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WILL THE REAL ANIMATION PLEASE STAND UP: *JURASSIC PARK* AND THE TRANSITION FROM STOP MOTION TO CGI IN HOLLYWOOD

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Some critics, such as Mark Langer in his article "The End of Animation History" 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 " …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.

I will use the transition from stop-motion and animatronics to CGI in *Jurassic Park* (1993) as a case study to illustrate my point.

From the very beginning Spielberg and his creative team thought it was important to create "realistic" dinosaurs. "What we tried to do," said Rick Carter, Spielberg's production designer, "was find the **animal** in the dinosaur as opposed to the **monster** in the dinosaur. …For our human characters, we wanted their situation to be more like they were being stalked by an animal that is a **carnivore**, as opposed to something that is psychopathic and just out to get them. That's one of the reasons we wanted to have herds of dinosaurs, to show that dinosaurs were just like any other life-form and that they lived out their lives in a somewhat naturalistic

manner."(Shay p 14) (I will come back to this issue of naturalistic performance later in the paper).

Traditionally, realistic animals in a film of this type would be accomplished using **stop-motion animation**, but Spielberg wanted to go with **full-scale animatronics**. Because Stan Winston had had such success with the monster in *Alien*, Spielberg gave the Stan Winston studio a 65 million dollar contract to produce a variety of animatronics so that it would be easier for the human characters to have realistic interactions with them, as he had done in different ways with *E.T.* and *Jaws*. (Shay 16-17) Winston and his team were also very concerned about making the dinosaurs come across as animals rather than monsters, and his artists based their drawings on the latest research that showed that dinosaurs were probably descended from birds and behaved in a birdlike manner. (Shaw 20-21)

Spielberg recognized that not everything he needed could be accomplished with animatronics, and so he hired Phil Tippet, one of developers of go-motion, to do about 50 go-motion shots for *Jurassic Park*. Originally experimented with in *The Empire Strikes Back* and perfected by Tippet for *Dragonslayer* (YEAR), go-motion uses puppets with rods that extend from their extremities and are attached to computer-controlled stepper-motors. The result is a kind of motion-control for puppets – the choreography of movements can be stored in the computer and repeated with

variations. Although traditional stop-motion animators did not like the high-tech variation, it did have the advantage of eliminating strobing, a jerky look caused by the lack of blur in traditional stop-motion.

Tippet and his team spent four months creating two brief animatic sequences, (animatics are moving storyboards used as a guide for subsequent animation), almost fifty shots, using the go-motion technology. (shay 38-39) The two sequences were of the T-rex menacing the two jeeps that are stranded outside its electric fence and the two raptors hunting the children in the kitchen. These and other bits of footage were compiled into a "Dinosaur Bible" and later used as the basis of pantomime by the on-set dinosaur operators. (Shay 39). The animatics were produced by Stefan Dechant, using an Amiga personal computer and Video Toaster Effects to construct a 3-D representation of the T-rex which was then animated. (47)

While all of this development was going on, Dennis Muren and his team over at ILM had used a combination of computer generated imagery and advanced morphing techniques, which, along with some puppet creations by Stan Winston's shop, had gone into creating the shape-shifting robot of *Terminator 2*.

Spielberg had asked Muren if he could create a stampede sequence for *Jurassic Park* using computer graphics, as it would be difficult to achieve using stop motion. Two of ILMs veteran animators, Mark Dippe and Steve

Williams, thought they could do more than the stampede, and secretly built a T-rex skeleton in the computer, using scientific images sent to them from the dinosaur repositories in Calgary. Once they had a **skeleton** they **animated** it in a brief sequence. They showed this to the *Jurassic Park* producers, and were given the go-ahead to try something more ambitious.

For their second attempt they took a model of the gallimimus dinosaur designed by Stan Winston, and computer graphics artist Eric Armstrong fashioned a gallimimus skeleton in the computer and developed an animated running cycle for it. "After we built the skeletons," said Dennis Muren, "we animated about ten of them running along in a herd. For the background, we picked some photos out of a book on Africa and scanned them into the computer. …we did two angles, … one looking down over a prairie on these animals running along and the other was a view right down at ground level as they run past."(Shay 49-50).

Although the animals were in skeletal form, everyone at Amblin was very impressed, and Steven Spielberg commissioned half a dozen shots for the film: the stampede sequence he had asked for originally, and a few grand vistas of dinosaurs dotting the countryside.

Still, the animators at ILM thought they could do more. Specifically, they wanted to take a shot at the T-Rex. For their next test they had to use film. They used a Cyberware scanner, which **focuses a revolving laser**

beam on objects or persons and **records the topographical data** into the computer, on Stan Winston's **fifth-scale** prototype, and animated it against a still image of rolling hills. "The shot started out with the T-rex maybe a hundred feet away, about two-thirds of the size of the frame. Then it just walked toward camera, step by step, and we sort of titled up at the head as it passed by." Said Muren (shay 50-51).

