Dimension and Duration
On the Aesthetic Relationship of Space and Time in 3D Cinema

Among the particular accomplishments of cinema, if one follows the philosopher Edgar Morin, is the cultivation of a specifically relational proportion between space and time, a type of reciprocal expansion and transformation, which, as a result, constitutes an expanded dimension of perception:

> Time has acquired the movable nature of space and space the transformative powers of time. The double transmutation of cinematic time and space has produced a kind of unique symbiotic dimension, where time is incorporated in space, where space is incorporated in time, where 'space moves, changes, turns, dissolves, and recrystallizes,' and where time 'becomes a dimension of space.' […] Space-time, such is the total and unique dimension of a *fluid universe*.[1]

Following this observation, my contribution explores the potential of 3D cinema to unfold its own aesthetic form of fluid spatiotemporality. I will argue that the staging of expanded space, which has characterized stereoscopic film since its inception, is connected to a specific understanding of temporal continuity. This is particularly noticeable in the tendency to leave behind the fragmenting form of editing and instead to favor the long, uncut shot. I will explore what aesthetic and narrative possibilities this opens up for 3D cinema in three sections. The first is concerned with the early phase of stereoscopic cinema and the first approaches to a distinct 3D film grammar; the second

1 Edgar Morin, *The Cinema, or The Imaginary Man*, trans. Lorraine Mortimer (Minneapolis: University of Minneapolis, 2005), 64.

then deals with classical cinema and the aesthetic capabilities of three-dimension spatial depth gradation, and the third considers digital 3D film as an aesthetic reflection of altered perceptive dispositions within digital media culture.

1. Early Cinema

Numerous scholars have drawn attention to the connecting lines between the technical development of early cinematography and stereoscopy. In his essay "The Myth of Total Cinema," for example, André Bazin mentions an approach to film historiography that highlights the stereoscopic understanding of space as the actual catalyst for the development of cinema: "[T]he film historian P. Potoniée has even felt justified in maintaining that it was not the discovery of photography but of stereoscopy, that […] opened the eyes of the researchers."[2] Siegfried Kracauer also points to stereoscopy as the antecedent of the first cinematic images, stating: "The crowded streets captured by the stereographic photographs of the late 'fifties thus reappeared on the primitive screen."[3] These references show that stereoscopy's spatial awareness of the image not only preceded cinema historically but also crucially influenced and informed its image forms. Since its introduction in the middle of the nineteenth century, stereoscopic productions of images and viewing systems experienced enormous popularity. Stereo photographs and stereo slides, which could be viewed individually through a device, were widely available for household use; furthermore, there were projection mechanisms for collective use in the public sphere. The spatial illusion of depth that they created and imparted were a stable component of the visual culture, and in this way, "the immense popularity of stereoscopy undoubtedly contributed to the development of a historically distinct set of expectations for early cinema."[4]

Among the media practices that are aligned with stereoscopic viewing conditions there is, on the one hand, the way of seeing, supported by tech-

2 André Bazin, "The Myth of Total Cinema," in *What is Cinema?*, trans. Hugh Gray (Berkeley: University of California Press, 1967), 20.

3 Siegfried Kracauer, *Theory of Film: The Redemption of Physical Reality* (Oxford: Oxford University Press, 1965), 31.

4 Michael Wedel, *Filmgeschichte als Krisengeschichte. Schnitte und Spuren durch den deutschen Film* (Bielefeld: transcript, 2011), 72.

nical equipment, that fosters an intensification of the viewing experience by excluding one's perception of the surroundings and, on the other hand, still more importantly, the perception of an intangible or dematerialized image. Unlike in two-dimensional photography, the stereo image is not fixed to a material backing but has a far more ephemeral constitution: "A stereoscopic image as such consequently does not exist; the stereoscopic impression of space is a purely hallucinatory one, created by the viewer on the basis of an active process of perception."[5] Spatial forms, by means of which such an image impression could be achieved and especially emphasized, primarily focused on three-dimensional volume effects, that is, visually "lifting" an object off the screen that it seems to hover over. It is this aesthetic conception that proved to be exceptionally influential for the moving pictures of the gradually forming cinematography. The combination of the unfixable image-object with a flowing movement was critical in the process, a merging, therefore, that organizes the fluidity of what is perceived both spatially and temporally.

