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Invitation to the Voyage: The Flight Sequence in Contemporary 3D Cinema

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If the iconic 3D effect of the 1950s is the "lion in the lap" proffered by the famous poster for *Bwana Devil* (1952), that of the contemporary wave of Digital 3D is perhaps the dragon-like "ikran" soaring between floating mountains in posters for *Avatar* (2009). In the effort to create a sustainable aesthetic for contemporary 3D, dramatic movement forward into diegetic space has become a staple strategy because of its ability to both showcase 3D spectacle and also bind visual novelty to story.[1] Running, tunneling, and other earthbound movements into depth have been used to stylish effect in such films as *Coraline* (2009) and *Hugo* (2011), but the flight scene, which relies on dramatic deployment of free, soaring movement in multiple directions, and is prominently featured in films like *Avatar, Up* (2009) *How to Train Your Dragon* (2010), *Legends of the Guardians: Owls of Ga'hoole* (2010) and *Rio* (2011), is perhaps the signature effect of the current 3D cycle. Aerial footage (real or simulated) is a nice vehicle for showcasing positive parallax (the illusion of space behind the screen plane). At the same time, the flight portrayed in these films remains spectacular in 2D versions, making it a good fit for a market in which non-3D theaters and 2D ancillary technologies make up a significant portion of a film's revenue. Furthermore, there are well-established tropes for integrating the spectacle of flight into a narrative on which the current films draw. The importance of this sequence in the current cycle is therefore a good indication of how filmmakers have hedged their bets when it comes to 3D production: they bring tried and true schemata to bear on new technology.

As Scott Higgins has discussed elsewhere in this issue of *Film History*, overt negative parallax effects, (the illusion of protrusion from the screen plane), have become synonymous with excessive and disruptive 3D spectacle. Such effects are often designed to provoke a startled reaction, which may be followed by chagrin on the audience's part at having been tricked.[2] Repeatedly startling the audience is rarely narratively justified outside of the rather narrow generic boundaries of horror, and perhaps action and adventure stories, genres to which new cinematic technologies are often consigned. Like negative parallax, soaring, aerial movement is a powerful 3D spectacle that might threaten narrative immersion, as the history of its use as a cinematic attraction will show. However, recent films insistently tether the flying sequence to storytelling, aligning 3D with industry prerogatives better than disruptive, protrusive effects. While they can be dizzyingly direct, flying effects can also be tipped towards wonder and exhilaration, spectatorial states that have versatile narrative functionality.

Key to flying sequences' narrative integration is the way they lend themselves easily to favored Hollywood character arcs, in particular progress from fearfulness to confidence. Tunneling movements, while perhaps equally capable of making the most of 3D's stylistic potential, are suggestive of hiding or retreat, and thus their narrative utility falls into a more limited (and less family-friendly) niche. In the case of *Coraline*, for example, movement down a tunnel is explicitly connected to the protagonist's retreat into an ultimately terrifying maternal engulfment. [3] Soaring through space, by contrast, has historically been associated with progress and mastery, both literally and metaphorically, and thus can be used to structure the overall journey of a heroic protagonist.[4] The centrality of flying in contemporary 3D is underscored by the number of entries in the cycle that feature bird protagonists, such as *Legends of the Guardians: The Owls of Gahool* and *Rio*, as well as dragons and dragon-like creatures, as in *Avatar* and *How to Train Your Dragon*, all of whose central narrative quests are connected to gaining the courage to fly.[5]

The current wave of 3D is of course not the first time that filmmakers have made use of the power of rapid movement into depth generally, and flying sequences more specifically, to show off the latest in cinematic spectacle. The Phantom Ride films shot from the front of trains, trams and boats starting in 1897, and Hale's Tours - not to mention the enduring success of the car chase in action films - demonstrate the significant place of ground-based kinetics in the annals of cinematic attractions. However, the history of the flying sequence suggests its special connection to the quest for a "total cinema". In "The Myth of Total Cinema", André Bazin made an analogy between the myth of Icarus, which has "dwelt in the soul of everyman since he first thought about birds", and the myth of cinema.[6] Just as the desire for super-human mobility predated the airplane, Bazin asserts that humankind yearned to replicate reality well before the

invention of cinema. The flying sequence offers a feeling of visual mastery of space that unites these myths.

The particular appeal of aerial spectacle may be attributed to the free and rapid movement of the camera in all directions through three-dimensional space, a visual perspective that remains novel even in an era when forward motion through space at highway speeds is a perceptual commonplace. The most powerful stylistic articulation of flying spectacle is the forward traveling point-of-view, which locates the viewer at the center of onrushing imagery. Its longevity as a cinematic attraction probably derives from the perceptual force with which it activates depth, movement, and constant renewal of detail, qualities specific to film at the time of its early development. In 2D, strong perspectival cues involving the relative size of objects as they advance and overlap emphasize a dynamic cinematic deep space. The rate of graphic change and relative movement increases as objects move into the foreground and pass out of frame. Yet, the eye tends to fixate on the center of the frame, a relatively stable point of distant but ever-evolving imagery, in essence the point of origin of every object that rushes forward. The result is a composition with a highly active periphery that nonetheless grants visual priority to its deep center.

