Studies in Movement [Frame Differencing][*]

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[*] Some unfinished notes on a continuing project.

I want to consider the τελοσ of the motion picture camera. By this I mean instead of looking at cinema from the viewpoint of historical meaning or artistic value, I want to consider the inventor's intention of the cinematic apparatus to imagine a different cinema. As we have come to expect from most new technologies, the beginnings of its use usually follows in the inventor's footsteps. Cinema was no different before its users branched out into various methods of use/abuse of the tool. But one strand of cinema, or history of the motion picture camera, continues to rely on its original intention. By narrowing my investigation or my demands on cinema to such a limited scope I am bound to force cinema into a position of failure…but it is this failure which I am particularly fascinated with in this essay. It is my hope that in bracketing a certain type of cinema—particularly the technical and formal aspects of the motion picture camera—and then realizing its failure within these specifications that this analysis will produce an insight into the rest of cinema and our perception of moving images in general.

It would not be obtuse say that recording reality was the original intention of the film-camera apparatus.[1] The design of this mechanism is to accept the light of the world and capture it in atomic frames. Of course, throughout all of film history artists have continually gone against the grain of the film apparatus, by using both technical means (e.g. out of focus shots, open shutter shots, filters, rapid camera movements, etc.) or thematic concerns (e.g. fictional drama, stylistic music videos, etc.).[2] But there is an intention in the original design of the motion picture camera which is assumed before it is played with, before it is short-circuited. One can trace a certain line of cinema which does not go against the film camera apparatus, but attempts to use it as it was intended. Not surprisingly, this line begins at the beginning. Initial footage by the inventors of the motion picture camera, the Lumiere brothers and Edison, were exercises in observing reality. Even Muybridge's motion analysis photographs, which foreshadowed cinema, were part of a process to record reality. And shortly after the Lumiere's invention, the biologist Julien Ries relied on the Lumiere *cinematograph* connected to a microscope to record the development of sea urchins. Ries believed the *cinematograph* was the tool necessary to record time that was too short for the human body to record and also too long for the human body to remain watching (Kelty 36). In more military-scientific ventures, the motion picture camera recorded prototype experiments, some of the most memorable clips of this footage are the atomic bomb experiments. Beyond these

[1] I specifically deal in this essay with the celluloid camera and not the video camera. It is important to note that while I restrict this essay's discussion to the treatment of the film shutter mechanism, the video scanline process, though different, does not escape the same critique.

[2] One could almost say the existence of experimental cinema thrives on this very short-circuiting of the apparatus. Narrative filmmakers, although creating fictions, most often rely on filming a reality that is recognizable and within the intention of the camera apparatus.

high profile tests, the use of motion picture recording has diffused into various fields of research from linguistic pronunciation to analyzing techniques in virtuoso pianists like Glen Gould. And of course I cannot ignore the ubiquitous surveillance cameras and satellites that continually keep watch from on high. It is the vector of cinema that pursues analyzing reality by recording it that I am interested in here. But this close focus on analytic cinema by no means assumes that other methods of more artistic/commercial filming are not subject to the same issue.

Cinema is just as much about excluding reality as it is about recording reality. I am not referring to the social censorship of Hollywood and the Hayes Code nor the unwritten rules of the 'culture industry,' but of two formal/technical limitations. First, as many thinkers have pointed out: because there is the frame, there is always the out-of-frame. By design, the camera limits its perspective of reality to a small window-frame. By choosing to frame a part of reality, it is forced to exclude the rest of reality. Of the two formal limits of cinema this is the more obvious one. Second, and less noticeably for the spectator due to the persistence of vision, half of the time in normal cinema (by which I mean, baring animation and open shutter shots) the camera shutter is hiding reality from the film, or vice versa, the film from reality. Ontologically, only half of "real" time is recorded in cinematic time.

