Creative Evolution of Moving Images?: Deleuze's *Cinema* and Pre-cinema

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Introduction
Creative Evolution in Deleuze's *Cinema*?

Akihisa Iwaki

This revised paper is based on oral presentations from a panel originally titled "Deleuze's *Cinema* and Pre-cinema: The Creative Evolution of Moving Images." The presentation was given on June 7, 2014 at The Second International Deleuze Studies in Asia Conference, held at Osaka University, Japan. We approached the subject from various interests and theorical backgrounds: aesthetics (Iwaki), history of photography (Masuda), and early cinema studies (Matsutani). At the time, Iwaki, Masuda, and Matsutani were postdoctoral fellows at Kwansei Gakuin University, Waseda University, and Kobe University, respectively. We deeply appreciate Professor Dork Zabunyan's (Paris 8; at the time, Charles de Gaulle University Lille III) accepting our proposal for him to be the chairman of the panel and leading the stimulating discussion after the presentations.

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Since their first publication, in France, the impact of Gilles Deleuze's *Cinema 1* (1983) and *Cinema 2* (1985) has gradually spread to various research areas. In

addition, there might be several links from *Cinema* to aesthetics and visual culture studies in a wider sense.

Furthermore, it would be interesting to examine the experience of movement and time in new media environments (e.g., that of computer technologies or that of new media art); new arrangements of perception, affection, and action occurring through technologies (e.g., neurotechnology and neuroart); completely different and renewed sensorimotor schema in the space of micro-gravity (e.g., space engineering and space art); life as time machine (e. g. biotechnology and bioart), and so on, with reference to Deleuze's perspectives in *Cinema*.

The panel focused mainly upon the impact of moving images from the end of the nineteenth to the early twentieth centuries, which Deleuze discussed briefly in *Cinema 1*. We employed the term "pre-cinema" to refer to moving images before "movement-image" (pure movement extracted from the movement of objects) was actualized through the use of camera mobility and montage— Deleuze summarizes this point by reference to the Bergsonian philosophy of evolution.

Examining the point of divergence of "movement-image (*image-mouvement*)" and "image in movement (*image en mouvement*)" (movement *of* objects) or that of "any-instant-whatever (*instant quelconque*)" (represented by modern science) and "privileged instant (*instant privilégié*)" (represented by ancient science) in visual culture, can we trace other divergent lines in the evolution of moving images? Given such questions, we focused on the seeds and the milieux of movement-image and time-image, and presented some ideas.

For details on the Bergsonian-Deleuzian concepts of "image in movement" and "movement-image" or "privileged instant" and "any-instant-whatever" which are important for our following discussion, please refer to the appendix at the bottom of this introduction. I would like to introduce a work that consists of pure movement-image (movement emancipated from the movement of objects).

Inspired by Deleuze's *Cinema*, a young contemporary artist, Nobuhiro Ito, made a sketch entitled "0099" (2008) using only pure movements, that is, zooms. It was an excellent interpretation of *Cinema*. Ito also created several other works such as "People who is recognizing the phantom image/Questioner and Actor" (2008), "1+1=1" (2008), "Dead Person/Living Person" (2010) and "Self and Other" (2010), inspired by the Deleuzian concept of "crystal-images"[4]. Here, we can observe a linkage from *Cinema* to artistic practice, demonstrating that the two volumes of *Cinema* are not only for academics.

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First, I briefly examined the concept of "creative evolution" in *Cinema*, because the subtitle of the panel discussion was "The Creative Evolution of Moving Images." As you know, Deleuze's *Cinema* has a deep theoretical relationship with Bergson's *Matter and Memory* (1896). We can superimpose the classification of images by Deleuze on this figure cited from *Matter and Memory* [fig. 1].
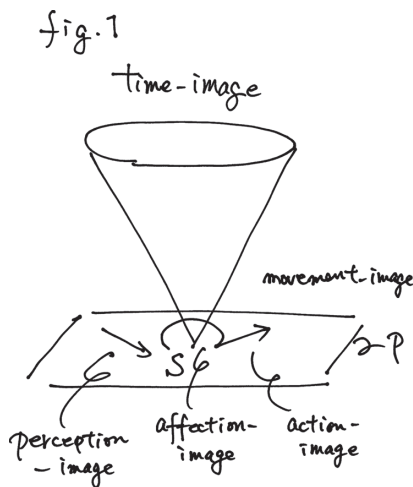
Figure 1. Classification of images in *Cinema 1* and *2* superimposed on a figure from *Matter and Memory*, sketched by the author.
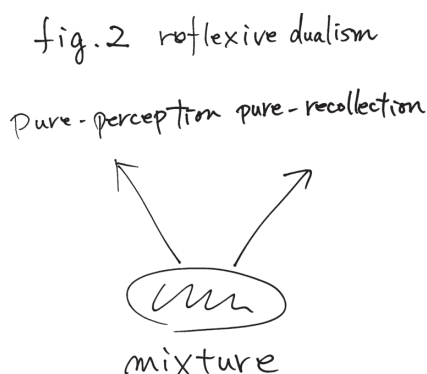
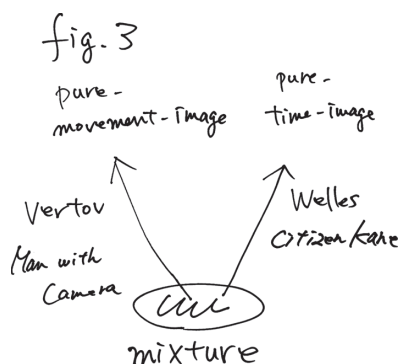*Figure 2*. Reflexive dualism in *Matter and Memory*, sketched by the author.
Figure 3. Reflexive dualism in *Cinema 1* and *2*, sketched by the author.

In *Matter and Memory*, Bergson divides the composite or mixture, which is given in our experience, into pure-perception and pure-recollection [fig. 2]. In *Bergsonism*, Deleuze calls this method "reflexive dualism (*dualism réflexif*)" (LB 98: 96)[5]. We can also read *Cinema* from this viewpoint [fig. 3]. Deleuze divides cinematographic images theoretically into pure movement-image and pure time-image. Near these two ideal extremes would be located, for instance, Vertov's *Man with a Camera* and Welles' *Citizen Kane*, respectively.

On the other hand, in *Creative Evolution* (1907), Bergson divides life along evolutionary lines [fig. 4]. He describes tendencies toward the emergence and differentiation of plant and animal, instinct and intelligence, and so on. Several evolutionary directions arise from one virtual multiplicity, that is to say, duration. Deleuze calls this "genetic dualism (*dualism génétique*)" (LB 99: 96) — in addition, can we call it "real dualism" or "natural dualism"?

