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# Revisiting dynamic space in film from a semiotic perspective

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**Abstract:** This paper revisits a particular area of concern in computer generated (CG) visual effects, namely, the problem of the space in dynamic, multiple panels created by digital processes. The paper critiques recent statements made on narrative understanding, positing equivalences between a viewer's navigation across dynamic frames in CG images and human-computer interactions, as well as claims of narrative complexity in films using dynamic frames. This paper will argue that it is necessary to approach the meaning construction of cinematic space by distinguishing analytical levels of materiality from their discursive meaning, because the visual effect created by the manipulation of a dynamic spatial layout does not necessarily burden the viewer's linear path for constructing coherent spatial meaning.

**Keywords:** film, dynamic space, split screen, multiple panels, computer generated images, complex narrative

## 1 Space in CG images in cinema and interactive media

In recent decades, film researchers have paid increasing attention to how the effects created by computer generated (CG) images in film impact on the narrative, spectacle, aesthetics, genre, history, and industry in contemporary cinema (cf. Manovich 2000; Tudor 2008; Stewart 2009, 2013; Whissel 2010). This paper revisits a particular approach to CG visual effects, namely, the problem of space created by dynamic and multiple image frames such as split screens. This paper first critiques some propositions posited in recent writings on analysis of film space created by digital processes, and seeks to address these issues by using analytical categories currently under development within socio-functional semiotics (van Leeuwen 2005; Bateman 2011). In particular, in the course of its discussion, the paper will argue that it is necessary to approach the meaning of cinematic space by distinguishing between the analytical level of materiality and that of the discursive meaning,

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because very often the visual effect created by the manipulation of the dynamic layout does not obstruct the viewer's straightforward path for constructing a coherent meaning of narrative space.

In her stimulating article "The Eye of the Frog: Questions of Space in Films Using Digital Processes," Deborah Tudor (2008) elucidates in depth the analogy between viewing digital cinema and human-computer interactions. In particular, she coins the term "array aesthetics" to analyze the uses of multiple panels that resemble the appearance of multiple windows on a computer screen and that redefine the viewer in relationship to film space. According to Tudor, films using array aesthetics such as *Hulk* (Ang Lee, 2003) and *Timecode* (Mike Figgis, 2000) present different points of view on space simultaneously, offering the viewer a type of viewing experience that is similar to a computer monitor, with separate windows open containing image, sound, and speech.

Array aesthetics thus requires the viewer to construct a more complicated path when interpreting narrative because it increases the quantity of information available at any one moment for the spectator to process (Tudor 2008: 102). Nevertheless, Tudor contends that contemporary viewers seem to have little trouble traversing dynamic frames, because most of us now live in a culture where tasks requiring dealing with multiple digital windows are ubiquitous. Tudor applies the term "functionality" used by virtual reality technologists to elaborate how the viewer's sensory motor apparatus is being trained through exposure to computer use so as to accommodate the new patterns of visual information and to reconstruct our understanding of the shot (Tudor 2008: 103).

The analogy between hypermedia interfaces and navigation in digital cinema immediately brings an issue to the fore – to what extent does a similar complexity of spatial materials in different media evoke equivalents in spectators/media users' construction of narrative space? Here I argue that it is necessary to establish a theoretical distance between layout as present on the screen and the viewer's construction of coherent meaning in narrative space. The frame lines of multiple panels in a film indeed resemble the multiple windows on a computer screen; however, the key difference from a viewer's traversal within the space of a (fictional) film is that a viewer constructs a general picture of space in a scene *not* directly based on the detailed spatial structures perceived on the screen, but rather through more general mechanisms that support their construction of a contiguous *off-screen* space (Hochberg and Brooks 1996). This space is not visible on the screen but still plays an important narrative role for the scene.

The fact that those films using complex digital processes such as *Hulk* remain mainstream films and that viewers appear to traverse their narratives with ease suggests that viewers' mapping of the off-screen space is, despite the dynamic multiple panels in the film, well mobilized. This kind of spatial understanding is

often different from a computer user's navigation through multiple windows on a screen. In most cases, traversing information across multiple windows in a computer does not motivate the construction of an invisible contiguous space (with the possible exception of those kinds of gaming which also involve narratives).

Studies have also suggested that it is not easy to generate effective narratives through an interactive medium. One representative piece of work in this direction is the empirical work conducted by Plowman and Luckin (1999). Their experiments investigate to what degree multimedia interactive learning environments allow the comprehensibility and coherence of narrative structures. They design a CD-ROM with three different degrees of narrative guidance: one version with an explicit linear narrative, one with purely resource-based sections without any guidance, and one with clear guidance across chunks of information and learning tasks. The results show that in multimedia interactive learning environments, guidance for the narrative route is crucial for the users to construct a coherent narrative and complete the learning tasks designed for the user. For instance, the resource-based version, in which the users need to define their own route without guidance, leads to problems with narrative construction. Even though the number of resource sections for users to process is very limited, it is still difficult for the user to complete their learning tasks without any guidance. Their experimental results imply that, for the users to make sense of learning tasks, either different chunks of information need to be pre-arranged in a particular linear order (i. e., with a guided reading path rather than multiple choices open to users), or, if information is available simultaneously in different spaces on the screen, these resources require explicit information for guidance as to some navigational routes.

