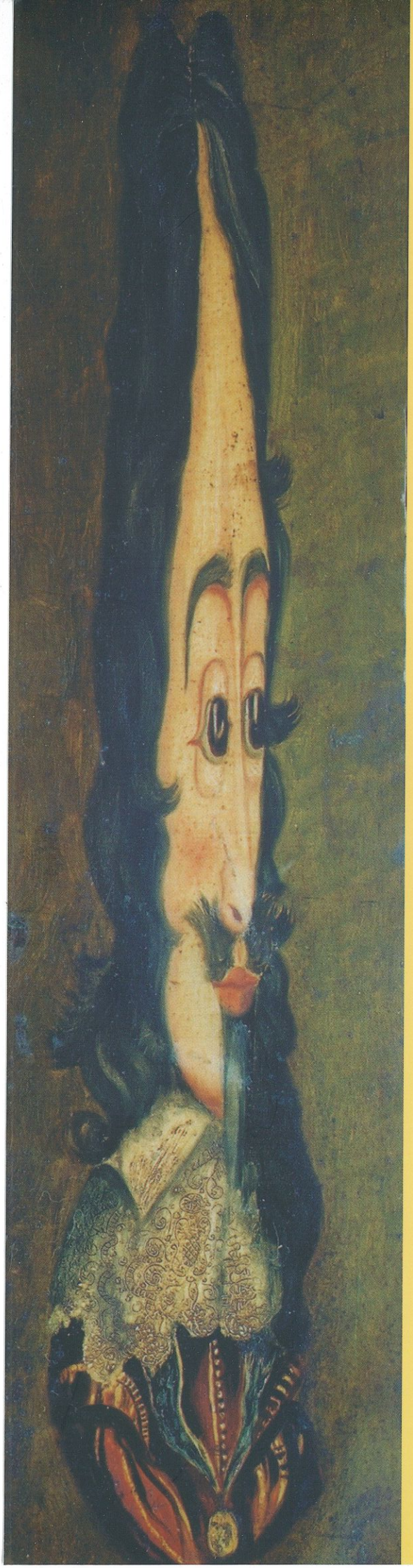

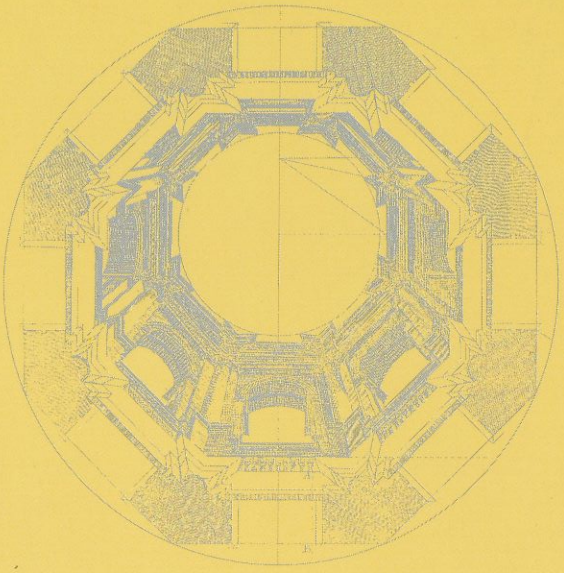

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BAROCK-BERICHTE

IN VENETIA, appreſſo Giordano Ziletti.
M. D. LXIX.

fig. 1: Silvio Belli; Libro del Misurar con la Vista. Venedig 1570, woodcut, p. 134S

Timothy Druckrey

Oscillating Interfaces: From Peep Vision to Phantasmagoric Spectacle...

"Seeing is never a mere reception; it anticipates and projects... As the eye became more estranged and critical, it successively questioned the iconographic value, then the pictorial image, and finally visual perspective itself."

Donald Lowe: History of Bourgeois Perception[1]

I.

An oscillating and reciprocal relationship between seeing and memory, illusion and 'reality', experience and spectacle, mobility and stasis, pervades the histories of the apparatus. In nearly all its incarnations, the apparatus has intervened – mediated – between senses and systems. The geometrical configurations of perspective, the optical regime of the lens, the systemization, then automation, of reproducibility, the joining of the visible and the knowable were readily integrated within the epistemologies of both science and communication. The "rationalization of space" (in Ivins' phrase) was not merely a staging of rationality for progressive pictorial space, architectural form, or the logistics of city planning, it is a rupture that reconceptualized the relationship with experience and observation and that altered our relationship with the sensible and the material. Indeed paralleling the investigations of the spatialization of time was an emerging temporalization of space. Joining the visual and temporal was a crucial component in the imaginary of both the culture of enlightenment and, particularly, in the development of the pre-cinema. How these representational systems framed the modern era is an intricate chronicle of occultism and entertainment, enlightenment and secularization, research and showmanship, causality and evidence, narrative and spectacle, magic and illusion, difference and repetition.