This merging comes especially to the fore in a work considered to be the primal scene in cinema and, simultaneously, the first 3D film: *L'Arrivée d'un Train en Gare de La Ciotat*, filmed by Louis and Auguste Lumière in 1895 and released as a stereoscopic version three decades later[6]. Undoubtedly, the specific fascination inspired by early cinematic perception derived from the liveliness and lifelike quality of the projected moving pictures. Yet the new way of looking does not lie solely in the observation of a familiar, lifelike everyday scene. Rather, it is the continuity and processuality of the movement, its fluidity, that makes the image itself move. This can be seen in the change in proportions (the train approaches from the background of the frame into the foreground) and, further, in the diffuseness of differences as well as in the obscuring of any possibility of differentiation. One cannot determine where exactly the movement begins and where it ends. As a continuous image (uncut and not separated by any markings), the film does not feature any determinable points in time but, rather, the flow of time, its continuous being. In the footage, options for spatial orientation are not fixed in place as static subdivisions but presented as blurry transitions. Thus, for example, the smoke

5 Ulrike Hick, *Geschichte der optischen Medien* (Munich: Fink, 1999), 279.

6 A compilation of sources on the Lumières' stereoscopic film experiments is provided by Ray Zone, *Stereoscopic Cinema and the Origins of 3D Film, 1838–1952* (Lexington: University Press of Kentucky 2007).

from the train causes the image background not to appear flat but malleable, so that the horizon is shifted into an undefinable distance.

The intertwining of spatial depth and temporal continuity evokes a sense of reality that goes far beyond the representational abilities of the static flat image. This impression of reality, moreover, is reinforced by the fact that it mediates a feeling of candidness and limitlessness. For Siegfried Kracauer, the filmic turn toward the incomplete is one of the most significant media qualities of cinematography. Fundamentally, he states, "films tend to capture physical existence in its endlessness. Accordingly, one may also say that they have an affinity, evidently denied to photography, for the continuum of life or the 'flow of life,' which of course is identical with open-ended life."[7] Along with the aforementioned image of the crowded streets, Kracauer cites the Lumières' train station scene as one of the select filmic scenarios of this constant flow: "It was life at its least controllable and most unconscious moments, a jumble of transient, forever dissolving patterns […]. The much-imitated shot of the railway station, with its emphasis on the confusion of arrival and departure, effectively illustrated the fortuity of these patterns."[8]

However, it should be added that the fluidity of the lifelike, everyday scene correlates with a clearly oriented conception of the image, that, in other words, the seemingly coincidental is arranged and structured within the framework of an image-aesthetic operation. Thus, for example, it is notable that the length of the recording is organized in a way that results in a temporally composed augmentation of movement dynamics. The film begins with a relatively empty space, in whose background one can discern an object at a distance. As a result of the train moving from the background into the foreground and continuously growing as an image object, the viewer's attention is increasingly drawn to and focused on the object. A few people waiting on the platform are at first the only thing visible. As the train arrives, however, the movement of the figures increases: they go from static positions to rushing around, and even more people move into the picture from offscreen. Only here does the "confusion" observed by Kracauer begin to develop, only now is the image filled with intersecting motions: passengers get on and off the train, people walk toward or away from others; the figures move into the foreground and background, from left to right and right to left. The resulting alternating crowding and dispersion create a semblance

7 Kracauer, *Theory of Film*, 71.

8 Ibid., 31.

of the uncontrollable and unplanned, the accidental and indeterminable, of everyday life. Along with this, however, there is a certain type of dramaturgical disposition, whose increasing dynamics are based on the temporal structure of the recording. Only in the continuous time of the uncut shot can formations gradually develop, only in the flowing progression of the events does the abundance of the movements become perceptible.

