MARY ANN DOANE

BIGGER THAN LIFE

THE CLOSE-UP AND SCALE IN THE CINEMA


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[The Close-Up and Scale in the Cinema]

Mary Ann Doane

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In memory of my sister, Janice Louise Doane

(1950–2018)

and

For my daughter, Hannah Doane Rosen

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Acknowledgments

It has become conventional in the genre of acknowledgments to confess how long it has taken to write the book (always longer than one thought it would be). I will not attempt to resist or undermine this generic convention since *this* book has taken even longer than longer. It began life as a short book on the filmic strategy of the close-up and has expanded exponentially to address more extensive issues of scale and media (it has been "scaled up," one might say). Even more than is typical, I feel that the writing of this book could have been prolonged into infinity. But the time has come to stop. Due to the *longue durée* of the work on the manuscript, this list of acknowledgments will inevitably be incomplete. My profound apologies in advance to anyone whom I may have inadvertently omitted.

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This book is dedicated to the memory of my sister, Janice Louise Doane. She was a stolid and uncompromising feminist and my best friend since childhood, a bulwark against the four brothers. She was certainly critical of me but was also the only one who could make me laugh for hours on end. Despite the fact that Jan and I had a lot in common in our work—an interest in feminist theory, an interest in language and form—we did not talk very often about our intellectual interests or our writing. I guess I didn't want her to be a figurative sister, of which I have many, but a literal sister, of which I have/had one. Jan sustained and supported me in ways that neither she nor I understood. I know that I don't even know now how very much I miss her.

Introduction

Scale, the Cinematic Image, and the Negotiation of Space

The sites in films are not to be located or trusted. All is out of proportion. Scale inflates or deflates into uneasy dimensions. We wander between the towering and the bottomless. We are lost between the abyss within us and the boundless horizons outside us. Any film wraps us in uncertainty.
—ROBERT SMITHSON, "A Cinematic Atopia"

The history of film theory is inundated with speculation about the effects of various scales of shots, but by far the most heavily discussed scale is that of the close-up. From Jean Epstein's rapture when confronted with the magnification of the human face to Béla Balázs's and Gilles Deleuze's insistence that the close-up of the face absorbs all space within itself and no longer acts as metonymy pointing to a larger whole, the close-up has been accompanied by an excessive discourse or, at the very least, a discourse about excess.[1] It is as though scale had gone awry. In comparison, the medium shot and the long shot appear to be of "normal" scale. "Normal" or "proper" scale is generally measured in relation to the human body. It is difficult for us to imagine the impact of enlarged, detached faces or even objects seemingly distorted in size on the screen in the early cinema. For Sergei Eisenstein, tearing the object from the real, the close-up introduced "absolute changes in the dimensions of

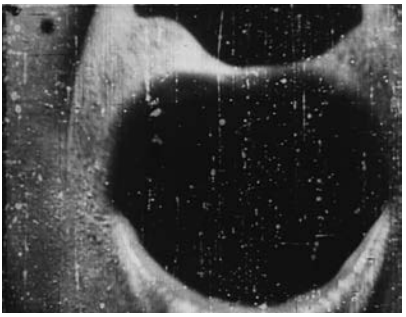
I.1 Georges Méliès's *The Man with a Rubber Head* (*L'homme à la tête de caoutchouc*; 1901).

bodies and objects on the screen."[2] The ordinary rules of classical perspective no longer obtain: "The laws of cinematographic perspective are such that a cockroach filmed in close-up appears on the screen one hundred times more formidable than a hundred elephants in medium-long shot."[3] Because the close-up exaggerates a perceived distortion of scale that, in fact, characterizes any projected image of film, it has been the subject of a film theoretical obsession. The close-up carries the threat of a certain monstrosity, a face or object filling the screen and annihilating all sense of scale.

In practice, cinema has always exploited the structuring ambiguity of shot size in the cinema—the ambiguity of scale versus distance. Is the close-up larger or closer? Despite the demand for life-size images of human beings in journalistic discourses about early cinema and a certain anxiety about cutting up the body, very early films often played intensively with the relations, contradictions, and potential misreadings of the interplay between scale and distance. In Georges Méliès's *The Man with a Rubber Head* (*L'homme à la tête de caoutchouc*; 1901), a chemist (played by Méliès) produces a close-up within the diegesis (narrative space) by placing his own head on a table and then pumping it with air (fig. I.1). Méliès generated the illusion by superimposing in the open space under an arch a view of his enlarging head obtained by having the director roll on a trolley on an inclined plane toward the camera. The effect in the image is not that of a decreasing distance between the head and the camera/spectator position but that of a head growing larger and larger as it is pumped full of air. The precariousness and instability of such a perversion of magnitude, of bodily scale, are underlined by the catastrophic explosion at the end of the film. Méliès's play with scale, his ironic and hyperbolic exploitation of the "larger than life" quality of the cinema, is consistent with a more widespread interrogation of the aesthetic feasibility of the close-up in early cinema.

Both in threatening a "proper" scale and in its dangerous proximity, the close-up poses the problem of the threshold, of the surface or screen as limit, as barrier. The screen presents itself as a boundary between two territories—that of the "world" of the film and that of the space of the spectator. The specter of the close-up is raised whenever an object or person moves toward

the camera, potentially putting into crisis the distance between screen and spectator, threatening to bridge the abyss of representation. Perhaps the most extreme of these early filmic ruminations on that threshold is *The Big Swallow* (aka *Interviewee Swallows Camera*, James A. Williamson, 1901). As the film catalog tells us, a gentleman reading is interrupted by a cameraman threatening to take his picture. The gentleman objects vociferously, shouting, "I won't, I won't, I'll eat the camera first!" Then, shouting and gesticulating, he approaches the camera until he is in extreme close-up, opening his mouth to reveal a black void (fig. I.2). There is then a cut to the cameraman and his camera indeed toppling over the edge of a parapet and disappearing. The gentleman retreats from the close-up, munching and smacking his lips in satisfaction. The film dramatizes in raw form the implications of the extreme close-up, of occupying a space that is too proximate, a kind of no-man's-land of representation. For it is not only the cameraman who is incorporated, absorbed within the diegesis, but also the figure of the spectator, who succumbs, if only momentarily, to the enveloping nothingness of the screen. There is an ironic play here on the inextricability of proximity and size in relation to the camera. The gentleman has only to move closer to the camera to become large enough to swallow it. As Noël Burch has pointed out with respect to *The Big Swallow* in the context of early cinema, "It is one of a series of battering rams beating on the 'invisible barrier' that maintains the spectator in a state of externality."[4]



I.2 *The Big Swallow* (aka *Interviewee Swallows Camera*, James A. Williamson, 1901).

The close-up of early cinema seems more acutely to evoke the possibility of breaching the limit of the screen, the protective barrier of representation. These two films signify by putting into play and exploiting the cinema's ability to shatter conventional scale, its tendency to produce (or, in these instances, to thrive on) disorientation and dislocation, to construct a space and a world to its own measure. In these examples, the problematic of scale and its distortion in cinema is performed. This distortion is not limited to the close-up, which is perhaps its best example, but is endemic to every shot size. With the rise of the classical Hollywood narrative and its continuity editing, the spectator was positioned to be less aware of the ambiguity. Preserving the unity and homogeneity of space, this style transmuted the

perception of scale—that is, calling attention to the size of the screen, that of the image, and aspect ratio (representational space)—into the perception of distance within the diegesis (represented space). This technique effects a displacement or amelioration of the threat of large scale, disproportion, and a disturbing monumentality by translating scale (the logic of large and small) into distance (closer or farther). Throughout this book, I will be discussing the effects of this abstraction and distortion of scale in the cinema and the way they cannot be confined to the floundering of an early cinema coming to grips with (and even commenting upon) its own unfamiliarity. Indeed, this scalar abstraction is endemic to the form, and it suffuses media to the present day, informing the work of IMAX, virtual reality, "immersive" sound systems, and Global Positioning Systems (GPS) that seek to dislocate and relocate the spectator/user in the production of an *other* experience.