The innumerable apparatuses that form the history of physics, electricity, astronomy, medicine, measurement, communication, visibility, etc., resonate with implications for any reasoned approach to a contemporary culture still captivated by sensory immersion and perceptual, now cognitive, research. In this sense, the shift from the magic lantern, peep show, panorama, phantasma-

fig. 2: „Von denen Ursachen aus welchen so wunderbarliche Dinge und Würckungen in der Natur entstehen", in: Giovanni Baptista della Porta; Magia Naturalis, Nürnberg 1713, 1. Buch, p. 2

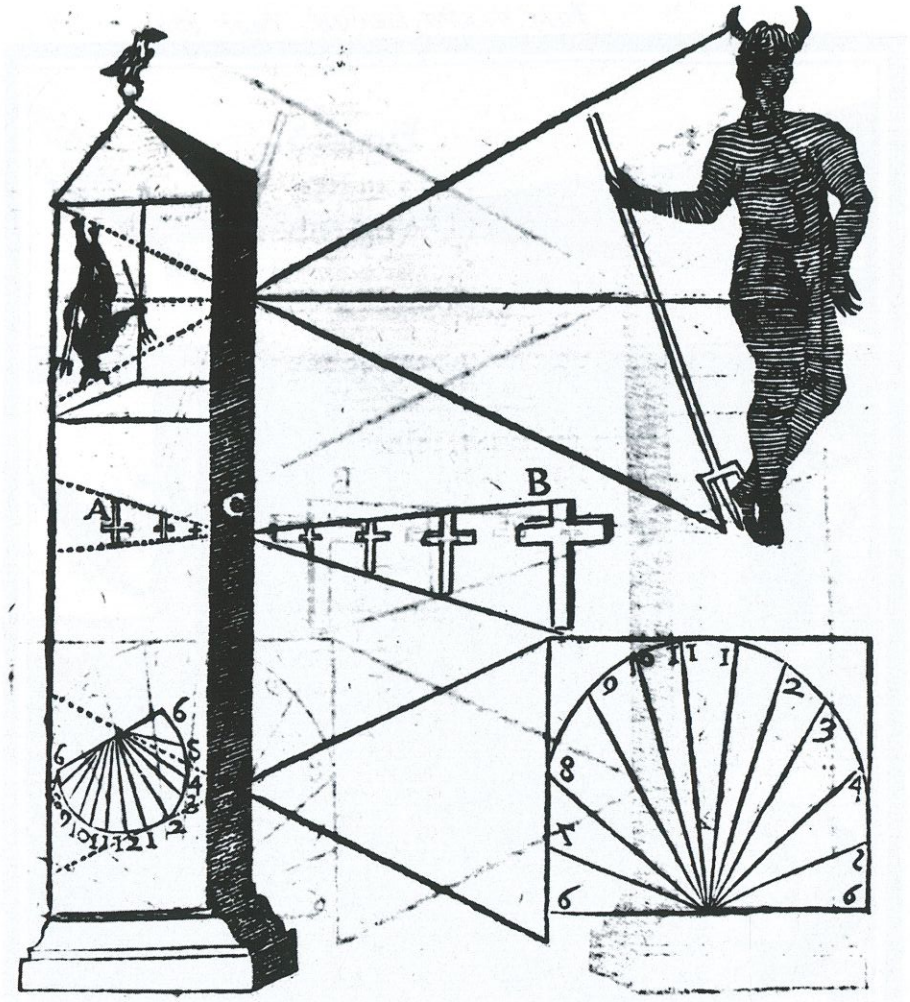

fig. 3 (right): Camera Obscura, in: Athanasius Kircher; Ars Magna Lucis et Umbrae. Rom 1646, p. 129

