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Discovering the Animated Camera: Exploring Multiplane Cameras, Rotoscoping, and Space

Abstract

This paper examines the concept of the imagined camera created in the process of animating. One may understand the camera as a spatial object, something that moves through space and records spatial information; the animated camera interacts similarly with animated space. The multiplane camera system and the rotoscoping process draw attention to specific relationships between the animated camera and animated space. This paper will begin to develop a theory of the animated camera through the analysis of these two styles of animating as seen in *Bambi* and *Waking Life*, respectively.

One comes to understand film through the camera, a seemingly simple device that has a vast impact on how we assign meaning to film. The variety of definitions one assigns to a camera is endless; is it showing us a particular point of view? Is it calling attention to its own existence? Is its use directly embedded into the narrative? When going through the history of thought of the camera, we eventually run into the genre of animation. In drawn animation, one typically uses a stationary camera to capture frames, which makes a roll of film, yet when we watch an animated piece, the camera seems far from stationary—we see the camera moving through the animation, as if the animated objects were actually being filmed. Clearly there is no physical camera doing this, aside from the stationary one, but the animator incorporates camera movements into his/her work. A camera is created in the process of animation, one that gives the animated material the quality of being filmed—we refer to this camera as the "animated camera."[1]

In this paper we will begin to develop a theory of the animated camera. While it shares many characteristics of a standard physical camera, it is inherently different, because while a physical form might be implied, it doesn't actually exist in the same way a camera does. Why would something so fundamentally different from a camera mimic it so closely? Why is it that we come to understand the animated camera in the same way that we do a regular one—meaning how does our understanding of the camera change when we consider it in the animated space? In our exploration of the animated camera we will touch on these questions, with the intention of starting a discussion about the animated camera, rather than presenting a fully-formed theory of its purpose and place in film. To inspire a theory of the animated camera, we will examine some cousins of it, namely the multiplane camera system and the process of rotoscoping. Each of these

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[1] We will use the term "animated camera" throughout the paper. While it has yet to be defined, we have noted that it is distinct from an actual camera. When referring to the animated camera, we will always use that term, for the sake of specificity. We will also use the word "camera" when speaking about a camera in general.

styles will contribute to our understanding of how animation relates to cameras (both real and

animated), and will inform our understanding of the animated camera.

Throughout our analysis we will make reference to the space of animation. More

specifically, we will adopt J.P. Telotte's term, "animating space," which refers to both the space

in which the animator works (the paper, the cel, the frame, etc.), but also "how that space comes

alive…as the work of the animator infuses it and all that seems to be within it." (1) This term

will help us to understand the animated camera as we understand physical one, as an object

moving through, existing in, and capturing space. The concept of animating space will inform

our understanding of the animated camera, as we will see through our analyses of the multiplane

camera and rotoscoping.

The Multiplane Camera: Rethinking Space

In 1937 Walt Disney Studios introduced the multiplane camera, an achievement that

would earn the studio an Academy Award for Technical Development. Tellote claims that the

multiplane camera changed animation, as "space would come to the fore and a sense of depth

would increasingly become an important measure of animation skill and even quality." (115)

Furthermore, Thomas LaMarre claims that animation was heading in this direction, crediting the

multiplane camera as

> an innovation upon the basic apparatus or invention of the animation stand used for cel
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> animation… [the new effects were] a result of sustained attempts to eliminate the sense of
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> gaps between the celluloid layers, which is to say that the 'artifacts' of the animation
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> stand tended to disrupt the sense of a closed volumetric three-dimensional world.
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> ("Multiplane Image" 242)

This transition to valuing a sense of depth speaks not only to the development of animation, but also to the development of the animated camera. The advent of the multiplane camera reframes our concept of the animated camera, as it creates space no longer through drawing, but by means of a more mechanical process, one that reforms our concept of animating space.

First, we assess how the multiplane camera changes the animating space; we explore how it works and what techniques it employs to create a sense of depth. Casey Riffel notes that "one of the essential problems of depth in animation is that the movement of the camera (real or virtual) ruins the illusion of space; movement reveals the contingency of perspective." (8) The multiplane camera solves this problem of movement in depth—as we move through space objects scale appropriately to their distance and size. With the advent of the multiplane camera came a substantial change in Disney productions, one that would strive for realism by "emphasizing three-dimensional space, camera movement, and characterization." (Telotte, 133) Thus the change in animation came from a change in the animating space—gone was the flatness and technical limitations of showing depth in cel animation. To further understand this, we turn to Riffel who claims that "Disney studio exploited the fragmentation and reconstitution of space in order to create films such as *Bambi* that negotiate the semantic gap inherent to this form of animation production." (14) The "fragmentation and reconstitution of space" refers to the act of separating the cels, which in turn reforms our concept of space in the animation, one that rejects the conventional perception of flatness in animation. While cel animation is grounded in separated images, Disney managed to access the space between cels as a tool for animation, thereby adding an entirely new dimension to the process.