3D gives the forward traveling point of view more apparent depth, but does not radically change its character. Peripheral details continue to slide off frame before protruding beyond screen space, and compositional priority remains with the distant center. As a long-standing showcase for cinematic depth, the traveling shot seems ideal for exploiting stereoscopy. Yet, perhaps because it works so successfully in 2D, the technique doesn't highlight the differentiation offered by 3D to the same degree that protrusion does. 3D filmmakers can compensate for this with momentary embellishments that emphasize stereo space. A flight path that takes sudden curves, for example, can pull the eye toward peripheral detail. Similarly, particulate mise-en-scène, like a spray of water or a crumbling rock, might activate foreground center space, thus creating limited protrusion. The effect can also be muted by pulling back from a literal point of view shot to include the flyer in the middle foreground, and shooting forward movement from over their back. The device is thus particularly suited to a controlled approach to 3D, in which intrusive dimensional effects are passing and punctual.

The emotional impact of this type of visual effect is illustrated by a shot in the celebrated "Circle of Life" sequence at the opening of *The Lion King* (1994), which, not incidentally, was recently released in 3D formats both theatrically and on Blu-ray. As the chorus begins, a tracking shot looks straight down on a blurry herd of running zebras and wildebeests. The percussion comes in and the music swells as the shot abruptly pans up to reveal a much deeper space, encompassing a panorama of the savannah. We leave the plodding beasts behind and soar rapidly towards Pride Rock, the promontory on which the lion king is standing. The hornbill, Zazu, flies in from the rear left of the frame and the camera follows the rest of his flight as he banks slightly to the left and right to land on Pride Rock. Given our heavy dependence on vision to gather information about the world around us, the moment plays on the intense satisfaction of suddenly going from a shallow and obstructed view to a scenic and all encompassing one. What's more, because of the rushing movement of the shot towards the promontory in the center of the frame, our vision itself seems capable of propelling us through space towards a distant goal. I would suggest that the perceptual richness of this illusion of visual mastery of space is at the heart of the powerful appeal of the flying sequence.

If this is the case, then the more complete the illusion of spatial mastery, the more satisfying will be the result. New technological innovations have activated additional visual and aural dimensions in the flying sequence over the years. In 1927, for example, by eschewing models and matte effects in favor of bravura stunt flyers and aerial cinematographers, and using the widescreen process Magnascope (discussed below) in some theaters, Paramount's World War I epic *Wings* contributed a new verisimilitude and immersiveness to the cinematic flying experience. Cinerama and IMAX activated peripheral vision and auditory surround effects to enhance the impression of movement through space. Computer generated imagery produces the illusion of flight in spaces and at speeds that even the most daring stunt performers cannot achieve, while 3D contributes the illusory effect not only of depth but also of parallax.

It is telling that aerial cinematography has repeatedly been linked to technological innovation both within and beyond commercial entertainment venues. Vitarama, a precursor to Cinerama, was the prototype for an immersive gunnery-training program during World War II. As one trainee described it, "You're flying, you're fighting, you're there!"[7]

Aerial cinematography also has a long history as a commercial attraction. John Belton notes that the 360-degree Cinéorama at the 1900 Paris Exposition "featured a balloon ascension, filmed from a real balloon which rose from the Tuileries and descended in La Grande Place de Bruxelles. The illusion of reality was enhanced by the presence of an airship captain who announced the various sights."[8] The climax of *This Is Cinerama* (1952), the first Cinerama film, is the spectacular "Flight Across America" sequence, featuring aerial footage of famous American landmarks. As with the film's better-remembered roller coaster footage, the flying sequence is shot from a point of view perspective to give the impression of direct audience participation in the soaring movement. To make the most of the Cinerama screen's ability to place images in the viewers' peripheral vision, cinematographers on the film sought out opportunities to shoot while moving past or through various objects. For example, stunt flyer Paul Mantz flew his plane down into Zion Canyon to get shots with the canyon walls moving past on either side. John Belton has described the powerful "participation effect" created by the film. "During Cinerama's aerial sequences", he notes "audiences are said to have 'leaned sharply in their seats to compensate for the steep banks of the airplane'," while war ace Gen. James Doolittle reportedly clutched his chair during scenes shot in the Grand Canyon.[9] The heavy use of direct point of view shooting is consistent with perpetuating the illusion of a ride experience. The print advertising for Cinerama also emphasized its ability to create a participatory illusion, showing viewers in their theater seats flying out over a lake on a power boat, hurtling down the big drop on a roller coaster, and hovering over the wing of an airplane.[10]

IMAX films, too, have relied on an immersive experience of flight. Two films centering on the space shuttle program, *Hail Columbia* (1982) and *The Dream is Alive* (1985), featured footage shot on the Columbia and Challenger space shuttles, respectively. Other films, including *Grand Canyon: The Hidden Secrets* (1985), featured more traditional aerial photography in the IMAX format.