There is an anomaly in the history of scalar effects in cinematic classical narrative—the zoom. In general, the zoom has been derided as a cheap and easy (or even facile) technique, one often associated with the "lesser" medium of television (the "small" screen). Serge Daney refers to it as having the reputation of an "automatic reflex" and as bearing the connotations of rape, penetration.[5] The zoom is of course the attempt to combine all cinematic scales—from the telephoto view to the extreme wide-angle view—in a single, continuous shot. Unlike the tracking shot, which because it is the result of an actual camera movement appears to transport the spectator along with the camera through a physical space with depth and varying perspectives, the zoom, as a mechanical movement changing the focal length of the lens, flattens and abstracts space. It is not a *real* movement. As John Belton points out, "In a tracking shot, the camera moves bodily through space, producing a two-dimensional image through a three-dimensional filming process which endows that image with an illusion of depth (via parallax and changes in perspective)." In contrast, in the zoom, movement through space is itself illusory and "a zoom lens produces the illusion of movement *optically* through continuous changes in the focal length of the lens, rather than through the actual movement of the camera, creating an image which progressively alters the original space being photographed and which subverts the illusion of depth."[6] There is always something uncanny or explicitly artificial about a zoom, which manufactures scale so blatantly and without shame, annihilating any physical space that the spectator might inhabit. The zoom makes visible the *abstraction* of space and scale that is usually concealed in classical cinema, and this is perhaps why it is derided. For we tend to take cinematic

scale for granted, as a reasonable measure in relation to the human body—of both the character and the spectator. But it is far more than that.

The word and the concept of scale have many different meanings that are worth pausing to consider. In geometry, scale is a relatively straightforward concept linked to proportion and ratio. Scale refers to the relation between the representation of an object (or a territory on a map) and the object itself. In the *Oxford English Dictionary*, scale is "a system of representing or reproducing objects in a smaller or larger size proportionately in every part. *to scale*: with exactly proportional representation of each part of the model."[7] But the term can also refer to a range (of exposures or colors in photography or of notes in music). Scale is in addition a standard of measure or calculation (as "on a global scale" or "the scale of the catastrophe"). In the plural, it can be an attribute of the body: scales as "membranous or horny outgrowths or modifications of the skin in many fishes and reptiles and some mammals" or, as a disease, one of the layers of the epidermis that can become separated.[8] In another somewhat remote sense, scales can be a cause of blindness or lack of knowledge—"to remove the scales from one's eyes" means to become enlightened and binds knowledge to the visible. Scale is also a measure of weight, as in "the scales of justice" (although here the judge is blindfolded), one of the most potent symbols of democracies.

In the late 1990s and early 2000s, the discipline of geography witnessed a transition in the understanding of scale whereby it was no longer taken for granted and instead became a shifting epistemological (and ideological) tool. In recent years there have been vigorous debates about the concept of scale in human geography, cultural geography, and radical geography. The project of geographers has aimed at the de-ontologization of scale and its understanding as a social and hence variable construction. Although there is widespread acceptance of a methodological division between the local, the urban, the regional, the nation-state, and the global, the relations between these scales (and sometimes the usefulness of the divisions themselves) are subject to great dispute—are these relations nesting, hierarchical, dialectical? Where does one end and the other begin? Andrew Kirby echoes David Harvey in claiming that globalization itself is a concept displacing the more politically charged concepts of imperialism and neocolonialism.[9] Marxist radical geographers tend to see capitalism as the driver of scale and through accumulation fostering a greater and greater expansion.[10] This position is substantiated by a relatively recent twist in the understanding of scale by corporations that use the term "as shorthand for '*scale* up' ('to grow or expand in a proportional and

usually profitable way') and as a noun that means 'proportional growth especially of production or profit' and/or 'a large market position.'"[11] Feminist geographers often claim that the emphasis upon production has suppressed an understanding of the scale of realms of reproduction and the domestic usually associated with women.[12] Taken further, this position claims that the global-over-local hierarchy "underwrites the problematic view that social processes can be detached from the grounded sites where people and objects concretely reside and social practices take place (e.g. in streets, bedrooms, boardrooms)."[13] Larger scales (the nation-state, the global), in their absolute abstraction, should be dismissed in favor of human, experiential scales. This, in turn, poses a number of problems linked to its polarization of the abstract and the concrete, assuming, for instance, that nationalism and globalization are not "lived," or do not have very real effects, and that the "experiential" is not infused with abstraction. But this is a recurring problem in discourses about scale that almost always calibrate themselves in relation to a particular conceptualization of the "human."

A number of scholars have insisted upon a distinction between scale and size. Joan Kee and Emanuele Lugli initially proffer a definition whereby size refers to "absolute dimension" and scale to "proportions," but then go on to claim that "the production of scale often depends on various articulations of size which themselves are far from stable."[14] Yet Anne Wagner invokes the assumption of stability in size in her claim that "scale is not the same as size. On the contrary, scale is the appearance of size" and therefore scale can be "deceptive."[15] Size is here linked to scientific exactitude and secure, unshifting knowledge. However, measurement (of size) itself is a cultural (and often political) phenomenon, and its units are variable or variably grounded across history. If scale is understood as the perception of size, it would seem to be chained to individual subjectivity and call for a phenomenological reading. Scale is ineluctably linked to size, but it cannot be reduced to individual perception (as is particularly visible in the geographic determinations of local, national, and global). Nor is size the effect of a secure and unwavering system. As Emanuele Lugli points out in his book on measurement, "Size standards are not mere objects, but objects that come with assumptions, desires, and projections."[16] Measurement is the ceaseless and historically grounded attempt to connect the material and the abstract in an unquestionable way—an attempt destined to fail. Perhaps this is why much of its history is illustrated by the role of the human body as measure, a human body that seems to be the most assured, unchanging support—at least until the meter.

For instance, in Robert Tavernor's vast intellectual history of the various systems of measurement devised by cultures over the last two millennia, *Smoot's Ear: The Measure of Humanity*, the practice of calculating size in relation to the human body as ultimate standard (the foot, the cubit) is displaced historically by the search for a universal system ultimately based on the abstract and dehumanized (if not antihuman) meter.[17] For Tavernor, this development constitutes a great loss, a denial of human experience or human scale, both determined by the body. Hence, the narrative of Oliver R. Smoot acts not simply as an amusing anecdote but as a hyperbolic confirmation of Tavernor's call for a greater humanization of scale. Smoot, the shortest initiate (pledge) in a fraternity at the Massachusetts Institute of Technology (MIT) in 1958, was chosen as the subject and tool of a prank revolving around measurement. The initiates were given the task of measuring the length of the Harvard bridge using Smoot's height as the determinate unit (five feet seven inches). They found that the bridge was 364.4 smoots, plus or minus one ear. Here, the body is quite literally used as a form of measurement. For Tavernor, Smoot's ear represents the leftover, the plus or minus, the inevitable impossibility of truly accurate measurement, and hence the confirmation of the persistence of the human—here encapsulated as the fallible—in all measuring systems.[18] In addition, the humor of the prank hinges on the knowledge that Smoot's height has no generalizability but is one of the specific features of individuality, given the very large range of human sizes. The MIT prank is an ironic conflation of the scientistic and the humanistic.

And yet scale is associated with the corporeal in another way, as the flakes or laminates of skin that can be peeled away, as traces of the body, lost to the body—a pathological phenomenon. In this sense, scale is entangled with a vision of mechanical reproduction as a peeling off and circulation of the forms/skins of bodies or objects. In the June 1859 issue of the *Atlantic Monthly*, Oliver Wendell Holmes wrote that photography, and specifically stereography, divorced form from matter and hence deprived matter of the value of its visuality: "There is only one Coliseum or Pantheon; but how many millions of potential negatives have they shed—representatives of billions of pictures—since they were erected! . . . Every conceivable object of Nature and Art will soon scale off its surface for us. Men will hunt all curious, beautiful, grand objects, as they hunt the cattle in South America, for their skins, and leave the carcasses as of little worth."[19] Holmes was concerned with the impact of this for the archive—how to store and make accessible the resulting huge numbers of scales or skins of objects? But the detachability

of these forms in photography and their later projection in the cinema also dissolved any concept of scale that could be soldered to the spectator's body, occasioning an anxiety that manifested itself in the early cinema as a demand for "life-size" images and "grandeur naturelle" in early press commentary on moving pictures.[20] The close-up in particular was perceived as aesthetically offensive in extreme ways—as monstrous or grotesque, even castrating, an excessive display of disproportion in scale and a violence to the human body. The residue of this hysteria can be seen in the hyperbolic language of early film theorists such as Epstein and Balázs.