Is it possible to read *Cinema* from such a viewpoint? Perhaps so, although there might still be many difficult problems to solve. At least, in the context of discussing the turning point from movement-image to time-image, Deleuze writes as follow: "It is never at the beginning that something new, a new art, is able to reveal its essence; what it was from the outset it can reveal only after a detour in its evolution" (IT 61: 43). The most famous point of divergence between

movement-image and time-image described in *Cinema* is that of the crisis of the action-image. However, it seems that Deleuze supposes several points of divergence between movement-image and time-image: not only the crisis of the action-image but also, for instance, the "flickering montage" in the perception-image（IM 122: 84）and "any-space-whatever" in the affection-image. From Deleuze's viewpoint, these elements introduce an "irrational cut" or "pure optical and sound situation" which functions as the passage from movement-image to time-image［fig. 5］.
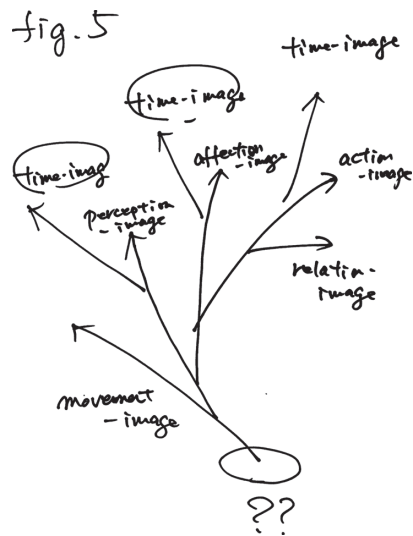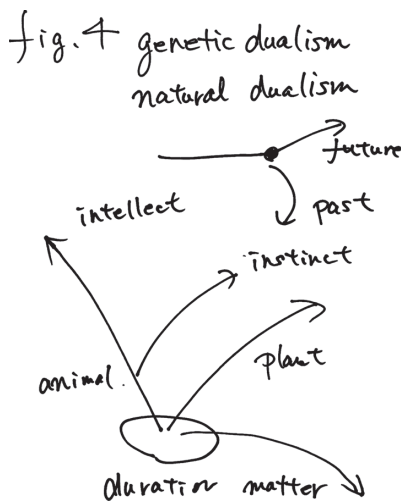

Figure 4. Genetic dualism and creative evolution, sketched by the author.
Figure 5. Creative evolution in *Cinema 1* and *2*, sketched by the author.

In addition, Deleuze mentions the Bergsonian philosophy of evolution more directly when he makes a distinction between "image in movement（*image en mouvement*）" and "movement-image（*image-mouvement*）" in *Cinema 1*（Please refer to the appendix for more detail）. With reference to Deleuze's discussion, can we trace other lines of evolution from pre-cinema to a broad range of moving images? The evolution of cinema as the "seventh art" would be only a part of this evolution. In fact, not a few contemporary artists present an imaginative or alternative evolution of moving images in their own way — in passing,

"imaginative evolution（想像的進化）" and "creative evolution（創造的進化）" are pronounced the same way in Japanese (*souzoutekishinka*). Against the general understanding of the technical history of moving images as a straightforward evolution from camera obscura to photography, from snapshots to cinema, from cinema to TV, and so on, artists such as Toshio Iwai (a Japanese new media artist), William Kentridge (a South African artist), and Alien Productions (an Austrian arts collective) give us a look at the imaginative evolution of moving images.

Does such an imaginary only represent a "possible" evolution, as was criticized by Bergson? In other words, is it only a result of the arbitrary retrospective view from today? If so, what about Deleuze's understanding of the evolution of cinema? Is the perspective of Bergsonian philosophy of evolution adequate to explain cultural phenomena in the first place? In the light of such questions, this panel focused on pre-cinema.

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Finally, as the starting point of the discussion, I briefly mentioned Bergson's experience of cinematography[6].

Bergson published *Matter and Memory* in 1896 and invented the concept of the movement-image," according to Deleuze. At almost the same time, the Lumière brothers invented cinematography and H. G. Wells published his novel *The Time-Machine* (1895). It is evident that Bergson was against conceptions such as the time machine, and he often used the term "cinematography" as part of a critical consideration of our deep-rooted illusion that we can reconstruct movements through immobility, and that time — past, present and future — is given in advance. It is evident that Bergson had already acquired this perspective before the "official" invention of cinematography in 1895. However, it is interesting to see that in an interview by Michel Georges-Michel in 1914, which has become famous in recent years — we can say this is one of the "Deleuze effects" — Bergson, contrary to expectations, had made a favorable comment

about projected images in cinema, although his comment on snapshots was not necessarily favorable: "Cinematography taught the painter that the photography was wrong."

I summarized the following two points for the panel. These points are not necessary essential to Bergsonian philosophy, but lead to interesting questions regarding the pre-cinema.

- Georges-Michel's interview and memoir suggest that Bergson had seen a type of "privileged instant"（similar to a fixed instant in Géricault's paintings of Horses）on *projected* images of cinematography.
  ⇒ questions regarding perception of cinematographic images by the spectators of the pre-cinema
- As a "philosopher of duration," Bergson might be sensitive to the variability of projection speeds at the dawn of cinematography.
  ⇒ questions regarding forgotten technologies and customs of the pre-cinema

The experience of cinematography by Bergson and that of cinema by Deleuze are evidently quite different. We can even say, in a sense, that the movement-image and time-image could be actualized only after the 1980s, and that they remained concealed until the publication of the two volumes of *Cinema* in 1983 and 1985. In this respect, it might be vain to ask whether or not Bergson encountered cinematographic movement-image or time-image during his own life.

Now, it is time to pass the baton to Mr. Masuda and Mr. Matsutani. They will give us further context on pre-cinema and examine several "possible" or "real" lines of evolution of moving images. At the end, I will focus on the flickering worlds.

Appendix

"Movement-image" and "Image in Movement"

Deleuze makes a distinction between "image in movement (*image en mouvement*)" and "movement-image (*image-mouvement*)" in *Cinema 1*. At a practical level of the discussion, while "image in movement" refers to the movement of objects, "movement-image" refers to the movement of the entire field (*champ*). *In theory*, all cinematographic images have *both* these aspects. *In fact*, the latter would become increasingly apparent through the mobility of camera and montage. Deleuze summarizes this point by reference to the Bergsonian philosophy of evolution.

"The evolution of the cinema, the conquest of its own essence or novelty, was to take place through montage, the mobile camera and the emancipation of the view point, which became separate from projection" (IM 12: 3)

In fact,

"We can therefore define a primitive state of the cinema where image is in movement rather than being movement-image. It was at this primitive state that Bergsonian critique was directed" (IM 40: 24)

In theory,

"[T]he primitive image, the image in movement, was defined less by its state than by its tendency. The spatial and fixed shot tended to produce pure movement-image, a tendency which imperceptibly came to be acted out by the mobilization of the camera in space, or by montage in time of mobile or simply fixed shots. As Bergson says, although he had not seen its application to cinema, things are never defined by their primitive state,

but by tendency concealed in this state" (IM 41: 25)

In fact: Even when the camera mobility and the montage are introduced,

"[A]t the outset two methods [the mobility of the camera and montage] were in some sense obliged to conceal themselves" (IM 40: 25)

In fact: Movement-image is fully actualized, for example, by the following Renoir's sequence.

