

Hito Steyerl

In Free Fall: A Thought Experiment on Vertical Perspective

01/11

e-flux journal #24 — april 2011 Hito Steyerl
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Imagine you are falling. But there is no ground.

Many contemporary philosophers have pointed out that the present moment is distinguished by a prevailing condition of groundlessness.¹ We cannot assume any stable ground on which to base metaphysical claims or foundational political myths. At best, we are faced with temporary, contingent, and partial attempts at grounding. But if there is no stable ground available for our social lives and philosophical aspirations, the consequence must be a permanent, or at least intermittent state of free fall for subjects and objects alike. But why don't we notice?

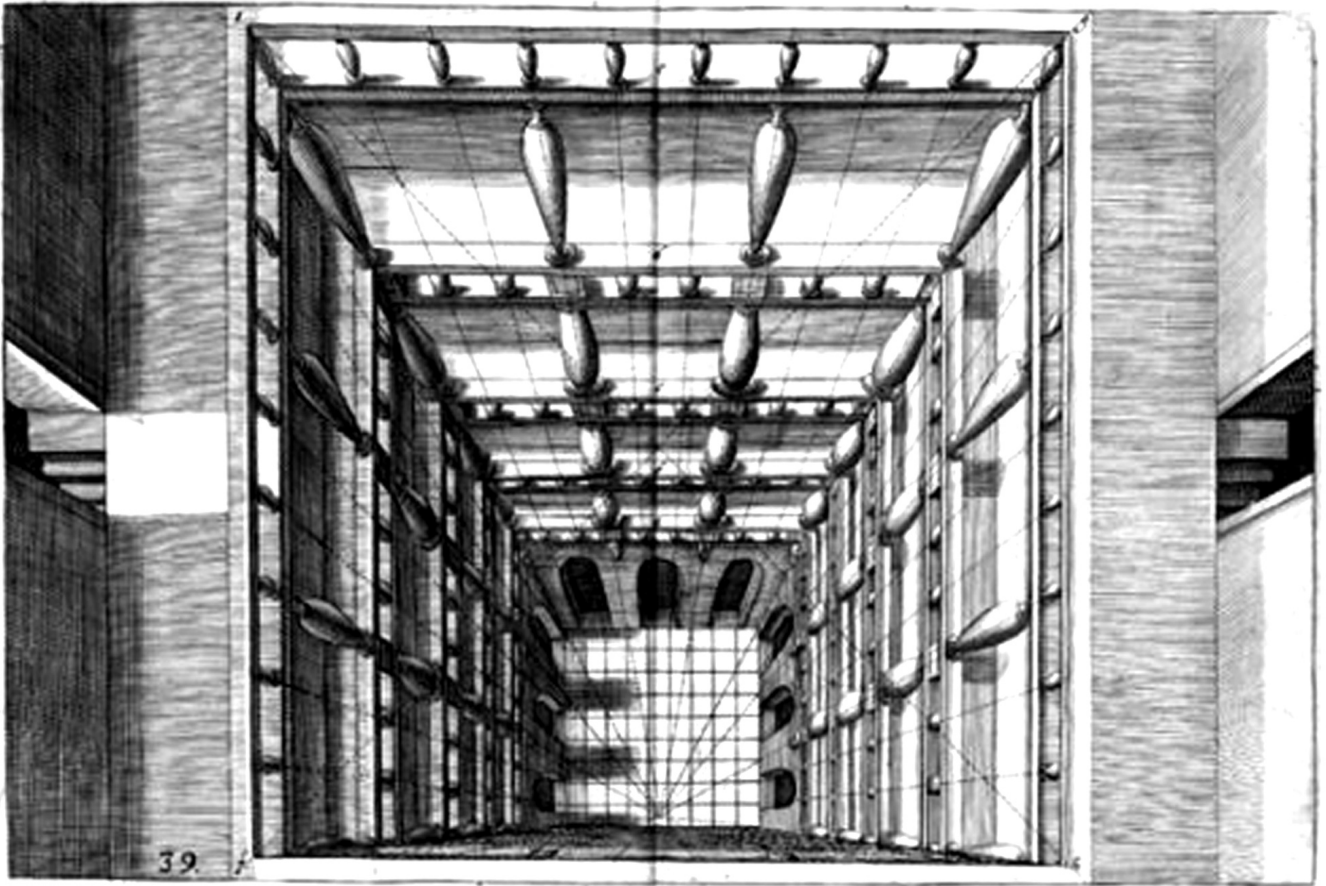
Paradoxically, while you are falling, you will probably feel as if you are floating – or not even moving at all. Falling is relational – if there is nothing to fall toward, you may not even be aware that you're falling. If there is no ground, gravity might be low and you'll feel weightless. Objects will stay suspended if you let go of them. Whole societies around you may be falling just as you are. And it may actually feel like perfect stasis – as if history and time have ended and you can't even remember that time ever moved forward.