On the basis of this empirical finding, one can assume that when viewing split screens in a film, the viewer must be provided with some kind of guidance in order to construct a coherent narrative, and one should not take the equivalence between viewing CG images in film and using interactive media for granted merely because both have multiple chunks of visual information simultaneously on offer – as the above study implies, in interactive hypertextual environments, only well guided hypertextual narratives with explicit reading path can lead to similar degrees of coherent narrative traversals.

One might argue that the multiple panels used in *non-fiction* films might possibly achieve an interactivity similar to the traversals of computer interfaces, since watching non-fiction films does not necessarily involve linear, chronological narrative. Hence, simultaneously provided elements or information chunks in split screens should be able to permit viewers to freely construct their own routes. However, despite the non-chronological possibilities of documentary content, the time-based nature of film still leads the viewer to digest the

information put forward by the filmmaker in a constrained, pre-selected route, as filmmakers normally make sure they get their messages across effectively. Freedom for navigation routes could risk the collapse of the delivery of contextualized information pursued by the filmmaker.

This point also echoes the observation by Carl Plantinga (1997) on documentary films. He anchors his view of filmmaker's pre-selected routes of information presentation in the work of Hayden White (2010) on historiography. In *Rhetoric and Representation in Nonfiction Film*, Plantinga contends that "What White says of narrative history also applies to historical nonfiction film. In narrative films, ordering is not merely chronological sequencing, but inventing events with dramatical movement and emotional force according to the perspective of discourse ... Invention also plays a part in historian and documentarian" (1997: 133). On the basis of Plantiga's analogy between the coherent wholeness of fictional and nonfictional narratives, what Aristotle described two thousand years ago about narrative wholeness actually equally applies to documentary film: "the various incidents of narrative must be so arranged that if any one of them is differently placed or taken away the effect of wholeness will be seriously disrupted. For if the presence or absence of something makes no apparent difference, it is no real part of the whole" (Dorsch 1983: 43). In short, although the documentary genre might seem to be a possible environment for interactive narrative construction equivalent to the computer interface, navigation in a documentary film is nevertheless just as constrained as is that of a fictional film.

Furthermore, it is often argued that the new technology used in digital cinema effectively enhances a viewer's experience of *immersion*. As Tudor (2008: 100–101) points out, a viewer of multiple panels in film is positioned simultaneously from different points of view and this multiple positioning creates an effect of being more engaged, immersed, surrounded by the overall cinematic space. She uses the term "engulfment" coined by Elsaesser (1998) to indicate a body-based pliability of the image in which the spectator is immersed and "engulfed" by space that departs from specularity. Other widely used technologies such as 3D or IMAX all aim at a similar effect, dominating the viewer's visual field and drawing the viewer closer to the diegetic space. However, to distinguish the immersive effect experienced in cinema from that with a computer, one must be aware of the viewer's active process of meaning-making when watching a film. The effect of immersion in film viewing is not solely triggered by the technology of CG images, but also by the viewer's narrative interpretation, which involves the ongoing activation of the viewer's huge reservoir of knowledge brought with them to the viewing process, which greatly contributes to the creation of the immersive effect along with the technology support.

More specifically, during film viewing, the viewer actively imposes a narrative structure on the filmic materials and makes connections in a personally meaningful way. This particular dynamic process of narrative construction is not necessarily what a computer user experiences. In short, the immersive effect is indeed substantially triggered by the technology used in CG images but is also greatly supported by the viewer's own effort on a focused path of narrative construction. Navigation of computer interfaces does not necessarily create a similar immersive effect when no task of narrative construction is involved. Computer users can certainly switch back and forth between different windows and feel surrounded or even overwhelmed by information in multiple channels. However, their traversals across multiple windows often do not draw them further into the central task of constructing a closed space. Rather, some studies have indicated that when dealing with multiple windows and channels, computer users tend to be more distracted from than concentrated on their path towards achieving task completion (cf. Shneiderman and Bedersen 2005; Wijekumar 2008).

## 2 Distinguishing between dynamic materiality and the construction of spatial meaning

In this and the next sections, I articulate further the significant distinction between spatial materiality and the meaning-making process, by extensively analyzing multiple panels used in the film *Hulk*, a film widely discussed in this context because of its deployment of various kinds of composite shots throughout the film (Bauer 2007; Tudor 2008; Ecke 2010; Bateman and Veloso 2013).