What happens in between the frames, a time only represented by a disproportionately thin black, spatial line? Here one thinks of the avant-garde structuralist filmmaker Peter Kubelka, who's "central focus is what is happening between the frames" (MacDonald 352). But unlike Kubelka who attempted to fuse frames together to investigate the interframe, is it possible to do the opposite? Can we investigate this invisible reality apropos a *via negativa* strategy? I speak hesitantly of following the negative theological practise that searches after the Invisible through defining what it is *not*. The ancient mystics believed language failed to capture the identity of the supreme Deity and therefore attempted to use language to undercut itself. To use language to subtract language from language. In the same spirit, can one use the method of subtraction to visualize the motion which the camera fails to capture? My quest is not to recapture a lost reality but to visualise the movement that is in between the static. Is it possible to imagine a visualisation of what is between captured frames—these atomic units? Is possible to visualise a cinema stripped down to the movement that eludes it? To attempt a Beckett-style cinema that claims not to reproduce reality, but to "bore one hole after another in it, until what lurks behind it—be it something or nothing—begins to seep through" (172). A minimalist cinema that suggests apperception? Does this cinema project unto the screen the basic projected phantasy of the spectator? Could this technique reconstruct a secret archive, a memory of repression, a repression of a reality the camera originally forbade? Is this cinema a radiographic analysis of what is under the skin of the image? ...an x-ray of motion pictures? The "the cinema of absolute difference" begins to ask these questions.

“The cinema of absolute difference” in 3 examples:

Technical Process:

By processing film footage with Max/Jitter software I am able to mathematically find the absolute difference between two different frames. These *numerique* values are then used to create a new matrix, or in other words a new frame which illustrates what the camera originally failed to capture. The newly composed frame is an *imaginary* frame visualizing the motion which has occurred between the original celluloid frames. The result is an abstraction of motion and not a new realistic frame that pretends to discover lost footage, however the abstraction is uncannily similar to the original footage which now temporally frames this interframe. To use Adorno’s words in reference to Walter Benjiman’s writings, these interframes are “the static notion of movement itself.”

The resulting progressive video frames are then individually photographed manually with a custom animation setup to transfer the images back to celluloid (their original source medium). At 24 fps, this means the three films require over 11,000 single exposures.

Finally, the films are projected with a modified analysis projector controlled with custom software. The films are played in various formats: forward, reverse; with multiple framerates; and with automated scheduled screenings creating temporal spaces between the events of the projection.

1. LumiereTriptych

In searching for the essence of cinema, I return to the origin of cinema. The source footage in this triptych comes from the Lumieres. <<Lumiere Triptych>> illustrates two different types of frame differencing. The image on the right is the original footage from the Lumiere's famous Train Station film. The middle image is the same footage processed according to the simple algorithm of comparing the first frame of the film to each subsequent frame in the footage. With this technique I suggest that movement can be determined according to a set frame, or in more everyday terms, a set reality. In this conception one aspect of reality remains firm and movement is perceived as the change in relation to this stable framework. The result is a ghostly world, a reality revealed behind the moving ghosts. The left image conceives movement as relative, or constantly defined in relation to its neighbour. The white forms are generated by finding the mathematical "absolute difference" between sequential frames. Movement is reconstructed according to process rather than progress.

2. Gould Techne

The source footage for this piece was shot in the 1950s as one of many analysis films. The intention was to film master pianists and then observe the slow-motion footage to learn their technique. But can technique be learned this way? And if it can, is this really what makes Glen Gould a master? Gould is recorded as saying it only takes a half an hour to learn the technique of playing the piano, but it takes a lifetime to figure out how one is to approach playing the piano. Much in this vein, I am skeptical of the scientific analysis of life through machines. As Goethe says in *Faust*,
When scholars study a thing, they strive
To kill it first, if its alive;
Then they have the parts and they've lost the whole,
For the link that's missing was the living soul.

This is a static linear version of the piece. Another version exists that is controlled in Max/Jitter in much the same fashion as an analytic film projector. With this patch the video can be rearranged and played in a non-linear format full of ticks, repetitions and glitches.

3. Atomic Archive
   (palindrome video loop/celluloid excerpt)

The frame differencing in this patch splits the atomic particles of film. Just as one can not watch an atomic explosion directly due to the extreme brilliance of the energy, so too the camera can not watch the explosion without some form of faltering. The frame differencing allows us to split the difference between the atomic frames and see the pure energy of movement which links these atoms. Again as in the analysis of Gould's technique, something terribly awry occurs. The technology is out of our control and begins to melt outside the frame as it goes in reverse and implodes, much like only hindsight reveals the danger of our experiments.

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