It is clear, then, that the flight sequence has been a favorite vehicle for displaying the potential of cinematic technology to produce a spectacular illusion of unmediated spectator participation. Although this type of spectacle has the raw power to be sold as a thrill ride, carefully deployed flying sequences also have a long history of successful integration into narrative structure. Such sequences have repeatedly provided centerpieces in production cycles relying on high production values and/or special effects, from the World War I "specials" of the 1920s to the space operas of the 1970s and 1980s.

The Flight Sequence in *Wings*

World War I epics such as *Wings, Lilac Time* (1928) and *Hell's Angels* (1930) set the precedent for, and offer the most striking parallels to, the current cycle's employment of the flight sequence. In these films, flying is both a central narrative structuring device and a means to foreground spectacular production values. *Wings*, the most successful and highest profile of the group, features four well-spaced and stunning major sequences of aerial combat, as well as a number of shorter scenes featuring aerial camera work. The *Variety* review of the film credits its "air stuff" for its powerful appeal and vitality. "Rolls, dives, slips, loops. They're all there", it states, "Manoeuvers [sic] that the average person has never seen performed in the air, space eaten up so fast that there's no calculating the rate it's consumed at ... . So much to see that it actually can't be minutely consumed at one viewing."[11]

In addition to its impressive production values, *Wings* was road shown in a number of theaters featuring Magnascope, a process in which some of the film's images were projected on an expanded screen using the wide-angle Magnascope lens. As John Belton explains, the process could produce an effect of gradual enlargement of the image through "the projectionist's movement of the black maskings framing the projected image". When applied to a shot of the U.S.S. *Constitution* sailing directly toward the camera in *Old Ironsides* (1926), the process produced "an illusion of the image's movement into the space of the

theater auditorium", in effect a type of protrusion.[12] However, the *Variety* review of *Wings* suggests that Magnascope's use for this film relied less on this type of incidental effect than on a sustained alternation between smaller and larger screens. Describing a screening at the Criterion Theater in New York, the review states, "Midway in the first part the switch is made to Paramount's Magnascope, which spreads the screen and projection across the entire stage. This is retained until the finish of the first half. The same thing occurs in the second part, so that much more than half the footage is magnified." The review goes on to describe the use of Magnascope in *Wings* as "much more effective than in either *Ironsides* or *Chang*, because of the terrific action". *Variety* also describes additional enhancements to the screening, all of which, though less demonstrative than the airship "captain" of the Cinéorama, seem designed to increase the verisimilitude of the flying sequences - such as occasional halts to the music "to allow full dramatic intensity", backstage effects simulating the sound of engines "in two tones to denote the American and enemy planes", and color tinting of the sky, clouds and "spouts of flame shooting from planes that dive, spiral and even zoom". The spectacle of flight was thus an occasion for a variety of technological embellishments.

The similarity of *Wings* to recent 3D features, both in terms of stylistic strategies and the narrative integration of aerial spectacle, make it worthwhile to look at the film in some detail. Each of the main sequences in the film raises both the stylistic and narrative stakes of those that came before, all the while working to ensure that spectacle is tightly tethered to character development.

The two most frequently used shots in *Wings*' flight sequences are front-on views of the pilots, shot with automatic cameras attached to the front of the planes, and aerial long shots of multiple planes interacting. Both types of shots display their status as genuine aerial shots, enhancing the verisimilitude of the flight sequences and underscoring the film's high production values. For example, the front-on shots often reveal impressive aerial compositions of other planes ranged in depth behind the pilot, while the long shots soar along with the flyers at varying heights above, below, and on a level with them. While these shots are certainly quite spectacular, the types of shots that create the most powerful illusion of flight for the spectator are much less common. Over-the-shoulder, or what might more accurately be called over-the-back shots, looking forward as the pilots fly, as well as true aerial point-of-view shots, are used very sparingly in *Wings*. They appear most frequently in the emotionally fraught climactic battle sequence, when, rather than giving the spectator an illusion of unmediated flight, they are aggressively tied to the protagonist's overwrought state of mind.

The centrality of flight to *Wings'* narrative, already established by the film's title and marketing campaign, is underscored by its opening aerial shot of a plane, framed in the foreground by the struts of another plane, followed by an intertitle featuring a quote from Charles Lindbergh about the feats of the wartime flyers. The flying sequences to come are anticipated by a shot of a plane's silhouette soaring in the clouds that illustrates the protagonist Jack's (Charles "Buddy" Rogers) daydreams of flying. The early portion of *Wings* also establishes the motif of kinetic camerawork in the film even during ground-based sequences, most notably with the first of several UFA style "entfesselte camera" (unfastened camera) shots that follows the arc of a swing shared by sweethearts David (Richard Arlen) and Sylvia (Jobyna Ralston). Further motifs associated with flying, such as the shooting star logo that Jack's pal Mary (Clara Bow) paints on his car, and the symbolic use of shots of clouds, are also established in the first portion of the film. However, actual images of airplanes in flight are delayed until our heroes take off at just under forty minutes into the film.