goria, zoetrope, kinetoscope (to choose only a minute selection), to photography, "gramophone, film, typewriter" (in Kittler's formulation), to electron microscopes, PET or MRI scanners, or even computer animation, are the groundwork for a penetration of the sites, events and the imaginary of an impenetrable 'real' only approximated or hinted at by reproduction or simulation. Rather than merely capturing or recording, these technologies have expanded visibility (and its expressions) through the perceptible toward the speculative and the virtual. They also radically reshaped, externalized, and encoded memory in ways both distinctly related to its historical 'palaces' (memory, illusory, perspective, theatrical) and set a trajectory of the archive and the database. Yet with all this seeming continuity, the punctuated evolution of the apparatus (and its effects) is still unraveling. Its 'archaeology' (or in Siegfried Zielinski's 'an-archaeology') is only slowly being deciphered, its many associations suggesting a scope hitherto unimagined, its effects marked by profound oscillations between credulity and doubt, between fascination and obsession.
"Every instrument", wrote Norbert Wiener in 1948, "... is a possible sense organ." Neither exaggeration nor revelation, Wiener's comment is a realization of the on-going interface between machines and humans. They perform and extend the senses (even in McLuhan's sense), expand the perceptual field, and propose forms of representation that link observer and observed in a reciprocal discourse. This kind of *subjectivization of observation* clearly has many roots and particularly is related to the kinds of machines that characterize the past several centuries: imitation machines, seeing machines, recording machines, inscription machines, calculating machines, computing machines, substitution machines... But within this technical history, these machines were employed in a wide array of practices that joined technology, culture, and subject in dizzying combinations of enlightenment engineering evoking awe, fear, and scientific instruction, in image 'theatres' employing (and creating) multifarious magical (later 'special') effects with subjects ranging from surrogate travel to séances and from demonic theatre to theatrical journalism.

These 'theatres' reframed the static, privileged, iconocentric image of the world, shattering a relationship with representation that was itself drifting from religious pedagogy to scientific rationality while continuing to invoke otherworldliness and 'natural magic.'

'Otherworldliness' was powerfully metaphorized in Baroque illusions. Norman Klein uses the metaphor of "scripted spaces" as an entry point into the history of these unique effects in his wide-ranging book *The Vatican to Vegas: A History of Special Effects*. "The scripting of illusions" characterizes for Klein architecture "from 1550 to 1780, then on toward cinema and amusement parks, and finally, to our era, when both architecture and film coexist inside the same moment. By decoding scripted space, we learn how power was brokered between the classes in the form of special effects."[2] He continues:
Within these scripted spaces are slender epiphanies, like the instant when you glance up at Mantegna's ceiling of 1470. They are a scripted phenomenology, where the shock that is a 'special' effect can be very, very brief - brief yet scrupulously designed: ... three acts in a few seconds. During the Baroque, these few seconds were often called "moments of wonder".[3]
'Natural magic' is a cross between philosophical exploration (including its occult aspects) and material science. It is here that

