Ex Typographia Ludovici Grignani, 1646).

10 See, for instance: Joscelyn Godwin, *Athanasius Kircher's Theatre of the World* (London: Thames & Hudson, 2009), 191–214.

11 Frances Terpak, 'Mirrors' in *Devices of Wonder: From the World in a Box to Images on a Screen*, eds. Barbara Maria Stafford and Frances Terpak (Los Angeles: The Getty Research Institute, 2001), 261.

12 For accounts of the reactions of the astonished visitors trying to catch reflected object see: Godwin, '*Athanasius Kircher's Theatre*,' 210.

13 See: John Glassie, *Man of Misconceptions: The Life of an Eccentric in an Age of Change* (London: Penguin Books, Riverhead, 2012), 115.

14 Otto Friedrich Bollnow, *Human Space*, ed. Joseph Kohlmaier, trans. Christine Shuttleworth (London: Hyphen Press, 2011), 86.

15 '*Raumgestaltung mit der zauberhaften Spiegelung des Glases,*' original brochure courtesy of Werner Ruhnau Archive.

16 Joachim Krausse, 'The Stage as a Construction-Site Laboratory for Transformations of Body, Space and Movement,' in *Human Space-machine. Stage Experiments at The Bauhaus*, eds. Torsten Blume, Christian Hiller and Bauhaus Dessau Foundation (Edition Bauhaus, (2008, 2014), 44.

17 László Moholy-Nagy, 'Light Architecture,' in *Moholy-Nagy. Documentary Monographs in Modern Art*, ed. Richard Kostelanetz (New York, Washington: Praeger Publishers, 1970), 155.

18 László Moholy-Nagy and Alfred Kemeny, 'Dynamic-Constructive Energy-System' in *Moholy-Nagy. Documentary Monographs in Modern Art*, ed. Richard Kostelanetz (New York, Washington: Praeger Publishers, 1970), 29.

19 Otto Piene, 'Paths to Paradise,' in *Theories and Documents of Contemporary Art. A Sourcebook of Artist's Writings*, eds. Kristine Stiles and Peter Selz (Berkeley, Los Angeles, London: University of California Press, 2012), 477.

20 Magdalena Broska, *Adolf Luther und seine Sammlung. Eine Kunst außerhalb des Bildes.../ Adolf Luther and his Collection. An Art Outside the Picture*, trans. Stephen Reader (Krefeld: Adolf-Luther-Stiftung, 1993), 6.

21 Adolf Luther, quoted in Broska, *Adolf Luther*, 24.

22 Magdalena Broska, *Adolf Luther. The Fascination of Light* (Athens: Museum Herakleidon, 2007), 'Architecture and Integration,' para. 4. The term 'materialised dematerialisation' is borrowed from Kenneth Frampton, who used it in the context of Ludwig Mies van der Rohe's work, which will be discussed on the subsequent pages. Kenneth Frampton, 'Modernidad y Tradición en la Obra de Mies van der Rohe,' *Arquitectura Viva Monografías* (AV), no. 6 (May-June 1986): 6.

23 Umberto Boccioni, 'The Plastic Foundations of Futurist Sculpture and Painting,' in *Futurism. An Anthology*, eds. Lawrence Rainey, Christine Poggi and Laura Wittman (New Haven, Connecticut: Yale University Press, 2009), 140.

24 Boccioni, 'The Plastic Foundations,' 140.

25 Germano Celant, *Ambiente/ Arte. Dal Futurismo Alla Body Art* (Venezia: Edizioni La Biennale de Venezia, 1977), 8.

26 Klaus Honnef, 'Adolf Luther's Centenary' in *Adolf Luther. A Remarkable Career as an Artist*, by Magdalena Broska (Krefeld: Adolf-Luther-Stiftung, Pagina Verlag GmbH, 2013), 60.

27 Lewis Carroll, *Through the Looking-Glass and What Alice Found There* (Mineola, New York: Dover Publications INC, 1999), 4–5. Emphasis in original.

28 Gilles Deleuze, *The Logic of Sense*, trans. Mark Lester and Charles Stivale (London: Continuum, 2004), 3–4.

29 Henri Bergson, *Matter and Memory*, trans. Paul Nancy Margaret and Palmer W. Scott (London, New York: George Allen & Unwin Ltd, The Macmillan Co., 1929), 177–178.

30 See, for instance: Gernot Böhme, 'Atmosphere as the Fundamental Concept of a New Aesthetics,' *Thesis Eleven*, no. 3 (1993): 113–26.

31 Christian Cay Lorenz Hirschfeld, *Theory of Garden Art*, ed. and trans. Linda B. Parshall (Philadelphia: University of Pennsylvania Press, 2001), 184.

32 Hirschfeld, *Theory*, 101, 415.

33 Jean Baudrillard and Jean Nouvel, *The Singular Objects in Architecture*, trans. Roberto Bononno (Minneapolis: University of Minnesota Press, 2002), 10. See also: Eco, 'Mirrors,' 226.

34 For the influence of the garden theories and sensationalist philosophy on the late-eighteenth-century theory of architecture, see: Robin Middleton, 'Introduction,' in *The Genius of Architecture, or, The Analogy of That Art with our Sensations*, by Nicolas Le Camus de Mézières, trans. David Britt, (Los Angeles: The Getty Research Institute, 1992), 17–64.

35 Adrian Forty, *Words and Buildings. A Vocabulary of Modern Architecture* (Thames & Hudson, 2000), 125. For the analogy of Soane's House to the garden see: Jonathan Hill, *Weather Architecture* (London, New York: Routledge, 2012), 142-146.