Fig 1.
Aerial point-of-view shots are used sparingly in *Wings*, appearing most frequently in the climactic battle sequence, in which they are aggressively tied to the protagonist's overwrought state of mind. Jack (Buddy Rogers) is looking at his target as he dives down towards it.

The climatic fifteen and a half minute battle sequence, beginning just over 106 minutes into the film, contains the most dramatic use of aerial footage to align spectators with the visual perspective of a pilot. The sequence includes not only aerial work but also an epic ground battle, visibly staged beneath the air war. The flying action in the sequence divides into three distinct parts. The first of these is a lyrical take-off sequence that echoes and amplifies an earlier dawn patrol sequence, this time portraying large numbers of planes taking off to join in the "big push". The second section centers on Jack's crazed quest for revenge for what he believes to have been the death of David. Here, viewers repeatedly have access to the kind of over-the-back and point of view shots that have been used with restraint in the rest of the film. This creates an uneasy and occasionally vertiginous subjective alignment with Jack's visual perspective as he engages in his most bloodthirsty and arguably least heroic actions: strafing essentially defenseless German troops on a bridge and a road and gunning down a German general in his squad car. One of the film's most dramatic deployments of subjective shooting occurs when Jack swoops in to strafe a German machine gun nest that has been decimating the advancing American line; an under-cranked point of view shot (apparently shot from a crane rather than an airplane) plunges down towards the dying gunners, and then begins to swoop back upwards before abruptly cutting.

Fig 2.
Aerial point-of-view shots are used sparingly in *Wings*, appearing most frequently in the climactic battle sequence, in which they are aggressively tied to the protagonist's overwrought state of mind. Jack (Buddy Rogers) is looking at his target as he dives down towards it.

Intercut with this action is a scene of David, who is trapped behind enemy lines, stealing a German plane. This scene carries forward the shift to more subjective shots in the final battle. As with the shots from Jack's perspective, David's point of view is used here to underscore the bloodthirsty attitude to which the boys have been driven. After circling over the German airfield to shoot down a would-be pursuer, David looks back over his shoulder to check his success. A pov shot shows the downed plane and the ground rapidly receding as David pulls back up into the sky, and a cut to his reaction reveals his crazed laughter. A cut back to a non-pov shot of the downed plane lingers on the other Germans pulling the limp body of their dead comrade out and carrying him away. David is thus shown to echo Jack's lack of remorse when killing an enemy, while the viewer is made privy to a longer view of the consequences of his action. There is a guilty quality to the spectacle that is offered here, tinged as it is with the suggestion that their aerial viewpoint allows the flyers to soar away from the consequences of the hail of bullets that they rain down.[13]

The final flight-based portion of the sequence falls just after the overall defeat of the Germans in the "big push", and represents the emotional climax of Jack and David's friendship. It centers on the horrifying action of Jack shooting David down with single-minded ferocity because he doesn't recognize his friend in the stolen German plane. Jack only discovers that he has killed his friend when he lands his plane and comes face to face with the victim of his aerial attack. Interestingly, the sequence backs away from shots that put the viewer "in the hunt" via the visual perspective of the attacking pilot, sparing viewers a full visual alignment with Jack's inadvertent murder of his friend. Instead, the more objective style of shooting used in the earliest flight sequence once again predominates, with a particular emphasis on medium shots of David as he shouts and waves, trying to get Jack to recognize him, and corresponding shots of Jack's angry face as he hunts down "another heinie". The stylistic retreat in the scene from point of view and over-the-back shooting emphasizes the contrasting emotions of the two friends rather than the vicarious "thrill of the hunt". The climax of the character arc thus trumps visual spectacle, while the anti-war sentiments of the tragic sequence are powerful enough without point of view shots of Jack shooting David.

The bravura flying sequences in *Wings* were clearly a focal point of the film and its marketing.[14] It is therefore instructive that William Wellman and his crew dole out what is undoubtedly the most dramatic

effect that aerial spectacle has to offer, forward rushing over-the-back and point of view shots, with relative parsimony. This restraint prevents aerial spectacle from overwhelming narrative immersion and facilitates its use to keep character development and subjectivity at the center of the audiences' attention. The particular ways in which aerial shots are deployed in *Wings*, from lyrical shots of planes surmounting the clouds to troubling point of view shots of strafing runs, also makes possible the film's complex ideological mix, in which the actions of the flying aces are at once mythologized and problematized.

Flight and plot structure in *How to Train Your Dragon* and *Avatar*

Like *Wings* before them, *Avatar* and *How to Train Your Dragon* are among the most successful and critically acclaimed films in a high profile production cycle, in this case recent 3D fantasy films.[15] Also like *Wings*, these films escalate spectacle while successfully tying flight sequences to narrative through the tight connection of flying to character development. Film style and narrative deployment of flight sequences contribute to the balance between providing a 3D ride and keeping spectacle in the service of the story.