"the movement-image — that is, pure movement extracted from bodies or moving things...It is always a great moment in cinema, as for example in Renoir, when camera leaves a character, and even turns its back on him, following its own movement at the end of which it will rediscover him" (IM 38: 23)

"Privileged Instant" and "Any-Instanstant-Whatever"

"Now *Creative Evolution* advances a second thesis, which, instead of reducing everything to the same illusion about movement, distinguishes at least two very different illusions. The errors remains the same — that of reconstituting movement from instants or positions — but there are two ways of doing this: the ancient and the modern. For antiquity, movement refers to intelligible elements, Form or Ideas which are themselves eternal and immobile (...) movement merely expresses a 'dialectic' of forms, an ideal synthesis which gives it order and measure. Movement, conceived in this way, will thus be the regulated transition from one form to another, that is, an order of poses or privileged instants, as in a dance (...) The modern scientific revolution has consisted in relating movement not to privileged instants, but to any-instant-whatever. Although movement was still recomposed, *it was no longer recomposed from formal transcendental*

elements（poses）, but from immanent material elements（sections）.（…） 'Modern science must be defined pre-eminently by its aspiration to take time as an independent variable.'// <u>Cinema seems to be the last descendant of this lineage which Bergson traced</u> (…) <u>cinema is system which reproduces movement as a function of any-instant-whatever that is, as a function of equidistant instants</u>, selected so as to create an impression of continuity. <u>Any other system which reproduce movement through an order of exposure [*poses*] projected in such a way that they pass into one another, or are 'transformed', is foreign to cinema</u>".（IM 12-14: 3-5）

"The difference is profound. In fact, in a certain aspect it is radical. But, from the point of view from which we are regarding it, it is a difference of degree rather than of kind. The human mind has passed from the first kind of knowledge to the second through gradual perfecting, simply by seeking a higher precision. There is the same relation between these two sciences as between the noting of the phases of a movement by <u>the eye</u> and the much more complete recording of these phases by <u>instantaneous photography</u>. It is <u>the same cinematographical mechanism in both cases</u>, but it reaches a precision in the second that it cannot have in the first. Of the gallop of a horse <u>our eye</u> perceives chiefly a <u>characteristic, essential or rather schematic attitude</u>, a form that appears to radiate over a whole period and so fill up a time of gallop. It is this attitude that sculpture has fixed on the frieze of t<u>he Parthenon</u>. But <u>instantaneous photography</u> isolates any moment; it puts them all in the same rank, and thus the gallop of a horse spreads out for it into as <u>many successive attitudes</u> as it wishes, instead of <u>massing itself into a single attitude</u>, which is supposed to flash out in a <u>privileged moment</u> and to illuminate a whole period".（EC 775-776: 360-361）

"Immobile, it is in a neutral state; in movement, it is life itself. And some

might conclude, or have already concluded, that life is movement. Is not vibration the essence of light and sound? Is not the living eye a cinematograph? This hypothesis was confirmed by this observation: <u>cinema put painters on the right path</u>. You know what a revolution in painting the invention of serial photography brought about. After this discovery, artists realized that, often enough, their representations, of the attitudes of a racing horse, for example, were not exact. They corrected them. And then this happened: <u>inspired by the startling attitudes captured in snapshots, artists created nothing but frozen images, without life</u>. Certainly, this was an advance for mathematical accuracy, but a loss for the impression of reality. <u>The cinematograph taught the painter that photography was wrong</u>. <u>By reproducing movement on the basis of personal impressions, the artist had recomposed, fused into one, several successive attitudes, giving the illusion of life and therefore of movement. They found these attitudes again on the screen</u>. // Thus, in a few admirable pages, Mr. Rodin explains how he gave life to a sculpture by fusing together different phases of a movement into the different parts of the figure he was modeling"（Georges-Michel 1914; trans. Schwartz 2011: 81-82）

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[4]   We can watch some parts of Ito's works on following web site: http://nobuakiitoh.com/en/index.html（Accessed on 05-06-2019）

[5]   Hereafter, I use the page numbers of the original texts and the corresponding page numbers of the English translation.

[6]   For more details about Bergson's experience of cinematography and its influence on his philosophy, please refer to Iwaki（2011）.

Chapter1

Chronophotography as Plasmatic Cinema

Nobuhiro Masuda

"Where Cinema and Biology Meet" in the 2000s

In 2010, *The New York Times* reported an intimate relationship between the recent trend moving images and the field of molecular biology in the article "Where Cinema and Biology Meet." The article quoted Robert Lue, a pioneer of molecular animation, "Scientists and animators are now recreating in vivid detail the complex inner machinery of living cells" with the use of "the power of cinema", thereby demonstrating the value of a digital imagery. Janet Iwasa also presented the technology of visualization as an animation of the molecule in a literal sense, saying, "What brought the molecules to life was really seeing them in motion." (New York Times, 2010)

In their moving image, "Powering the cells: Mitochondoria" (Bio Visions at Harvard University, 2010), we can see colorful and speculative figures of animated organisms. What point in this is surprising? Of course, this case is an advanced product of digital CGI and not a live action film in the classical sense of a photochemical index on the strips of film. Nonetheless the animator's words above, namely, "the power of cinema," suggest that such a boundary of moving image has collapsed amid technological advancements in these fields. At a more fundamental level, the emphasis is in the visualization of microscopic objects and giving movement to objects that were invisible to the naked eye.

Where do these biological animations come from historically? How could we situate them in the lines of the evolution of moving images, if possible? In this paper, I will consider the historical background of biological animation, by referencing Henri Bergson and Gilles Deleuze. Then, the issue does not lie in the boundaries between digital and analog or animation and live-action films. Rather, I wish to turn the problem inside out to consider, for cinema or media studies, "what is being brought to life" by biological animations. For this purpose, we

have to go revisit the context in the 1900s.

"Where Cinema and Bergson Meet in the 1900s"

In a 1914 *Journal* article, Bergson said, "Several years ago, I went to the cinema. I saw it at its origins. Obviously, this invention, a complement to instant photography, can suggest new ideas to a philosopher" (Georges-Michel 1914; trans. Schwartz 2011: 81). As we know, cinematograph presenting a series of instantaneous photographs becomes a famous model, called "cinematic illusion", through which this philosopher could critique the mechanism of human practical thoughts. This mind-cinema analogy allowed Bergson to reveal a general tendency for understanding time as immobile sections and failing to grasp the real duration.

