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WILL THE REAL ANIMATION PLEASE STAND UP: THE TRANSITION FROM STOP MOTION AND ANIMATRONICS TO CGI IN HOLLYWOOD FILMS

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When I first saw it, I was amazed. Every type of animation has a different vibe, and it's not something that you can really analyze or verbalize. But there was SOMETHING about the computer medium that seemed to work with these characters, because they were all the same, because they had a certain quality in their movement. (Tim Burton, talking about his decision to use *CGI* for *Mars Attacks!* From Jones, p. 123-124)

In an interview with the London Sunday Times of February 9, 1997, Tim Burton said that he had originally planned to use a great deal of stop-motion animation for his sci-fi satire, *Mars Attacks*. According to the article, when Warner Brothers realized that his film would not play to the lucrative sci-fi audience, they forced him to switch from stop-motion to CGI – and shave twenty million from the budget. Burton, who had started his career in animation and first made his mark with the stop-motion short, *Vincent*, fought the change, until Industrial Light and Magic (ILM) showed him what they had done on *Jurassic Park* and *Jumanji.* Burton was impressed with how good it looked – "better than stop motion." Burton's decision-making process basically replicated that of Steven Spielberg on *Jurassic Park* just six years before. Spielberg had started production by giving a sixty-five million dollar contract to Stan Winston and Phil Tippet. Then ILM gave him a demonstration of what CGI animators could do with a dinosaur stampede and Spielberg re-assigned the Winston contract to them.

The decision in both cases was painful and expensive. (The story of the *Jurassic Park* transition is told on a documentary that is on the DVD of the film, so I will not concern myself with it here). As Karen Jones tells it, in the case of *Mars Attacks*!, Burton

had already hired Ian Mackinnon and Peter Saunders, owner-partners of a special effects company based in Manchester, England, and given them the job of making stop-motion Martians. Burton specified that he wanted the battle scenes between humans and Martians in *Mars Attacks!* to be reminiscent of skeleton fight in *Jason and the Argonauts*, in which Ray Harryhausen had brilliantly combined live-action and stop-motion. He also wanted the "hub-cap like flying saucers" to be produced using stop-motion. In order to faciliate the work, Mackinnon and Saunders moved to LA and began to arrange a collaboration with the Skellington group in San Francisco, the company (run by? Headed by? Henry Selick) that had produced *Nightmare Before Christmas,* but Skellington was too busy with *James and the Giant Peach.* Mackinnon and Saunders got to work on their own, setting up a facility in LA and producing various models of Martians for Burton's approval. After viewing their models, Burton made two key decisions: that all the Martians should look the same, and that they should never blink. According to Jones, Burton made these changes to make the Martians more frightening, but they are also the kind of decisions made by someone working in stop-motion who is trying to cut costs.

When Larry Franco, the producer for *Mars Attacks!*, who was fresh off the set of *Jumanji*, saw the first stop-motion tests of the Martians, he was reminded of the early phases of the CGI animal animation for *Jumanji.* It was he who asked Burton to meet with the people at ILM. Burton agreed with hesitation: he didn't like the look of *Toy Story*, and that's what he thought he was going to see. At ILM, Mark Miller, who had been the visual effects producer on *Jumanji* and would soon be playing the same role for *Mars Attacks!* and computer graphics supervisor Jim Mitchell spent a month preparing a screen test of digital Martians against a real background, with a flying saucer and sound track.

When Burton saw the ILM test, he was amazed:

> When I first saw it, I was amazed. Every type of animation has a different vibe, and it's not something that you can really analyze or verbalize. But there was SOMETHING about the computer medium that seemed to work with these characters, because they were all the same, because they had a certain quality in their movement (Jones, 123-4). Also, because we needed so many of them, that would have been much more difficult with stop-motion. To animate ten of them in

> a room would have been a much more difficult task. …At the root of it, animation is animation. Each form requires its own special set of circumstances and expertise." (135-137)

As a result, just as Mackinnon and Saunders were ready to go into full Martian-stop motion puppet production, in November of 1995, Burton pulled the plug. Karen Jones gives a more detailed description of the problem:

> Faced with the incredibly demanding production schedule, the marriage of live action and animation proved too difficult. Due to the extremely time-consuming nature of stop-motion, Burton would have had to film the live-action plate shots – the background shots into which the animation puppets would be composited digitally – months before the other scene elements even could have been conceptualized, particularly those starring the live actors who would be filmed playing opposite the Martians. (Jones, 47)

The only Martian played by a live actor was the martian femme fatale, played by Lisa Marie, Burton's girlfriend (the two had been introduced by Jonathan Gems, the screenwriter for *Mars Attacks!*). Because the mayhem in the film required life-sized Martian bodies, Mackinnon and Saunders were asked to produce fifteen full-scale Martians for use as Martian corpses in the film, and their design work was passed on to James Hegedus at Industrial Light and Magic (ILM), who inherited the job of creating 3D Martians, but now in the computer. Hegedus had worked as visual art director for Joel Schumacher on the Tim-Burton-produced *Batman Forever*. The digital architecture for *Mars Attacks* kept some influences from its stop-motion incarnation: many of the sets were round, as round sets made it easier for stop-motion animators to reach in and make adjustments (Jones, 67). The switch to CGI had certain benefits: the realistic interaction between Martians and live actors that Burton wished for would be easier to achieve, and Burton could now film the rest of the movie in an anamorphic format, which would not have been possible if he were still working with stop-motion (Jones, 125). Burton was able to return to some design elements, such as the tear-drop shaped Martian helmets he had wanted but had to let go of for stop-motion.(Jones 133). The ILM animators even offered to leave off the motion blur that is added towards the end of the computer

animation process, to make the images look more like stop-motion, and keep Burton's original idea of an homage to the work of Ray Harryhausen. But Burton refused: if they had the ability to make the Martians look real, then that is what they should do.

Like any animation format, CGI has a long lead time, and with a December 1996 release date, time was tight. A team of 60 at ILM was responsible for around 200 shots, mostly involving the Martians in such a way that they would match with the live-action footage and interact with the live actors. Warner Brother's own digital company, Warner Digital Studios, was responsible for the remaining 130 effects shots, including the Martian robot, the flying saucers and the scenes of exterior destruction. An in-house model shop built exact replicas of such monuments as the Eiffel Tower, England's Big Ben, and the Taj Mahal to be exploded on film. None of these model shots ever stood alone; all required computer graphic additions, like flying saucers and death rays. The visual effects division at Warner Digital was run by Michael Fink who had previously won and Academy Award nomination for Best Visual Effects for the penguins and bats he had produced for *Batman Returns*. (Jones, 141). Fink commented on Burton's photoreal, but completely stylized look for the animation:

> Unlike other films, where the effects you create are entirely photorealistic and completely modern, *Mars Attacks!* has a very different kind of production design. What we tried to do was re-create the feel of the fifties science fiction invasion from Mars kind of movies, but make it contemporary and modern, and completely photorealistic. It's a very fine line to walk.

The appearance o f the martian robot, like the style for most of the film, was based on the Topps bubblegum trading cards banned in the 1960s for their "violent subversive images" of Martian firing ray guns at semin naked blondes. The Martian robot is a closely modeled on Topp's Trading Card (#32, "Robot Terror), as well as related denizens of '50s sci fi movies. For its movement Warner Digital Studios took cues from other Tim Burton characters, such as Edward Scissorhands and Jack Skellington". The robot, which Fink describes as "a two legged army tank," was transported directrly from the page to the screen. "We had the reference from the trading card (32, Robot Terror)

and we also had a reference from Wynn Thomas, who had an illustrator draw a proposal for a robot. Based on these, we actually created a robot in our computer. Quite often, we'll actually sculpt a creature in three dimensions and then digitize it, but in this case, we started from scratch on the computer."

These two high-profile cases, *Jurrassic Park* and *Mars Attacks!*, are indicative of a change that is taking place industry-wide, where much work that would have once been done with stop-motion and animatronics is now done with computer generated graphics. Some critics, such as Mark Langer in his article "The End of Animation History" (on the SAS website) have pointed out that both practitioners and scholars need to come up with a new definition of what animation is, a definition that isn't based on calling animation "not live action cinema" but puts animation and live-action into a new relation to each other. Langer goes as far as to say "… [the] hybridization of animation and live-action … this collapse of the boundary between animation and live-action … can no longer be viewed as an aberration, but as a major trend of contemporary cinema."