Both *How to Train Your Dragon* and *Avatar* structure viewer engagement with the development of character around the kinetic spectacle of flight. Their flying sequences are centerpieces of 3D spectacle, and fall at turning points in the script or highlight key moments in character development. In a general sense, the narrative and thematic stakes of flying are very similar in these two films, and also reminiscent of *Wings*. For the two protagonists, Hiccup (*Dragon*) and Jake Sully (*Avatar*), flying is a way to escape marked physical limitations that set them apart from their peers. Each act of flying takes them deeper into a new world and leads them to form bonds with former enemies, causing their allegiance to shift dramatically by the end of the film. However, the character arc of the protagonists in these films isn't as tragic or complicated as in *Wings*; these are straightforward adventure stories.

Fig 3.
Point-of-view cutting in *Wings* shows David's crazed reaction as he soars away from a German plane that he has shot down.

Both films also present notable moments of 3D spectacle beyond flying shots, such as moments of negative parallax and 3D "beauty shots". Of the two films, the fully animated *How to Train Your*

Fig 4.
Point-of-view cutting in *Wings* shows David's crazed reaction as he soars away from a German plane that he has shot down.

Dragon is more overt and playful in its presentation of 3D attractions. It offers some fairly brief moments of objects "poking out" in negative parallax, spacing them out during transitional moments in the film. Protrusion effects include a splashing wave in the opening shot and assorted objects that emerge from the screen during a spectacular montage of the Vikings getting ready to board their ships.

Avatar, of course, differs from *How to Train Your Dragon* in a number of important ways. It is a more dramatic and adult-themed film, with greater pretensions to being "quality cinema". Despite its extensive use of similar technologies, it is also photorealist, and thus less comically stylized than the animated *Dragon*. There are nevertheless some striking parallels in the way that it deploys its flight sequences. Negative parallax in *Avatar* is less overt than in the examples from *Dragon*, but the film contains no

shortage of "beauty shots", notably in the striking scene in which Jake and Neytiri explore the nighttime jungle of Pandora. 3D in general is thus handled much like spectacular elements in 2D films; the most blatant 3D spectacle is interspersed with scenes of more transparent style, it flares out most overtly in establishing shots and montages, and, as much as possible, it is harnessed to narrative development.

As with *Wings*, both of these films point from the start toward the idea of flying to come. The two opening shots of *Dragon* provide a helicopter style approach to the island of Berk, showing off the mobility of the virtual camera as it soars first low over the sea and then up over the village, tracking through mist and catching a splashing wave right at the stereo window. The opening shot of *Avatar* is quite similar to that of *How to Train Your Dragon*: a helicopter shot that soars through the mist, this time dipping low over a lush jungle rather than over the sea, with trees rushing up toward the stereo window. The connection to Jake's later flights on his dragonlike "ikran" (or "banshee") is made explicit when he explains in a voice over that, while he was in a VA hospital, he had dreams of flying and of being free. The shot ends abruptly in a cut to black, followed by a close-up of Sully's eye in intense blue light, as he says, "Sooner or later, though, you always have to wake up". Of course, the character's journey will lead him to the moment when he does not have to wake up to his "real world". He will become entirely engulfed in a dream world in which he *can* fly, and wake up to that reality, instead. Thus loaded with thematic weight, flying is reintroduced at key points along Jake's journey, each time becoming more organic and internalized for him, while upping the stakes of spectator engagement with cinematic spectacle.

Before flying can become a reality for either protagonist, however, they will have to travel through a typical coming-of-age process of training and mental awakening, connecting familiar tropes in character development to the flying thrills to come. They will even, like Bellerophon before them, have to tame their own personal Pegasus to achieve their destiny. For Hiccup, his initial flight is an abortive one. As in *Wings*, the promise of flying suggested by the opening shots is withheld, in this case for thirty-six minutes, underscoring the frustration felt by Hiccup and the dragon he has shot down during a fight. With part of his tail gone, the dragon, dubbed Toothless, is unable to fly up out of the valley in which he has landed. Hiccup constructs a prosthetic tailpiece for Toothless and the two are finally able to make a short flight together. The kinetically explosive flight ends after only twenty-nine seconds, however, when the pair is unable to cooperate in operating Toothless's prosthesis. Our access to spectacle thus depends on narrative developments - we'll get to see more flying when the protagonist learns his lesson about cooperation.

Jake's first experiences of flying over Pandora are vicarious. At about twenty-four minutes into the film, Jake leaves the confines of his wheelchair and the humans' compound in his avatar form for his first exploration of Pandora by helicopter. Like Hiccup's first flight on Toothless, the forty-second scene of the helicopter flight provides a short glimpse of attractions to come. While it offers soaring views of Pandora's fauna, Jake is clearly signaled as a spectator, with helicopter pilot Trudy at the controls, and, unlike later flights, the experience is also mediated by human machinery. Several short flying sequences continue this pattern of gradually immersing Jake in the Pandoran landscape. A second helicopter flight at fifty-five minutes introduces the floating "Hallelujah Mountains". Shortly after this, Jake first sees the Na'vi woman, Neytiri, flying on her ikran, and Neytiri suggests that Jake will have an opportunity to choose an ikran when he is ready to become a hunter.