Changing the nature of the animating process changed the way space was animated and gave new meaning to the animated camera. The multiplane camera offered the animated camera

depth in movement; while the concept was not new, cel animation imposed a severe technological limitation on it, as problems like cel layering and color distortion tarnished any attempts at moving through space. The motivation behind the multiplane camera system can be understood in terms of the challenges the animated camera faced at the time. In "The Multiplanar Image," LaMarre introduces the idea of geometric perspective: that the use of perspective lines creates depth in image, so that objects appear to be scaled appropriately in three dimensional space. (131) This sense of perspective is essential to cultivating the realism Disney strove for with the multiplane camera. Before its invention, the animated camera could not produce this sense of perspective so easily—sure, the possibilities for the theoretical camera are infinite, but that does not mean the animator can access all of them. The multiplane camera widened the accessible opportunities to use the animated camera, and what's worth noting is that it went in the direction of realism (at least in Disney's case).

To give our analysis of the multiplane camera some context, we will consider its use in Disney's *Bambi* (1942). We have considered the multiplane camera as a tool that inspired Disney Studios to embrace realism in their animation, particularly in the sense that it allowed the animated camera to better act as a physical camera (as it could now preserve the geometric perspective). In regards to realism, the use of the multiplane camera actually disrupts our reconciliation between the natural world and its animated counterpart. Consider the opening scene, which makes heavy use of a multiplane camera. We move horizontally through the forest, weaving our way through the thick brush, encroaching into the depths of the forest. The realistic movement through space feels invasive; in an attempt to depict the depth of nature in a realistic way, the animators instead called to attention the human perspective, the intrusive eye so far detached from the animal world that we realize that we cannot understand it. This dissonance,

the conflict between depicting nature without understanding it, arises from the multiplane camera's ability to reconfigure the animating space. Thus as the animated camera mimics the real camera, we notice the disconnect between animation and reality, and we see the intimate relationship between the animating space, the subject, and how the animated camera reconciles the two.

We treated the multiplane camera as a special instance of the animated camera. With its invention came a surge of realism in Disney animation, and it strengthened the link between animator and animated camera. We attributed this strive towards realism to the manipulative powers of animating space that the multiplane camera offered—the animated camera could behave more like a realistic one, as the animator could now preserve the geometric perspective. This development suggests that the use of the animated camera is directly tied into the animator's mastery of the animating space, and the multiplane camera channeled that ability to form a more realistic interpretation of space. Furthermore, treating the multiplane camera in the context of the animated camera allowed us to understand how subject, animation, and cinematography are connected, as we saw with *Bambi*. This branch of the subject of the animated camera provided us with a particular focus on the animated camera mimicking the actual camera, since historically the multiplane camera was born from the movement towards realism in animation.

Rotoscoping: Inventing the Animated Camera

In 1917 Max Fleischer patented the rotoscope, a device that allows the animator to trace over footage that is then re-filmed as animation (Furniss, 76). The Fleischer brothers used the technique known as rotoscoping to create "more naturalistic motion and to seamlessly combine

animated motion with live action." (Telotte, 80) The technology for rotoscoping has developed, for example in Richard Linklater's *Waking Life* (2001), in which animators used software called Rotoshop that streamlined the rotoscoping process. We will return to *Waking Life* again, but note that our analysis will focus on rotoscoping in general, and will not pay particular attention to the methods used to implement it, meaning we won't spend time distinguishing between advanced forms of rotoscoping and more primitive ones.

Rotoscoping presents an interesting concept of the space of animation. The image oscillates from real to animated as it captures a moment like any camera would, is drawn into the realm of animation, and then finds itself completely realized as an animated entity. LaMarre describes it as the doubling of the "presence" of the camera, claiming that "the realism of animation, evident in rotoscoping, must grapple with multiple presences and cannot make claims for linearity." ("Cartoon Film Theory" 228) With this, LaMarre calls to attention the splitting of the original image, that if the original image guarantees a single temporal and spatial point of reference, then that grounds it in reality, but the process of rotoscoping strips the image of this grounding. Thus we have this duality between the original image and the animated one, suggesting grounding in reality, but ultimately failing to achieve it. Telotte also refers to a doubling effect, but he points out that the Fleischer brothers used rotoscoping techniques to create a "double space," as their cartoons would often refer to or interact with the real world, the space outside of animation. In creating hybrid spaces and calling attention to the medium of animation itself in their work, the Fleischer brothers' use of rotoscoping

> "not only naturalized the motion of the animated figures, but also helped suture the cartoon figures into the filmic space by ensuring that the various creations would fit almost seamlessly within the real world the films depict." (83)

LaMarre's doubling of the presence of the camera, along with Telotte's concept of the double space allow us to construct an understanding of how rotoscoping interacts with animating space. The rotoscoped image sits somewhere in between the original and the animated one, with artifacts of both appearing in the final result. It also calls to attention the attempt animation makes towards capturing reality as the imprint of the realistic image appears in the animated one. Rotoscoping reforms our concept of animating space, giving it an explicit foundation in reality, yet completely severing it as a realistic representation. In this sense, rotoscoping creates what we will refer to as a "dual space,"[2] a space that is animated, but is tied to a prior image in its creation, one grounded in reality. One might assert that any animated image gives rise to a dual space, and that is certainly true, but we merely invent the term to refer to the fusing of the double presence of the camera and the double space that LaMarre and Tolette presented, respectively. Rotoscoping simply emphasizes where these two ideas intersect, the idea of an image implying the existence of two cameras coupled with the concept that animation creates the animation itself and a reference to animation as a medium. The dual space is simply the animated space implied by the rotoscoped image.