As you are falling, your sense of orientation may start to play additional tricks on you. The horizon quivers in a maze of collapsing lines and you may lose any sense of above and below, of before and after, of yourself and your boundaries. Pilots have even reported that free fall can trigger a feeling of confusion between the self and the aircraft. While falling, people may sense themselves as being things, while things may sense that they are people. Traditional modes of seeing and feeling are shattered. Any sense of balance is disrupted. Perspectives are twisted and multiplied. New types of visuality arise.

This disorientation is partly due to the loss of a stable horizon. And with the loss of horizon also comes the departure of a stable paradigm of orientation, which has situated concepts of subject and object, of time and space, throughout modernity. In falling, the lines of the horizon shatter, twirl around, and superimpose.

A Brief History of the Horizon

Our sense of spatial and temporal orientation has changed dramatically in recent years, prompted by new technologies of surveillance, tracking, and targeting. One of the symptoms of this transformation is the growing importance of aerial views: overviews, Google Map views, satellite views. We are growing increasingly accustomed to what used to be called a God's-eye view. On the other hand, we also notice the decreasing importance of a paradigm of visuality that long dominated our vision: linear perspective. Its stable and single point of view is



Hans Vredeman de Vries, plate in *Perspective*, 1604-1605.

being supplemented (and often replaced) by multiple perspectives, overlapping windows, distorted flight lines, and divergent vanishing points. How could these changes be related to the phenomena of groundlessness and permanent fall?

First, let's take a step back and consider the crucial role of the horizon in all of this. Our traditional sense of orientation – and, with it, modern concepts of time and space – are based on a stable line: the horizon line. Its stability hinges on the stability of an observer, who is thought to be located on a ground of sorts, a shoreline, a boat – a ground that can be imagined as stable, even if in fact it is not.

The horizon line was an extremely important element in navigation. It defined the limits of communication and understanding. Beyond the horizon, there was only muteness and silence. Within it, things could be made visible. But it could also be used for determining one's own location and relation to one's surroundings, destinations, or ambitions.

Early navigation consisted of gestures and bodily poses relating to the horizon. "In early days, [Arab navigators] used one or two fingers width, a thumb and little finger on an outstretched arm, or an arrow held at arm's

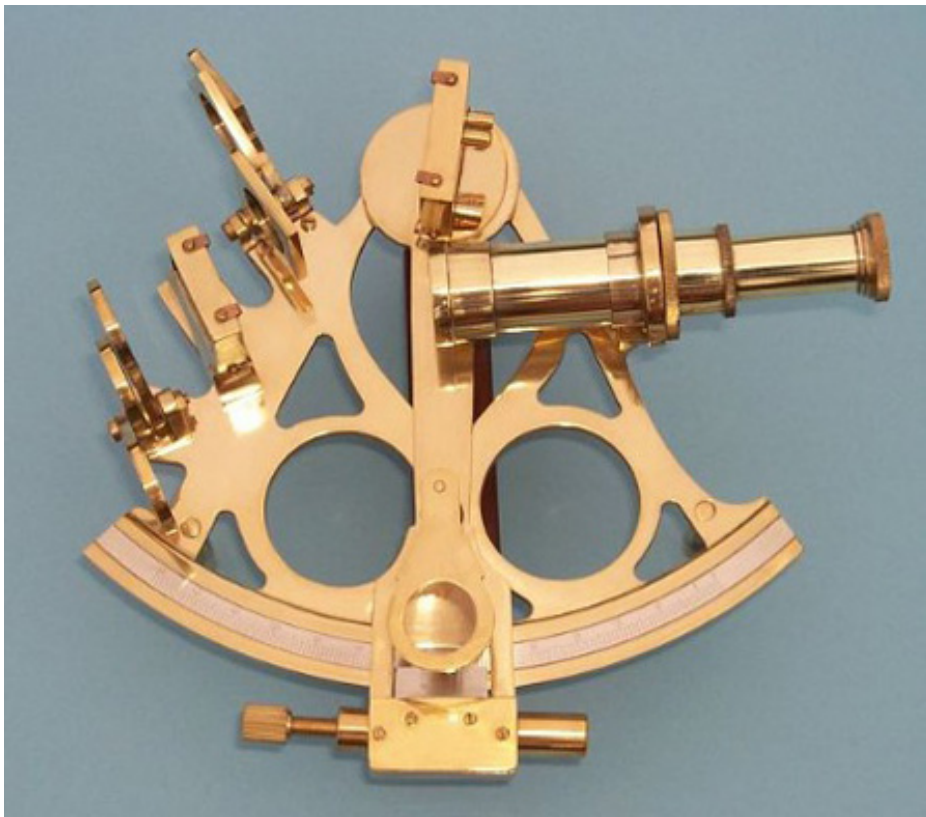
length to sight the horizon at the lower end and Polaris at the upper."² The angle between the horizon and the Pole star gave information about the altitude of one's position. This measurement method was known as *sighting* the object, *shooting* the object, or *taking a sight*. In this way, one's own location could be at least roughly determined.