The continuing and compensatory effects of this anxiety about representation and scale can still be seen in the concept of "actual size" or "actual scale" often used in advertising photographs. "Actual scale" is a paradox insofar as it is an attempt to annihilate representation, to authenticate the image by denying its scalelessness; yet it is an admission of the scalar instabilities of visual representation (for, like television and liveness, where the graphic "Live" is required to authenticate the temporality of the image, one always has to be told, with a caption, that this *is* the actual scale of an object). There is an exception whose exceptionality is a function of its indexicality, its physical adherence to its object—the nature print, a physical imprint of a plant specimen, which Jeremy Blatter has named the "zero degree of scale." However, as he points out, this scalar fidelity sacrifices other attributes of the object, including its three-dimensionality.[21] The cinema, even in films like Man Ray's rayograms, in which pins and nails are scattered across the surface of the celluloid to exploit their direct imprint, has no access to this zero degree of scale because the images are projected on a screen and hence enlarged (unpredictably, given the variation in theatrical "throws").

The concept of "actual size" or the "zero degree of scale" is hyperbolized and ironized in Jorge Luis Borges's famous short essay "Of Exactitude in Science." Jean Baudrillard's well-known reading of this essay emphasizes the ludic nature of a map the size of the territory it represents and deploys Borges's essay to shed light on his own concept of simulation and the destruction of the real. But what is lost in his reading is Borges's ironic critique of science and his invention of a mythical cartography as an absurd instantiation of scientific exactitude:

> In that Empire, the craft of Cartography attained such Perfection that the Map of a Single province covered the space of an entire City, and the Map of the Empire itself an entire Province. In the course of Time, these

> Extensive maps were found somehow wanting, and so the College of Cartographers evolved a Map of the Empire that was of the same Scale as the Empire and that coincided with it point for point. Less attentive to the Study of Cartography, succeeding generations came to judge a map of such Magnitude cumbersome, and, not without Irreverence, they abandoned it to the Rigours of sun and Rain. In the western Deserts, tattered fragments of the Map are still to be found, Sheltering an occasional Beast or beggar; in the whole Nation, no other relic is left of the Discipline of Geography.
>
> From *Travels of Praiseworthy Men* (1658) by J. A. Suarez Miranda

"Of Exactitude in Science" appears in a collection of Borges's short essays titled *A Universal History of Infamy* and takes the form of a literary forgery—attributed to a fictional J. A. Suarez Miranda and allegedly written centuries ago.[22] The appeal to historicity is redoubled by the inconsistent use of capital letters as signs of an aged and historical writing. The historical loss emerges as that of the "Discipline of Geography" (whose tool, cartography, has evolved from a craft to a college, study, and finally a discipline). Why do we find this characterization of cartography and the ideal map so absurd? Maps are supposed to be utilitarian, and their utility hinges upon their reduced scale and hence portability. A map usually carries within it its own explanation/illustration of the scale it uses (e.g., one inch = five miles). But here the "perfection" of cartography entails its own annihilation, the erasure of proportion as an instrument of representation, the very rejection of representation so that the map merges with its territory. Scientific exactitude avoids the possibility of inaccuracy by invoking a scale of 1 to 1, or "point for point." Nostalgia for the "Discipline of Geography" is here nostalgia for the scale of the real. The cinema is the antithesis of this Borgesian "perfect cartography."

The cinema in its earliest years had barely started to generate a hysteria about scale deviating from the scale of the human body when it began to exploit the scalar instabilities of the projected image through the use of the scale model, one of the first "special effects." In 1898, E. H. Lumet used miniature ships in a tank to film *Battle of Santiago Bay*. And Fred Dobson used a scale model of San Francisco burning in order to film the earthquake of 1906. The use of the scale model takes advantage of the illegibility of scale in the cinema, the spectator's inability to locate herself spatially in relation to the image (fig. I.3). The comparability required to acquire a sense of scale resides only within the image, where perspective and distance can

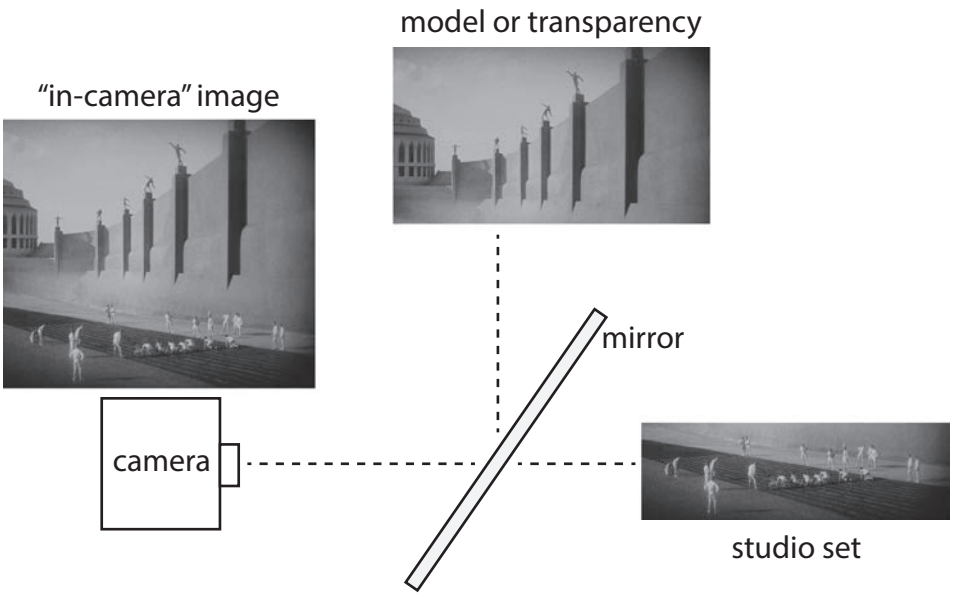
1.3 On the set of *Blade Runner* (Ridley Scott, 1982).

be manufactured independently of any "real" space.[23] The unreality of this space is accompanied by a necessary derealization of time when the object is moving (a ship on the ocean, a gigantic monster roaming a city, large rocks crushing a small-scale model of a house). In the 1920s and 1930s, film technicians noticed that a small-scale car filmed at the usual frame rate (where the rate of the film moving through the camera equals that through the projector) will appear to the spectator as a toy car. This is linked to the inextricability of expectations about size, mass, and movement. Filming at a higher speed produces a more plausible movement of a gigantic figure when projected at normal speed. Hence, the manipulability of size and the production of scalar illusion are dependent upon a manipulation of frame rate

and hence represented temporality. The artifice of space/size is wedded to an artifice of time.[24]

Robert Smithson's sense of dislocation in the cinema, of proportion out of control, leads him to label the cinema an "atopia" (no place).[25] The scale model depends upon and instantiates what could be seen as two (not unrelated) failures of the classical theatrical cinema: (1) the inability of the spectator to orient herself or to measure scale in relation to her own body, thus producing a fundamental dislocation; and (2) the failure of the cinema to provide the precision and control of a scientific instrument due to its scalar instability (both spatially and temporally; this was Étienne-Jules Marey's reason for dismissing film as a viable tool of scientific method).[26] There is a sense in which cinema exposes the impossibilities of scale as it has been conceived in relation to both the realm of the human and the realm of abstract science.

The scale model deployed in the early years of cinema can be linked to a long history of magic and illusion, including Étienne-Gaspard Robertson's phantasmagoria of the 1790s, based on the magic lantern but distinguished from it by the concealing of both lantern and screen, so that the dark space of the auditorium was illegible to and unnavigable by the audience, making them vulnerable to the fear and anxiety of ghostlike apparitions.[27] In the nineteenth century, the very popular "Pepper's Ghost" used a partially reflective mirror to produce the illusion of a bodiless actor or ghost (the mirror image) on the stage, again concealing the means of production. In the European film industry in the mid-1920s, Eugen Schüfftan invented a process using mirrors to generate illusory scales that came to be known as the Schüfftan process.[28] This widely used process was economical, allowing the extensive use of small-scale models in place of large, expensive sets (fig. I.4). A mirror, part of whose reflective surface has been removed, is placed at a forty-five-degree angle in front of the camera, and the small-scale model is situated to the side of the camera. The live action of the scene appears in the nonreflective part of the mirror, seemingly surrounded by the environment provided by the model reflected in the mirror. The Schüfftan process was used in two of Fritz Lang's films—*Die Nibelungen: Siegfried* (1924) and *Metropolis* (1927).[29] As Katharina Loew points out, the Schüfftan process was associated with "Gulliver" effects—that is, "the rendition of extreme size differences between living things."[30] Special effects in this case are based on the meticulous confusion of virtual and "real" images in order to produce effects of scale. The use of



1.4 The Schüfftan process, *Metropolis* (1927).

scale models contributes to the growing dissociation of scale and the human body (here, the body of the spectator) as measure.