The spatial effect in stereoscopic cinema is thus different than that of the static stereo photo. It develops out of film's temporality and emphasizes this sense of time with motion sequences, whose fluid movements the fixed nature of photography had not been able to depict. 3D film takes on the aesthetic of depth of field from the stylistic tradition of stereophotography, or, in other words, the precise perceptibility of objects in both the foreground and background. Along with this perceptual basic, the question of how the movements of objects and forms can be set in relation to this arises as a new specific characteristic of film. The early experimental phase of 3D film features various approaches to this question. On the one hand, there is the directed movement of an object from the depth of a picture into the foreground (a type of augmentation and overwhelming that pushes the events onscreen to the fore); on the other hand, there are also the smallest elusive movements, such as in the smoke in the background (a type of staging that causes the image space to seem more plastic and extends it to the rear). Both directionalities are achieved via the 3D moving image's passage of time, even more so: they both become discernible simultaneously in the same single shot. The various dimensions and dynamics of movement are developed not sequentially but simultaneously; they do not unfold between images but in the image. In essence, the first narrative possibilities are already in place. For example, events can play out simultaneously in both the foreground and the background and thereby dramaturgically influence each other; furthermore, single objects or figures can especially be accentuated or stressed by the motion-induced change of proportions, while others appear less conspicuous in their unchanged position. The first 3D film, *L'Arrivée d'un Train en Gare de La Ciotat*, is not exceptional because of what it shows (it is a familiar, everyday scene) but because of the way that it shows it (from an unusual and unfamiliar perspective that results from the choice of the camera's point of view and from its shot length). The content is thus nothing new, but the form is: enlargements and reductions, as well as malleable alterations and deformations, become perceptible in continuous filmic progression and thus acquire the function of meaning creation. Even though the Lumières' first cinematic

works were long considered primitive precursors of cinematic art and classified as underdeveloped due to their lack of editing, they nevertheless already contained the core elements of an aesthetic-narrative potential for the continuous three-dimension moving picture.

2. Classical Cinema

Endowing the projected image with spatial volume has been one of the ongoing efforts of cinema since early film history. Along with Auguste and Louis Lumière, Edwin S. Porter and William E. Waddell also experimented with stereoscopic processes: their test films were shown for the first time in 1915 in New York's Astor Theater. A few years later, Harry K. Fairall produced the first anaglyph feature-length film with *The Power of Love*, which premiered in Los Angeles in 1922. The first 3D film with sound, Guido Brignone's *Nozze vagabonde*, was presented in Italy in 1936. Around the same time, the Zeiss Ikon *Raumfilm* process was developed in Germany. In 1937, one of the first films produced with this technology premiered at the Ufa-Palast in Berlin: *Zum Greifen nah* by Curt Engel and Karl Schröder, a promotional 3D film for life insurance from *Volksfürsorge*. In the 1940s, several feature-length 3D films were shown in the USSR, among them *Robinson Crusoe* (Aleksandr Andriyevsky, 1947), which contained color sequences and was screened through a lenticular projection system that did not require viewers to wear 3D glasses.[9]

After these few scattered approaches, 3D film was given a new impetus in the 1950s, a phase that is considered the "golden age of 3D motion pictures."[10] The reason for this upswing, which drove growing investments in 3D technologies and increased production of stereoscopic films, was one of the greatest crises that classical cinema had experienced up to that point. With the expansion of television, the number of cinema audiences dramatically dropped, so much so that cinema tried to stand out against the new competitive medium. The strategies that were developed for this purpose strove,

9 On the early experimental history of 3D film, cf. in detail James L. Limbacher, *Four Aspects of Film. A History of the Development of Color, Sound, 3D and Widescreen Films and their Contribution to the Art of Motion Picture* (New York: Arno Press, 1978) and Ray Zone, *Stereoscopic Cinema and the Origins of 3-D Film, 1838–1952* (Lexington: University Press of Kentucky, 2007).

10 Zone, *Stereoscopic Cinema*, 149.

above all, to play the largeness of the cinematic image against the smallness of the televisual image, that is, not only to emphasize but greatly enhance the specifically filmic accomplishments of the big-screen experience. Edgar Morin describes this aesthetic expansion as follows:

> The moment there was a serious crisis in cinema attendance, the search for a supplement of objective presence brought about the extension (CinemaScope, Cinerama) and volumization (stereoscopy) of the image. It is because they constitute two concretizing aspects of the same tendency toward the emancipation of the image from the screen that the two techniques asserted themselves and fought against each other at the same time.[11]

In his essay "Will CinemaScope Save the Film Industry?" André Bazin addresses the differentiation of cinema from television in the 1950s, i.e. the filmic exploration of a visual experience that exceeds and surpasses TV images. Like Morin, he points to the crisis of cinema as an innovation driver and names Cinemascope and 3D as the apparent tendencies of an expansion of the cinematic aesthetic. Furthermore, however, he asks about the consequences of this expansion for the development of filmic language. According to Bazin, the expansion of the image space could bring back the art of the long shot. For Bazin, this had been long repressed as a stylistic achievement by the concentration on editing as the determining filmic structural form. Its return and reconstitution are already beginning to show, however, so that the dominance of editing is increasingly weakened. Bazin states:

> That's the operative word here: *editing*. […] It is not true that cutting into shots and augmenting those shots with a whole range of optical effects are the necessary and fundamental elements of filmic expression, however subtle that expression might otherwise be. On the contrary, one can see that the evolution of film in the last fifteen years has tended toward the elimination of editing.[12]

Bazin's argument against editing as a foundational element of film aesthetics is guided by the fundamental capability of cinema to make time percepti-

11 Edgar Morin, *The Cinema, or The Imaginary Man*, trans. Lorraine Mortimer (Minneapolis: University of Minnesota Press, 2005), 140.