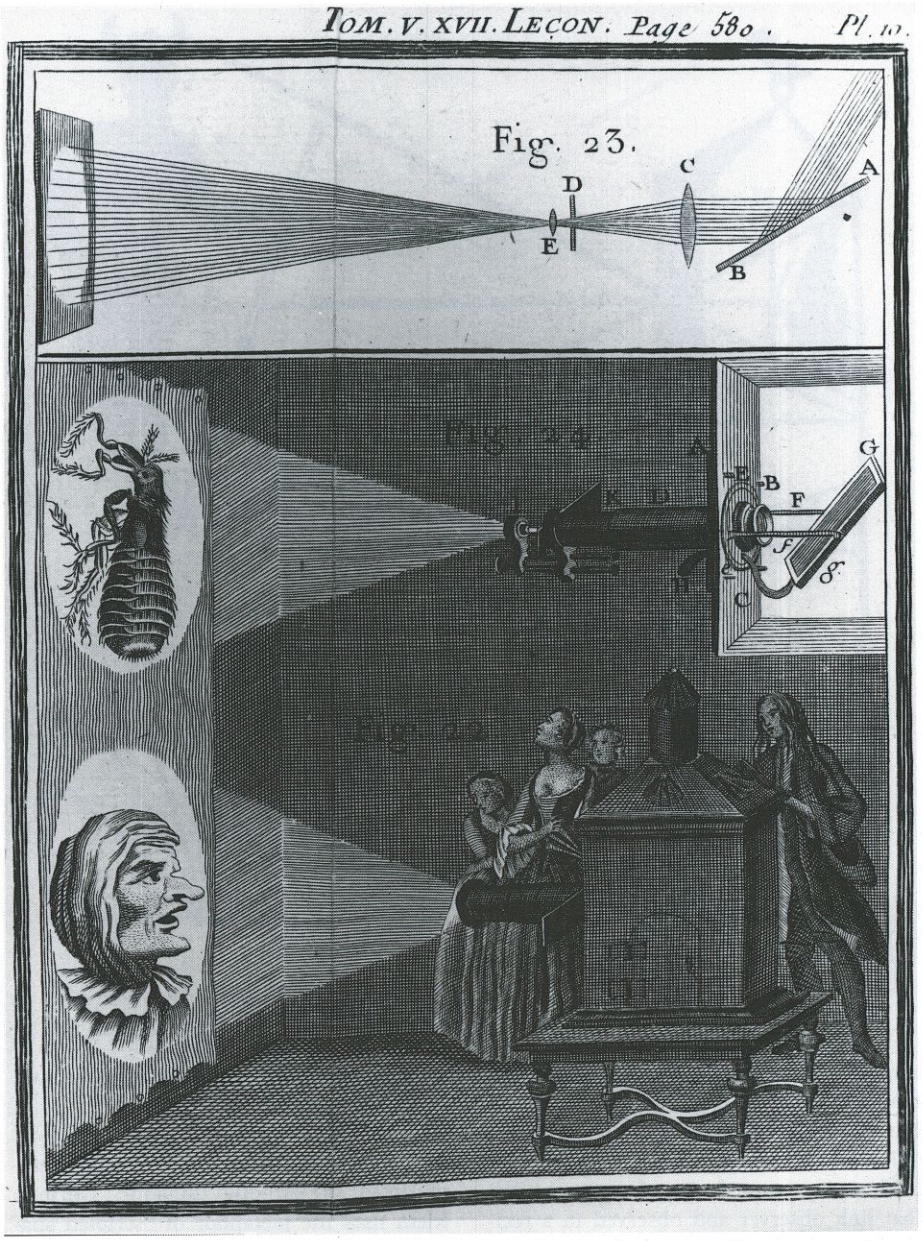

fig. 4: Jean Antoine Nollet; Leçons de Physique expérimentale, Paris 1755, tom. 5, p. 580, pl. 10

the early investigations into optics, cameras and magic lanterns appear. The encroachment of the apparatus was to play a continuing role in the dissemination of the new sciences. Increasingly observational, they were to be rooted in a refunctioned form of visibility that substituted the apparatus as an interlocutor mediating 'realities', an *interface* into a booming visible sphere at once baffling and hypnotic. A secularized-scientized-gaze was supplanting a credulous one that oscillated between faith and certainty, mystery and revelation.

These two forms of illusion correspond to what Henri Lefebvre identifies, in *The Production of Space*, as "the double illusion" characterized by 'the illusion of transparency' and the 'realistic illusion': He delineates them:

Illusion of Transparency:
Here space appears as luminous, as intelligible, as giving action free reign. What happens in space lends a miraculous quality to thought, which becomes incarnate by means of a design... The illusion of space serves as a mediator – itself of great fidelity – between mental activity (invention) and social activity (realization) ... Anything hidden or dissimulated – and hence dangerous – is antagonistic to transparency, under whose reign everything can be taken in by a single glance from that mental eye which illuminates whatever it contemplates."
The Realistic Illusion:
This is the illusion of mental simplicity – the product of a na¨ve attitude long ago rejected by philosophers and theorists of language, on various grounds and under various names, but chiefly because of its appeal to naturalness, to substantiality.[4]
Lefebvre completes the thought in this way: "The illusion of transparency has a kinship with philosophical idealism; the realistic illusion is closer to (naturalistic and mechanistic) materialism."
There's little doubt that the linked development of the microscope, the telescope and the camera (and its implied reversal as projector) provided pivot points for both the history of science and for a culture whose metaphysics where shifting from the purely theological to the mundanely epistemological. In this, the new optical instrument played a duplicitous role as harbinger and death-knell, it conjured visibilities of extraordinary 'worlds' (microscopic, macroscopic, and anthroscopic) as it ended a representational regime rooted in faltering hierarchies that could hardly be contained.
The visual world was exploding and imploding, it was no longer to be the realm of privilege, obscurity, or authority, it was to absorb a public soon to be inebriated by images (in many forms), by modes of mobility (including the mobile gaze), and was to participate in the founding of communicative spheres that continue to reverberate.

As Lorraine Daston and Katherine Park write: *... the implicit analogy was psychological: the marvels of prenatural philosophy, like the excesses of enthusiasm and superstition, provoked wonder, and could therefore be manipulated to instill that particular and peculiarly destructive form of fear linked with the demonic or the divine ... For the prenatural philosophers of the sixteenth and early-seventeenth centuries, the imagination could produce genuine marvels – apparitions, monsters, sudden cures – ... By the early decades of the eighteenth century, however, the powers of the imagination had contracted to the mind and, among the highly susceptible, the body of individuals.*[5]

This subjectivized system – within the technical imperatives of a growing 'mechanization of the world picture' – formed the crux of a new cognition, one that expanded the perceptual horizon beyond the tactile, the imperceptible, the remote, the spectacular. This materialized imaginary – the 'double illusion', for better or worse, set in motion a vast enterprise for illusions and the triumph of an ideology of the apparatus that persists. It was all inclusive and would transform visibility into both spectacle and virtuality. As Norman Klein suggests, "baroque special effects are architectonic scripted spaces where optics, sculpture, theatre, mathematics, shipping operate like mixed media, where the charm of Artifice exceeds the harmonies of nature itself."[6]

II.