In this interview, Bergson treated the cinematograph as "a complement to instant photography." If he obtained a critical suggestion "in its origin" for the invention of his original cinematograph, could we find another diverging point in the line passing from the instant photography to a popular cinematograph? From this perspective, it is worthwhile to ask what kind of cinema Bergson saw in this period.

Recent studies have come to clarify this point. Paula Amad, who investigated the Archive des Planète by Albert Kahn, found a specific example from the inter-war period.

"On June 26, 1921, Bergson, accompanied by his wife and daughter, viewed six films. The first of these, Dr. Comandon's film titled *Les Fleurs* (most likely the time-lapse, hand colored film of flowers blooming still extant in the Albert Kahn Museum), would have offered the philosopher one of cinematic "encounters" that Artaud argued contested the normal temporal-spatial chronology of events captured by the camera.

Bergson most likely chose the films he wanted screened, and may well

have selected *Les Fleurs* — a mechanically aided yet natural spectacle of plants moving as they grow within a condensed time frame — in order to reflect further on issues of vitality, movement, and time"（Amad 2010: 237）

In this project, Albert Kahn screened the images of a growing vegetable or a blooming flower using techniques for accelerating the projection speed, with film colored via stencil. The autochrome photo printing and the cinematograph capturing the plant growth would attract Bergson among a number of intellectuals.

Jean Comandon, a biologist and the cinematographer in this project, is remembered as one of the pioneers of the ultramicroscopic cinematograph in France. By means of his special device, he originally succeeded in filming microbes in 1909. From this period, the cinematograph functioned as an ideal machine in the domain of biology for observing microscopic objects that commonly required patience, for a time-consuming process. From cell division to the blooming of flowers, Comandon recorded biological samples on film, and it is worth noting that the visualization of these invisible moving objects always proceeded under the manipulated time of the cinematograph[1].

In fact, the beginning of the 20th century is regarded as a turning point for the history of biology. Paralleling the developments in histology and embryology, microscopic objects began to be transported from *in vivo* to *in vitro* to manipulate life forms（cf. Landecker, 2010）. This fact would be interesting for the evolution of moving images, as it is supposed to be a precondition of the visualization for biological animations. Further, *in vitro* describes not only a test tube or a culture medium, but also literally the medium of film, at least in the practice of Comandon. Indeed, he had to pay close attention to the treatment of biological samples because the heat of the strong light for shooting would damage or kill the living organisms under observation. Hence, Comandon's project can be described as culturing life within his special micro-cinematograph.

In this context, these biological moving images reveal two features. First, in projecting microscopic objects, the screening time had to be manipulated to synchronize with spectators' lived time. Second, biological samples had to be transported from the living into the culture medium, including the film itself. If we understand these technologies for visualizing objects in motion as an animation, Comandon's images may be considered as biological animation in the beginning of the 20th century. And it was these techniques which allowed Bergson for viewing the organisms cultured via the cinematograph.

Chronophotography as a point of divergence

In this period, Comandon was not the only one who succeeded at filming microscopic objects. Bergson talked about his colleague at the Collège de France, François-Frank, pseudonym of Nicolas-Charles-Emile François who was able to show his students the phases of cell division thanks to serial photography aided by the cinematograph. As in 1909, when Comandon reported the first micro-cinematograph to the Academy of Science, Bergson might have had the opportunity to see these biological animations, even if he had never seen the cinematograph in its popular form.

Let us consider one example: "Cinematography of fertilization and cell division" (fig. 1). This chronophotograph taken by Julius Ries visualizes a process of segmentation of sea urchin egg under fertilization. Of course, this case is undoubtedly not exempted from the critique of Bergson. It is clearly composed of "any-instant-whatever" extracted from the phases of cell division. If we recognize here a sense of continuity, such a sense is nothing but a schematized, abstract time presented by modern science (and supported by our thought process).
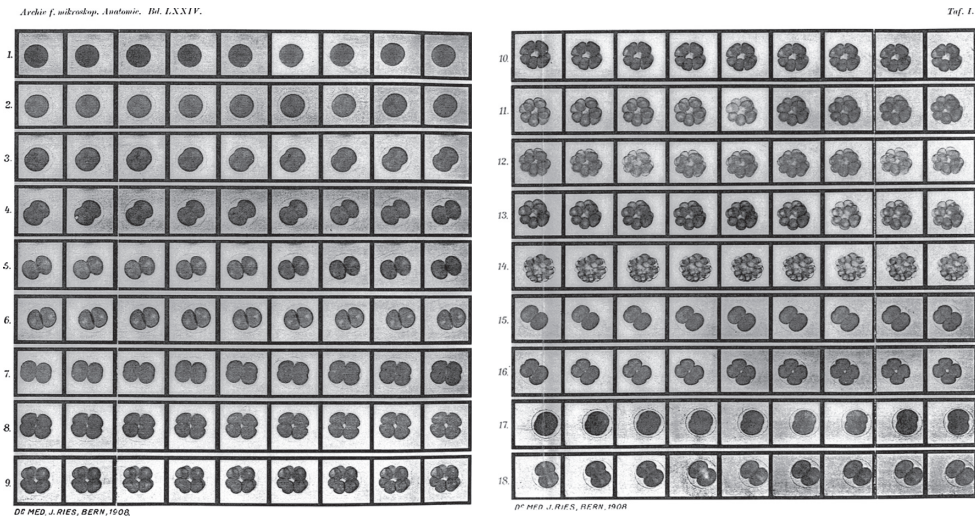
Figure 1. Cinematography of fertilization and cell division（Ries 1909: 32, 33），
Copyright © 1909, Springer-Verlag

However, given this visualization, another question becomes crucial: what is re-presented here, or what do these images resemble? I am not referring to the lack of sharpness. Rather, taking into account the techniques of visualization which has been elaborated as paralleling the theory of biology of this period, this moving image might be regarded partly as a simulation of a pre-established mind by a biologist. In short, how could we understand the process of visualization achieved here, which recent animators might call "the power of cinema"?