First of all, one particular extract is examined to compare and contrast the analysis of the same extract provided by (Tudor 2008). The extract involved is a scene transition generally hooking together two main scenes by using a series of images that transgress shot boundaries. The selected frames of this scene transition are displayed in Figure 1. The transition begins with the two main characters Bruce (Eric Bana) and Betty (Jennifer Connelly) looking at each other (frame 1). A rapid camera zoom-out shows the two characters reflected in a frog's eye (frames 2–4). This is then followed by another zoom-out showing the lab space containing the frog (frames 5–6). After the spatial overview (frame 6) revealing the lab space, the following shots depict some details of the scientists' preparation within the lab for the experiments to be performed (frames 7–16). The preparation scene begins with some shots with dynamic frames, resembling the sides of a rotating box (frames 7–11). After the box rotates three times, the scene transition is completed with the camera panning from some lab machines to Betty in a close shot (frame 12–16).

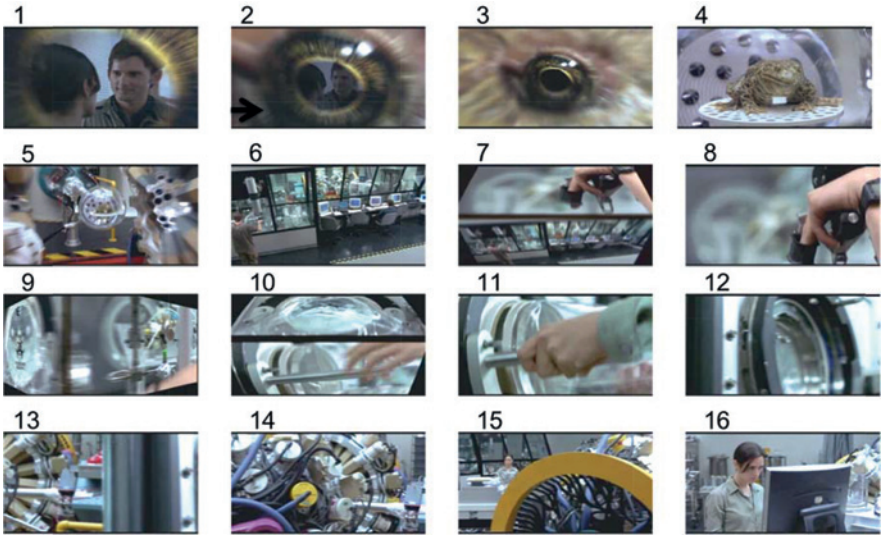



**Figure 1:** Selected frames extracted from a scene transition in Hulk (00:13:29–00:13:50).

In Tudor's analysis, she draws a strong analogy between the space construction of this scene and the interface of the (Apple) computer. In her words:

> The "transition" between eye and lab is accomplished by a visual effect that resembles both a traditional swish pan and the "genie effect," which is the way that program windows hide and display on an Apple computer monitor. The external space of the lab in which the two scientists smile at each other seems to be layered behind or within the frog's eye, which also (through another transition/not transition) appears to contain the space of a lab, creating a very pliable space in which objects and characters can fold out or into other objects and spaces. The resemblance to the genie effect also implies that the space is always present, but minimized. This constructs a relationship among cinematic spaces that promotes the idea of fluidity and simultaneity, since the minimized spaces are still available on a computer monitor screen. (Tudor 2008: 97–98)

Here I suggest that despite the dynamic frames, the viewer's construction of spatial meaning is most straightforwardly guided in a similar fashion to that of other mainstream films. That is, the traversal across on-screen and off-screen space operates linearly without confusion from any interference of simultaneous "hidden" space.

In order to distinguish between the separate mappings of materiality and of meaning construction, the analysis here adopts the descriptive categories defined in socio-functional semiotics. This is motivated by the fundamental notion within socio-functional semiotics that each particular semiotic is itself stratified into an

*expression* plane and a *content* plane following the Hjelmslevian distinction (Hjelmslev 1961 [1943]), namely, into expressive materials and discursive meaning-making. In this stratification, the configuration of the lower level of expressive materials realizes meaning-making at the higher level (Halliday 1978). Crucially, this realization is context determined: i. e., materials do not directly carry certain meanings. Rather, how meaning-making is at work depends on where and how the materials are deployed, e. g., with what modes and forms, in which genre, in what medium, etc. Within this framework, the recent re-conceptualization of *semiotic modes* by Bateman (2011) develops further the analytical relations across modes, medium and materiality. Bateman insists that when analyzing multimodal artefacts, we need first to examine any given media genre in its own right before empirically investigating just which modes of meaning-making are at work. Applying this line of thought to the present case, we do not prejudge the "dynamic frame" in isolation, because how it functions as a meaning-making mode and what effects it creates may well be very different across different media genres such as cinema or computer.