12 André Bazin, "Will CinemaScope save the film industry? [1953]" *Film Philosophy* 6, no. 2 (2002).

ble as a continuum. Film is a medium of time whose unique strengths lie in the ability to present the continuous flow of time as something connected and cohesive. On the contrary, editing breaks up and destroys this unity of the temporal elapsing, since "[t]he expression of concrete duration conflicts with the abstract time of montage."[13] Along with the ability to experience the passage of time, Bazin notes a further advantage of the uncut, uninterrupted shot. This benefit has to do with the depth of field, a process that Bazin appreciates in particular because of the intellectual involvement of the viewer. The depth of focus assumes "a more active mental attitude on the part of the spectator and a more positive contribution on his part to the action in progress. While analytical montage only calls for him to follow his guide, to let his attention follow along smoothly with that of the director who will choose what he should see, here he is called upon to exercise at least a minimum of personal choice."[14] Everything that the filmic image can comprise in terms of complexity is retained in the long, deep-focus shot. In this respect, it calls on viewers to move around in the image space in order to explore its ambiguity and intricacy.

Alfred Hitchcock's 3D film *Dial M for Murder* (1953) serves as an outstanding example of the way the retention of the filmic image's heterogeneity can be combined with the depth of the multi-tiered space. Unlike many other stereoscopic films of the 1950s, which emphasized the spectacular effects of 3D technology and employed them as a supplementary attraction,[15] Hitchcock understands the stereoscopic aspect of space not as an additive, but generative, principle. This awareness of the spatial-staging function of the 3D process can especially be seen in his decision to markedly reduce the frequency of cuts and dispense with elaborate camera movements. The underlying concept of the film is as simple as it is compelling. *Dial M for Murder* is a chamber play that almost never leaves its internal space.[16] The film's narrative dynamic

13 André Bazin, "The Virtues and Limitations of Montage," in *What is Cinema?*, trans. Hugh Gray (Berkeley: University of California Press, 1967), 52.

14 André Bazin, "The Evolution of the Language of Cinema," in *What is Cinema?*, trans. Hugh Gray (Berkeley: University of California Press, 1967), 35–36.

15 Examples of this type of use of 3D are *Bwana Devil* (Arch Oboler, 1952), *The Charge at Feather River* (Gordon Douglas, 1953), *The Nebraskan* (Fred F. Sears, 1953), *House of Wax* (Andre DeToth, 1953), *Creature from the Black Lagoon* (Jack Arnold, 1954), and *The French Line* (Lloyd Bacon, 1954).

16 Hitchcock's interest in long shots had already been already apparent in *Rope* (1948), a film that is (almost) completely accomplished without editing. This film was also

is adapted to this arrangement in a formidable way. It develops not so much between characters but results from the strained, charged atmosphere of the rooms themselves.

Hitchcock achieves this building of tension with a unique focus on the relationship between foreground and background. This can be seen, for example, in a long shot showing a dialogue between Tony Wendice and Charles Swann. It shows an image layout that places a rather unimportant element, a green lamp, in the extreme foreground. The lamp acts here as a barrier between both characters in the middle ground and simultaneously establishes a vertical separation of the space into several parts. In addition, its position in the foreground creates the effect of depth that, overall, makes the space seem more malleable. However, what is more important is the fact that, with this arrangement, our attention is drawn to what is playing out behind the obvious events, that we are made aware of the movements taking place behind what can easily be recognized in the foreground. Here, the visual effect arises from the tension between the static object in the foreground and the moving action in the area of the image area behind it.

This relationship, however, can also be reversed. In another shot, we see Tony Wendice in the foreground and a few objects in the background. Notable here is the Chinese porcelain figurine, whose function becomes apparent a few moments later. Upon closer inspection, it becomes clear that the statue has changed its position—it now no longer looks to the right edge but to the center of the frame. This is in no way a continuity error (which would have hardly escaped the meticulous interior designer that was Hitchcock) but part of a consistent staging strategy. If one carefully observes the porcelain figurine, one can see that it is always looking exactly where something crucial to the plot is occurring—it points out the events within the space before they even occur. It thus concerns a type of direct gaze into the camera, a reflexive process that is employed both as commentary and as a moment for building tension.