Instruments like the astrolabe, quadrant, and sextant refined this way of gaining orientation by using the horizon and the stars. One of the main obstacles with this technology was the fact that the ground on which sailors stood was never stable in the first place. The stable horizon mostly remained a projection, until artificial horizons were eventually invented in order to create the illusion of stability.

The use of the horizon to calculate position gave seafarers a sense of orientation, thus also enabling colonialism and the spread of a capitalist global market, but also became an important tool for the construction of the optical paradigms that came to define modernity, the most important paradigm being that of so-called linear perspective.

As early as 1028, Abu Ali al-Hasan ibn al-Haytham (965–1040), also known as Alhazen, wrote a book of visual theory, *Kitab al-Manazir*.

03/11



The sextant, a nautical instrument which determined the angle between a celestial object and the horizon.

After 1200, it became available in Europe and spawned numerous experiments in visual production between the thirteenth and fifteenth centuries, which culminated in the development of linear perspective.

In Duccio's *Last Supper* (1308–1311), several vanishing points are still evident. The perspectives in this space do not coalesce into a horizon line, nor do they all intersect in one single vanishing point. But in *Miracle of the Desecrated Host (Scene I)* (1465–69), painted by Paolo Uccello, who was one of the most ardent experimenters in the development of linear perspective, the perspective is aligned to culminate in one single vanishing point, located on a virtual horizon defined by the eye line.

Linear perspective is based on several decisive negations. First, the curvature of the earth is typically disregarded. The horizon is conceived as an abstract flat line upon which the points on any horizontal plane converge. Additionally, as Erwin Panofsky argued, the construction of linear perspective declares the view of a one-eyed and immobile spectator as a norm – and this view is itself assumed to be natural, scientific, and objective. Thus, linear perspective is based on an abstraction, and does not correspond to any subjective perception.³

04/11

Instead, it computes a mathematical, flattened, infinite, continuous, and homogenous space, and declares it to be reality. Linear perspective creates the illusion of a quasi-natural view to the “outside,” as if the image plane was a window opening onto the “real” world. This is also the literal meaning of the Latin *perspectiva*: to see through.

This space defined by linear perspective is calculable, navigable, and predictable. It allows the calculation of future risk, which can be anticipated, and therefore, managed. As a consequence, linear perspective not only transforms space, but also introduces the notion of a linear time, which allows mathematical prediction and, with it, linear progress. This is the second, temporal meaning of perspective: a view onto a calculable future. As Walter Benjamin argued, time can become just as homogenous and empty as space.⁴ And for all these calculations to operate, we must necessarily assume an observer standing on a stable ground looking out towards a vanishing point on a flat, and actually quite artificial, horizon.

But linear perspective also performs an ambivalent operation concerning the viewer. As the whole paradigm converges in one of the



Paolo Uccello, *Miracle of the Desecrated Host (Scene I and 5)*, 1465-69.

viewer's eyes, the viewer becomes central to the worldview established by it. The viewer is mirrored in the vanishing point, and thus constructed by it. The vanishing point gives the observer a body and a position. But on the other hand, the spectator's importance is also undermined by the assumption that vision follows scientific laws. While empowering the subject by placing it at the center of vision, linear perspective also undermines the viewer's individuality by subjecting it to supposedly objective laws of representation.