The views, even the scripts, those few that exist, cannot recreate the shows, for the shows were dependent on the showmen and their abilities as storytellers. Could they conjure up an image and make it more powerful than reality, could they free the imagination and let it wander, could they tempt one, even momentarily, to cast aside one's own world and take a glimpse of something grand or frightening, real or fanciful? Could they cast a spell, create an illusion? The box was the backdrop for the storyteller rather than the other way around.[7]

...glow-worms are Nature's own Chinese lanterns: phantasmagoria comes into being when, under the constraints of its own limitations, modernity's latest products come close to the archaic. Every step forwards is at the same time a step into the remote past. As bourgeois society advances it finds that it needs its own camouflage of illusion simply in order to subsist. For only when so disguised does it venture to look the new in the face. That formula, 'it sounded so old, and yet was so new', is the cipher of a social conjecture.[8]

From the early 17th century, the investigation of the broad significance of empiricism was joined with a range of optical apparatuses, visual metaphors, researches into the materiality of light, and the physiology of perception. Indeed the proliferation and network of figures engaged in these investigations (from Athanasius Kircher to Réné Descartes, Ruggiero Giuseppe Boscovich to Galileo Galilei, Christiaan Huygens to Isaac Newton, Giovanni Battista della Porta to Antoni von Leeuwenhoek) approached the visibility of the world as a scientific and philosophical challenge and that would attempt to calibrate (or recalibrate) theology and instrumental inquiry. Even with profound reverberations in the sciences, the assimilation of the apparatus into the arts ran parallel with the episodic pictorializations of biblical narratives, the secularization of literacy (after Gutenberg), and the mechanization of reproducibility in the graphic arts. Typically associated with the use of optical instruments as aids for artists (as in Albrecht Dürer or later Jan Vermeer), the apparatus was less conceptualized as an 'autonomous' machine than as a mere tool. This history limited (or disregarded) the evolution of the optical device as both precursor (of photography and eventually cinema) and as an independent system for distinct forms of representation.

In this sense, the so-called 'pre-cinema' could suggest that these devices simply provide the failed traces leading toward the inevitable cinematograph rather than a substantive series of stages in which representation (and vision itself) was reconceptualized, animated, projec-

fig. 5: „Le Théatre chez soi par le Téléphonoscope" – Vision des Bildtelefons, in: Albert Robida; Le Vingtième Siècle. Georges Decaux (Hrsg.), Paris 1883, p. 56

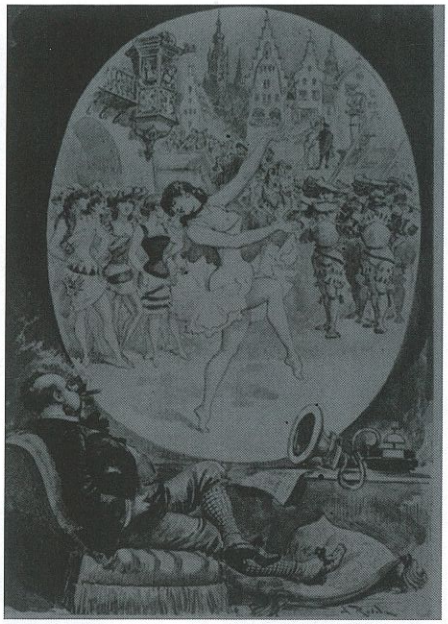

fig. 6 (below):
Etienne Gaspard Robertson, Mémoires récréatives scientifiques et anecdotiques, Paris 1831. Frontispiece

fig. 7: Joannes Pook; Rommel-Zoodjen, Amsterdam 1709. Harlequin with peep-box

ted, and put to the service of a 'new' economy of images in which introspection would give rise to an immanent 'reality.'

Between the peepshow and the phantasmagoria an astonishing array of optical interrogations would focus on the creation of illusions (like the thaumatrope, the phenakistiscope, etc.), on the physiology (and phenomenology) of perception (as in the work of Helmholtz, and the conceptualization of the 'afterimage'), and on the creation of image 'theatres' that would reshape and expand the experiential horizon. In these 'theatres,' a differentiated subject position was created along with the new spaces of seeing. These spaces were 'virtual' in a particular form. David Summers, in *Real Spaces: World Art History and the Rise of Western Modernism*, suggests that 'virtual space' demands "completion on the part of the viewer." In this system, "whatever illusionistic force they have, virtual spaces show what is always at an unbridgeable remove, at a distance in space or time, another present, a past or a future."[9] This temporalization of space (experientially and conceptually) involved more than simply surrogate travel ('in space or time'), but in the renewal of the image as an encounter with contingency.