In responding to this question, the reference to *Cinema 1* by Deleuze, particularly the part examining Dziga Vertov's Cine-Eye, becomes useful. Deleuze said, "Slow and high-speed shots, superimposition, fragmentation, deceleration, micro-shooting. This is not a Human Eye — even an improved one. For, although the human eye can surmount some of its limitations with the help of contraptions and instruments, there is one which it cannot surmount, since it is its own condition of possibility" (IM 117: 80-81)[2]. This statement describing the perception-image is interesting, because hesitation in determining the image of cell division as either representation or simulation may derive from the fact that

visualization of micro-cinematography is not an improved eyesight but reaches to the limitation of moving image, that is, "its own condition of possibility." Deleuze continues,

> For, in Vertov's view, the frame [photogramme] is not simply a return to the photo: if it belongs to the cinema, this is because it is the genetic element of the image, or the differential element of the movement. It does not 'terminate' the movement without also being the principle of its acceleration, its deceleration and its variation. [...] And, if cinema goes beyond perception, it is in the sense that it reaches to the genetic element of all possible perception, that is, the point which changes, and which makes perception change, the differential of perception itself. (IM 120: 83)

This part could be understood as an explanation of "image-perception" situated at a moment of the evolutionary line of moving images. It helps in the reconsideration of chronophotograph as photogrammes, which succeeded in visualizing and decelerating the process of cell division. However, I think it should not simply be identified as "movement-image" or "time-image" because in this case there is no montage, even more the mobility of a camera. What can be recognized here is only movement of an object, namely, the segmentation of an egg. This is an "image in movement," to be defined by its tendency according to Bergson (and as confirmed by Deleuze).

At this point, we have to explore the technical problem about image projection. In 1909, although projecting images was already possible, these scientists often called such images chronohotography. The reason seems partly derived from the fact that the biologists filming it were more or less under the influence Etienne-Jules Marey, who reportedly objected to having his method made into popular cinema. Nonetheless, as for the manipulation of time, it was Marey himself who expected it in predicting the synthesis of serial images. For

example, his comment to the photographs "presented to the eyes in sufficiently rapid succession to allow of the changes being clearly perceptible" (Marey 1895 304: 305), suggests that he already understood manipulated time as one of the conditions of possibility for our perception, if it was not in a manner of the cinematograph.

In other words, chronophotography is understood as a point of divergence in this line of evolution for the biological animation. We could expect and wait for segmentation of the cell on the progress of film in a mode similar to sugar melting in water. However, if this animation has generated a sense of anticipation, it is derived not only from the division of cell but also manipulated time or interval of these frames. In his article, "Animation and Vitality," Philip Thurtle said,

[A]nimation's use of frame rate and the persistence of vision allows for a perception of the continuity of movement while the disruption of this continuity can give a sense of the passage of time irreducible to movement. [...] [A]constantly changing world may not feel vital if the rates of change remain stable. A vital world, instead, has discernible changes in the capacity for change, either in the increase or decrease of potentials. (Thurtle, 2014)

Of course, Thurtle was conscious of the risk of explaining animated images as "vital" because this word has a classical implication of being immediately equated with personal or social worth. Such a risk cannot be avoided if only the potential between frames is emphasized.

However, in projecting a chronophotograph of cell division, where does its vitality come from? It does not simply belong to the cell. Given that the cell was to be cultured via the cinematograph, its vitality would cease to be merely trope or metaphor in the classical sense. Rather, its vitality could be generated in the process of visualization through the projection with manipulated time. When

these techniques are regarded to comprise a medium surrounding the cell and spectators, the vitality of biological animation could be recognized within the cinematograph for another line of the evolution for moving image.

Conclusion

We have tried to reconsider moving images as a technology for culturing medium from biological animations, which Bergson might have seen in the 1900s. Then, with a reference to *Cinema 1* by Deleuze, particularly on manipulated time, the visualization of cell development reveals the vitality of moving images that existed in the mechanics of the cinematograph. Our endeavor, as a whole, could be considered as initiative to treat a technology of visualization, chronophotography, as a plasmatic cinema, constantly moving toward proper evolution. From this perspective, we could revisit the idea of (new) medium itself as a culturing technique, and then situate digital CGI including the biological animation in the line of evolution of moving images.

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1　The following is the statement of Comandon:《En quoi le cinématographe est-il utile dans les recherches microscopique? C'est avant tout, à cause de la possibilité qu'il nous donne de ralentir ou d'accélérer la vitesse des mouvements enregistrés, en agissant sur la durée […] La cadence choisie pour la vue pourra donc etre proportionnée à la vitesse du mouvement que l'on desire étudier.》（Comandon 1937）

2　Hereafter, I use the page numbers of the original texts and the corresponding page numbers of the English translation.

Chapter 2
Deleuze's *Cinema* and Lumière Films

Yosaku Matsutani

Introduction

Gilles Deleuze published two books on cinema, *Cinéma 1* and *Cinéma 2*, in the 1980s. There is no doubt that the discussions on cinema in these two books have had an impact on diverse terrains. We can pose a key word, "movement," to describe a key influence on Deleuze's *Cinema*, even thinking about the moving image in terms of "movement."

Over the history of film theory, the idea of the cinematographic image as movement was mentioned frequently by film theorists and critics until the 1950s such as Siegfried Kracauer and André Bazin, among others. However, according to remarks of Tom Gunning, a researcher in visual culture studies and film studies, "[s]ince that time [the 1950s], the centrality of motion to cinema has, while rarely being explicitly denied, certainly been marginalized in most discussions in favour of narratively based issues"(Gunning 2009: 165). In this context within film studies, discussions of Deleuze's *Cinéma* since the 1980s have served as a trigger to re-energize the consideration of movement in film studies.

Incidently, the 1980s, when Deleuze's works on cinema became known, was an era of reform in film studies. The focus of scholars in that field moved from a reading of films based on structuralism, semiology, and psychoanalysis, the trend since the 1960s, to an examination of the relationship between the body and cinematic image by employing all theoretical methods and taking into account the context around the body and image. Among the research programs emerging from this change, was the early cinema studies, the study of the relationship between film and its spectators from the birth of cinema to the beginning of the 20th century.

Scholars in early cinema studies analyzed early films using diverse documents and materials, as well as their knowledge of turn-of-the-century

thinking to understand the cinematic experience of spectators at that time. As a consequence, they proposed an entirely different idea about early films, particularly Lumière films, than that proposed by Deleuze. Deleuze discovered the primitive image, the image in movement of the pre-cinema in Lumière films. In contrast, other scholars in early cinema studies asserted that Lumière film audiences were often enthusiastic about the movement of natural phenomena across the screen (e.g., the movement of wind, dust, and water). Can we argue that they had already actualized a type of "movement-image" in their own way? This paper examines points of divergence of moving images, within the context of the public's perception of cinematography.

Lumière Films for Deleuze and for Spectators at the Turn of the Century

Deleuze places Lumière films as "pre-cinema" when he proposes three theses on a movement based on Henri Bergson's concepts. Deleuze based his view of Lumière films on the following three aspects of Lumière's apparatus:

1. [T]he frame is defined by a unique and frontal point of view, which is that of the spectator on an invariable set: there is therefore no communication of mutually referring variable sets (IM 39: 24)[1].
2. [T]he viewpoint of Lumière films was fixed, the shot was therefore spatial and strictly immobile (IM 39: 24).
3. [T]he apparatus for shooting was combined with the apparatus for projection, endowed with a uniform abstract time (IM 12: 3).