In the scene transition in Figure 1, despite the transgression of the classical continuity convention, several devices which motivate the continuity and coherence of meanings are at work directing the viewer along a most straightforward narrative path – not only do cohesive devices explicitly establish co-referential ties between the characters' identities across the transition (in particular: the identity of Betty in image 1 cohesively ties to her reappearance in image 16; Tseng 2012), but also the logical relations (Bateman 2007) across these shots are straightforwardly signaled through the action-match of the series of shots showing the scientists' preparations for experiments in the lab. In other words, the rapid zoom-out from the frog's eye to the lab and the rotation of the box in the scene transition may contribute to a particular effect of immersion, but these dynamic materials do not burden viewers' linear construction of a constrained narrative space.

Adopting the categories of meaning dimensions defined within socio-functional semiotics (Halliday and Mathiessen 2004), the deployment of fluid frames in this scene transition can be considered as manipulating the *interpersonal* meaning, that is, the viewer's distance and evaluative relationships to the diegetic space. In this interpersonal dimension, the dynamic frames can create an immersing and surrounding effect. However, along the simultaneously constructed dimension of *experiential* meaning, the spatial information significant for the viewer's narrative path is given to the viewer most straightforwardly in a classical, coherent fashion.

Distinguishing different dimensions of meaning creation (e. g., experiential versus interpersonal) and different strata of meaning realization (e. g., materials versus discursive meaning) then leads us to a further, more adequate multi-

dimensional analysis of space in film. To achieve certain particular emotional, interpersonal effects, such as suspense, immersion, and so on, a film needs first to provide a clear narrative sequence experientially to support the working of interpersonal effects. This point has also been suggested by Murray Smith (1995) when theorizing the workings of character engagement. According to Smith, the achievement of emotion, empathy, and moral engagement, termed *alignment* and *allegiance* in his account, is grounded first in *recognition*, the overall understanding of characters and events around them. Hence, the proposal that multiple panels and dynamic frames in a film allow viewers to actively combine the meanings among the frames and create their own interpretation of a film lacks a multi-dimensional consideration of the meaning making process. As we will see in the next section, the uses of dynamic materials and multiple frames actually require a more constrained, less complex meaning interpretation path for the viewer to follow.

Moreover, it must be noted that the way spatial materials function to make meaning and to create certain effects is context-determined. The interpersonally engaging and immersive effect created by multiple panels is well achieved in *Hulk* or in *Bram Stoker's Dracula* (Francis Ford Coppola, 1992) analyzed by Elsaesser (1998). However, the similar uses of multiple screens and multiple perspectives in the genre of war films could create exactly the opposite effect. The analyses of Garret Stewart (2009) compellingly show, for example, just how the use of dynamic frames of digital mediation, such as, sudden shifts of perspectives, moving frames, and frame-in-frame spatial layouts, can blur the expressive strengths of narrative agency and greatly distance the viewer from emotional engagement, which is the main effect originally pursued by the genre of anti-war films. In brief, providing the viewer with multiple points-of-view or the deployment of dynamic frames does not in itself directly create specific effects. The kinds of meanings these materials construct build substantially on their interaction with other elements at work within the film and the genre expectations of the viewer.

## 3 Multiple frames, constrained narrative path

One view underlying several discussions of cinema using hypermedia layout is that multiple channels provide the viewer with a set of choices and allow spectators to actively play with relationships among the dynamic frames, producing distinct versions or readings of the narrative. As a consequence, the viewer can create his or her own mix, or interpretation of the film (cf. Ben Shaul 2008; Tudor 2008; Nedelcu 2013). Multiple windows of split screens indeed resemble layouts of the surveillance medium and might suggest a sense of control.

However, in most mainstream films, split screens do not necessarily lead to a flexible path for narrative combination. Most often, multiple windows are accompanied with more cohesive devices at work precisely to constrain the viewer's interpretation. These devices operate well beyond the unit of the shot, and guide the viewers to construct a coherent, classical space of cinematic narrative even across multiple frames.

One typical example of this is the use of a split screen in one scene in *500 Days of Summer* (Marc Webb, 2009) displayed in Figure 2. The split screen simultaneously shows the male character Tom's (Joseph Gordon-Levitt) expectations of what


**Figure 2:** Split screen extracted from 500 Days of Summer (01:06:32).

might happen and what really happens in the birthday party of the female character, Summer (Zooey Deschanel). The scene begins with similar event actions in the two windows – the visual structural mappings of how Tom arrives at Summer's apartment and gives her a birthday present are almost equal across the two panels as shown in frame (a) in Figure 2. However, after Tom joins the party, the event actions start to differ. Despite the two windows showing two totally different events at the same time, the manipulation of audio-visual salience reduces the possibility of split attention. As shown in frame (b) in Figure 2, Tom's imaginary events in the left window at the party are presented in the long shot. The minimal variation of event actions within this window leads the viewer to focus most attention on the right-hand window where the details of facial expressions and dialogues between the characters are shown in shot-reverse-shots.

This is also the case in *Timecode*, which consists of four split windows depicting four simultaneous events throughout the film. Some analysts have pointed out that *Timecode*, as well as several other split screen movies, uses the devices of audio salience to explicitly direct attention over the visual material and to guide the viewer to certain narrative paths (cf. Verevis 2005; Garwood 2008). In other words, the viewer is not given multiple choices for navigation in the narrative: on the contrary, sufficient devices of sound and speech are deployed to ensure that the viewer follows the desired dramatic path.