Already in 1947, Sergei Eisenstein had pointed to the unique aesthetic functions of stereoscopic film. Eisenstein understood the new quality of 3D film to be grounded not in technology but in staging, namely the possibility of conceiving of both the foreground and background of the image as

adapted from a theater play and focused the plot on the limited interior space of an apartment. Unlike *Dial M for Murder*, however, *Rope* is characterized by a highly mobile camera that follows and circles around the characters.

formative elements in their own right: "Every effort is made to differentiate them as much as possible, and to bring them together again in a whole new way—in a reciprocally informed composition."[17] In this context, Eisenstein clearly stresses the fact that such an understanding of space can be traced back to the logic of the stage: "Within the family of the performing arts, stereocinema is to be classed not only with the grand-nephews of Edison's and Lumière's inventions but also somewhere among the great-grandchildren of theatre."[18] With these approaches, the unedited films of early cinema and the reference to the theatrical tradition, Eisenstein touches on those influences that achieve their expressive impact not from editing but from the principle of continuous exhibition. In their discussion of *Dial M for Murder*, Eric Rohmer and Claude Chabrol likewise emphasize the fact that in this film, it is not the art of editing, but the theatrical principle, that guides its construction: "The algebraic formula of the stage play is here given a geometric expression of rare elegance. The point is not so much to split hairs as to make us see things clearly—to see in the way Hitchcock wants us to see."[19] Here it should be noted that this invitation to see things clearly is thanks to a concept of viewing that grants us an open view of the space of action, in other words, that enables us to take in the events in long shots without the image detail being overly altered or distorted. To achieve this viewing arrangement, Hitchcock had a special trench built in front of the set into which the camera was lowered. Like a spectator sitting in the front row of a theater, the camera observed the space in front of it both statically and frontally, and, similar to theater, the variation of framing and camera distance was dispended with. The aspect of the film that generates tension, therefore, does not play out in the combining of images but is already inherent in the singular, long-lasting shot. And here is where Bazin's aesthetic law of non-editing can be applied: "When the essence of a scene demands the simultaneous presence of two or more factors in the action, montage is ruled out."[20]

17 Sergei Eisenstein, "On Stereocinema (1947)," in *3D Cinema and Beyond*, ed. Dan Adler, Janine Marchessault, and Sanja Obradovic, trans. Sergey Levchin (Bristol: Intellect, 2013), 23.

18 Ibid., 27.

19 Éric Rohmer and Claude Chabrol, *Hitchcock: The First Forty-Four Films*, trans. Stanley Hochman (New York: Ungar, 1979), 121.

20 Bazin, "The Virtues and Limitations of Montage," 50.

If viewers are supposed to look closely, they must be given time to do so; if space is staggered in a complex way, it requires an unobstructed view in order for the viewer to make sense of it. Hitchcock's editing pace explores this configuration and, with it, shows a special sensibility for the aesthetic-narrative potential of stereoscopic cinema. For unlike in two-dimensional film, the illusion of depth here is not organized by the change of the camera position but is accomplished by staggering the depth of the space itself so that the uncut shot enables both a lingering in the space as well as the attentive comprehension of the movements that take place within it. In doing so, it is crucial that Hitchcock does not show important elements in alternation but simultaneously integrates them into the picture. This simultaneous integration does not mean dispensing with editing in the sense of an aesthetic reduction but, quite to the contrary, an increase in complexity, the uncovering of a further playing field, and the exploration of a new dimension of meaning.