The critique of the abstract metric scale in evidence in Tavernor's work was shared by Le Corbusier, who conceived of architecture first and foremost as a space designed *for* the human body, one that humans must inhabit and, therefore, one whose proportions must accommodate that body. In the 1942 treatise *The Modulor*, he applauded units of measure based on parts of the human body: elbow (cubit), finger (digit), thumb (inch), foot, pace, and so on, and disdained the move to the metric system, which was abstract and "indifferent to the stature of man."[31] Organic units were superior to the metric units because they grounded mathematics in the human body rather than in a cold, scientific, and inorganic system; in addition, they partook of the elegance and harmony of that body.[32] Despite, or perhaps because of, the nostalgia for "man [not woman] as the measure of all things," the anthropometric system was problematic. It evinced a desire to naturalize and ground the concept of scale, to repudiate its resolute denial of an absolute and its consequent embeddedness in the process of comparison. And, as Christopher Lukinbeal has argued, "Anthropometric measures are attributes

of power and class struggle, they are symbolic and built on the 'process of social conditions in which the idea of "just measures" becomes a symbol of "just man," of justice as such, and of just human relations,'" hence the scales in the figure of a blind justice.[33]

While the development of the metric system was allegedly an attempt to produce and enforce a universal mode of measurement, grounded in scientific principles, it simply incarnated a shift from the human body as regulator of scale to a globe that had become ever more definitive of experience, whose symbolic pressure was increasingly felt. In the late eighteenth century, well into the era of colonialism, there were two schools of thought about the definition of a standard unit of measurement, one based on the duration of the swing of a pendulum (ultimately rejected due to perturbations caused by gravity) and the other advocating the definition of the meter as one ten-millionth (1/10,000,000) of the length of the distance from the equator to the North Pole. The approach based on the measurement of the circumference of the earth was the historical victor, at least temporarily. In 1889, the first General Conference of Weights and Measures established an international prototype meter bar, which is still housed in Sèvres, France.[34] Its original ground of authority was the measurement of the globe (an enterprise that was increasingly perceived as problematic, since the earth is not a perfect sphere).

The globe, according to Peter Sloterdijk, has constituted the imaginary image of location at least from the time of the circumnavigation of the world in the sixteenth century and is hence a product of the colonial enterprise: "Discovery aims for acquisition: this gave cartography its world-historical function. Maps are the universal instrument for securing what has been discovered, in so far as it is meant to be recorded 'on the globe' and given as a secure find."[35] Contemporary discourses of globalization as a new phenomenon are blind to the fact that the concept of space in relation to a world conceived as a sphere (and hence as conquerable) are effectively much older than these discourses admit. The apprehension of the world as a globe coincided with the concept of discovery and control of new territory, with colonialist and imperialist discourses. From the outset, globalization presupposed that any point on the globe was equidistant from the center and hence, in terms of measurement at any rate, equivalent to any other location, a homogenization of space that continued to accelerate into the twentieth century and beyond.

The cinema participated in this early discourse of globalization in a number of ways. It is not coincidental that the prototype meter bar came to incarnate

I.5 Esperanto poster stamp for 1913 international congress.

a universal measurement at the same time that the cinema emerged with the claim that it was a universal language, readable across national and linguistic borders, accompanying the concurrent cult surrounding Esperanto. The promotion of Esperanto as a universal language in stamps and posters for conferences invoked the globe as an imprimatur, blessing its worldwide aspirations (fig. I.5). Echoing this exploitation of the trope, an early 1909 advertisement in the journal *Moving Picture World* situates a globe as background framed on the bottom by two supportive film reels (fig. I.6), and RKO's logo presents a transmission tower straddling the top of the globe. On the occasion of its hundred-year anniversary, a reprise of the history of the Universal Studios logo displays the insistence of the globe as trope in the cinematic imaginary.

But, in addition, the cinema was an arena for a certain play with scale, an alignment of scales of shots that produced an imaginary space in which the idea of the spectator's "location" was repressed and reconfigured. The iconography of cinema often colluded with this discourse on scale and its malleability. Scale models go hand in hand with tales of enormous scalar disproportion between monsters and human beings—monsters whose spectacular size is often a result of world disaster, of atomic catastrophe, whose effects are perceived in relation to seemingly unimaginable sizes, both small and large. Mothra (in the 1961 film of that title produced by Toho Studios)

I.6 Ad in *Moving Picture World* 4, no. 24 (June 12, 1909).

is a gigantic egg, then caterpillar, then moth whose disproportion is directly linked to atomic testing on the island where she resides (fig. I.7). The island in general is inhabited by fantastic forms of both plants and animals and two women, only twelve inches tall, who act as Mothra's priestesses and are able to summon her after they are captured to be put on display in Japan. As miniatures, they are carnival-like attractions who prove to be the fascinating scalar counterpart of the enormous Mothra. Godzilla, in the original film of that name (*Gojira* [*Godzilla* is the Americanization], Ishirō Honda, 1954), is both a metaphor for and a product of nuclear holocaust (fig. I.8). In his immensity and unstoppability, Godzilla is the atomic bomb itself (Honda, the director, said years after the film, "I wanted to make radiation visible").[36] For the threat of the atom bomb lies not so much in its materiality or even its tremendous energy but in the devastation and scale of its lasting effects. A prominent paleontologist in the film inspects a giant radioactive footprint and hypothesizes that Godzilla is a creature from the Jurassic period whose dormancy was broken by American testing of the H-bomb. Godzilla breathes radioactive fire.

Unable to afford the stop-motion techniques of *King Kong*, Toho Studios borrowed from traditional Kabuki and Bunraku drama and portrayed

1.7 On the set of *Mothra* (Ishirō Honda, 1961).

1.8 On the set of *Godzilla* (Ishirō Honda, 1954).

Godzilla by having an actor wear a latex costume. The scale of the miniature sets ranged from a ratio of 1/25 to one of 1/33, the logic being that Godzilla must be able to see over what were the largest buildings in Tokyo at that time.[37] In films of the ensuing series, Godzilla was rescaled to keep pace with the new skyscrapers of Tokyo. Godzilla's size is directly linked to visibility and invisibility—Gareth Edwards made his 2014 Godzilla larger than any previous incarnation (350 feet high) in order to make "the monster . . . so big as to be seen from anywhere in the city, but not too big that he couldn't be obscured," allowing the capitalization of fear and anxiety associated with invisibility in the classic horror film.[38] Giganticism in this genre, including Godzilla, Mothra, and King Kong, is accompanied by a number of tropes: the utter destruction of urban architecture—bridges, skyscrapers, and so forth; the ineffectivity of armies, missile systems, or any known defensive weapons in battling the monster; the awakening of a contained monster often associated with a primitive culture and the resulting havoc it wreaks upon civilized societies. The tropes of discovery and conquest are pervasive. King Kong is "discovered" by a film crew and stolen from his primitive and even prehistoric surroundings in order to be put on display in New York.[39] The Empire State Building, because its scale is widely known, can ironically act as the measure of both empire and its conquest, King Kong. These pathologies of scale accompany the aggressive incursion/penetration into new spaces on the globe. The proof of this exploration of the new, other, alien is the creature whose scale is unimaginable, inhuman.

For Sloterdijk, the globe became "the central medium of the new homogenizing approach to location," and its "monopoly on complete views of the earth's surface" was only broken late in the twentieth century by satellite photography.[40] A sense of the world as globe ruptured the experience of location as potentially separate, isolated, and protected. No place was immune from the knowledge that there was more, outside, that one is caught within a global network. Location, for Sloterdijk, is "not a blind spot in a field, but rather a place in which one sees that one is seen" as a consequence of globalization.[41] In this sense, cinema is compensatory. For in the theater, the spectator sees that they are not seen; the credibility of the film's space depends upon it. The delocalization of the spectator (not necessarily their disembodiment) is the precondition for the intense production of location that is a crucial component of cinema.

