

Quantum Filmmaking: The Cinema that Transforms Reality

Iceberg Fernandez

Abstract

The recent development and implementation of multi-directional mobile social media in Post-industrial societies has dissolved the ontological binary opposition between film producers and audiences. In this context, cinematic narrative as an art form needs to be re-appraised. The convention is to study the form as a linear method of one-way communication, and an audio-visual semiotic system derived from Linguistics.

This paper is an introduction to [Quantum Filmmaking](#), a new interdisciplinary participatory art practice composed by [Kino-Present](#) and [Now&Here=Everywhere](#). It provides a framework to analyse the Physics of cinematic narrative. That is, understanding narrative as an artistic process of producing and receiving participatory video-collages created with camera-phones. It also draws attention to transformations in reality generated during the ON/OFF line cause and effect chain.

This article develops an interdisciplinary theory of Quantum Film, merging subatomic Physics with Expanded Cinema theories. It explores the under-researched influence of developments in Quantum Physics during the evolution of American avant-gardes in the 1960s and the ontology of Expanded Cinema. A synthesis of the two is emergent through the practice of Quantum Filmmaking as participatory video-collage produced through mobile social media.

Keywords: Quantum Filmmaking, Quantum Film Theory, Physics of Narrative, Participatory mobile phone cinema, collage narrative, eutopian discourse

Quantum Filmmaking: The Cinema that Transforms Reality

Through the course of this article, I will be exploring the historical, ontological, epistemological, and empirical premises that have given rise to the interdisciplinary, participatory practice of Quantum Filmmaking. My examples are developed through the projects *Kino-Present* and *Now&Here=Everywhere*. These projects provide a framework within which to analyse the Physics of cinematic narrative or narrative as an artistic process of producing and receiving participatory video-collages created with camera-phones. They also draw attention to transformations in reality generated during the ON/OFF line cause and effect chain. Physics is often defined as the study of matter, energy, space, and time and the deterministic cause and effect relationships between them. Analogous to this, we can understand narrative as the chain of events in a cause and effect relationship occurring across space and time. Therefore, the Physics of Narrative is a generative process, originating other narratives in reality, and thus merging art with everyday life to transform it. The Physics of Narrative follows the ontological and epistemological principles of Quantum Mechanics. This analysis has a critical basis in Quantum Film Theory, which is an interdisciplinary methodology merging subatomic Physics with Expanded Cinema theories.

Quantum Filmmaking stands for the live production and reception of participatory video-collages building upon the medium specificity of contemporary camera-phones and mobile social media. The qualities of these media include ubiquity, connectivity, and mobility, enabling the participation or/and interaction of anyone, anywhere, anytime, in their present tense. Outcomes are often unpredictable as artworks emerge during development. Quantum Filmmaking dissolves the hierarchical binary oppositions between art producers and receiver. They are roles that co-exist in superposition, reversing the ontological chronological order of production and reception.

The art projects recover the eutopian discourse of Quantum Physics, which empirically demonstrated that the act of observation could transform reality. However, in this context, the camera-phone supplants the microscope. Thus, it presents eutopia as the possibility of *utopia* (it seems that the word's signifier stops it from becoming reality). The word *utopia* comprises the negation of the syllable *ou*, meaning no, and *topos*, meaning place. Even so, the homophonic prefix *eu*, meaning *good* also echoes in the word, with the connotation that "there is not place for a good place." Hence, the first step towards eutopia is to stop spelling it as *utopia*, liberating the concept from the constraints of impossibility.

First, I will introduce the Quantum Filmmaking projects *Kino-Present* and *Now&Here=Everywhere* as frameworks through which to analyse the Physics of Narrative in participatory video-collages. Next, I will expose the main theories in particle Physics that inform the methodology of Quantum Film Theory and its relationship to the analysis of experimental projects such as the double-slit experiment read in relation to the Copenhagen interpretation of Quantum Mechanics (1924-7). Following this, I will explore the under-researched impact of the scientific development of Quantum Physics in the American Post World War II avant-gardes. This will shed light on Expanded Cinema as a collage practice during the 1960s, which subsequently informs Quantum Filmmaking as a participatory practice

within the contemporary mobile and social media context. Finally, I will analyse the Physics of Narrative as it occurs during the production and reception of participatory video-collages.