Apart from audio devices' leading the viewer through the intended narrative order, the movements of frames can, rather than distracting or confusing the viewer, effectively lead the viewer's attention across multiple windows. This dynamic device is used substantially in *Hulk*. In this film, multiple panels within one screen are often presented to the viewer linearly one after another to organize the viewer's attention shifts. In other words, these composite shots use the motion of the frames to suggest where the more salient information is located at any moment. We can take the shot shown in Figure 3 as an example: here the background window is presented first before the right window zooms out to view.

This is then followed by the two smaller left-hand windows zooming out to show other perspectives on the same scene. In a composite shot like this, there are usually no surprises of event development within each window. Once viewed, the story actions in each window continue chronologically and they are highly predictable. This allows viewers to shift their focus to the appearances of other windows without missing any narrative information. In several high-speed action scenes, such as the scene when the Hulk is under siege from some soldiers, shown in Figure 4, the four panels deployed, despite the moving frames and the fast actions within each window, nevertheless present the same general circumstances of a typical action scene being presented from different perspectives without any unpredictable elements in individual panels.


**Figure 3:** The order of appearance of dynamic panels in Hulk suggesting the viewer's attention path (01:11:15).

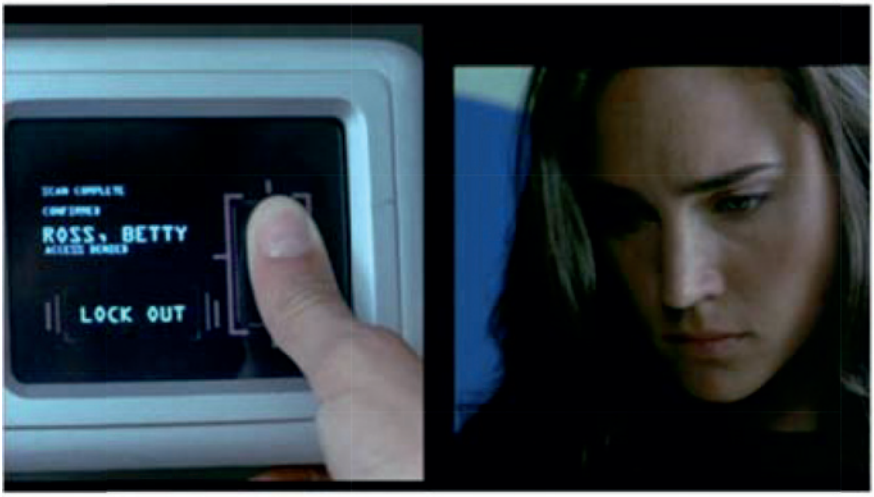
**Figure 4:** Split screens in Hulk showing the general circumstances in action scenes from different camera positions (01:49:21).

In an analysis of *Hulk*, Ecke proposes that the film is mostly concerned with "subverting the usual temporal order of narration" so that present and future are combined in an "all-encompassing present" (2010: 18). This description is only feasible at the stratum of the material layout. Spatial information across different times is indeed often available simultaneously on screen. Nevertheless, at the stratum of discursive meanings, sufficient cohesive devices are functioning to suggest a path for a linear interpretation and the meaning of the event depicted across the multiple panels. For instance, in one brief scene where Betty walks to the door of the room in which Bruce is located, we see movements of the character at two different times. As shown in the first frame in Figure 5, Betty's approaching the door is presented simultaneously with the appearance of another window at the bottom left corner showing her finger on the touch screen.

The close shot of the touch screen immediately takes over the salience, and the window showing Betty's continuing walking to the door is backgrounded. This composite shot is then followed by another split screen shot, shown in the second frame of Figure 5, zooming out from the touch screen and then adding two more pieces of information about the ongoing event: Betty's confused face and her dialogue line "What do you mean I do not have access to him," which hooks the viewer to the dialogue between Betty and her father in the scene following. The overlapping windows in this brief scene speed up the narrative progression but the overall discursive meaning in the event is explicitly and linearly constructed, not only by the manipulation of frame salience but also by the contextualizing information in Betty's speech which succinctly summarizes what has just occurred.

Another longer scene using split screens to present multiple perspectives is when the Hulk is being transported to a military base in the desert. This long scene (1:08:18–1:12:38) has two parts: the first part shows a cargo helicopter carrying a large metal container flying over the desert to the military base. The second part then shows how the Hulk in the container is transported into a lab in the base, escorted all the way by several soldiers. Ecke analyses the first part of the scene as follows: "Lee shows a helicopter flying over the desert in one split-screen, while the very same helicopter can already be seen landing in the desert in another frame" (2010: 18). Thus, in Ecke's view, the scene presents a mixture of multiple temporality. However, in the analysis by Bateman and Veloso (2013), the helicopter scene is temporally a most straightforward one. In their words:

> Whereas the changes in perspective and angles [of the helicopters] that might normally follow the actions in such a scene would lead to a variety of cuts and repositionings of the viewer, the split screens allow a *physically continuous unfolding of events*. As each part of the journey passes, split screens manage the transition to the next – usually multiply so that the transition may be overlooked amidst the surfeit of visual continuities presenting different angles on what is going on. (Bateman and Veloso 2013: 12–13)




Betty: what do you mean I do not have access to him?