Based on these three aspects, Deleuze regards the images of Lumière films as one in movement rather than movement-image (IM 39: 24). In other words, in Lumière films, "movement remains attached to elements, characters and things which serve as its moving body or vehicle," and pure mobility is not extracted from its movement. However, Deleuze asserts that the spatial and fixed shots

such as found in Lumière films have two ways of producing a pure movement-image: the mobilization of the camera in space and montage in time. Unfortunately, we can neither find camera mobility and montage in Lumière films nor add them to the films. Consequently, Lumière films remain "pre-cinema" in Deleuze's concept of movement.

In contrast to Deleuze's discussion about movement, the scholars in early cinema studies pay attention to the relationship between cinematographic image and body. First, they show a regime of image in early cinema and observe that the narrative was not dominant in early cinema's filmmaking process; the relationship between film and spectator in early cinema was not immersed in a narrative regime. Next, scholars demonstrate the characteristics of image in early films. According to their discussions, while narrative films are composed of causal chains of images, into which the spectators are willing to submerge themselves, the early cinema used simple shocking or surprising images that function to attract "spectator attention, inciting visual curiosity and supplying pleasure through an exciting spectacle"(Gunning 1990: 58). As a result, the scholars of early cinema studies reveal that early cinema "moves outward towards an acknowledged spectator" (Gunning 1990: 59) and constructs a direct relationship between film and spectator.

Then, during that time what attracted spectators toward films, especially Lumière films? We could suggest some answers to that question. One of those was the movement of natural phenomena across the screen. One retro film review clearly reveals the considerable validity of this view. That review was written for a Lumière film, *Baby's Breakfast* (1895), screened on 30th December 1895.

Or else there is an intimate scene, a family gathered which his father is feeding him fall from its lips, while the mother smiles. In the distance, the trees are swaying: one sees the breezes lift the child's ruffle... (Le Poste

1895; trans. Emanuel, cited in Toulet 1995: 130)[2]

The reviewer commented about that film without montage and shot by fixed camera and explained a situation or the actions of parents and baby, i.e., image in movement in Deleuze's terms. We can also find out a review for another Lumière film, *The Blacksmiths*（1895）, screened at the same time.

> The blacksmiths ... engaged in the exercise of their job. We could see that the iron was blazing in the fire, growing longer as they beat it, producing, when they plunged it into the water, a cloud of vapor rising slowly in the air, and that a gust of wind came to hunt a cloud of vapor all at once.（Gay 1895: 310）

The reviewer, André Gay described the blacksmiths working with accuracy, in other words 'image in movement' in that film. If the typical spectator of nowadays watches two films, he/ she would follow with eyes the actions of the parents, the baby and the blacksmiths in the similar manner as two reviewers did. However, two reviewers described other aspects of the films in their reviews; swaying trees, lifting the child's ruffle by the breezes, a cloud of vapor slowly rising in the air, and hunting a cloud of vapor all at once. According to the descriptions, two reviewers as the typical spectator at that time also paid great attention to the movement of natural phenomena across the screen such as wind and vapor, which do not seem important to today's spectator.

A documentary-film researcher and filmmaker, Dai Vaughan reveals the audience response to Lumière films on the basis of retro documents, such as the review of *Baby's Breakfast* and *The Blacksmiths*:

> ［W］hat most impressed the early audiences was what would now be considered the incidentals of scenes: smoke from a forge, steam from a

locomotive, brick-dust from a demolished wall.（Vaughan 1990: 64）

According to Vaughan, in Lumière films, the spectator noticed smoke, steam, and brick-dust or the wind and the change of the atmosphere included unintentionally. In other words, the spectator was attracted to movement as the change derived from the function of the camera that transduces everything in front of it into cinematographic images. Hidden in the background of daily lives, the movement does not rise to a spectator's conscious mind. Therefore, movement goes beyond natural perception and shows the world changing. Thus, at the turn of the 20th century, Lumière films were a medium for spectator, that expressed the world's changes and image-movement in terms of Deleuze.

For New Theory on Image and Movement

In this paper, I do not intend to decide which viewpoints about Lumière films are reasonable. However, I do hope to show the possibility that Lumière films, without montage and shot by fixed camera, actualized in their own way a type of "movement-image." I also indicate the different points where these moving images diverge from Deleuze's moving images. Such discussion leads the way for analysis of many contemporary image practices, for example a project by Sarah Moon. In this project, using Lumière's apparatus Cinématographe, forty contemporary filmmakers made films composed of a maximum of three shots, with screen times of 52 seconds each.

Another example would be that of digital technology, i.e., the surveillance image and the moving image in meteorological forecasting — neither having montage or camera mobility. I believe that we can understand such contemporary image practices by fusing the different discussions in Deleuze's *Cinéma* and in film studies into the new theory about image and movement.

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[1]　Hereafter, I use the page numbers of the original texts and the corresponding page numbers of the English translation.

[2]　The reference is a very famous article on *La Poste*（30th December in 1895）, reported by Emmanuelle Toulet in *Birth of the Motion Picture*.

Chapter 3
Flickering Worlds

Akihisa Iwaki

Introduction

[T]he essence of the cinematographic movement-image lies in extracting from vehicles or moving bodies the movement which is their common substance, or extracting from movements the mobility which is their essence. *This was what Bergson wanted*: beginning from the body or moving thing to which our natural perception attaches movement as if it were a vehicle, to extract a simple colored "spot," the movement-image, which "is reduced in itself to a series of extremely rapid oscillations" and "is in reality only *a movement of movements*." (IM 43-44: 23, emphasis by author)

As Deleuze argues, Bergson might not have seen a "movement-image" in cinematographic image. Furthermore, according to Bergson's comments in an interview conducted by Michel Georges-Michel in 1914, it seems that he saw a kind of privileged instance on screen:

The cinematograph taught the painter that photography was wrong. By reproducing movement on the basis of personal impressions, the artist had recomposed, fused into one, several successive attitudes, giving the illusion of life and therefore of movement. They found these attitudes again on the screen. (Georges-Michel 1914; trans. Schwartz 2011: 82)

However, from the viewpoint of aesthetics, which explores the conditions of our experience, I would like to argue that after the cinema, moving images of all kinds are a type of "movement of movements" in the Bergsonian sense, whether they appear as "movement-images" or "images in movement."[1] In addition, pre-cinema audiences might perceive not only the movements of objects but also

micro-movements — a series of extremely rapid oscillations or a *flicker*.

Perceiving Flicker/Eliminating Flicker

From Deleuze's perspective expressed in *Cinema*, the "flickering montage (*montage clignotant*)" (IM 122: 84)[2] created by such American experimental cineastes as Markopoulos, Conard, and Sharits (IM 122-123, note 22: 230, note 22), refers to "the genetic element of the image, or the differential element of the movement (*l'élément génétique de l'image, ou l'élément différentiel du mouvement*)" (IM 120: 83) on one hand, and the "irrational cut (*coupure irationnelle*)," like the connections making up the networks of the brain, on the other (IT 280: 215). Thus, these images can be understood as a type of pure movement-image as well as a pure time-image.