It is strange that film theory historically has not been more attentive to scale. It is a crucial component of the cinema's representation of space in

a quite specific way that cannot be duplicated in theater or literature, the usual arts invoked in early discussions of cinematic specificity. While the scale model is perhaps the most overt and obvious incarnation of the cinema's ability to exploit the illegibility of scale, that tendency can be seen in the less ostentatious realms of the scale of shots (close-up, medium shot, long shot), the aspect ratio and scale of the screen, perspectival relations, and the very fact of projection (a small frame becomes a dauntingly large projected image). The management of scale in the cinema is a fundamental aspect of its production of a space that resides nowhere else but in the cinema (hence its characterization as "atopia")—a space that could, perhaps, be characterized as both unreadable and overly readable, illusorily navigable and fundamentally disorienting.

The two parts of this book, each containing three chapters, address two aspects of scale in the cinema: first, shot size, with an emphasis on the scale that has dominated film theoretical discourse—the close-up; and, second, larger questions of scale concerning perspective, projection, the screen as surface, and the size of the screen. Chapter 1 traces the vicissitudes of the close-up in the history of film theory and the way in which it uneasily navigates the oppositions between miniature and gigantic, size and distance, interiority and exteriority, detail and totality. Virtually every film theorist, from Hugo Münsterberg to Gilles Deleuze, situates the close-up as vital to their analysis. In part, this is due to the fact that the close-up stands out as the most easily isolable and decipherable unit of filmic technique in an otherwise seemingly continuous and unbroken imagistic flow. In a semiotic form that strikes early observers as objective and without need of human intervention—the machine that writes itself—the close-up also functions to reactivate the domain of the human through its love affair with the face. That face, in its magnitude, elicits panic and delight, both responses hyperbolic, disproportionate. The scale of the close-up stimulates an insistent discourse about its despatialization. It seems to many theorists to extract the face from any recognizable diegetic space, to in effect make it spaceless. This is one of the earliest recognitions of the cinema's potential for a derangement of scale and the construction of a space that has no referent.

Chapter 2 addresses the historical vicissitudes of the close-up, its contradictory reception, and the way in which its scale has been correlated with that of the human body, whether abstractly or concretely conceived. In the early years of the cinema, the close-up was the source of both an anxiety linked to its perceived monstrosity and adulation for its ability to reveal a character's "interiority." The monumental close-up (often referred to as "close

view" or "large view" in journalistic discourse), particularly of the face, was regarded as grotesque, often horrifying, while its violent fragmentation of the body was made equivalent to a form of castration. *The Big Swallow*, discussed earlier, gave witness to an implicit grasp of the close-up's aberrant relation to space, its annihilation of depth, and its testing of the screen as surface and border between the spectator and the diegetic world. The close-up could be *too close*, threatening to invade the space of the viewer, demolishing the otherness of the depicted space. Later, as in IMAX and surround sound, discussed in chapter 6, the expansion of the realm of the diegesis into the auditorium would be celebrated. But here, in the early cinema, the close-up's annihilation of depth, of the existence of a vanishing point so adamantly asserted by the train tracks in the popular films depicting the arrival of a train, was the uneasy sign of a confounding of size and distance and a potential breaching of the demarcation between two incommensurable spaces. Yet the integrity of the diegetic space was bolstered by an alignment of the close-up with characterization. Domesticated by narrative, the close-up could expose the interiority of a character through its magnification of detail and expression. There is a displacement of the depth of the perspectival vanishing point to the depth of interiority, signaled by the face. In this way, the close-up could be subjected to the spatial logic of the narrative. Nevertheless, this domestication of the scalar instability of the close-up was always fragile, tenuous, and threatened to disturb spatial equilibrium, even within classical narrative.

The historical predilection of the close-up for the face is the condition of possibility of yet another implementation of scale in the cinema. The foregrounding of the face in narrative film for purposes of characterization is based upon the assumption of its transparency, its general legibility. Chapter 3 explores early discourses about the readability of facial expression in film and their alignment, whether conscious or unconscious, with the concept of a universal language. The silent cinema as a whole had been equated with a universal language, easily understandable globally, and hence available for worldwide marketing. The alleged transparency of the face anchored the universal language trope in a humanism that seemingly repressed all difference. However, the claims for this legibility relied on the pseudoscience of physiognomy, a discourse that was saturated with assumptions about racial difference and its relation to facial configurations. The concept of a universal language and, indeed, the very concept of the universal were responses to the colonial encounter with difference/otherness. In addition, the perceived necessity of physiognomic guidelines for reading faces also emerged from the increasing

confrontations with strangers in modern urban milieux. Film was seen as a kind of training ground for dealing with the explosive expansion of the world, and its ostensibly easy access to a global scale reconfirmed its modernity.

Part II shifts the focus from the close-up as an isolable unit and the most visible marker of scale within the film to relations between scale and the screen itself. The perception of the cinema as a universal language collaborated with the desire to disseminate it on a worldwide scale, as a global commodity. Chapter 4 details the special contribution of the image of the woman to this economy of scale and the transnational binding of her image to the technology of the screen as a support of this logic of commodification. In this process, the female face is bound to the surface of the screen and annihilates the legibility so crucial to the conceptualization of the cinema as a universal language, producing contradictions that are only precariously resolved. My approach here involves investigating forms of cinema other than the classical Hollywood film (forms that are nonetheless inextricable from thinking about modernity), including the historical avant-garde of the 1920s (Richter and Eggeling, Man Ray, Fernand Léger, Marcel Duchamp) and the avant-garde of the 1960s and 1970s (Andy Warhol and Jean-Luc Godard). These two avant-gardes manifested an intense fascination with light, projection, and the location of the image, and this project was intimately linked to the image of the "modern" woman and her very close relation to the screen. In another register, Shanghai cinema of the 1930s and 1940s deployed the figure of the woman (as did much of Western cinema at the time) as the privileged exemplar of modernity and of the urban reordering of space and its negotiability. This transcultural obsession helps to illuminate the very concept of modernity and the debate about a singular modernity versus multiple modernities.

Projection has historically been integral to the cinema and one of the elements of its specificity. It enables scalar alteration and destabilization—the maneuvering of the large and the small. Chapter 5 analyzes the relationship between projection, perspective, and the scale of the image, as well as the way in which these strategies/structures are linked to the question of location—the location of both the viewer and the image itself. In the history of the generation of moving images, the cinema was preceded by the optical toy, whose image was tangible, localized. Here, I trace the movement from the optical toy, where the illusion of movement is diminutive and holdable as a possession, to the emergence of a publicly viewable cinema, where scale becomes variable and erratic through projection and the dematerialization of the image. In cinematic projection, the distance of the image is a measure

of this dispossession, its intangibility a sign of the increasing abstraction of a consumer economy and the rise of the spectacle. Projection is integral to the cinema but rarely foregrounded in its analysis. In psychoanalysis, it is intimately linked to a confusion between the interior and the exterior and names a fundamental disorientation, a spatiopsychical instability. In the avant-garde of the 1960s and 1970s, projection becomes a technology that is disengaged from any content of the image in flicker films and the work of Anthony McCall (for instance, in *Line Describing a Cone*, 1973).

Projection, in its geometric signification, refers to a plotting of points to produce a two-dimensional representation of a three-dimensional space—hence its strong affiliation with not only the cinema but also mapping, the translation of a sphere, the globe, onto a flat surface. Cartography is about location, navigation, and the generation of space as homogeneous and rational. Renaissance perspective shares a history with mapping and also produces a space that is systematic and homogeneous. Both are about location, position, "knowing where one is." The grids of latitude and longitude in mapping and the network of orthogonals and transversals in perspective situate both places and viewers in a stable and knowable site. In the work of Albrecht Dürer and others, perspective is inseparable from the idea of bodily proportion—both are concerned with achieving "harmony" and "correctness," one in relation to space, the other in relation to the human body. In this context, the female body resists and is instead allied with a fundamental *disproportion*, destabilizing the homogeneous space of perspective and suggesting the conundrums of its concepts of the vanishing point and infinity. A number of artworks—including Dürer's famous illustration of the production of perspective using a grid, *Draughtsman Making a Perspective Drawing of a Reclining Woman* (ca. 1600); Gustave Courbet's *Origin of the World*; and Marcel Duchamp's *Étant donnés*—give witness to this difficulty of thinking the spatiality of the female body in relation to the coherence and homogeneity of perspective.