The peepshow unquestionably joins image and story in a form of performativity. If Richard Balzer is correct that "the box was the backdrop for the storyteller rather than the other way around," the optical images (and effects) that mesmerized its spectators were enlivened by supplementary oral narration-storytelling. Peepshows, hard to generalize as a singular form, appeared in many incarnations, emerging, on the one hand, from the perspective boxes of innovators like Hoogstraten, and, on the other, from the normalization of perspective as both a viable illusion (as in painting) and as essential for rationalizing increasingly urban space. But in essence, peepshows are containers for images and, for the most part, were mobile theatres. For a generation of itinerant showmen whose meandering journeys linked voyeuristic travel with portable media, the peepshow was part magic part science, part showmanship. Well documented, images of these peripatetic artistes helped establish a relationship between seeing and commerce as they proliferated through the town-square, the countryside, and soon into the far-corners of the world. Their views varied widely – from anecdote and fable to chronicle and tourism. As much as the images themselves must have been a marvel, the apparatus itself surely dramatized its presence. Crowds of children, skeptical adults, gleeful voyeurs, startled foreigners, formed audiences (or queues and crowds) for a peek into a miniaturized 'screening' of (in Summers' words) "another present."

Quickly the peepshow found ever more impressive and portable forms. Perspective books allowed spatial views to extend in space with layers of images opening vistas into intricately petite topographies. Confounding the senses, these views must have come as startling illusions. Unfolding within the confines of the optical 'book' was a grand view of a world opening, literally, before ones eyes. More effects multiplied the illusions. Dissolving views turned space into time as light effects allowed the mixing of reflected and transmitted illumination. Day became night, stars glowed, time passed. The economy of illusion joined the commodification of time. A few pennies and a few seconds and the cycle of the passage from day through night materialized. Gradually the temporalized image heightened the "moments of wonder" and extended them, made them, in effect, come alive.

For all their naïveté, peepshows were not an innocent form of fantasy. Rather, they 'invented' a new observer, steeped in the evolving subjectivity of the modern. Individualized, observers of the apparatuses that created the new world, this new observer was relativized,

empowered, subjectified. The gradual subjectification of observation and objectification of the apparatus is not to be understood carelessly. It reformulated, perhaps inverted, the status of a world in which representation was itself as conditional as the individual. As a transitional – and highly significant – technology, the peepshow legitimated itself as both a pivotal apparatus and a new form of entertainment. It privatized the image and would reappear in the stereoscope, Edison's Kinetoscope, the Viewmaster, and in early 'virtual' reality 'eyephones.' It inverted the gaze, turned it into a singularity and a private illusion. This while the trajectory of the technology was also shifting toward the projected image, the audience, the public illusion, the 'mass media.'

"*Light needs its shadows to make an image; projected images need their darkness to be seen.*"[10]

Along with the peepshow and the phantasmagoria came stunning innovations in projection technology. Magic Lantern shows, enormous panoramas, Daguerre's Diorama, all called for ever larger architectures, ever more sophisticated technologies, ever more clever effects, and ever more 'epic' narratives. The illusionistic 'theatre' of the peepshow could no longer be contained in miniature form. Already with a history back to Kirchner and Huygens, the Magic Lantern turned the image into appearance, projection. Well documented, the development and deployment of the Lantern set the stage for casting visual dramas into audiences riveted by excessive enlightenment ribaldry, faux séances, calculated horror, along with moral and instructional homilies, popular scientific lectures, and 'natural magic.'

"*The early magic lantern shows developed as mock exercises in scientific demystification, complete with preliminary lectures on the fallacy of ghost belief and the various cheats perpetrated by conjurers and necromancers...*"[11]

Increasingly, the performances found their way into fixed (if sometimes improvised) spaces and into the commercial market for booming 'home entertainment' systems.

The panorama, with its experiential perspectives, its lush platforms and meticulous illusions, its grand scale and scopic centrality (that would demonstrate its connection to Bentham's *Panopticon*), with its pedagogical and immersive pretenses, that, in the words of Laurent Mannoni, "hinted at the dream of a complete spectacle, of 'total cinema', which some cinematograph pioneers attempted to realize at the start of the twentieth century, a dream finally realized in the 1980s and 1990s by large scale systems such as *Imax*, *Omnivision*, and the 360-degree cinema."[12] As Wolfgang Schivelbusch writes in *Disenchanted Night: The Industrialization of Light in the 19th Century*, "The picture world of the new media offered endless opportunities for creating illusions, belonging as it did to a different existential sphere from the reality in which the audience was sitting."[13] This "unlimited" horizon (some panoramas gave binoculars to their audiences) projected a universal gaze, suggested the image as inexhaustible. They also created an audience whose appetite for illusions was paralleled by a scientific frenzy to understand the physiology of optics and human vision as a central issue.