Needless to say, this reinvention of the subject, time, and space was an additional toolkit for enabling Western dominance, and the dominance of its concepts – as well as for redefining standards of representation, time, and space. All of these components are evident in Uccello's six-panel painting, *Miracle of the Desecrated Host* (1465-69). In the first panel, a woman sells a Host to a Jewish merchant, who in the second panel tries to "desecrate" it. For this, the Jewish merchant ends up at the stakes. Along with his wife and two small children, he is tied to a pillar on which parallels converge as if it were a target mark. The date of these panels shortly prefigures the expulsion of Jews and Muslims from Spain in 1492, also the year of

05/11

Christopher Columbus's expedition to the West Indies.⁵ In these paintings, linear perspective becomes a matrix for racial and religious propaganda, and related atrocities. This so-called scientific worldview helped set standards for marking people as other, thus legitimizing their conquest or the domination over them.

On the other hand, linear perspective also carries the seeds of its own downfall. Its scientific allure and objectivist attitude established a universal claim for representation, a link to veracity that undermined particularistic worldviews, even if halfheartedly and belatedly. It thus became a hostage to the truth it had so confidently proclaimed. And a deep suspicion was planted alongside its claims for veracity from its inception.

The Downfall of Linear Perspective

But the situation now is somewhat different. We seem to be in a state of transition toward one or several other visual paradigms. Linear perspective has been supplemented by other types of vision to the point where we may have to conclude that its status as the dominant visual paradigm is changing.

This transition was already apparent in the nineteenth century in the field of painting. One



Netscape's Jim Clark stands atop 192ft mast of his "superyacht," Hyperion, during a 1998 Fortune shoot. Louie Psihoyos/Science Faction Images.

work in particular expresses the circumstances of this transformation: *The Slave Ship* (1840), by J. M. W. Turner. The scene in the painting represents a real incident: when the captain of a slave ship discovered that his insurance only covered slaves lost at sea, and not those dying or ill on board, he ordered all dying and sick slaves to be thrown overboard. Turner's painting captures the moment where the slaves are beginning to go under.

In this painting, the horizon line, if distinguishable at all, is tilted, curved, and troubled. The observer has lost his stable position. There are no parallels that could converge at a single vanishing point. The sun, which is at the center of the composition, is multiplied in reflections. The observer is upset, displaced, beside himself at the sight of the slaves, who are not only sinking but have also had their bodies reduced to fragments – their limbs devoured by sharks, mere shapes below the water surface. At the sight of the effects of colonialism and slavery, linear perspective – the central viewpoint, the position of mastery, control, and subjecthood – is abandoned and starts tumbling and tilting, taking with it the idea of space and time as systematic constructions. The idea of a calculable and predictable future shows a murderous side through an insurance that prevents economic loss by inspiring cold-blooded murder. Space dissolves into mayhem on the unstable and treacherous surface of an unpredictable sea.



J. M. W. Turner, *The Slave Ship*, 1840.

Turner experimented with moving perspectives early on. Legend has it that he had himself tied to the mast of a ship crossing from Dover to Calais, explicitly to watch the horizon change. In 1843 or 1844, he stuck his head out of the window of a moving train for exactly 9 minutes, the result of which was a painting

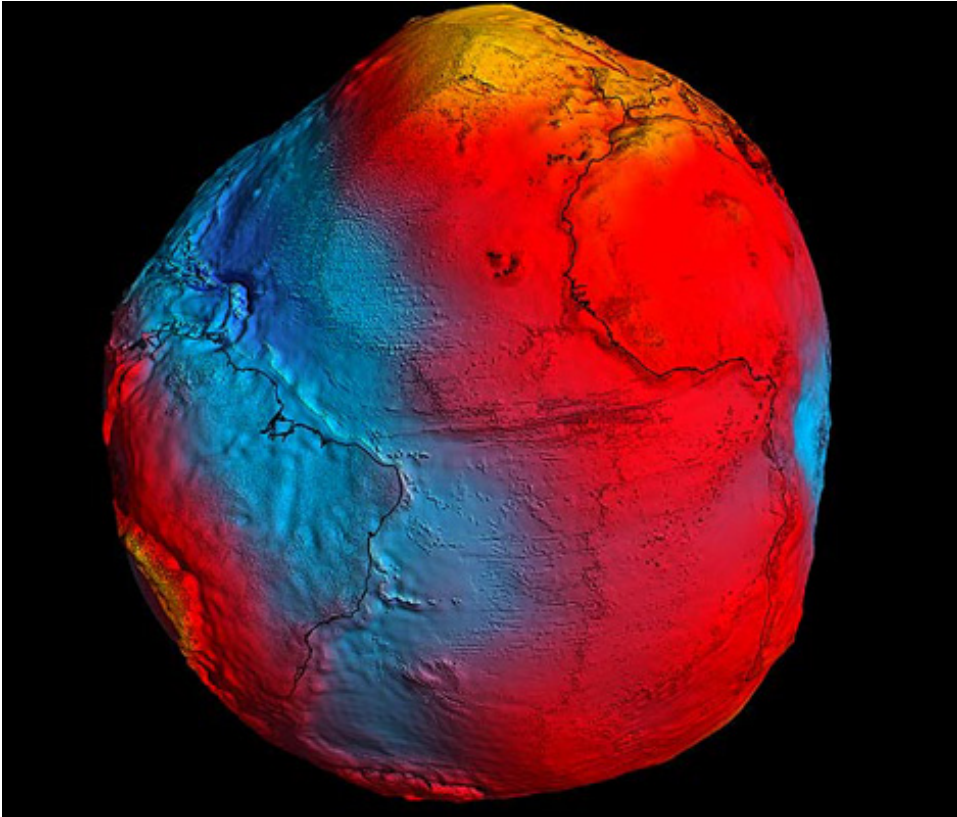
called *Rain, Steam, and Speed – The Great Western Railway* (1844). In it, linear perspective dissolves into the background. There is no resolution, no vanishing point, and no clear view to any past or future. Again, more interesting is the perspective of the spectator himself, who seems to be dangling in the air on the outer side of the rails of a railroad bridge. There is no clear ground under his assumed position. He might be suspended in the mist, floating over an absent ground.