3. Digital Cinema

If the heyday of 3D in classical cinema had drawn new attention to the aesthetics of stereoscopy, this broad-based investment was already beginning to abate by the mid-1950s. Still, 3D films did not completely disappear after this time but remained visible in various forms—for example, in the 1960s in the subculture of underground cinema (*The Stewardesses*, Allan Silliphant, 1969), in the 1970s as a Blaxploitation remake (*Wildcat Women*, Stephen Gibson, 1976), in the 1980s in the horror genre (*Rottweiler: The Dogs of Hell*, Worth Keeter, 1982), and in the 1990s as a theme park attraction (*Marvin the Martian in 3D*, Iwerks Entertainment, 1997). However, 3D film experienced a comprehensive upturn only in the course of digitalization. This revitalization of 3D was led by the immense success of James Cameron's *Avatar* (2009), which was followed by a long series of digital 3D productions. This included the 3D animated films from Disney Studios (*Up*, Pete Docter and Bob Peterson, 2009), Pixar (*Toy Story 3*, Lee Unkrich, 2010), and DreamWorks (*Shrek Forever After*, Mike Mitchell, 2010), as well as films from major directors such as Tim Burton (*Alice in Wonderland*, 2009), Steven Spielberg (*The Adventures of Tintin*, 2011), Martin Scorsese (*Hugo*, 2011), and Ang Lee (*Life of Pi*, 2012). In addition to global Hollywood's increased interest in 3D film, European auteurs such as Werner Herzog (*Cave of Forgotten Dreams*, 2010), Wim Wenders (*Pina*, 2011), and Jean-Luc Godard (*Adieu au Langage*, 2014) explored the potential of three-dimension film aesthetics.

The current renaissance of 3D film has been frequently compared to the successful phase of stereoscopy in classical Hollywood cinema in order to predict how long it will last. Thus, prominent 3D critics such as Roger Ebert and Walter Murch accused 3D film of causing too many headaches, having admission prices that are too high, and featuring special effects that do not offer any added value. According to such critics, as with the introduction of television, cinema today is attempting to combat the increasing competition from smaller screens (those of PCs, smartphones, and tablets) with the strategy of outdoing them, and like in the previous 3D boom, the current boom is also nothing more than a helpless attempt by the film industry to augment the spectacular character of the cinematic experience with additional gimmicks.[21] However, the reason for the current assertiveness of digital 3D film has its roots elsewhere, as Thomas Elsaesser argues: "D3D is not (only) a defensive damage-limitation exercise; we are not in the 1950s, where the film industry might have lost the family audience to television."[22] Not only have new processes of digital recording and rendering eliminated numerous deficits in stereoscopic image perception, but also the simultaneous introduction of 3D-capable household electronics is an indication of a broader expansion of the digital three-dimensional image:

> As far as Hollywood goes, D3Dis not treated as a special effect but as a means towards integration and a resetting of default values; its vigorous promotion is not a panic reaction but part of a push towards integrating all platforms and screens, big and small, fixed and mobile."[23] In this respect, one can assume that "that 3-D today should be regarded as part of and symptom for a broader change in our perceptual and sensory default values.[24]

In the transition from established forms to newly evolving forms, the aesthetic conventions of analog cinema have been subjected to an extensive process of transformation that accelerates along with altered visual experiences in the digital age. While the long shot, for example, had once been an exception and an unusual deviation from the dominant logic of editing, nowadays, uncut

21 Cf. Roger Ebert, "Why I Hate 3D Movies," *Newsweek*, May 9, 2010, and Roger Ebert, "Why 3D Doesn't Work and Never Will. Case Closed," *Chicago Sun-Times*, January 23, 2011.

22 Thomas Elsaesser, "The 'Return' of 3-D: On Some of the Logics and Genealogies of the Image in the Twenty-First Century," *Critical Inquiry* 39 (2013): 221.

23 Ibid., 245.

24 Ibid., 235.

film sequences are far more familiar to us as part of new visual dispositifs. Nicholas Rombes cites, for example, the spread of surveillance technologies as an example of the current visual experience of a continuous shot: "Surveillance cameras and systems—with their endless gaze and deep storage capabilities—constitute an alternate cinema of the neo-liberal, post 9/11 age."[25] The expansion of storage capacities made possible by digitalization provides for the potential extension of recording time. It is no longer limited by the material basis of the analog equipment but is experiencing an extension, a result of which being that stylistic formations are also beginning to change: "Just as the cuts in classical cinema were motivated, in part, by the limits of how long filming could continue before the camera needed to be reloaded, the cuts in digital and HD cinema will evolve into a new grammar at least partially motivated by the fact, that, literally, a film can be shot in one take with no cuts."[26] In actuality, this principle can today already be easily realized by any smartphone user. The numerous uncut amateur films and videos that can be found on YouTube, Vimeo, or other digital platforms show that continuous recording, as an aesthetic phenomenon, has now become a self-evident principle of film production and reception. A further extension, which integrates the continuous gaze into the viewing experience, is being realized by digital computer games. Their worlds of imagery do not unfold as fragmented visual arrangements but are based on uninterrupted movement through three-dimensional space, as Lev Manovich remarks: "Many computer games also obey the aesthetics of continuity in that, in cinematic terms, they are single-takes. They have no cuts. From beginning to end, they present a single, continuous trajectory, through 3D space."[27]

Instructed and inspired by new image forms and viewing experiences, cinema in the digital age no longer remains what and how it once was. Under the influence of a comprehensive media re-organization of perspectival understandings and visual relations, it is reassessing its aesthetic possibilities and, in the process, is changing its forms of narration and expression. Digital 3D is therefore not a new edition of an old attraction value but a cinematic form of reflection of spatiotemporal continuity and fluidity made possible and driven by digital media culture.