fig. 8: Ambrogio Orio; a peep-box scene, colored copperplate engraving, Italy c. 1800

The Diorama linked the illusions of the image with theatrical lighting technologies and "special effects" that are undeniably the precursors of cinema – where illusion meets temporality. More theater than platform, the Diorama's attraction was in the incorporation of gradual temporal transformation. The diorama's "animated" transitions between reflected and transmitted light made for *passages* between day and night, interior and exterior, crowds and solitude. Not a projection system, the diorama's extraordinary effect was in the sheer use of lighting effects to draw out the subtle alteration between scenes. Clearly inspired by dissolving views the experience of the diorama stretched and animated the effect. In essence it was a machine embedded in a bourgeois experience in which representation integrated the flow of temporality – the time-image.

The panorama and diorama were tuned to a burgeoning commerce in visuality that institutionalized media practices. Their technologies necessitated the development of architectures suitable to their illusions and the staggering number of buildings devoted to their 'performance' spread quikkly. These architectures, really these protomedia institutions, were dedicated to exploiting illusions and generating spectacles of sensation (visual and cognitive) and in claiming the "real" world, as photography would do (until its rendezvous with cinema technologies in the 1880s). They were, as Klien suggested a site in which 'architecture and film coexist.' 'Natural Magic' gave way to what Christine Boyer calls "rational entertainment", an entertainment that "lies in the organizational heart of the great nineteenth-century exhibitions that turned the industrial world into one immense picture show" in which "things were replaced by a sequence of optical tableaux, an accumulation of weightless and fantastical images that floated about in a dream world."[14]

Into this sphere of 'rational entertainment' came the phantasmagoria. It would defy rationality as a conundrum, an oscillating system of reason and the uncanny. As Mannoni writes it, "The aim of the phantasmagoria was therefore rather dubious: it sought more to create fear than to dispel the occult source of fear ... it was certain to

disturb the most rational of its spectators."[15] Terry Castle adds to this perspective suggesting that an examination of the phantasmagoria would demonstrate "the latent irrationalism haunting, so to speak, this rationalist conception of mind."[16] She continues: "*Thus even as it supposedly explained apparitions away, the spectral technology of the phantasmagoria recreated the emotional aura of the supernatural. One knew ghosts did not exist, yet one saw them anyway, without knowing precisely how.*
Translated into a metaphor for the imagery produced by the mind, the phantasmagoria retained this paradoxical aspect. It was never a simple mechanistic model of the mind's workings. Technically speaking, of course, the image did fit nicely with post-Lockean notions of mental experience: nineteenth century empiricists frequently figured the mind as a kind of magic lantern, capable of projecting the image-traces of past sensation onto the internal 'screen' or backcloth of the memory. But the word phantasmagoria, like the magic lantern itself, inevitably carried with it powerful atavistic associations with magic and the supernatural. ... The association with delirium, loss of control, the terrifying yet sublime overthrow of ordinary experience, made the phantasmagoria a perfect emblem, obviously, of the nineteenth-century poetic imagination...".[17]

Appearing in the last years of the 18th century, the 'invention' of the phantasmagoria[18] was claimed by Etienne-Gaspard Robertson (who popularized it), a claim discredited (in a fascinating 19th century legal action). But rather than focus on this micro-history (since it was, like so many 'inventions' a hybridization), better to aim at the formation of a theatre of representation that drew enormous audiences away from the singular illusions of the peepshows into the shared illusion of the phantasmagoria. Emerging in the midst of the neo-gothic (in Great Britain) and the reign of terror (in France), the phantasmagoria shows were a haunted cross between proto-operatic flights from reality (later to appear in Wagner) and the phantasmatic reality of revolution.

fig. 9: peep-box, France c. 1730

For all the accurate criticism of Robertson's claim as inventor, his inventiveness was significant. His phantasmagoria used rear-projection, optical systems that allowed movement, multiple projectors, and the fabulous effect of 'zooming' (with the projector on wheels). The apparatus was suddenly invisible, the 'image' both irrepressible and heightened by 'audio illusions' – sound effects. Projections onto smoke drew wild responses as the floating apparitions mesmerized growing audiences. The phenomenon of the phantasmagoria confounded common sense in the artificial light of an apparatus that would induce not just visual sensation but emotional fervor. With all this, it is not coincidental that the *phantasmagoria's* animated spectacle stirred, or perhaps legitimated, notions of causality that defied common-sense and suggested that the ephemeral character of reality was inhabited by more fugitive realities increasingly mediated through technologies that could, however fleetingly, materialize or represent worlds (if not hallucinations) imperceptible outside of the imagination. As Castle writes, "a fantastically exalted picture of what one 'sees' when one thinks."[19]

III.