Dziga Vertov, in his *Provisional Instructions to Kino-Eye Groups* (1926), established an interesting analogy between the film camera and the microscope. He stated that if the microscope was invented to see invisible phenomena, “the cine camera serves to penetrate more deeply into the visible world” (Vertov, as cited in Fowler, 2002, p. 34).

In 1929, Vertov directed *The Man With A Movie Camera*, presenting a day in the life of the proletarians from the Ukrainian cities Odessa, Kharkiv, and Kiev. In this documentary, the director experimented with a range of cinematic techniques such as double exposure and fast/slow motion. Throughout the film, Vertov explored a Film-within-Film structure, linking the actual screen action of the documentary with its own filmstrip in the cutting room manipulated by the editor, Elizaveta Svilova (Vertov’s wife). At the end of the day, the proletarians go to a cinema to watch the film in which they are also the leading characters.

Kino-Present is a 21st Century digital interpretation of *The Man With A Movie Camera*, reversing and synthesizing traditional cinema’s ontological order of production and reception. Instead, participants co-create film collages drawing from contemporary domestic social media, Bluetooth, and mobile technologies. The single-screen video-collages created throughout the *Kino-Present* process are the final trace, a documentary record of the interaction of observers in the OFF line with the ON line realm. In the first instance, contributors upload onto the website (or, send to us) fifteen-second video clips. These are then broadcast in the public domain via Bluetooth to the mobile phones of public participants, creating ephemeral multiscreen OFF line mobile cinemas. Then, they are uploaded onto the website from mobile phones. Participants can then edit ON line, creating new video-collages ready for watching anytime and anywhere.

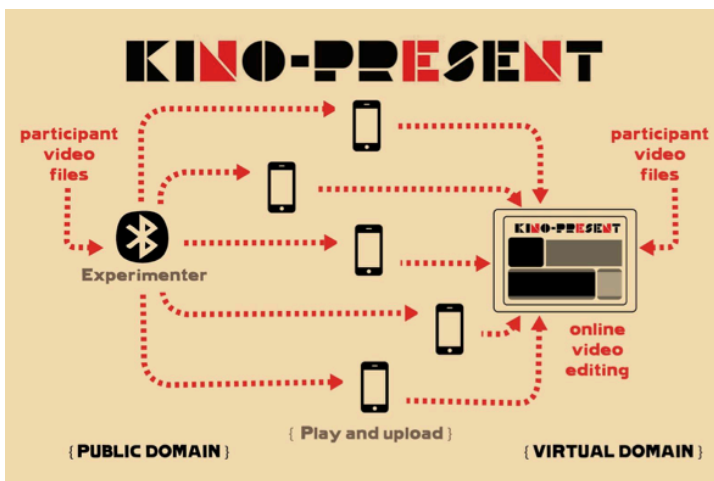


Figure 1. *Kino-Present*

Now&Here=Everywhere is the shortest international art collaboration in the history of humanity, lasting for only thirty seconds. The participatory, multi-screen video-collage project celebrates cultural diversity. Everyone is invited to collaborate with mobile phones, co-creating and re-creating simultaneous moments. An announcement is

made on the homepage of the website with the date and time of the international event taking place. It is an invitation to everyone with access to a camera-phone and a 3-4 G connection to make a thirty-second video depicting a situation, detail, or place that they are in at that precise moment. Then, these videos are sent straight back to the researcher via e-mail or *WhatsApp* and published onto the *Gallery of Moments* section of the website. The multi-screen collage-moments are randomly generated, collapsing into a different possibility every time those observers interact with them.