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25 Nicholas Rombes, *Cinema in the Digital Age* (London: Wallflower Press, 2009), 38.

26 Ibid., 39.

27 Lev Manovich, *The Language of New Media* (Cambridge: MIT Press, 2001), 142–143.

A notable example of this digital stereoscopic aesthetic is Alfonso Cuarón's *Gravity* (2013). Unlike Hitchcock's *Dial M for Murder*, which refers to geometrically organized spatial structures in order to explore and play them out, this film does not focus on clear-cut spatial separation but on the blurring of transitions. We are no longer dealing with a visual arrangement that enables orientation in space through recognizing its boundaries, but on the contrary, questions them by letting them become permeable. This can already be seen in the film's exposition, an almost 14-minute sequence shot that was achieved without any visible cuts. At first, the dark depths of space are shown, within it the distant outline of Earth, a space shuttle, the Hubble Telescope, and several astronauts. The camera slowly hovers through the space, revolves around the figures and objects, pauses intermittently, moves again, slides from left to right and from right to left, from front to back and from back to front. This diversity of movements is nevertheless developed not as a rapid, rhythmic alternation but as a calm flow, as a constant flux of visual and spatial relations that is only constituted in and by fluid continuity. It is not critical that the viewer comprehends movements within a defined space but, rather, that the space itself becomes mobile. In doing so, its capacity for expansion is spread out in front and behind, above and below. This becomes clear, for example, in a moment in which a small screw comes loose from the outside of the telescope and floats toward the viewer, thus moving from the greatest distance to the nearest proximity, or in another moment in which the hail of space debris begins to diffuse across all lateral boundaries in a comprehensive blasting motion. However, not only the objects but also the characters are subjected to a constant change of position due to the fact that they find themselves in a dimension of movement outside the laws of gravity: they fly forward from the depth of the space or are pushed backward; they remain static or revolve around their own axis; they are shown vertically like bodies standing up or horizontally like bodies lying down.

The film repeatedly illustrates the flexibility of perspectives and the potential for viewing possibilities. We can hardly take in the scenery before its boundaries expand; before we can even make out an order of vertical and horizontal lines, they then turn into a provisional arrangement that is then replaced by another. The film does not structure these arrangements in the form of classic editing, in other words, by stringing together stable and clearly definable shots in which one element necessarily follows the next. Rather, the transitions are always already contained in the image itself in order to develop

there as a process of movement: the space of the image becomes the space of its possibilities.

As a result, viewers also lose their bearings, for the constantly transforming space does not create any definite stability of one's own position. Because the possibilities of spatial orientation are always disappearing, because there are no longer any stable relations, no reliable coordinates that structure the field of view, the viewing situation itself begins to float: it seems to become weightless. It is this visual overshoot that does not leave the viewer distanced and untouched but involves him or her in the image and physically affects him or her. Scott Bukatman sees a unique expansion of self-perception in the visual-aesthetic tradition of simulated zero-gravity: "All the fantasied escapes from gravity […] recall our bodies to us by momentarily allowing us to feel them differently. It is a momentary effect, a temporary high: we are always returned to ourselves. These escapes, however, are more than retreats from an intolerable existence, they are escapes into worlds of renewed possibilities."[28] In the digital age, this transformative capability is further augmented by the potential of the reorganization of all kinetic elements and the possibility of the seamless fusion of previously distinct areas. In this respect, the digital 3D film *Gravity* refers to a perceptive disposition that not only questions the static fixation of the moviegoer but also presents the status of the image in its specifically digital flexibility. Elsaesser has emphasized this new form of pictoriality, which, on the one hand, relates to cinema and, on the other hand, detaches itself from cinema in order to expand its own boundaries. In this way,

> 3-D paradoxically symbolizes the variable properties, uses, and surfaces of what we still call screens, at the same time as it does away with the level horizon, the fixed point of view. It inaugurates instead a floating presence, immaterial and invisible as well as ubiquitous and omnipresent […]. Now the illusion of ubiquity, simultaneity, and omnipresence compensates for being a mere speck in the universe, enmeshed in networks of plotted coordinates, trackable and traceable at every point in space or time and yet suspended in an undulating, mobile, variable inside, to which an outside no longer corresponds.[29]

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28 Scott Bukatman, *Matters of Gravity: Special Effects and Supermen in the 20th Century* (Durham: Duke University Press, 2003), xiii.