"*The first seventy years of the nineteenth century gave expression to the growing need and technical ability to grasp and appropriate the visible surface of the world through its re-visualization and the ability to play around with it: the cinematisation of the eye and of perception as a counterpart and complement to the extensive acquisition of natural and technical processes for other areas of the production of commodities and meaning.*"[20]

The myriad optical apparatuses, toys, theatres, performances, and inventions that form the 'pre-history' of the cinema constitute an extraordinary – and still active – archive that is only slowly materializing in the reassessment of the *optifications* of modernity. Long marginalized in the traditions of art history and long underestimated in histories of cinema, this field has deep bonds with scientific research and aesthetic praxis. Not every technology is merely a prototype or predecessor. Often they mark a distinct entry into the social sphere, leave indelible effects, propose radical (and wonderful) forms of conceptualizing an 'image' of the world.

Between the peepshow and the phantasmagoria culture was in a stunning series of transformations. The role of the observer as being individuated, the machine was filtering into the routines of everyday life, the borders of experience were being extended in profound forms, localization was giving way to internationalization, mobility was shattering the here-and-now, time itself

became as distinct a form of life as was space, and new representational techniques were fueling a burgeoning new world order of images that could penetrate the invisible as handily as they could the visible spheres. Everything, everyplace, every event, in this could be and often were subject to a new visibility and, as importantly, to a new desire to see. The archive of these experiences is enveloped within the astonishing array of devices, images, and accounts whose presence is surfacing in the 'archaeology of the media.'

From the intricate illusions of the peepshow to the exaggerated effects of the phantasmagoria, time and memory, perceptibility and information, trace and chronicle, were joined with a new form of witness. This witness was itself an effect of the interface between humans and machines intertwined to form a harbinger of the continuing oscillation between systems and the senses. Strongly evidenced in the history sketched here, this reciprocity is still forcefully present in contemporary media, a discourse whose 'world-picture' is resolutely speculative and too often phantasmatic.

fig. 10: Peep-box image with the interior of a church – illuminated from the front
fig. 11: Peep-box image with the interior of a church – illuminated from behind. Hand-colored copperplate engravings, perforated and with colored papers pasted on the backside, c. 1720

Notes:
(1) Donald Lowe: History of Bourgeois Perception (University of Chicago Press, Chicago, 1982) p. 80.
(2) Norman Klein, The Vatican to Vegas: A History of Special Effects (The New Press, New York, 2004) p. 11.
(3) Klein, p. 12.
(4) Henri Lefebvre, The Production of Space (Basel Blackwell, Cambridge, 1984), p. 27.
(5) Lorraine Daston and Katherine Park, Wonders and the Order of Nature (Zone Books, New York, 1998), p. 339.
(6) Klein, p. 397.
(7) Richard Balzer: Peepshows: A Visual History (Harry Abrams, New York, 1998) p. 26.
(8) Theodor Adorno: In Search of Wagner (New Left Books, London, 1981) p. 95.
(9) David Summers, Real Spaces: World Art History and the Rise of Western Modernism (Phaidon Press, London, 2003) p. 44.
(10) Tom Gunning, "Illusions Past and Future: The Phantasmagoria and its Spectators" (www.mediaarthistory.org/Programmatic/key/texts/pdfs/Gunning.pdf) p. 2.
(11) Terry Castle, The Female Thermometer: 18th Century Culture and the Invention of the Uncanny (Oxford University Press, New York, 1995) p. 143.
(12) Laurent Mannoni, The Great Art of Light and Shadow: Archaeology of the Cinema (University of Exeter Press, Devon, 2000) p. 176.
(13) Wolfgang Schivelbusch, Disenchanted Night: The Industrialization of Light in the 19th Century, (University of California Press, Berkeley, 1995) p. 213.
(14) M. Christine Boyer, The City of Collective Memory: Its Historical Imagery and Architectural Entertainments (MIT Press, Cambridge, MA, 1996) p. 257.
(15) Mannoni, p. 161.
(16) Castle, p. 143.
(17) Castle, p. 144.
(18) Well documented in Laurent Mannoni's Great Art of Light and Shadow.
(19) Castle, p. 167.
(20) Siegfried Zielinski, Audiovisions: Cinema and Television as Entre'actes in History (University of Amsterdam Press, Amsterdam, 1999) p. 27.

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