In both of Turner's paintings, the horizon is blurred, tilted, and yet not necessarily denied. The paintings do not negate its existence altogether, but render it inaccessible to the viewer's perception. The question of horizon starts to float, so to speak. Perspectives assume mobile points of view and communication is disabled even within one common horizon. One could say that the downward motion of the sinking slaves affects the point of view of the painter, who tears it away from a position of certitude, and subjects it to gravity and motion and the pull of a bottomless sea.

Acceleration

With the twentieth century, the further dismantling of linear perspective in a variety of areas began to take hold. Cinema supplements photography with the articulation of different temporal perspectives. Montage becomes a perfect device for destabilizing the observer's perspective and breaking down linear time. Painting abandons representation to a large extent and demolishes linear perspective in cubism, collage, and different types of abstraction. Time and space are reimagined through quantum physics and the theory of relativity, while perception is reorganized by warfare, advertisement, and the conveyor belt. With the invention of aviation, opportunities for falling, nose-diving, and crashing increase. With it – and especially with the conquest of outer space – comes the development of new perspectives and techniques of orientation, found especially in an increasing number of aerial views of all kinds. While all these developments can be described as typical characteristics of modernity, the past few years has seen visual culture saturated by military and entertainment images' views from above.

Aircraft expand the horizon of communication and act as aerial cameras providing backgrounds for aerial map views. Drones survey, track, and kill. But the entertainment industry is busy as well. Especially in 3D cinema, the new characteristics of aerial views are fully exploited by staging vertiginous flights into abysses. One could almost say that 3D and the construction of



After just two years in orbit, the European Space Agency's GOCE satellite has gathered enough data to model Earth's gravity with unrivalled precision. ESA/NASA - SOHO/LASCO



Space debris or junk (such as rocket stages, defunct satellites, and explosion and collision fragments) orbiting the earth. Frankfurter Allgemeine Zeitung.

imaginary vertical worlds (prefigured in the logic of computer games) are essential to each other. 3D also intensifies hierarchies of material required to access this new visuality. As Thomas Elsaesser has argued, a hardware environment integrating military, surveillance, and entertainment applications, produces new markets for hardware and software.⁶

In a fascinating text, Eyal Weizman analyzes verticality in political architecture, describing the spatial turn of sovereignty and surveillance in terms of a vertical 3D sovereignty.⁷ He argues that geopolitical power was once distributed on a planar map-like surface on which boundaries were drawn and defended. But at present, the distribution of power – he cites the Israeli occupation in Palestine as his example, but there could be many others – has increasingly come to occupy a vertical dimension. Vertical sovereignty splits space into stacked horizontal layers, separating not only airspace from ground, but also splitting ground from underground, and airspace into various layers. Different strata of community are divided from each other on a y-axis, multiplying sites of conflict and violence. As Achille Mbembe contends,

Occupation of the skies therefore acquires a critical importance, since most of the policing is done from the air. Various other technologies are mobilized to this effect: sensors aboard unmanned air vehicles (UAVs), aerial reconnaissance jets, early warning Hawkeye planes, assault helicopters, an Earth-observation satellite, techniques of “hologrammatization.”⁸

Free Fall

But how to link this obsessive policing, division, and representation of ground to the philosophical assumption that in contemporary societies there is no ground to speak of? How do these aerial representations – in which grounding effectively constitutes a privileged subject – link to the hypothesis that we currently inhabit a condition of free fall?