36 Sir John Soane, *Description of the House and Museum on the North Side of Lincoln's-Inn-Fields, the Residence of John Soane* (London: Printed by James Moyes Took's Court, Chancery Lane, 1830), Emphasis in original. See: Helene Furján, *Glorious Visions: John Soane's Spectacular Theater* (London, New York: Routledge, 2011).

37 Elizabeth Gaskell, *North and South* (Wordsworth Editions, 2002), 74. Interestingly, Hirschfeld made a similar observation: 'Water is in a landscape what mirrors are in a building or eyes in the body,' Hirschfeld, Theory, 180.

38 Hill, *Weather Architecture*, 145.

39 David Watkin, *John Soane* (London, New York: Academy Editions, St. Martin's Press, 1983), 46.

40 Baudrillard, *The System of Objects,* 23.

41 See: Hill, Weather Architecture, 145; Gillian Darley, *John Soane An Accidental Romantic* (New Haven, London: Yale University Press, 1999), 156.

42 For such an interpretation of the Claude Glass, see, for instance: Arnold Berleant, *Aesthetics Beyond the Arts. New and Recent essays* (England: Ashgate, 2012), 6.

43 Soane, *Description,* 6.

44 Darley, *John Soane*, 306.

45 Patrick Brydone, *A Tour through Sicily and Malta. In a Series of Letters to William Beckford, Esq. of Somerly in Suffolk from P. Brydone, F.R.S.* (London: printed for W. Strahan and T. Cadell, in 2 volumes, 1975), Volume 2, 97–99.

46 Hill, *Weather Architecture*, 145.

47 Sir John Soane, *Description of the House and Museum on the North Side of Lincoln's Inn Fields, the Residence of Sir John Soane* (London: Printed by Lavey, Robson, and Franklyn, St. Martin's Lane. Not published. Only one hundred and fifty copies printed, 1835-1836), 44.

48 Deleuze, *The Logic of Sense,* 12.

49 Vladimir Nabokov, *Transparent Things* (New York: Vintage International, 1989), 2.

50 See: Robin Evans, 'Mies van der Rohe's Paradoxical Symmetries,' in *Translations from Drawing to Building and Other Essays* (London: Architectural Association, 1997), 233-276; Frampton, 'Modernidad y Tradición,' 6; Stan Allen, 'Theater of Effects: The New National Gallery Berlin,' in *Practice: Architecture, Technique + Representation* (New York: Routledge, 2009), 96–115.

51 Ludwig Mies van der Rohe, 'Skyscrapers' in *The Artless Word: Mies van der Rohe on the Building Art*, by Fritz Neumayer, trans. Mark Jarzombek (Massachusetts: MIT Press, 1991), 240.

52 van der Rohe, 'Skyscrapers,' 240.

53 Susan Sontag, *The Volcano Lover* (New York: Picador, 2004), 251.

54 Josep Quetglas, *Fear of Glass. Mies van der Rohe's Pavilion in Barcelona* (Basel, Boston, Berlin: Birkhäuser, 2001), 15, 101.

55 Quetglas, *Fear of Glass,* 101, 127.

56 Isobel Armstrong, *Victorian Glassworlds. Glass Culture and the Imagination 1830–1880* (Oxford, New York: Oxford University Press, 2008), 7.

57 Colin Rowe and Robert Slutzky, 'Transparency: Literal and Phenomenal,' *Perspecta The Yale Architectural Journal* 8 (1963): 45-54; Colin Rowe and Robert Slutzky, 'Transparency: Literal and Phenomenal. Part II,' *Perspecta The Yale Architectural Journal* 13/14 (1971): 287-301; Sol LeWitt, 'Paragraphs on Conceptual Art,' in *Theories and Documents of Contemporary Art. A Sourcebook of Artist's Writings*, eds. Kristine Stiles and Peter Selz (Berkeley, Los Angeles, London: University of California Press, 2012), 987-992.

58 Rowe and Slutzky, 'Transparency' (1971), 295.

59 Henri Lefebvre, *The Production of Space,* trans. Donald Nicholson-Smith (Oxford: Blackwell Publishers Ltd. 1991), 146.

60 Lefebvre, *The Production,* 181–188.

61 Heinrich Wölfflin, 'Prolegomena to a Psychology of Architecture,' in *Empathy, Form, and Space: Problems in German Aesthetics*, 1873-1893, eds. Harry Francis Mallgrave and Eleftherios Ikonomou (Santa Monica: The Getty Center For The History of Art and the Humanities, 1994), 155.

62 Bergson, *Matter,* 294.

63 Jonathan Crary, *Techniques of the Observer. On Vision and Modernity in the Nineteenth Century* (Cambridge, Massachusetts, London: MIT Press, 1992), 64.

64 Crary, *Techniques,* 64.

65 Bergson, *Matter,* 2, 7.

66 Merrifield Mary Philadelphia, 'Essay on the Harmony and Contrast of Colours as Exemplified in the Exhibition,' *The Art Journal Illustrated Catalogue: The Industry of All Nations* (London, George Virtue, 1851), I++-VIII++: II++. Emphasis in original. These epithets appeared in *Chamber's Edinburgh Journal* from 1 March 1851 and *Ecclesiologist* from 1851. See: Armstrong, Victorian Glassworlds, 152–153. Quoted in Peter Zumthor, *Atmospheres. Architectural Environments. Surrounding Objects* (Basel, Birkhäuser Verlag, 2006), 5.

67 Quoted in Peter Zumthor, *Atmospheres. Architectural Environments. Surrounding Objects* (Basel: Birkhäuser Verlag, 2006), 5.

68 Sigfried Giedion, *Space, Time and Architecture: The Growth of a New Tradition* (New York, Harvard University Press, 1982) 254.

69 Quoted in Benjamin, *The Arcades*, 541.

70 Gernot Böhme, 'Staged materiality,' *Magic of Materials, Daidalos* 56 (June 1995): 36-43.