**Figure 5:** An extract in Hulk presenting different time in dynamic split screens (01:19:46–01:19:58).

The present paper follows the same analysis by Bateman and Veloso and suggests that the key difference of Bateman and Veloso's analysis from Ecke's lies in their consideration of the cohesive functions of the split screens, working to guide the viewer's narrative traversal. The multiplication of action transition in split screens supports the viewer's recognition, across the transition, of the same objects and places, and enhances the continuity of the linearity rather than subverting it.

The second part of the transportation scene is also composed of several composite shots. These dynamic frames present different perspectives on the Hulk's transportation within the base. Screenshots of frames from the sequence are displayed in Figure 6. The first frame shows the container being transported into the base. This is followed by three frames with split screens (frames 2–4). These panels enter into the frame one after another and show the details of the soldiers' actions. The overall establishing shot of frame 1 remains in sight in these composite shots, functioning as the support of spatial continuity. Frame 5 and frame 6 are the zoom-outs of a split screen in frame 4, showing the soldiers' continuing transportation of the Hulk down into the lab basement. This is then hooked to the computer screen of frames 7, 8 and 9 through graphic match – the diagonal lines in frame 6 cohesively hooked to the lines in frame 7 and the form of the lines in frame 8 hook cohesively to the metal pipes in frame 9. Frame 10 is another establishing shot giving a clear overview of the lab basement. Similar to the composition of frames 1–4, frames 10–16 use split screens to juxtapose parts

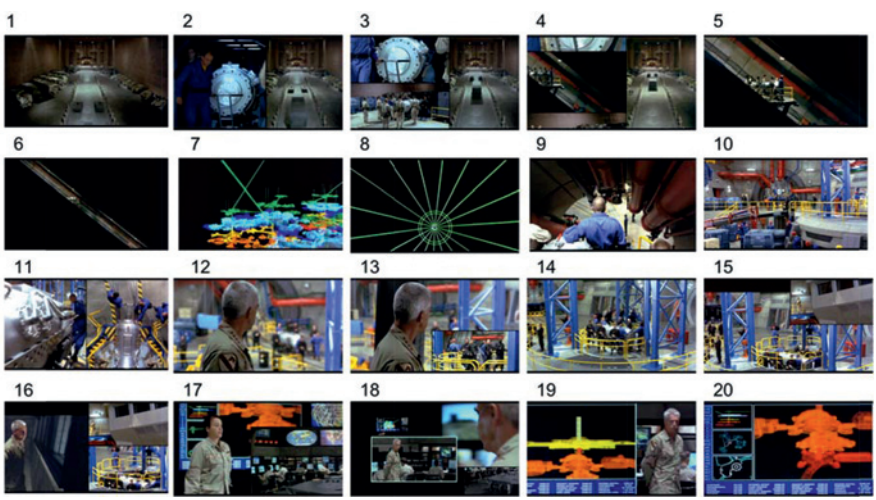



**Figure 6:** An extract from The Hulk presenting different spaces and perspectives in dynamic split screens (01:11:23–01:12:38).

and the whole of the ongoing event. The over-the-shoulder shot of the general in frame 12 and the reappearances of the general supervising the action add the meaning potential of point-of-view perspective in frames 12–20.

In frame 15, the entering of the upper-right split screen shows some black windows, whose spatial significance in the narrative is made clear in the left split screen in frame 16: it is where the general and his team are located. Finally, frame 17 is an establishing shot showing the background location of the close shots of frames 18–20.

The use of split screens here not only speeds up the progression of the overall event flow, but also functions to strengthen the spatial continuity across these composite shots through keeping the establishing shots (frames 1, 10, 17) in one split screen while presenting the action details in close-ups in sub-panels at the same time. In combination with Bateman and Veloso's (2013) analysis of the first part of this scene, the entire transportation scene, also the longest scene composed of CG images in *Hulk*, does not "subvert the usual temporal order of narration" or confuse the viewer due to its simultaneous spatial information. On the contrary, split screens and dynamic frames often function as cohesive devices for guiding the viewer's narrative traversal.