At their midpoints, both films mark the culmination of the training portion of the story and the characters' growth with spectacular flight sequences that are structurally equivalent to the scene in which David and Jack down a large German Gotha bomber in *Wings*. Over the course of these flights, the protagonists find their true purposes and commit themselves to new paths. For Hiccup, this comes after a montage sequence of abortive practice sessions that tease the possibility of flight. For example, one shot frames Hiccup flying on Toothless against a beautiful blue sky, only to pull back to reveal a tether holding them in place. Soon after, however, an extended set piece shows Hiccup and Toothless finally working together to complete a successful flight in and around the rock stacks off of Berk's coast.

Similarly, there is a great deal of build up to Jake's first solo flight ninety minutes into *Avatar*, roughly its midpoint. Neytiri's promise that Jake will choose his own ikran is fulfilled sixty-five minutes into the film,

when she tells Jake that he is ready, and they set off on his quest to the ikran nesting grounds. Jake and several Na'vi warriors climb up the treacherous floating mountains, he fights the ikran, subdues it, and, much like Hiccup (and Bellerophon), makes an initial bond with it before finally taking flight. The next six minutes are devoted to a montage of Jake's quick progress as a Banshee rider. The sequence has three distinct acts, made up of Jake's first flight, a flight with Neytiri and the other Na'vi warriors, and an escape with Neytiri from a giant flying predator, the toruk. These segments are divided by two short interruptions for non-flying scenes: an animated discussion of flying between Jake and Neytiri and an exposition scene with Grace and the other scientists. Jake's progress from beginning flyer to "ace" is accomplished during a narrative ellipsis. During his escape from the toruk with Neytiri, it is Jake who demonstrates not only flying prowess but an understanding of the terrain. He directs her to the safety of some vines that the toruk cannot navigate, presaging his later mastery of the giant toruk itself. This long flying sequence near the midpoint of the film is thus a key moment in Jake's journey to becoming a leader among the Na'vi and shifting from Neytiri's student to her lover.

The turning point of both of these central flying sequences is a moment that is emblematic of the need for the protagonists to let go and trust their instincts. This is a repeated trope in "learning to fly" narratives. It is the moment when Dumbo realizes that he does not need his magic feather to keep him in the air, and also the moment when Luke Skywalker turns off his targeting computer and takes his shot at the Death Star using "the force". Like Dumbo, Hiccup begins his flight clutching a prop: a sheet of directions for the movement of Toothless's prosthesis. The two fly up too high and Hiccup's tether comes loose, and they both plummet earthwards. In the process of getting back on Toothless, Hiccup loses his cheat sheet. In order to react in time to avoid some oncoming rock stacks, he must abandon the instructions and fly by instinct. A parallel moment occurs in *Avatar* when a panicky Jake nearly falls from his newly captured ikran, before he discovers his ability to control it through his tsaheylu, or mental bond, with the creature.

The midpoint flight sequences in which the protagonist discovers/proves his ability to fly is followed in these two films by subsequent flights that increase the stylistic and narrative stakes, culminating in a final epic aerial battle. Because of a variety of generic and historical factors, a notable difference between *Wings* and the newer films is that the final battles in the latter films are free of any complicating moral ambivalence: they are moments of unadulterated triumph and vindication for the protagonists. In all three films, the final battle relies on scale to magnify the aerial spectacle. In *Dragon* and *Avatar*, the protagonists now lead large groups of fellow flyers into battle. For Hiccup it is the other young Vikings who have learned to fly dragons and help him to attack a larger, evil dragon, while for Jake it is the gathered Na'vi warriors who join him and his toruk in a "big push" against their colonizers. The final battle completes the hero's journey through the expulsion of a monster and the protagonist's full integration as a leader of the "tribe" that formerly rejected him.

Flight and film style in *How to Train Your Dragon* and *Avatar*

The basic stylistic vocabulary of these two films is also in many ways quite similar to *Wings*, with changes that are consistent with the intensified continuity of modern filmmaking. Effects that foreground 3D serve to embellish this basic vocabulary without radically changing it. As in *Wings*, long shots of the flyers from a wide variety of angles, including directly above and below, are a staple of the flying sequences in *Dragon* and *Avatar*. Consistent with heightened continuity, the editing is more rapid than in *Wings*, and computer generated imagery makes possible some angles that even *Wings*' automatic cameras and bravura stunt pilots could not obtain. Throughout the flight sequences there is also consistent cutting from kinetic flying shots to medium shots at eye level with the characters, showing their reactions. This strategy differs from *Wings* primarily in the camera angle; because the aerial reaction shots in *Wings* were made with cameras mounted on the planes, by necessity they were frontal. *Dragon* and *Avatar* are free to place their "camera" where they will, and typically choose to shoot reaction shots from the side.

As in *Wings*, however, the reaction shots serve the same basic function of keeping the characters' experience of flight at the center of attention. They also provide interludes of stable and relatively flat compositions that punctuate the marked positive parallax of the more kinetic portions of the sequence.