My goal in this paper is to put the relationship of animation and live-action cinema today into perspective by looking back at the relationship between the two at the very beginnings of cinema's history. Traditionally in cinema studies we have seen animation as a sub-set of live-action cinema; I will argue that if we compare the relationship between the two at the beginning of cinema's history we will see the aberration is not that the boundary between animation and live action cinema is collapsing now, but that the two were ever seen as separate to begin with. Langer mourns the loss of cinema's indexicality and connects it to an overall cultural fear that we can no longer distinguish between simulation and reality. I argue that cinema has always been about simulation; culturally, until recently at least, we have associated photorealism with realism, but just because we think of it that way does not make it so. In fact, I would go as far as to argue that live-action cinema and animation were never really distinct mediums, and that live action cinema should be seen as a sub-set of animation.

Let me explain. I believe that we have misunderstood the primary drive behind changes in cinema production and exhibition. The primary drive is not a drive towards

increased realism, based on audience demand, but a drive to mechanization. In my book on the first woman filmmaker, *Alice Guy Blaché, Lost Cinematic Visionary*, I argued that processes such as the impulse toward color and synchronized sound in the cinema, which have usually been interpreted as reponses to audience demand for increased realism, were really the result of an industrial drive to mechanization – to put it simplistically, to need of the film manufacturers to standardize production and exhibition in order to more reliably define markets.

The drive to mechanization in live-action cinema made itself felt in animation as well, from the Taylorization of animation studios initiated by John Bray, to the use of techniques like rotoscoping.

When I looked more closely at this drive to mechanization, it struck me that in many cases, whether I was looking at examples from live action or from animation produced at the turn of the 20th century, the drive to digitization was already apparent. In other words, the mechanization of cinema in the 20th century and the digitization of cinema in the 21st are related drives, acting on live-action cinema and animation in related ways. So I don't think it's surprising that current "improvements in animation technology make it impossible to tell animation from live-action, [and] improvements in special effects have made it impossible to tell live-action from animation," (Mark Langer). What surprises me is that we ever saw the two as separate at all.

I will illustrate my point by taking three cases from early cinema: cases of early motion capture, early rotoscoping, and early digitization as represented by trick films, in

the work of film and animation pioneers Etiènne Jules Marey, Emil Reynaud, and Georges Méliès.

Marey, and his associate, Georges Demenÿ, were French peers of Eadweard Muybridge and like him, pioneers in motion studies. In the pursuit of a better understanding of how the human body moves, Marey used an early version of motion capture: Demenÿ or other test subjects would wear black body socks marked with white dots so that only dots were recorded by the camera as the subject moved. When filmed, all that was visible were the white lines and the white dots that marked the joints, creating a skeleton dance version of the movement.

Emile Reynaud, better known as an early animator, also used a method that could be seen, retroactively, as a form of digitization. In 1896 he adapted Marey's proto-motion picture device, the *chronophotographe,* to make a motion picture camera-projector and made a handful of films. The first of these was a classic vaudeville act by two clowns, Footit and Chocolate (who was in blackface), loosely based on an episode of William Tell: Chocolat has an apple on his head (and takes bites out of it) and Footit shoots it off with a water rifle, soaking Chocolat in the process. Once Reynaud had the film (shot at 16 frames a second) he took a few frames from one part and a few frames from another. These short selected sequences were then reproduced on the transparent celluloid, improved by drawing and coloring applied by hand and then strung into a sequential loop by joining them within in a perforated flexible metal band. Reynaud repeated this process with two other early digitizations-in-a-mechanical-format, one entitled *Le Premier Cigare (Mimodrame Comique)* in which a university student tried his first cigar and found it

comically sickening, and another vaudeville act featuring a pair of clowns, called *Les clowns Prince (Scène comique)* made in 1898, which was never shown to the public. Unfortunately, none of these early efforts survive.

A similar method was used in 1899-1900, by the Brothers Bing of Nuremberg, along with other German toy firms, Planck, Bub and Carette, and the French Lapierre Company, all of whom made cartoons for use in toy viewers based on live-action films. These toy cartoon animators invented a form of rotoscoping, tracing from early live action films such as the Lumière film *L'arroseur arrosèe,* a Méliès trick film, *The Serpentine Dance (Loie Fuller)*, 1901, *Skiers (*two films from 1900), *Jumping Clowns, Clown and Dog,* and *Rider* all by Ernst Planck, all from 1910. Rotoscoping continued to be important in animation films until the advent of digital motion capture.