The answer is simple: many of the aerial views, 3D nose-dives, Google Maps, and surveillance panoramas do not actually portray a stable ground. Instead, they create a supposition that it exists in the first place. Retroactively, this virtual ground creates a perspective of overview and surveillance for a distanced, superior spectator safely floating up in the air. Just as linear perspective established an imaginary stable observer and horizon, so does the perspective from above establish an imaginary floating observer and an imaginary stable ground.

This establishes a new visual normality – a new subjectivity safely folded into surveillance technology and screen-based distraction.⁹ One might conclude that this is in fact a radicalization – though not an overcoming – of the paradigm of linear perspective. In it, the former distinction between object and subject is exacerbated and turned into the one-way gaze of superiors onto inferiors, a looking down from high to low. Additionally, the displacement of perspective creates a disembodied and remote-controlled gaze, outsourced to machines and other objects.¹⁰ Gazes already became decisively mobile and mechanized with the invention of photography, but new technologies have enabled the detached observant gaze to become ever more inclusive and all-knowing to the point of becoming massively intrusive – as militaristic as it is pornographic, as intense as extensive, both micro- and macroscopic.¹¹

The Politics of Verticality

The view from above is a perfect metonymy for a more general verticalization of class relations in the context of an intensified class war from above – seen through the lenses and on the screens of military, entertainment, and information industries.¹² It is a proxy perspective that projects delusions of stability, safety, and extreme mastery onto a backdrop of expanded 3D sovereignty. But if the new views from above recreate societies as free-falling urban abysses and splintered terrains of occupation, surveilled aerially and policed biopolitically, they may also – as linear perspective did – carry the seeds of their own demise within them.

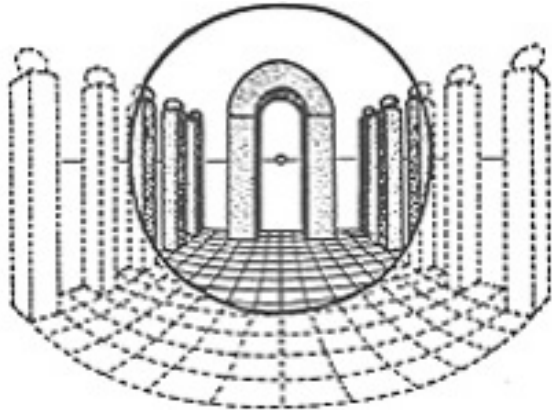
As linear perspective began to tumble down with the sinking bodies of slaves thrown into the ocean, for many people today the simulated grounds of aerial imagery provide an illusionary tool of orientation in a condition in which the horizons have, in fact, been shattered. Time is out of joint and we no longer know whether we are objects or subjects as we spiral down in an imperceptible free fall.¹³

But if we accept the multiplication and de-linearization of horizons and perspectives, the new tools of vision may also serve to express, and even alter, the contemporary conditions of disruption and disorientation. Recent 3D animation technologies incorporate multiple perspectives, which are deliberately manipulated to create multifocal and nonlinear imagery.¹⁴ Cinematic space is twisted in any way imaginable, organized around heterogeneous, curved, and collaged perspectives. The tyranny of the photographic lens, cursed by the promise of its indexical relation to reality, has given way to hyperreal representations – not of space as it is, but of space as we can make it – for better or

08/11

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worse. There is no need for expensive renderings; a simple green screen collage yields impossible cubist perspectives and implausible concatenations of times and spaces alike.



Finally, cinema has caught up with the representational freedoms of painting and structural and experimental film. As it merges with graphic design practices, drawing, and collage, cinema has gained independence from the prescribed focal dimensions that have normalized and limited the realm of its vision. While it could be argued that montage was the first step towards a liberation from cinematic linear perspective – and was for this reason ambivalent for most of its existence – only now can new and different sorts of spatial vision be created. Similar things can be said about multiscreen projections, which create a dynamic viewing space, dispersing perspective and possible points of view. The viewer is no longer unified by such a gaze, but is rather dissociated and overwhelmed, drafted into the production of content. None of these projection spaces suppose a single unified horizon. Rather, many call for a multiple spectator, who must be created and recreated by ever-new articulations of the crowd.¹⁵