Perspective is often situated as a technology that has been superseded in the current era by the pervasiveness and apparent inescapability of the aerial view and what has been labeled its "vertical perspective." Drones, surveillance cameras, military aerial photography, and the zooming and floating vision facilitated by Google Earth obliterate the power of the horizon in vertical perspective and situate the spectator in an unstable place—suspended, hovering. Ironically, GPS, which provides perhaps the vertical perspective par excellence, is designed to orient the viewer and pinpoint location. It increases exponentially the scale of our access to any part of the earth. Yet, as the image

becomes a heterogeneous collection of data only mimicking wholeness, the viewer's orientation is based upon a profound disorientation. While perspective strove to guarantee a stable position of vision, to make the world available for representation, the aerial view bestows upon the spectator a military, strategic, and probing comprehension and a perpetually shifting perception.

The satellite view and the zoom of Google Earth escalate the stakes of scale. On a more "local" level, this can be seen in the proliferation of different sizes of screens from mobile phones to IMAX. IMAX in a sense competes with these modes of viewing, exploiting the zoom through space of Google Earth in its attempt to "immerse" the spectator in an ever-expanding world/diegesis. From its emergence in the world fairs and expos of the 1970s to its later transformation into a mainstream narrative format, IMAX has always been about large scale, sheer magnitude. Like widescreen processes before it, IMAX attempted to expand the space of the diegesis to more intensely engage the spectator in its "world." Together with surround sound processes such as Dolby Atmos, it strives to eliminate the frame, invading spectatorial space. Chapter 6 dissects these two technologies and their relation to the concept of "immersion," an idea that goes beyond the realism and absorption of classical film and is defined primarily as a relation between the body and space. The rhetoric of immersion, deployed within both IMAX advertising and critical discourse, is symptomatic of a crisis of location in technologically mediated space—a despatialization, a reconceptualization of position, scale, and infinity that undergird the mechanisms of late capitalism and its incessant expansion of commodification. Immersion is always about the provision of an elsewhere designed as a lure, so much so that it is often portrayed as an inevitable end point of media history. The vicissitudes of scale discussed throughout this book in relation to cinema constitute early stages of a reconfiguration and abstraction of space and its corollary dislocation of the spectator.

Scale is always comparative, relational—a ratio—and it can only be understood as produced for a particular viewpoint or subjectivity, a perspective. Most frequently, this perspective exhibits an anthropocentric and hence humanist bias. As outlined in chapter 2, this bias is deeply inscribed in the analytical classification of types of shots (close-up, medium shot, long shot) and their various gradations—medium long shot, medium close-up, and even *plan américain*, all defined in relation to the human body. In the reception of early cinema, the demand for "life-size" representation of objects and human beings was a demand for a ratio of one-to-one, of a complete mimesis of the scale of everyday life. Once the anxiety attached to the close-up of the human

face was allayed, the rationalization of shot size continued to append itself to the human body. As Pascal Bonitzer has pointed out, if the entire body of a cockroach fills the frame, we call it a close-up or an extreme close-up. If the frame encompasses the entire body of a human being, we call it a medium shot, or medium long shot (*plan général*). The close-up originally responded to a narrative requirement for representation of the intensity and differentiation of emotions—"It is therefore, retroactively, in relation to the close-up, that the difference of shots (the sizes of shots) takes on meaning" and "The cinematographic impression of reality is sustained by human stature and reciprocally."[42] Modern cinema (e.g., Godard and Syberberg), according to Bonitzer, negates or at least represses this anthropocentrism and opens up a dimension that is "nonhuman, infrahuman, or extrahuman: that of the gods and the quarks [subatomic particles]."[43]

This desire to exceed or surpass the scale of the human has been allied historically with film theory insofar as the camera lens is understood as inhuman, "objective," independent of authorial perspective. For André Bazin, the painter's work was "always in fee to an inescapable subjectivity," and photography and cinema satisfy our desire for realism with "a mechanical reproduction in the making of which man plays no part."[44] For Jean Epstein, *photogénie*, the essence of cinema, is "the taste of things . . . the human eye cannot discover it directly . . . a lens zeroes in on it, drains it, distilling *photogénie* between its focal planes."[45] The documentary movement of cinema verité was sustained by the assumption of the detachment and impartiality of the lens whose only function was to observe, independently of the human eye. In terms of scale, one of the earliest uses of film was for the scientific recording of microscopic images of cells and structures invisible to human beings.

From a somewhat different perspective, this desire to transcend or surpass the human has been espoused by certain trends in contemporary theory, including "new materialism," posthumanism, and thing theory, and often these discourses invoke the concept of scale.[46] Karen Barad, for instance, insists that distinctive scales such as the local, the national, and the global do not have "nesting relations" in which one is simply included as a miniature (or larger) version of the other. Rather, "this 'connectedness' should be understood not as linkages among preexisting nested scales but as the agential enfolding of different scales through one another . . . intra-actively produced through one another."[47] The "agential realism" she espouses returns agency to matter so that determination becomes an intricately entangled dance of different factors, only part of which is the human (which is highly overrated

in her theory): "In my agential realist account, intelligibility is an ontological performance of the world in its ongoing articulation. It is not a human-dependent characteristic but a feature of the world in its differential becoming. The world articulates itself differently."[48] Zachary Horton pursues the implications of Barad's approach in his impressive and incisive analysis of the mediation of scale. Horton advocates a "trans-scalar ecology" that would honor the "difference that is immanent to matter itself." Citing Barad, he claims that "matter differentiates itself, and thus meaning arises as a material rather than mental process."[49] This is a far cry from the linguistic and semiotic understanding of difference as the central mechanism of language and underlines the degree to which the new materialisms constitute a rejection of structuralism and poststructuralism. Scale achieves an ontological status in this approach—for Horton, "scalar difference is real and ontologically prior to our encounter with objects at other scales," and "we make scales, but scale bites back."[50] Scale is presented as a subject, as an already given environment, with different scales providing different logics and determinations incompatible with other scales.

I share Horton's leeriness of anthropocentric scales that are calibrated in relation to the human, particularly the human body. But I also believe that the concept of scale is inevitably one that is produced through human discourse (a discourse that can be anthropocentric or not). It has no ontology. To the extent that scale is always comparative (even in the metric system), it is a ratio, a word whose etymology is traceable to *logos* in ancient Greek and reason/the rational in Latin. The scales of the interplanetary and the microscopic are certainly alien to the space and scale of human encounter, but they are accessible to us and made knowable through scientific and social technologies. One could go further and claim that precisely as scales they are generated by human discourse (although this term is redundant). Microscopic realms are diminutive not for the beings/things that inhabit these realms but for those who label them. The technological/medial generation of scales perceived as "other," that is, mind-bogglingly large or staggeringly small, no doubt produces anxiety about the fragile, precarious, and potentially meaningless domain of the human (which is not equatable with humanism as an ideology). This anxiety is reinforced by climate change, the glut of information/data made possible by computers, the technological compression of space and time and corresponding annihilation of distance, and the illusory dematerialization of the digital. There seem to be two responses to this predicament. The first would be a form of abdication of analysis/interpretation and a corresponding celebration of the posthuman and the ontological

agency of matter—that is, new materialism (or a kind of rematerialization in the wake of the digital). In its rhetorical embrace of rhizomes, material flows, intensities, and dynamics, as well as irreducible complexity, this approach ironically resigns itself to an unending description as methodology and the (unacknowledged) renunciation of a political position of analysis. The second response to this anxiety is the resuscitation of a nostalgia for the "life-size," human scale, the antitechnological. This nostalgia is manifested in the work of, among others, Jonathan Crary, Peter Sloterdijk, and Paul Virilio.[51]

Virilio, for instance, distinguishes between a "small-scale optics," that is, a geometric optics of Renaissance perspective (an optics "which, in the end, only covers man's immediate proximity"), and a "large-scale optics," the "active optics of the time of the speed of light," an optics that "disregards the traditional notion of a horizon." Here, scale refers to a way of inhabiting space and time. The concept of a large-scale optics emerges in relation to phenomena such as teleconferencing and the digital more broadly, which are made possible by real-time emission and instantaneous reception of audiovisual signals. Its scale is that of time and instantaneity, and it crushes the optics of perspective, the horizon, and the vanishing point. In teleconferencing, the "now" outweighs the "here" of the meeting room and the meeting, in fact, takes place nowhere. While perspectival small-scale optics preserves the concepts of extension and duration and hence geography, large-scale optics "dissolves the scale of the human environment." What is lost in this transition is the quality of the "life-size." But, in fact, there are a series of associated losses for Virilio—the horizon, optical density, physical proximity, depth of field (everything is flattened)—and ultimately what is risked is the loss of "our own world." There is a slippage in Virilio's argument between the here and now of our everyday life, of our apprehension of time and space, and a perspectival optics, which is not the optics of everyday life but that of representation, mediation. This becomes most evident when he laments the loss of the horizon and a perspective "that previously allowed us to recognize ourselves here and now."[52] Perspective as a representational strategy is indeed about position and location, but it does not mirror the position and location of everyday life. As has been extensively argued in film theory and elsewhere, perspective *constructs and rationalizes* a position for the spectator. In this sense, it has been viewed as stabilizing, especially in comparison with the realm of the digital. Virilio is not the only theorist who makes this claim. Hito Steyerl, for instance, has argued that the vertical perspective of contemporary digital media (of drones and satellite imaging), in contrast with

the stable horizon of perspective, induces a sense of floating and free fall in the spectator, producing both a new set of ideological constraints and new forms of political possibility in art.[53]