These shots can also become the starting point for a "wheeling away" shot that is used early on in both films. Dragon and rider begin the shot in a close, level framing, and then unexpectedly wheel back and recede rapidly within the frame. This dramatic shot is used during Hiccup's first ride on Toothless and during the helicopter flight in *Avatar*. The maneuver links character reaction and spectacle in a single take, emphasizing the speed of the dragon/helicopter's movement and dramatically reactivating our sense of 3D's ability to render depth. In addition to consistent cuts to reaction shots, sound perspective also keeps the characters close during flight scenes. For example, when Jake rides his ikran for the first time, his panting and low comments are clearly audible even in long shots.

Consistent with a logic of escalation that is key to showmanship in all three films, these films also echo *Wings*' incremental rollout of stylistic devices that supply flying thrills. For example, not only does *Dragon* tease viewers with a short initial flight, but Hiccup also spends this whole flight facing the dragon's tail. Forward soaring movement with the character is thus withheld in this first short sequence, and the brief, receding over-the-back shots of Hiccup used here don't pack the kinetic sensation of later examples of this shot, when he is facing forward. The scene of Jake observing Neytiri on her ikran does provide over-the-back shots of her flight and shows off the extreme mobility of the camera. Our access to flying spectacle is in a sense diluted in this scene, however, given the repeated cutting to shots of Jake and to his point of view from a high branch watching her flight. In a literal sense, this provides less screen time for flying shots, while it repeatedly "takes us out" of the experience of flight, reminding us that it is not the protagonist doing the flying. It thus reinvokes the desire and expectation of seeing Jake experience flight more directly that is set up in the opening helicopter sequence, which will be fulfilled when he becomes a warrior and obtains his own ikran.

As might be expected, the midpoint flight sequences increase the stylistic stakes considerably in the films. For example, in Hiccup's first successful flight with Toothless, forward-facing over-the-back shots now give the viewer a more thrilling head-on perspective of the flight. The pair's treacherous flight between the rocky sea-stacks also emphasizes the illusion of motion parallax, providing a 3D enhancement to shots reminiscent of the Zion Canyon shots in *This Is Cinerama*. The sequence ends with an exhilarating, rapidly cut series of shots (thirty shots in forty-six seconds) that mixes rushing, over-the-back shots, front-on shots of the pair flying toward the camera, inserts of Hiccup's feet and the tail-rudder, bird's-eye views of the pair weaving through the rocks, and a side angle long shot that features a strong motion parallax effect. Near the end of this portion of the flight, an over-the-back shot follows the two as they clear the rocks and fly free, and the last shot of the sequence is also an over-the-back shot that ends things on a comical note as Toothless flies Hiccup right through the path of his triumphant puff of flame, a shot that echoes David's flight through the smoke of a fallen Fokker in *Wings*. The overall effect is an intense illusion of spatial mastery that ties this flourish of 3D spectacle to the character's acquisition of the skills and trust needed to truly become one with his dragon.

Notably, both of these films make sparing use of true point-of-viewshots. Thus, once again, despite its undeniable kinetic power, the extended, unmediated "Phantom Ride" view of the movement of flight is not a central part of the stylistic vocabulary of the aerial sequence in these films. Instead, point of view tends to be used for isolated shots that foreground key moments of character subjectivity. For example, at the start of Hiccup's first abortive flight on Toothless, a quick pov shot shows the ground racing away below, underscoring his shock at suddenly finding himself airborne. A few shots later, a pov from Toothless's perspective shows the reverse effect: the ground races towards the camera, as the collapse of his prosthesis causes Toothless to plummet. The quick alternation of point-of-view shots underscores that the characters share an out-of-control sensation in their first flight together. *Avatar* goes even farther than *Dragon* in eschewing point-of-view shots that might provide a Phantom Ride-type experience. In the long central flying sequence, point-of-view cutting is only used for a couple of quite conventional and static exchanges of smiling glances between Jake and Neytiri, and again when Jake looks down at the Tree of Souls. One moment that seems tailor made for a pov occurs in the wildly dynamic first portion of the sequence, when Jake has yet to control his ikran. Fast editing and camera movement and the rapid vertical movement of Jake and the ikran combine to make this one of the most kinetic sequences in the film as the two plunge down the side of a cliff face. At one point, Jake stares hard at something ahead of

him and says "Aw shit!", cueing the expectation of a point of view. Instead, another long shot is used, in effect keeping the sequence from becoming purely a thrill ride.

Though the use of pov is restrained in these films, one point of departure from *Wings* is the much more consistent use of over-the-back shots from behind the flyers in *Dragon* and *Avatar*, providing viewers with a controlled version of the thrill of rapid forward movement through three dimensional space. Contemporary audiences are likely better acculturated to overtly kinetic visual style than viewers of 1927, or at least the norms of intensified continuity admit a higher degree of formal play, without causing disengagement from the story. With brief exceptions, however, the dragons and riders are nearly always visually present in the frame as they fly, somewhat muting the perceptual experience of forward motion. Despite the truly spectacular 3D of these sequences, this (and other stylistic features, such as consistent cutting to reaction shots and character centered sound perspective), helps to anchor flying effects to character experience. Flight can certainly deliver the novelty that lures viewers to 3D, but the contemporary formula takes pains to temper the thrill by insistently focalizing it through character, and by working with a tried and true set of stylistic devices for rendering flight.