In many of these new visualities, what seemed like a helpless tumble into an abyss actually turns out to be a new representational freedom. And perhaps this helps us get over the last assumption implicit in this thought experiment: the idea that we need a ground in the first place. In his discussion of the vertiginous, Theodor W. Adorno scoffs at philosophy's obsession with earth and origin, with a philosophy of belonging that obviously comes packaged within the most violent fear of the groundless and bottomless. For him, the vertiginous is not about the panicked loss of a ground imagined to be a safe haven of being:

A cognition that is to bear fruit will throw itself to the objects *à fond perdu* [without

hope]. The vertigo which this causes is an *index veri*; the shock of inclusiveness, the negative as which it cannot help appearing in the frame-covered, never-changing realm, is true for untruth only.¹⁶

A fall toward objects without reservation, embracing a world of forces and matter, which lacks any original stability and sparks the sudden shock of the open: a freedom that is terrifying, utterly deterritorializing, and always already unknown. Falling means ruin and demise as well as love and abandon, passion and surrender, decline and catastrophe. Falling is corruption as well as liberation, a condition that turns people into things and vice versa.¹⁷ It takes place in an opening we could endure or enjoy, embrace or suffer, or simply accept as reality.

Finally, the perspective of free fall teaches us to consider a social and political dreamscape of radicalized class war from above, one that throws jaw-dropping social inequalities into sharp focus. But falling does not only mean falling apart, it can also mean a new certainty falling into place. Grappling with crumbling futures that propel us backwards onto an agonizing present, we may realize that the place we are falling toward is no longer grounded, nor is it stable. It promises no community, but a shifting formation.

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Another (completely different and rather rambling) version of this text was published in the reader for the second FORMER WEST Research Congress in Istanbul, which took place in November 2010: *On Horizons: A Critical Reader in Contemporary Art*, ed. Maria Hlavajova, Simon Sheikh, and Jill Winder (Rotterdam: Post-Editions; Utrecht: BAK basis voor actuele kunst, 2011).

e-flux journal #24 — april 2011 Hito Steyerl
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10/11

e-flux journal #24 — april 2011 Hito Steyerl
In Free Fall: A Thought Experiment on Vertical Perspective

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Examples of so-called anti- and post-foundational philosophy are given in the preface to Oliver Marchart's introductory volume *Post-Foundational Political Thought: Political difference in Nancy, Lefort, Badiou and Laclau* (Edinburgh: Edinburgh University Press, 1997), 1–10. Briefly speaking, such thought, as proffered by the philosophers under discussion, rejects the idea of a given and stable metaphysical ground and revolves around Heideggerian metaphors of abyss and ground, as well as the absence of ground. Ernesto Laclau describes the experience of contingency and groundlessness as a possible experience of freedom.

2
Peter Iffland, "The History of the Sextant"; see <http://www.mat.uc.pt/~helios/Mestre/Novemb00/H61iflan.htm>.

3
Erwin Panofsky, "Die Perspektive als symbolische Form," in *Erwin Panofsky: Deutschsprachige Aufsätze II*, ed. Wolfgang Kemp et al. (Berlin: Akademie Verlag, 1998), 664–758.

4
Walter Benjamin, "Theses on the Philosophy of History," in *Illuminations*, trans. H. Zohn. (New York: Schocken Books, 1969), 261. See <http://www.marxists.org/reference/archive/benjamin/1940/history.htm>.

5
Etienne Balibar and Immanuel Wallerstein, *Race, Nation, Class: Ambiguous Identities* (London and New York: Verso, 1991).

6
The following quote by Elsaesser can be seen as blueprint for this paper, whose inspiration derives from an informal conversation with the author: "This means that stereoscopic images and the 3-D movie are part of the new paradigm, which is turning our information society into a control society and our visual culture into a surveillance culture. The movie industry, civil society and the military sector are all united in this surveillance paradigm, which, as part of a historic process, seeks to replace "monocular vision," the way of seeing that has defined Western thought and action for the last 500 years. It is this means of seeing that gave rise to a wide range of innovations like panel painting, colonial seafaring and Cartesian philosophy, as well as the whole concept of projecting ideas, risks, chances and courses of action into the future. Flight simulators and other types of military technology are part of a new effort to introduce 3-D as the standard means of perception – but the development goes even further

to include surveillance. This encompasses an entire catalog of movements and behaviors, all of which are intrinsically connected to the monitoring, steering and observation of ongoing processes, and which delegate or outsource what was once referred to as introspection, self-awareness and personal responsibility." Thomas Elsaesser, "The Dimension of Depth and Objects Rushing Towards Us. Or: The Tail that Wags the Dog. A Discourse on Digital 3-D Cinema." See <http://www.edit-frankfurt.de/en/magazine/ausgabe-12010/the-dimension-of-depth/the-dimension-of-depth-and-objects-rushing-towards-us.html>.