The pre-cinema audience perceived images not only in movement but also in micro-movements — that is to say, flickers. Fredric Talbot summarizes this point as follows:

In the early days it was difficult to convey the impression that motion was being shown, because the movement of the shutter cutting off the picture was so emphasised as to convey a distinct sense of blankness between the successive images. *Thus regular intermittent occurrence of invisibility, described as "flicker," caused tremendous strain to the eyes, and provoked nauseating headache*. When the flicker was eliminated the strain ceased; the illusion was rendered more perfect as well. (Talbot 1912: 7, emphasis by author).

For instance, there is an article about a sickness called "les cinématophtalmies (cinematophathalmia)" by Dr. Etienne Ginestous that appeared in the *Gazette hebdomadaire des sciences médicales de Bordeaux*, in 1909. He described, "Ophthalmic troubles caused by cinema...compose precisely a

new malady due to a new spectacle" (translated from Ginestous 1909: 266).

For the pioneers of cinematography, not only generating smooth movement of objects (image in movement) on the screen but also suppressing movement or flicker (micro-movement) was a serious problem.

An effort to remedy this disastrous effect was made by the introduction of *a violet-coloured sector* of similar area to the opaque sector, and set opposite to the latter, which gave the shutter the appearance of a two-bladed propeller. This is effective to a certain degree; but it has been superseded by *a shutter having three blades.*" (Talbot 1912: 95, emphasis by author)

As C. Francis Jenkins wrote in 1920, "The suppression of flicker (and resultant headache) was the next problem to attract attention, and the first mention I find is in 1900 and the description says that 'the shutter rotates once in the interval between the movements of the film.'" But as more commonly practiced flicker is subdued by adding one or more blades rather than by rotating the shutter oftener." (Jenkins 1974: 5).

We can see here at least three types of different solutions were tried to eliminate the flicker: a violet-colored sector; a shutter rotating once in the interval between the movements of the film; and a shutter having two or three blades. Can we compare these developments to the creative evolution of the eye described by Bergson? (EC 558: 74-).
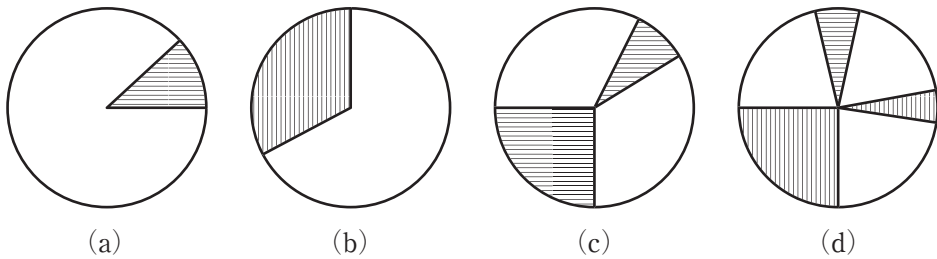
Figure 1. Shutters（a）and（b）, when multiplied by 16 times per second, will produce visible flicker. If we add a blade like the one in（c）, the blinks increase by 32 times per second, suppressing the flicker. If we add a second blade, like the one in（d）, the blinks increase by 64 times per second, further suppressing the flicker. Source: Löbel 1912: 31.

We can also find similar solutions in texts published in France. Löbel for example, describes in more detail the adequate shutter required to suppress the flicker effect. Referring to Figure 1, according to his description, with the shutter like（a）and（b）turning 16 times per second, we might recognize flicker. However, if we add a blade like the one in（c）, we will increase the blinks by 32 times per second and the flicker will be suppressed. If we add a second blade, like the one in（d）, we will increase the blinks by 48 times per second, further suppressing the flicker.

In addition, Löbel reported on the research of M. Mallet, the inventor of a popular edition of a shutter with minimum flicker, and arrived at a following conclusion: In an apparatus where the film is moving in 1/5 of the circumference, it is adequate to use a shutter with three blades when each of them are 1/5 of circumference. If it is 1/6, it is adequate to use a shutter with three blades when each of them are 1/6 of circumference, and if it is 1/8, it is adequate to use a shutter with three blades when each of them are 1/8 of circumference.

By the 1910s, projectors had set up double- or triple-bladed shutters（Figure 2）. When the projection speed was twenty-four frames per second and the projector had a double-bladed shutter, the lens opened and closed ninety-six

times per second, and images were projected forty-eight times per second. At this rate, flicker was eliminated for most human viewers. Each frame（photogram）was actually projected at least twice. Thus, the repetition of flicker or a photogram in cinema can be defined as the movement that is both perceived yet imperceptible（Figure 3）.
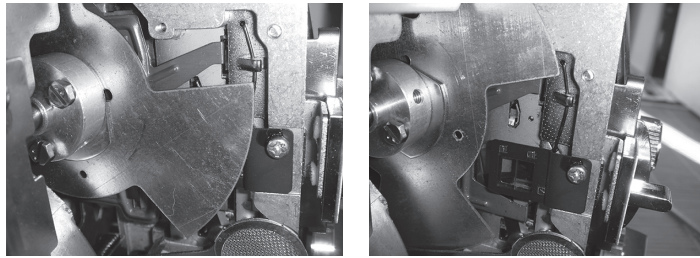

Figure 2. A triple-bladed shutter（Fujiscope M40: 8mm）, photographed by the author
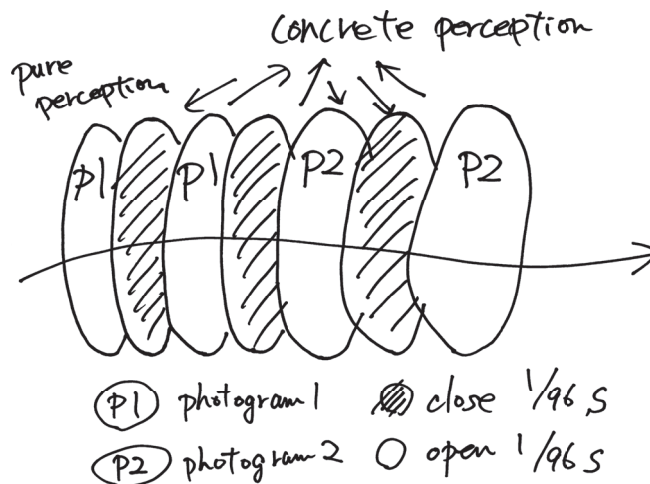

Figure 3. The repetition of flicker and perception, sketched by the author.