Nevertheless, I think it is crucial to understand how the vicissitudes of scale in the cinema act as a kind of premonition of the placelessness of new technologies and allow it in its own way to disturb the "here and now" of the spectator. Cinema's deployment of differently scaled shots, its use of the scale model and especially the close-up constitute a derangement of scale that upends classical notions of location and orientation. As Susan Stewart has extensively demonstrated, the cultural fascination with the miniature and the gigantic predates the cinema by centuries. But the cinema builds into its representation or deployment of scale a position or location for the spectator in relation to its world. As Robert Bird has maintained in another context, film "animates a subjectivity that is capable of viewing it," of absorbing its scalar logic.[54] In the cinema, the miniature and the gigantic do not inhabit the world of ordinary proportions, where the astonishment/shock of their difference constitutes a great deal of their pleasure. The cinema, through the very fact of projection, produces a world of imaginary proportions and interpolates the spectator within it. The here and now of the spectator's location in the theater disappears as location is dynamically produced. It is not "large-scale optics," in Virilio's terms, that initiates the process of dissolving "the scale of the human environment," but the cinema before it which activates another scalar logic.

Notes

Introduction

Epigraph: Robert Smithson, "A Cinematic Atopia," in *Robert Smithson, the Collected Writings*, ed. Jack Flam (Berkeley: University of California Press, 1996), 141.

1 See Béla Balázs, *Theory of the Film: Character and Growth of a New Art*, trans. Edith Bone (New York: Dover, 1970); Jean Epstein, "*Bonjour cinéma* and Other Writings," trans. Tom Milne, *Afterimage* 10 (1981): 8–39; Gilles Deleuze, *Cinema 1: The Movement-Image*, trans. Hugh Tomlinson and Barbara Habberjam (Minneapolis: University of Minnesota Press, 1986). Also see my article "The Close-Up: Scale and Detail in the Cinema," *differences: A Journal of Feminist Cultural Studies* 14, no. 3 (Fall 2003): 89–111.

2 Sergei Eisenstein, *Au-déla des étoiles*, trans. from Russian into French by Jacques Aumont et al. (Paris: Union Général d'Editions, 1974), 229. Translations into English within the text are my own.

3 Eisenstein, *Au-déla des étoiles*, 112.

4 Noël Burch, *Life to Those Shadows* (Berkeley: University of California Press, 1990), 202. There are a number of excellent readings of this short film, including Tom Gunning, "The Impossible Body of Early Film," in *Corporeality in Early Cinema*, ed. Marina Dahlquist et al. (Bloomington: Indiana University Press, 2018), 13–24; and Akira Mizuta Lippit, *Atomic Light (Shadow Optics)* (Minneapolis: University of Minnesota Press, 2005), 71–73.

5 Serge Daney, "The Forbidden Zoom," *Framework: The Journal of Cinema and Media*, no. 32/33 (1986): 177.

6 John Belton, "The Bionic Eye: Zoom Esthetics," *Cinéaste* 11, no. 1 (Winter 1980–81): 21. This is the authentic version of Belton's essay, which had been published earlier by *Film Comment* in an altered form, adding a coauthor and substantially changing the content without consulting Belton. See John Belton and Lyle Tector, "The Bionic Eye: The Aesthetics of the Zoom," *Film Comment* 16, no. 5 (September–October 1980): 12.

7 *Oxford English Dictionary*, 2nd ed. (Oxford: Oxford University Press, 1989; online ed., 2016), s.v. "scale, n. 3," accessed August 2, 2016, https://www.oed.com.

8 *Oxford English Dictionary*, s.v. "scale, n. 2," accessed August 2, 2016, https://www.oed.com.

9 Andrew Kirby, "Popular Culture, Academic Discourse, and the Incongruities of Scale," in *Geographies of Power: Placing Scale*, ed. Andrew Herod and Melissa W. Wright (Malden, MA: Blackwell, 2002), 74.

10 Sallie Marston, Keith Woodward, and John Paul Jones III, "Scale," in *Dictionary of Human Geography*, ed. Derrek Gregory et al., 5th ed. (Malden, MA: Wiley-Blackwell, 2009), 665.

11 "What Does 'Scale the Business' Mean? How a Common Word Became a Staple of Business Jargon," Merriam-Webster, accessed July 27, 2019, https://www.merriam-webster.com/words-at-play/scale-the-business-meaning-origin.

12 See Sallie A. Marston, "The Social Construction of Scale," *Progress in Human Geography* 24, no. 2 (2000): 219–42; Sallie A. Marston and Neil Smith, "States, Scales, and Households: Limits to Scale Thinking?," *Progress in Human Geography* 25, no. 4 (2001): 615–19.

13 Marston, Woodward, and Jones, "Scale," 666.

14 Joan Kee and Emanuele Lugli, "Scale to Size: An Introduction," in *To Scale*, ed. Joan Kee and Emanuele Lugli (West Sussex: Wiley Blackwell, 2015), 10.

15 Anne Wagner, "Scale in Sculpture: The Sixties and Henry Moore: Rothenstein Lecture," in *Tate Papers*, no. 15 (Spring 2011), https://www.tate.org.uk/research/publications/tate-papers/15/scale-in-sculpture-the-sixties-and-henry-moore.

16 Emanuele Lugli, *The Making of Measure and the Promise of Sameness* (Chicago: University of Chicago Press, 2019), 214.

17 Robert Tavernor, *Smoot's Ear: The Measure of Humanity* (New Haven, CT: Yale University Press), 2007.

18 Tavernor, *Smoot's Ear*, xvi.

19 Oliver Wendell Holmes, "The Stereoscope and the Stereograph," in *Classic Essays on Photography*, ed. Alan Trachtenberg (New Haven, CT: Leete's Island Books, 1980), 81.

20 See Jan Holmberg's dissertation on the close-up, "Förtätade bilder: Filmens närbilder I historisk och teoretisk belysning" (PhD diss., Stockholms Universitet [Sweden], 2000), ProQuest Dissertations Publishing (CA36980). I am grateful to Jan Holmberg for providing me with an English translation of chapter 3, "Large and Small."

21 Jeremy Blatter, "Constructing Scale," in *Paper Worlds: Printing Knowledge in Early Modern Europe* (Cambridge, MA: Collection of Historical Scientific Instruments, Houghton Library, Harvard University, 2010), 73–74, exhibition catalog.

22 Jorge Louis Borges, "Of Exactitude in Science," in *Jorges Luis Borges: Collected Fictions*, trans. Andrew Hurley (New York: Penguin Books, 1999), 325.

23 Computer-generated imagery (CGI) may seem to have obliterated the necessity of scale models, but it still operates in relation to the production of scales and scalar systems, and scale models themselves have not disappeared.

24 See Joseph A. Ball, "Theory of Mechanical Miniatures in Cinematography," *Transactions of SMPE*, no. 18 (May 1924): 119–26; and G. F. Hutchins, "Dimen-

sional Analysis as an Aid to Miniature Cinematography," *Journal of the Society of Motion Picture Engineers* 14, no. 4 (1930): 377–83, for the early discussion of these issues, mostly revolving around the search for an algorithm that would accurately translate linear scale into frame rate. The term "miniature" was most frequently used to denote a scale model at this time. The discussion following Ball's essay is noteworthy for its focus on human scale and expectations that would undermine the audience's perception of a human as gigantic. The argument was that audiences would perceive a human walking in slow motion as more likely to denote a human being subjected to a lack of gravity, for instance, walking on the moon, than to perceive the human as gigantic. Since walking on the moon would only become a common image more than forty years later, this is a striking illustration of the persistence and embeddedness of human scale as a norm. See also Sarine Waltenspül, "The Camera as a Scaling Instrument: Focus on Cinematographic Modelling Techniques," trans. Burke Barrett, in *Too Big to Scale—On Scaling Space, Numbers, Time and Energy*, ed. Forian Dombois and Julie Harboe (Zurich: Verlag Scheidegger & Spiess AG, 2017), 33–48, for an intriguing discussion of the scaling of "size via the detour of time" (43) and the contradictory doubleness of the cinematographic scale model, which is scaled differently in both profilmic space (smaller) and screen space (larger). I am grateful to Florian Dombois for alerting me to this work and to the phenomenon of film rate manipulation. For more discussion of the scale model (miniature) and its relation to temporality, see Raymond Fielding, *The Technique of Special Effects Cinematography*, 4th ed. (London: Focal Press, 1985), 322–86.