An interesting comparison can also be made here with *intensified continuity*, a term used by David Bordwell (2002) to describe a significant shift in American cinema. According to Bordwell, the editing style in American films since the 1960s has been intensified and faster-paced, featuring certain stylistic traits, such as, the shortening of the average length of each shot in a film, that scenes are framed with more close shots, more extreme focal lengths are used, that the scenes include an increased number of camera moves, and that staging a whole scene has become less common. The use of multiple panels in *Hulk* seems to be able to mediate between standard and intensified continuity. This can be exemplified through a fast-paced action sequence shown in Figure 7. This extract is the beginning of a longer sequence showing the Hulk's escape from the military base and fight against the soldiers commanded by "the bad guy" Glenn Talbot (Josh Lucas). In Frame 1, Talbot commands the soldiers to attack the Hulk. Talbot is framed in a dynamic split screen moving from right to left. Frame 2 adds one split screen showing another perspective of the anxious general in another room. In frame 3, the general discovers through a computer screen that the Hulk has escaped from the lab. A new split screen at the right side shows an over-the-shoulder shot of the general watching the computer screen. This is then followed by frame 4, where the general is calling Talbot to evacuate his soldiers. In frames 5–8, we can see how the entire screen is divided into three perspectives, showing Talbot's resistance to the general's order, the confrontation between the Hulk and the soldier, and the outraged general in another control room.

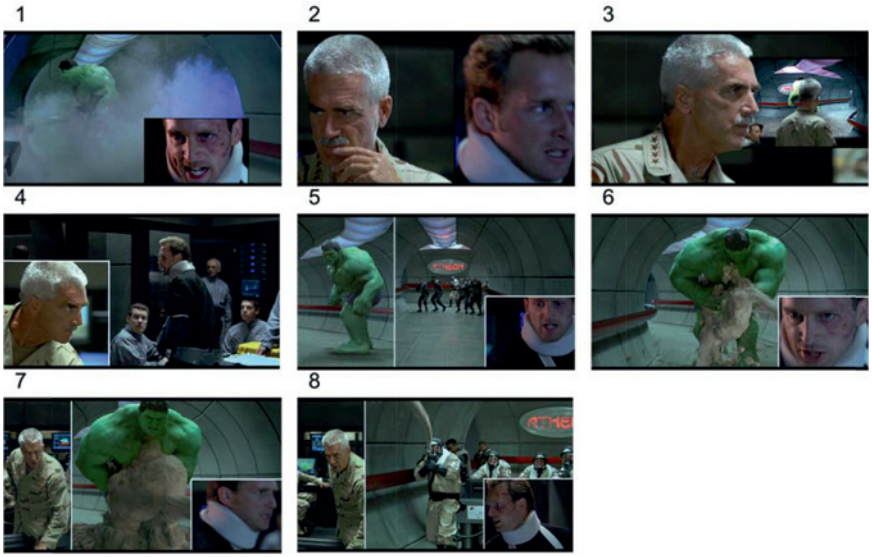



**Figure 7:** A fast-paced action scene in Hulk showing the Hulk's escape from the military base (01:30:33–01:30:00).

This would be a simple enough action scene, such as those usually taking place at the end of standard Hollywood action films. But what the multiple and dynamic split screens do with this is interesting. Whereas the fast changes in three different spaces (the general, Talbot, and the Hulk with the soldiers) in such an action scene would normally lead to an intensified continuity with fast-cutting down to two or three seconds per shot on average, the split screen allows a longer shot length while keeping the same film tempo. In this extract, Talbot remains in one split-screen in close-ups for more than 10 seconds, the general 6 seconds, and the confrontation between the Hulk and the soldiers is shown continuously, clearly in one panel through shot-reverse shot for 10 seconds. This sequence ends nevertheless within around 35 seconds, which would normally have been divided into several fast-cutting shots across a complex spatiality. In short, the use of the split screen in this kind of fast-paced action scenes actually lightens the viewer's burden in traversing a narrative.

Bernard and Carter (2005) insist, "in movies that try to use split screen techniques derivative of comics panels, Ang Lee's *Hulk*, for example, it is extremely disconcerting and ostentatious simply because it is not what viewers are used to experiencing." Given the analyses presented above, this does not seem to be a likely analysis. Information that is available through a simultaneously presented layout

does not automatically mean that the meaning is perceived as simultaneous. Devices employing sounds and speech, the motion of the frame lines, and cohesive ties established across scene transitions, can all function to guide the viewer across the unconventional uses of dynamic composite shots and to direct the viewer along a straightforward and usually very specific narrative path. The above analyses show that the unit of 'shot' is not the only atomic element available for the viewer to construct a classical, unified narrative space. The information of where the shot boundaries are located can actually be of marginal significance for narrative traversal when other cohesive devices are being mobilized.

## 4 Dynamic interpretation of space with static materials

On the basis of the analytical distance between the material layout and the space in discourse, we can further note that the viewer is not always directed to interpret one constrained space simply because the film follows a conventional layout of shots. Some static forms can effectively enhance the significance of off-screen spaces and integrate them into the viewer's narrative interpretation. These static ways of enhancing the meaning and the impact of hidden spaces are what film researchers such as Bazin (1967) and Deleuze (1986) have regarded as a particularly important dimension of film language in its own right.