7
Eyal Weizman, "The Politics of Verticality." See http://www.opendemocracy.net/ecology-politics/verticality/article_801.jsp.

8
Achille Mbembe, "Necropolitics," *Public Culture* vol. 15, no. 1 (Winter 2003): 29. See <http://www.jhfc.duke.edu/icu/ss/pdfs/Mbembe.pdf>.

9
Dieter Roelstraete and Jennifer Allen both describe this new normality from different perspectives in very good texts. Dieter Roelstraete ("Jena Revisited) Ten Tentative Tenets," *e-flux journal*, issue 16 (May, 2010). See <http://www.e-flux.com/journal/view/137>; and Jennifer Allen, "That Eye, The Sky," *Frieze* 132 (June–August 2010).

10
Lisa Parks, *Cultures in Orbit: Satellites and the Televisual* (Durham, NC: Duke University Press, 2005).

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In fact, the perspective of the floating camera belongs to a dead man. Most recently, a dehumanization (or posthumanization) of the gaze is perhaps nowhere as literally allegorized as in the film *Enter the Void* (Gaspar Noé, 2010), where, for most of the film, a disembodied point of view endlessly drifts over Tokyo. This gaze penetrates any space, moving without constraint and with unrestricted mobility, looking for a body in which to biologically reproduce itself and reincarnate. The point of view in *Enter the Void* is reminiscent of the gaze of a drone. But instead of bringing death, it is looking to recreate its own life. To this end, the protagonist basically wants to hijack a fetus. But the film is also very picky about this procedure: mixed race fetuses get aborted in favor of white ones. There are more issues that link the movie to reactionary breeding ideologies. Floating and biopolitical policing are mixed into a computer-animated obsession with superior bodies,

remote control, and digital aerial vision. The floating gaze of the dead man thus literally echoes Achille Mbembe's powerful description of necropower: necropower regulates life through the perspective of death. Could these tropes allegorized in a single (and frankly, god-awful) movie be expanded into a more general analysis of disembodied hovering points of views? Do the aerial views, drone perspectives, and 3D dives into abysses stand in for the gazes of "dead white males," a worldview which lost its vitality, yet persists as an undead but powerful tool to police the world and control its own reproduction?

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Paraphrasing Elsaesser's notion of the "military-surveillance-entertainment complex." See <http://www.edit-frankfurt.de/en/magazine/ausgabe-12010/the-dimension-of-depth/the-dimension-of-depth-and-objects-rushing-towards-us.html>.

13

Assuming there is no ground, even those on the bottom of hierarchies keep falling.

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These techniques are described in Manesh Agrawal, Denis Zorin, and Tamara Munzer, "Artistic multiprojection rendering," in *Proceedings of the Eurographics Workshop on Rendering Techniques 2000*, ed. Bernard Perroche and Holly E. Rusgmaier (London: Springer-Verlag, 2000), 125–136; Patrick Coleman and Karan Singh, "Ryan: Rendering Your Animation Nonlinearly Projected," in *NPAR '04: Proceedings of the 3rd International Symposium on Non-photorealistic Animation and Rendering* (New York: ACM Press, 2004), 129–156; Andrew Glassner, "Digital Cubism, part 2," *IEEE Computer Graphics and Applications*, vol. 25, no. 4 (July 2004): 84–95; Karan Singh, "A Fresh Perspective," in *Proceedings of the Eurographics Workshop on Rendering Techniques 2000*, ed. Bernard Perroche and Holly E. Rusgmaier (London: Springer-Verlag, 2000), 17–24; Nisha Sudarsanam, Cindy Grimm, and Karan Singh, "Interactive Manipulation of Projections with a Curved Perspective," *Computer Graphics Forum* 24 (2005): 105–108; and Yonggao Yang, Jim X. Chen, and Mohsen Beheshti, "Nonlinear Perspective Projections and Magic Lenses: 3D View Deformation," *IEEE Computer Graphics Applications*, vol. 25, no. 1 (January/February 2005): 76–84.

15

Hito Steyerl, "Is a Museum a Factory?" *e-flux journal*, issue 7 (June, 2009). See <http://www.e-flux.com/journal/view/71>.

16

Theodor W. Adorno, *Negative Dialectics*, trans. E. B. Ashton

(New York: Continuum, 1972), 43.

17

Taking the cue from Gill Leung's reflection, "After before now: Notes on In Free Fall." See [href=](#).

11/11

e-flux journal #24 — april 2011 Hito Steyerl
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