Blinking light in the cinema has been successfully concealed under the superficial movements of the "form," "quality," and "position" of moving images. However, this blinking light has continued to exist since the invention of alternating current and cinema at the end of the nineteenth century[3]. Can we argue that, being troubled with headaches, the pre-cinema audience had already encountered the "differential element of the movement" or the "genetic element

of all possible perception," as Deleuze discusses in *Cinema*?. For Deleuze, at least in *Cinema*, the concepts that cinema gives rise to are important. However, the projection system of cinema demonstrates Bergson's thesis: "movement of thing is in reality only a movement of movements" (PM 1383: 124) and the relation between the "genetic element" of perception and perception itself. Image generation systems after cinema, which use scan lines, illustrate Bergson's thesis further. Thus, we can imagine a material world in which multiple mechanical repetitions coexist, and we are incorporated in this flickering world (Figure 4).
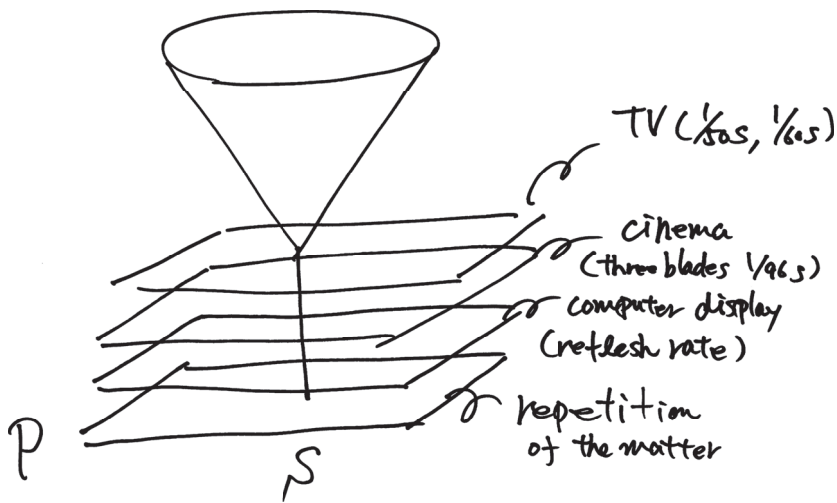

Figure 4. Repetition of the matter and the mechanical blinks, sketched by the author.

Coda: Beyond Human Rhythms of Duration

Although cinema immediately provides movement, it is only because motion picture mechanisms were modified to correspond with human perceptual mechanisms. In this sense, the mechanisms of all moving image-generation systems are still quite humanistic. In contrast, Bergson pushes his investigation beyond the conditions of human perception:

The primal function of perception is precisely to grasp series of elementary changes under the form of a quality or of a simple state, by a work of

condensation. The greater the power of acting bestowed upon an animal species, the more numerous, probably, are the elementary changes that its faculty of perceiving concentrates into one of its instants. And the progress must be continuous, in nature, from the beings that vibrate almost in unison with the oscillations of the ether, up to those that embrace trillions of these oscillations in the shortest of their simple perceptions. (EC 749: 327)

Bergson supposes that a species' ability to act is proportional to the complexity of its nervous system and the degree of contraction of its duration (MM 377-378: 332). It would be interesting to examine this viewpoint of Bergson's in comparison with recent research in the field of biology showing that living beings' rhythms of duration and ability to act are measured in terms of flicker; in this context, can we really say that humankind is one of the most contracted living beings, as Bergson supposed? For instance, in a paper entitled "Metabolic Rate and Body Size Are Linked with Perception of Temporal Information," which appeared in the October 2013 issue of *Animal Behaviour*, we can find the list of critical flicker fusion frequency (CFF) of various species. It is supposed that the CFF of *Anguilla anguilla* (the European eel) is 14 and that of *Callospermophilus lateralis* (the gold-mantled ground squirrel) is 120, among others (Healy et al., 2013). Is *Anguilla anguilla* more contracted than humankind?

It would be also interesting to interpret recent artworks from Bergson's viewpoint. For instance, Dagulas Gordon's *24 Hour Psycho* (2003) is a video installation of Hitchcock's film *Psycho* (1960), slowed to 2 frames per second (the film is generally run at 24 frames per second). One of the ideas came from Gordon's experience of watching films on home VCR at different speeds — slow and fast motion. In contrast to Gordon's work, Jim Cambell's *Illuminated Average #1 Hitchcock's Psycho* (2000) scanned every single frame of *Psycho*, compressed them into a single digital still image, and illuminated it in a light box.

In the context of pre-cinema, where projection speeds were variable to a degree, Bergson wrote the following:

［In theory］the film could be run off ten, a hundred, even a thousand times faster, without the slightest modification in what is being shown; if its speed were increased to infinity, if the unrolling（this time, away from the apparatus）became instantaneous, the picture would still be the same.（PM 1259-1260: 18）

Bergson also said, "In fact, this speed is fixed, since the unrolling of the film corresponds to a certain duration of our inner life"（PM 1261: 21）.

In this respect, Campbell's *Illuminated Average #1 Hitchcock's Psycho* simulates a film unfolded to one little moment of human perception at ultra-high-speed. This is *Psycho* played by projector at an ultra-high-speed（something still unrealized and, even if such ultra-high-speed projectors were realized, would be for uses still unknown）. From another perspective, it suggests a *Psycho* watched by a far more contracted "duration of consciousness" — an elephant's *Psycho*? On the other hand, what Gordon's *24 Hour Psycho* suggests is a *Psycho* at ultralow-speed projection（if it was on film, it would burn）watched by a far more relaxed "duration of consciousness" — a mouse's *Psycho*?[14]

Although "memory-recollection" and "memory-contraction" are Deleuze's favorite concepts from Bergsonian philosophy, it seems that Deleuze didn't develop the latter adequately in *Cinema*, since there might not be many films that give rise to memory-contraction in the sense that Deleuze describes it: "contraction as the essence of duration and as operating on elementary material agitations in order to constitute the perceived quality"（DR 98: 313）.[5] In addition, for Deleuze, projection speed was fixed on "twenty-four images per second（or eighteen at the outset）"（IM 11: 2）. However, the two works mentioned above, for instance, give rise to "memory-contraction" in their own way, and we can also

imagine other lines of evolution from forgotten technologies and perspectives associated with the pre-cinema to contemporary art and science.

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[1] For more details on the theoretical framework of this argument, please refer to Iwaki 2016.

[2] Hereafter, I use the page numbers of the original texts and the corresponding page numbers of the English translations.

[3] About epileptic seizure induced by animated cartoon "Pocket Monster" on 16 December 1997 in Japan, please refer to Niijima et al., 1998; Takada et al. 1999. A large number of people, mostly children had a fit while watching a character, Pikachu emitted red and blue flickering light at 12 Hz.

[4] For more detail, please refer to Iwaki 2013.

[5]　In a lecture at Vincennes, Deleuze sees both of "memory-contraction" and "memory-nappe" in the depth of field of Orson Wells（Deleuze 1983）.