Several directors, such as Ozu, Wong Kar Wai, Haneke, etc., have shown how, without any digital process, the deployment and integration of off-screen spaces can greatly impact film meaning. For example, Ozu's films often lead the viewer away from narratively significant space (cf. Bordwell and Thompson 1976) by showing several shots depicting settings between scenes. These contiguous spaces near the story action not only remind the viewer of the existence of off-screen space, but also function to take on a systematic narrative role in the viewer's meaning interpretation. This is explicitly suggested by Bordwell and Thompson (2013) in their analysis of Ozu's *Tokyo Story* (1953):

> Ozu's narration alternates between scenes of story action and inserted portions that lead us to or away from them. As we watch the film, we start to form expectations about these wedged-in shots. Ozu emphasizes stylistic patterning by creating anticipation about when a transition will come and what it will show. The patterning may delay our expectations and even create some surprises. (Bordwell and Thompson: 421–422)

The interpersonal effect of surprise is also achieved by films of Haneke such as *Cache* (2005) and *The White Ribbon* (2009), whose substantial use of off-screen

space create disturbing effects and suspense (cf. Saxton 2007; Stewart 2010). For instance, in *The White Ribbon*, most violent scenes are off-screen. One particular example is a scene of family violence, in which brother and sister are beaten by their pastor father for being late for dinner. During the beating scene, the viewer is positioned down a hallway and is not able to witness the violent event, although each beating sound is clearly audible. The director's manipulation of off-screen space disturbs the viewers by making the violent space invisible while pushing the viewers to construct a narrative path through it.

Another example of statically enhanced spatial meaning can be seen in some Wong Kar Wai films. Wong's films often insert long shots of certain unspecified landscapes between scenes, as can be seen in the several high angle long shots of waterfalls in *Days of Being Wild* (1990) and forest landscapes in *Happy Together* (1997). These spaces do not function in the surrounding narrative actions. But their salient presentation signals viewers to change their expectations about their narrative potential.

In sum, the uses of off-screen space in the films of Ozu, Wong Kar Wai, and Haneke are examples of how the viewer's interpretation of narrative space can be broadened also within static filmic layouts. Without any layout resembling surveillance camera or multimedia, these films nevertheless powerfully direct the viewer to traverse back and forth across on-screen and off-screen spaces.

## 5 Final remarks

This essay has analyzed some problems of dynamic space in cinema discussed in recent decades and has proposed approaching the cinematic space of CG images within a stratified theoretical framework that explicitly distinguishes several different dimensions and strata of meaning. Building on the conceptual model of semiotic stratification, one can address further how the viewer's spatial perceptions are (or are not) manipulated by other modes of multimedia devices. For instance, at the stratum of materiality, the installation of multi-channel surround sound in a movie theater originally aimed to expand the viewer's spatial perception and to envelop the viewer in the off-screen space. However, a recent study by Elvemo (2013) argues that in some cases sounds reaching an audience from many channels and directions instead cause dys-functional surround effects and expose the audience to spatial conflicts due to a perceptual-cognitive limit in linking information spaces in front of and

behind the audience. On the other hand, without any multimedia support, some "static" strategies of sound at the stratum of discourse can nevertheless effectively signal the narrative significance of off-screen space. A particularly striking example of this is a famous scene in *Mulholland Drive* (David Lynch, 2001). In the scene at Club Silencio, one stunning moment is when the main characters Betty (Naomi Watts) and Rita (Laura Herring) clutch each other and weep during the singer Rebekah Del Rio's singing of a Spanish translation of Roy Orbison's "Crying" (*Llorando*). The singer abruptly collapses while the music continues without her – this sudden shift of sound perspectives dramatically changes the viewer's expectations concerning the on-screen sounds, powerfully enhancing the audience's awareness of on- and off-screen space and including the off-screen space into meaning interpretation. The discursive manipulation of sound perspectives then further supports higher-level interpretations of the film: as Nochimson (2002: 43) points out, for example, the shifts of sight and sound create a powerful illusion cueing the disintegration of Betty's and Rita's personalities later in the film.

Even though several writers have suggested that the new technologies used in film have subverted the Renaissance spatial perspective (cf. Elsaesser 1998), in the present paper I hope to have shown that the cyberspace-like mapping of spatial structures in a film often does not motivate a subversion of the meaning-construction already conventionalized in Western visual culture for hundreds of years. Despite the complex spatial layout, a film viewer's traversal of the narrative space is substantially supported by several other devices mobilized in the surrounding context within the film and in the cultural context outside the film – including, for example, viewers' genre expectations and top-down predictions, which guide the viewers' selective perception of the spatial information. Finally, just to what extent multimedia materials and discourse devices affect a viewer's traversal of the narrative requires detailed empirical investigation. To support this, the analyses presented in this paper have suggested that it is necessary for analysts to be more critical when comparing and contrasting meaning-making across different media in a multi-dimensional and contextualized way.

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