A closer examination of trick film techniques shows that they also can be considered a mechanical version of modern computer simulation techniques.

Trick films made before 1908 by artists such as Méliès working in his own studio and Zecca and Segundo de Chomón working for Pathé included processes such as stop-substitution (stopping the camera and replacing a beautiful princess with an old hag, or a horse with a toy), filming in slow motion so that when projected at normal speed the film would appear speeded up, combining such fast-motion though superimposition with a regular speed sequence so that some characters moved at comically fast speeds and others at normal speed, cutting alternate frames out of a sequence to speed it up, shooting with the camera hanging upside down so that the film when projected normally would play the action backwards, fade in and fade out of a figure in superimposition to simulate the

apparition and disappearance of a ghostly figure, and the use of props such as removable limbs, miniature sets, and miniature props. The list is much longer but this gives an indication of the creativity of the film manufacturers working in live action cinema before 1910.

Let's look at some of these techniques more closely. First of all we have **stop-substitution**. In this early film (title), a man is run over by a car. The camera is stopped before the man is actually run over, and a real cripple with dummy legs is put in his place. After the car runs over the dummy legs they are separated from the cripple's body, leading to the humorous conclusion of the film, where a doctor who was in the car replaces the leg and instantly the man (through another stop-substitution) is able to rise and walk.

The effect achieved through stop-substitution is thus similar to that achieved through digitization in the recent film *Forrest Gump*, where Gary Sinise is shown to be legless from the knee down. In both cases the goal is the same: to simulate an amputee when in fact the principle actor is whole-bodied. The difference is the means to achieve it: in 1904 the means was mechanical; in 1994?) the means were digital.

Matthew Solomon, in his essy "Twenty-Five Heads Under One Hat": Quick-Change in the 1890s, has made a connection between the turn-of-the-century illusions of the quick-change artistry type, such as "…the rapid alteration of character through costume changes; chapeaugraphy, the manipulation fo a piece of felt to form different hats; and shadowgraphy, the use of the hands to create human and animal figures in a beam of light," (Solomon, p.3) and digtal morphing.

> Placing metamorphic performance within a longer history of transformation that includes not only the emergence of cinema but also the contemporary proliferation of digital media…. Foregrounds a significant set of continuities. Viewed from the late twentieth century, one hundred years later, when the cinematic is being increasingly replaced by the digital,quick-change, chapeaugraphy, and shadowgraphy take on added significance, appearing not so much archaic as visionary. (Solomon, p. 4)

Let me show you an example of such a performance, in which Melies combined his own metamorphic abilities with the transformative qualities of superimposition and dissolve in the cinema. (Show "Untameable Whiskers).

This film is prescient, in that it is not simply a record of a quick-change performance – the transformations are too detailed for that – nor is it simply a series of a repeated cinematic trick, but rather both combined, much in the way that morphing combines performance and digital trickery today. As Solomon concludes, cinema abandoned these early attempts at morphing, though the tradition could still be found in certain animated films, but it reappears now with the possibilities of digital media. (Solomon, p. 17)

Most of the tricks I listed above are based on some kind of stop-motion technique used in live-action films, and it might seem a stretch to talk about trick films in the same breath as 2D animation. In fact, most film historians generally focus on the influence of early trick films on animation films in terms of content. But we must not forget that animation itself is a product of stop-motion animation, as each drawing is substituted by the next, shot on another bit of film, until the whole gives the impression of movement.

When the popularity of trick films waned, around 1907, cinema and animation went in apparently separate ways: stop motion lost it's popularity after the first decade or so of the 20th century, though it continued to be used for special effects; but animation continued to be based on the stop-motion principle. Now the two paths, relatively

separate for most of a century, are coming back together as the drive towards mechanization reaches the fullness of its accomplishment and is replaced by the drive to digitization. In digitization, as we have seen in recent movies such as *Waking* Life and *Final Fantasy*, cinema and animation are coming back together, forcing us to reconsider the true nature of both arts.

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