This sequence would turn out to be the sequence that "changed the world". Just as the earliest stop-motion animation by Willis O'Brian had been of dinosaurs, so now it was another animated dinosaur that would change animation in Hollywood forever. As Spielberg described it:

> "My intention had always been to use full-size dinosaurs as much as I could, but I knew that my long shots or wide-angle shots would need to be done with stop-motion or go-motion, just like Willis O'Brien and Ray Harryhausen had done. None of us expected that ILM would make the next quantum leap in computer graphics – at least not in time for this picture. We had seen the gallimimus tests… but they were just skeletons and they were on video. The T-rex was complete and on film and walking in daylight, making full contact with the ground. It was a living, breathing dinosaur, more real than anything Harryhausen or Phil Tippet had ever done in their careers. At the showing, Phil groaned and pretty much declared himself extinct."(shay 51-2).

It was clear that the go-motion from Phil Tippet would not be needed, and neither would any more animatronics have to be built by Stan Winston's shop. Instead, those contracts were re-assigned to ILM. However, Spielberg discovered that he needed Tippet's expertise at generating convincing

animated animal performances to guide the computer animators. Tippet had to get some crash computer training, which alternated with him **training the computer animators in pantomime** to help them **block out the shots using their own bodies**. (Shay 53). Furthermore, Tippet's animatics remained the definitive guide for the dinosaur movements.

Tippet had developed a system called **Dinosaur Input Devices**, or DID, (later was re-named Direct Input Devices), in which **stop motion movements on a dinosaur armature** were recorded by a computer using encoders. This information would then be used by an animator to generate the CGI footage. In other words, the CGI was motivated, when the DID system was used, by stop-motion. (Pettigrew p. 385).

In other words, the **realistic dinosaur behavior** that Steven Spielberg, was so concerned with was achieved by numerous processes that all accomplished one goal: **the breaking down of a performance into various elements** that can be then **re-mixed and matched** at the will of the films' animators, and ultimately, the director. As we've seen so far, telemetry, motion capture, and direct input devices were all used to capture **performances that originated in another format**, whether in a **physical performance** by an actor, a puppeteer, or a **stop motion animation**, and translate it to CGI. Various forms of **scanning**, from that of a still **photograph** of a valley setting or a dinosaur bone, to the **all-around**

Cyberware scanner, feed images into the computer that can be manipulated by the computer graphics artists and then animated.

(Mary Desjardins and Mark Wolf gave two excellent papers yesterday that looked at how this process works in taking various elements of a performance and reconstituting them works with synthespians such as Aki Ross from *Final Fantasy*. Synthespians are a great concern, at least to actors, now, because, as Desjardins and Wolf pointed out, they alter our notion of a performance and who can claim authorship for a performance – who can say "I created that character?" when we are talking about Gollum from Lord of the Rings: II Towers?

The discussion would alter considerably if everyone concerned realized that in fact this situation is not new.

I believe that we have misunderstood the primary drive behind changes in cinema production. The **primary drive** is not a drive towards **increased realism**, even if someone like Spielberg consciously thought of his goal as a more realistic dinosaur performance. Of course, this was part of it, but each decision that led him away from **actors in dinosaur suits**, **puppeteers**, **animatronics and stop-motion**, also reflected a stronger drive that has been inherent in the cinema since its inception: **the drive to mechanization.**

I first discussed the drive to mechanization in my book on the first

woman filmmaker, *Alice Guy Blaché, Lost Cinematic Visionary*. There I argued that processes such as the **impulse toward color and synchronized sound in the cinema**, which have usually been interpreted as responses 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.

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 **around 1900**, 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**," as (Mark Langer put it). **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* 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. Fleischer didn't invent the process; he perfected it and of course, patented it. **Rotoscoping could also be defined as the 2-D version of motion capture, as it takes a filmed live-action performance and translates it to 2-D cel animation**. In the 20th century rotoscoping was a tedious mechanical

process, but as we've seen with *Waking Life*, the process has now been digitized as well.

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 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.

All of these tricks can be seen as mechanical versions of effects that we now accomplish digitally.

Let's look at some of these techniques more closely. First of all we have **stop-substitution**. In a French film from 1905 for which no title has been found, 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 digital 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)

An example of such a performance,is the Melies film "Untameable Whiskers" in which Melies combined **his own metamorphic abilities** with the transformative qualities of **superimposition and dissolve** in the cinema.

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)

When the popularity of trick films waned, around 1907, cinema and animation went in apparently separate ways, and many of the techniques of trickality and 3-D animation were thought of as forms of special effects usually relegated to genre films such as fantasy and science fiction.

Today, **live-action cinema and animation**, seen as quite separate for

most of a century, are coming back together as the drive towards mechanization reaches the fullness of its accomplishment and is itself morphed into the drive to digitization. The drive to digitization, however, should not be seen as simulation and special effects taking over live-action cinema. Instead, I have argued here that what we were after since the early 1880s was animation to begin with, and live action cinema is simply one form of it. If we look at cinema and animation in this light we will be in a better position to understand the changes that are taking place in the industry now.

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