Stylistic strategies in both *Avatar* and *How To Train Your Dragon* gesture toward the attractional power of flight while preventing it from becoming just a visual thrill ride. By structuring character development around the act of flying, these films have found a means to address the problem faced by 3D aesthetics of how to make stereo spectacle serve a narrative master. However, the solution raises other problems. William Paul has argued that 3D demands that narrative be structured around it.[16] The story structured around flight is clearly already repeating its rather narrow formula. How many stories of human dragon riders or bird protagonists learning to fly are audiences prepared to watch? Has 3D created its own new, small generic ghetto of the flying story? In spite of the flight sequence's long history as a focal point of cinematic spectacle, it is not clear whether the aesthetic model provided by the flight sequence is generalizable in a way that will help 3D finally become more than a recurrent but short lived cycle in mainstream filmmaking.

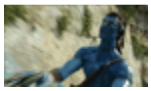

Fig 5.
During his first flight on his ikran in *Avatar*, Jake stares hard at something ahead of him, cueing the expectation of a point-of-view shot. Instead, another long shot is used to show his near collision with a cliff.

Fig 6.
During his first flight on his ikran in *Avatar*, Jake stares hard at something ahead of him, cueing the expectation of a point-of-view shot. Instead, another long shot is used to show his near collision with a cliff.

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Notes

1. William Paul has suggested connections between 3D's movement through depth and earlier efforts to achieve deep focus and a "realistic" sense of depth, allowing the eye to move forward through the diegetic space, in films which foregrounded the forward tracking or craning shot, from Disney's *The Old Mill* (1937) and *Pinocchio* (1940) to *Citizen Kane* (1941). *The Old Mill* and *Pinocchio* made use of the studio's new "multiplane" camera, constructed specifically to create the illusion of movement into the diegetic space in animation. William Paul, "The Aesthetics of Emergence", *Film History*, Vol. 5, No. 3 (1993): 333.

2. There are, of course, exceptions to the use of negative parallax for a startling effect, such as effects featuring mist and snow, and, in *Harry Potter and the Deathly Hallows: Part II* (2011), particles of Voldemort's disintegrated corpse.

3. A flying effect is used elsewhere in *Coraline*, when the Other Father takes Coraline up in a helicopter to see the Other Garden. Here it is associated with plentitude and freedom, though her perception of the Other Garden is later revealed to be a false one.

4. The "hero's journey" story, in films such as *Star Wars* and *The Matrix*, is a staple of screenwriting manuals. See, for example, Linda Seger, *Making a Good Script Great* (New York: Samuel French, 1994), 146

5. *Dumbo* (1941) seems an obvious source text for this type of story. If it were more marketable to modern audiences, the seventieth anniversary Blu-ray release of the film in September 2011 would seem to have been a prime candidate for Blu-ray 3D - as was the case with the October 2011 Blu-ray release of *The Lion King* (1994), which also received theatrical re-release in 3D.

6. Andre Bazin, "The Myth of Total Cinema", *What Is Cinema, vol. 1*, (Berkeley: University of California Press, 1967), 22.

7. Quoted in David Strohmaier's documentary, *Cinerama Adventure* (2002). For a discussion of the use of Vitarama as a basis for aerial gunnery training, see John Belton, *Widescreen Cinema* (Cambridge: Harvard University Press, 1993), 101. Stereographic aerial photography was also used in World War II to develop depth maps of enemy territory to aid in bomb sighting. 3D Storytelling conference, Ravensbourne, March 2012. 3D, Storytelling, 3D Narrative Panel Debate Chaired by Alex Stolz (UKFC) Part 3, http://www.youtube.com/watch?v=OlCg5yZLxfQ

8. Emmanuelle Toulet, "Le cinema a l'Expostion universelle de 1900", *Revue d'histoire moderne et contemporaine* 33 (April-June 1986): 195, cited in Belton, 85.

9. Cited in Belton, 93.

10. *Cinerama Adventure*; Belton, 98.

11. "*Wings*", *Variety* (17 August 1927): 21.

12. Belton, 38

13. It is notable in this context that the most striking point-of-view shots before this sequence provide the perspective of a German Gotha crew as they bomb a French village.

14. For example, an advertisement for the film in *Variety* crows "Paramount alone was smart enough to produce an epic of aviation with the world aviation-mad". *Wings* advertisement, *Variety* (7 December 1927): 15.

15. *Wings* won Academy Awards for "Outstanding Motion Picture Production" and "Engineering Effects" at the first Academy Awards in 1929. *Avatar* won Academy Awards for Art Direction, Cinematography and Visual Effects, and was nominated in six other categories, including Best Picture, in 2009. *How to Train Your Dragon* was nominated for Academy Awards for Best Animated Feature and Best Original Score in 2011

16. Paul, "The Aesthetics of Emergence".