29 Elsaesser, "The 'Return' of 3-D": 244–245.

In *Gravity*, references to the changing conditions of digital visuality are constructed in numerous ways. This includes, first of all, a comprehensive topological transformation that makes the image space seem to be detached from all definable scales and measurements. What becomes palpable in this developmental process is the uncertainty of proportions and movement dynamics, which leads to a fluid reconfiguration of previously stable relations. As a result, those preconditions that were defining for the image in analog cinema are subjected to a process of dissolution. It is not just that the distinctions of objective and subjective viewing positions are so smoothly interwoven with each other that the moment of transition remains invisible.[30] Even the differentiation between real and virtual elements is gradually blurred in digital 3D film, even made impossible.[31] In this sense, the liquifying of previously stable oppositions is also extended to each character and object in the film, to the hybrid creatures composed of computer-generated and actually existing

30 There are multiple examples of this type of transgression of perspective in *Gravity*, such as when the camera moves closer and closer from outer space toward the astronaut Ryan Stone, overcoming the edge of her helmet and thus switching from an objective to a subjective perspective. If at first the viewer had perceived the space from an exterior perspective, he or she can now see it through the character's eyes. Cinematographer Emmanuel Lubezki characterizes this form of shot modeling made possible by digital processes as "elastic shots". This refers to "takes that go from very wide shots to medium close-ups, then segue seamlessly into a point-of-view shot, so the viewer is seeing the action through the character's eyes, right down to the glare and reflections on a helmet visor. 'The shot goes from objective to subjective and again widens out to be an objective shot again,' explains Lubezki. 'We use that through the movie a couple of times. It's very immersive and immediate and it makes you really go into the world and the head of the characters.'" Justin Chang, "Alfonso Cuarón's Signature Style Offers Unique Viewing Experience," *Variety*, September 2, 2013, online: https://variety.com/2013/biz/news/alfonso-cuarons-signature-style-offers-unique-viewing-experience-1200596491/.

31 This continuous piecing together of real and digitally generated components can especially be seen in the example of the astronauts' physique: "The technical and aesthetic accomplishments of *Gravity* become all the more impressive when Lubezki reveals that the only real elements in the space exteriors are the actors' faces behind the glass of their helmets. Everything else in the exterior scenes—the spacesuits, the space station, the Earth—is CGI. Similarly, for a scene in which a suit-less Stone appears to float through a spaceship in zero gravity, Bullock was suspended from wires onstage, and her surroundings were created digitally." Benjamin Bergery, "Facing the Void," *American Cinematographer* 94, no. 11 (November 2013), online: https://theasc.com/ac_magazine/November2013/Gravity/page1.html.

components, and thus transgresses and surpasses the indexicality of photographic images.

Digital images sustain a specific quality through the continuity of concretion and abstraction—to the extent that one can still call them "images" at all, as Lorenz Engell remarks: "The structures of visual data already bear the prerequisite and concurrent mark of their could-be-different-ness. This is exactly why the term 'image' here, with digital seeing or with visual data, is misleading. Consequently, the digital image can also no longer be described in terms of the image but only in those of a liquified interval."[32] Therefore, in digital images, there is no longer anything coherent, cohesive, or complete; there are only liquified transitions.

The spatiotemporal fluidity that 3D film has staged since its beginnings and varied in motif alongside technical and aesthetic transformations testifies to a history that places us in relation to continuously expandable image worlds. This history does not solely address cinema's awareness of its own possibilities of flexibility, it above all addresses us. Because what 3D film brings us closer to is the awareness not only of living with images but also of moving with and in them.

32 Lorenz Engell, "Die Liquidation des Intervalls. Zur Entstehung des digitalen Bildes aus Zwischenraum und Zwischenzeit," in *Ausfahrt nach Babylon. Essais und Vorträge zur Kritik der Medienkultur*, ed. Lorenz Engell (Weimar: VDG, 2000), 205.