25 Robert Smithson, "A Cinematic Utopia," in *Robert Smithson: The Collected Writings*, ed. Jack Flam (Berkeley: University of California Press, 1996), 141.

26 Cited in Marta Braun, *Picturing Time: The Work of Etienne-Jules Marey (1830–1904)* (Chicago: University of Chicago Press, 1992), 155. See esp. 155–56 for a discussion of Marey's attempts to develop a motion picture camera.

27 See Tom Gunning, "Phantasmagoria and the Manufacturing of Illusions and Wonder: Towards a Cultural Optics of the Cinematic Apparatus," in *The Cinema, a New Technology for the 20th Century*, ed. André Gaudreault, Catherine Russell, and Pierre Veronneau (Lausanne: Editions Payot Lausanne, 2004), 31–44.

28 Katharina Loew, "Magic Mirrors: The Schüfftan Process," in *Special Effects: New Histories/Theories/Contexts*, ed. Dan North, Bob Rehak, and Michael S. Duffy (London: Palgrave, 2015), 63. As Loew argues, the Schüfftan process standardized and commodified the bricoleur-like production of special effects that had previously been associated with art and handicraft in relation to singular filmic challenges that demanded varying approaches. For a discussion of the Schüfftan process, see also Fielding, *The Technique of Special Effects Cinematography*, 61–68.

29 Loew, "Magic Mirrors," 65.

30 Loew, "Magic Mirrors," 66.

31 Le Corbusier, *The Modulor: A Harmonious Measure to the Human Scale Universally Applicable to Architecture and Mechanics* (Cambridge, MA: Harvard University Press, 1954), 20.

32 Le Corbusier, *The Modulor*, 19.

33 Christopher Lukinbeal, "Scale: An Unstable Representational Analogy," *Media Fields Journal*, no. 4 (2012): 2; quoting Witold Kulu, *Measures of Men*, trans. R. Szreter (Princeton, NJ: Princeton University Press, 1986), 100.

34 The current definition of the meter is based on the speed of light—it is the distance traveled by light in a specific fraction (1/299,792,458) of a second. This illustrates a move away from the guarantee of measure incarnated in a tactile object and toward the abstraction of measurement (this trajectory is also that of the kilogram).

35 Peter Sloterdijk, *Spheres*, vol. 2, *Globes*, *Macrospherology*, trans. Wieland Hoban (South Pasadena, CA: Semiotext(e), 2014), 868.

36 Quoted in Peter H. Brothers, "Japan's Nuclear Nightmare: How the Bomb Became a Beast Called Godzilla," *Cineaste* 36, no. 3 (Summer 2011): 36.

37 Wikipedia, "Godzilla," accessed August 5, 2016, https://en.wikipedia.org/w/index.php?title=Godzilla_(1954_film)&oldid=731652267.

38 Kwame Owusu, "The New Godzilla Is 350 Feet Tall! Biggest Godzilla Ever!," *Movie Tribute*, February 28, 2014, https://www.movietribute.com/874/new-godzilla-is-350-feet-tall-biggest-godzilla-ever/.

39 See Fatimah Tobing Rony, *The Third Eye: Race, Cinema, and Ethnographic Spectacle* (Durham, NC: Duke University Press, 1996).

40 Sloterdijk, *Spheres*, 2:785.

41 Sloterdijk, *Spheres*, 2:936.

42 Pascal Bonitzer, "Les dieux et les quarks," *Cahiers du cinéma*, no. 295 (December 1978): 8 (my translation).

43 Bonitzer, "Les dieux et les quarks," 8 (my translation).

44 André Bazin, "The Ontology of the Photographic Image," in *What Is Cinema?*, ed. and trans. Hugh Gray (Berkeley: University of California Press, 2005), 1:12.

45 Epstein, "*Bonjour cinéma* and Other Writings," 13.

46 See Bill Brown, "Thing Theory," *Critical Inquiry* 28, no. 1 (Autumn 2001): 1–22; Bill Brown, *A Sense of Things: The Object Matter of American Literature* (Chicago: University of Chicago Press, 2004); Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham, NC: Duke University Press, 2010); Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham, NC: Duke University Press, 2007).

47 Barad, *Meeting the Universe Halfway*, 245.

48 Barad, *Meeting the Universe Halfway*, 149.

49 Zachary K. Horton, "Mediating Scale: From the Cosmic Zoom to Trans-scalar Ecology" (PhD diss., University of California, Santa Barbara, 2015), 92.

50 Horton, "Mediating Scale," 76.

51 See Jonathan Crary, *24/7: Late Capitalism and the Ends of Sleep* (New York: Verso, 2014); Sloterdijk, *Spheres*, vol. 2; Paul Virilio, *Open Sky*, trans. Julie Rose (New York: Verso, 2008).

52 Virilio, *Open Sky*, 44.

53 Hito Steyerl, "In Free Fall: A Thought Experiment on Vertical Perspective," in *The Wretched of the Screen*, ed. Julieta Aranda, Brian Kuan Wood, and Anton Vidokle (Berlin: Sternberg Press/e-flux journal, 2013), 12–30. However, it is important to note that for Steyerl there is no return to a pretechnological era.

54 Robert Bird, "How to Keep Communism Aloft: Labor, Energy, and the Model Cosmos in Soviet Cinema," *e-flux journal*, no. 88 (February 2018): 9.

Chapter 1. The Delirium of a Minimal Unit

A primitive version of chapter 1 was published in *differences: A Journal of Feminist Cultural Studies* 14, no. 3 (Fall 2003).

1 See Donald L. Fredericksen, *The Aesthetic of Isolation in Film Theory: Hugo Münsterberg* (New York: Arno, 1977); Noël Carroll, "Film/Mind Analogies: The Case of Hugo Munsterberg," *Journal of Aesthetics and Art Criticism* 46, no. 4 (1988): 489–99. For a brief discussion of Münsterberg's pioneering of "psychotechnics," see Friedrich Kittler, *Discourse Networks 1800/1900*, trans. Michael Metteer with Chris Cullens (Stanford, CA: Stanford University Press, 1990), 225–26; Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford, CA: Stanford University Press, 1999), 159–60; and Kittler, *Optical Media: Berlin Lectures 1999*, trans. Anthony Enns (Cambridge: Polity, 2010), 175. See also Giuliana Bruno, "Film, Aesthetics, Science: Hugo Münsterberg's Laboratory of Moving Images," *Grey Room* 36 (Summer 2009): 88–113, which argues that the technical instruments of Münsterberg's experimental laboratory at Harvard were closely connected to his theory of film, which was, for Münsterberg, a "laboratory of emotion" (100).

2 The revolver is often used as a privileged example of the close-up, here and in Christian Metz, *Film Language: A Semiotics of the Cinema*, trans. Michael Taylor (New York: Oxford University Press, 1974), 67; and Jean Epstein, "The Cinema Seen from Etna" and "On Certain Characteristics of *Photogénie*," trans. Stuart Liebman, in *Jean Epstein: Critical Essays and New Translations*, ed. Sarah Keller and Jason N. Paul (Amsterdam: Amsterdam University Press, 2012), 290, 295.

3 Hugo Münsterberg, *Hugo Münsterberg on Film: The Photoplay—A Psychological Study and Other Writings*, ed. Allan Langdale (New York: Routledge, 2002), 86.

4 Münsterberg, *Hugo Münsterberg on Film*, 86–87.

5 Münsterberg, *Hugo Münsterberg on Film*, 62.

6 Münsterberg, *Hugo Münsterberg on Film*, 117.

7 Münsterberg, *Hugo Münsterberg on Film*, 153.