With this concept of the dual space formed, we can come to understand the art of rotoscoping as it relates to the animated camera. While the multiplane camera allowed the animated camera to resemble a real one, rotoscoping seems to go in the other direction. One takes an image a camera captures and transfers it to the realm of animation. This process takes the space of possibilities of shots and movements a real camera can perform, and maps them into the space of possibilities of the animated camera, arguably a much larger one. Rotoscoping takes a representation of reality and moves it into frame of infinite possibilities, but ultimately limits

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[2] Note that this is a different term than Telotte's "double space." The concepts are related, but distinct.

those possibilities. It's as if we told the camera operator the secret to performing impossible camera angles and movements, but she isn't allowed to actually do them—she has to stay in the realm of the possible. In rotoscoping an image one embeds it in the dual space, and the real camera is embedded in the realm of the animated camera, but by the process we just described, it has the same limitations that a real camera has, creating a secondary animated camera. To clarify, if we consider the path the image takes as one captures it in real time, traces over that image, and then makes it part of an animation, we see that the implied camera follows a similar path: there is the original camera, implied by the original image, and then it is framed as an animated camera, but we can restrict this framework further, forming an animated camera bounded by the same limitations of a physical one. Since animating space and the animated camera are intimately intertwined, so is the dual space with this new camera, and we will refer to it as the "dual camera." We use this term to refer to the camera that lives in the realm of the animated camera, but is restricted to the confines of the real one—it alludes to both cameras simultaneously, but exists as a separate entity, just like the dual space.

We apply the concepts of dual space and the dual camera to *Waking Life*, a film about dreams. The film was shot on a real camera; actors performed in front of a camera and were then taken into an animated world. Throughout the film we see the dual space in action. For example, in one scene Wiley Wiggins's unnamed character walks through a train station, and in the background we see the compartments of the hallway portioned by the ceiling arches moving around, as if they were detached, drifting away from one another. This image makes reference to a scene that was actually shot in a train station, but permanently engrains it in an animated world by giving it an unrealistic quality. This image is one of many that presents the rotoscoped image that while ultimately exists as an animated entity; it calls attention to the medium of animation

by alluding to its prior form as a real image. Similarly, the film calls to attention to the dual camera constantly. Consider the "Holy Moment" scene, where Caveh Zahedi and David Jewell discuss Bazin's theories of cinema. In the scene we see the dual space in action as animated elements intrude on the implication of the real one: lightning strikes at Zahedi's command, the walls fall apart, and the two men turn into clouds. Amidst these fantastical elements, the camera stays surprisingly stagnant—it follows a conventional style of filming dialogue, with over-the-shoulder shots of Jewell, close-ups of Zahedi, and a two-shot to end the dialogue. Here we see the presence of the dual camera plainly—while it clearly is capturing an animated world, it adheres strictly to what a camera operator would do with a physical camera in a dialogue scene. The exaggerated animated elements that bring the dual space to attention also expose the dual camera—it captures to world of the fantastical, but it exists in only the possibilities of the real world.

In forming the concepts of the dual space and the dual camera, we characterized the animated camera in the framework of rotoscoping. Like with the multiplane camera, we examined a niche of the subject of the animated camera—rotoscoping combines real space, animated space, the real camera, and the animated camera. While the multiplane camera extended the animated camera to enhance realism in animation, rotoscoping contracts our concept of the animated camera to one limited by reality.

Concluding Thoughts

Through our analysis of the multiplane camera and practice of rotoscoping, we made clear distinctions between a regular camera and the camera implied by animation. LaMarre writes that "it is as if rotoscoping and the multiplane-camera system…were but two faces of the

same photographic realism," ("Cartoon Film Theory", 243) suggesting that while these techniques are different, they both attempt to cultivate a sense of realism in animation. We treat these as instances of an animated camera—a concept we began to develop, but won't explore further in this paper. Norman McLaren's definition of animation points us in one direction:

> Animation is not the art of drawings that move but the art of movements that are drawn; what happens between each frame is much more important than what exists on each frame; animation is therefore the art of manipulating the invisible interstices that lie between the frames. (Furniss, 5)

If animation is what happens between frames, the animated camera is what captures that phenomenon. In this vein, the animation has the included burden of maintaining the existence of a camera. An image implies a physical camera, which is how animation is ultimately made, but in the middle of that process the animation itself implies a camera. The multiplane camera and rotoscoping allude to such a camera, existing within the framework it sets up. The next step is to explore the process in which the animated camera is created, and to then attempt to understand it through the theories of the camera, or perhaps to develop new ones.

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