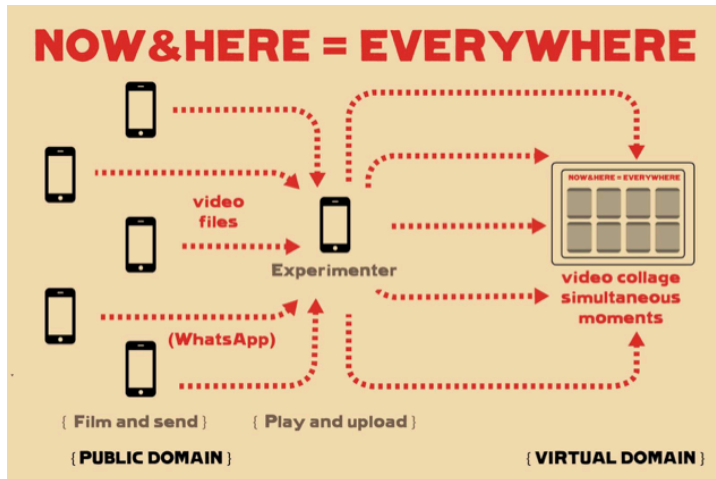


Figure 2. *Now&Here=Everywhere*

Quantum Film Theory studies the Physics of Narrative in Quantum Filmmaking. It refers to the cause and effect relationship between observers and mobile media as well as the transformation of audio-visual narratives in the ON/OFF line space and time. In addition, it considers the unpredictable narratives generated throughout the process such as the choreographies and situations created in the reactive OFF line realm; and the independent video-clips and their assemblage in the form of video-collages. Quantum Film Theory merges Expanded Cinema with Quantum Theory, challenging traditional conceptions of cinematic narrative. This theory postulates, “the reality is in the observations, not in the electron” (Heisenberg, 1958). In other words, as is the case with Particle Physics, the narrative depends on the free interpretation of observers.

The main theories in subatomic Physics that inform Quantum Film Theory are the outcomes of the double-slit experiment addressed in the Copenhagen interpretation of Quantum Mechanics (1924-27). At that time, the physicist Bohr was impressed by the multi-perspectivism of Cubist collage because it represented a scene as if the observer was “moving around an object [in order to] seize it from several successive appearances...” thus freeing the artist from a single perspective in favour of multiple viewpoints (Miller, 2000, p. 396). Hence, the scientist developed the principle of complementarity in Quantum Mechanics (1927). He established the principle of wave-particle duality, where an electron can behave both as a wave and as a particle, but not both at the same time. They are complementary faces of a unique reality, and the observer has the freedom to choose which quality to observe.

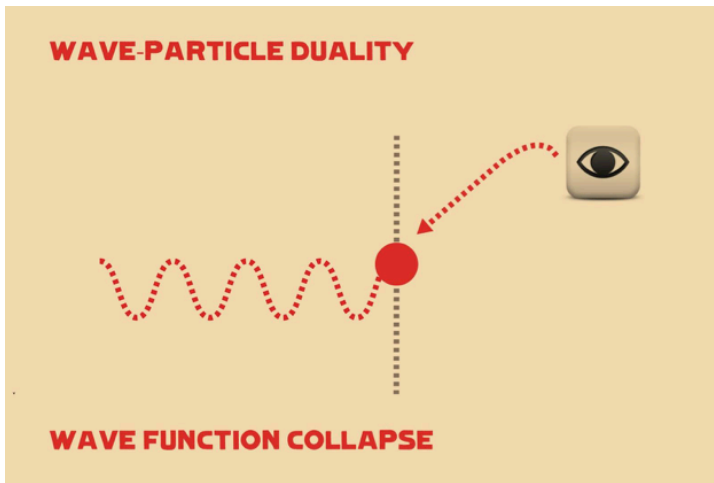


Figure 3. Wave-particle Duality

Further, the research physically demonstrated the phenomenon of wave-function collapse. Here, the wave-function ($\Psi = \text{psi}$) or the probability of a photon/electron being at any particular place is within a quantum superposition that collapses through an observer's action of measuring. This activity transforms the quantum wave into particle that takes a position within the system at random.

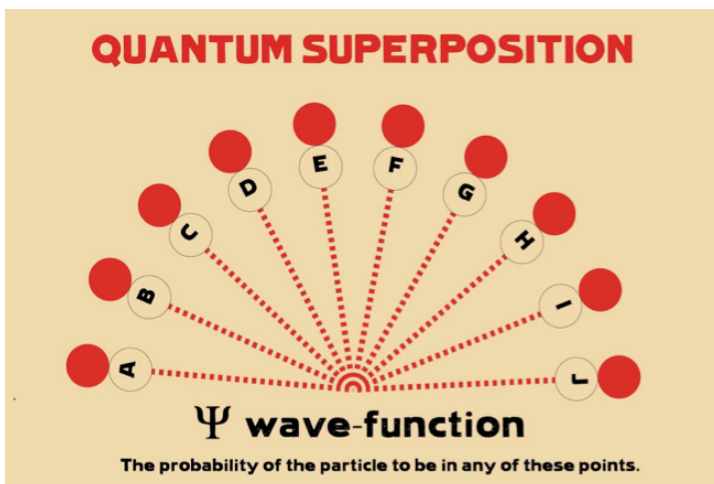


Figure 4. Quantum Superposition

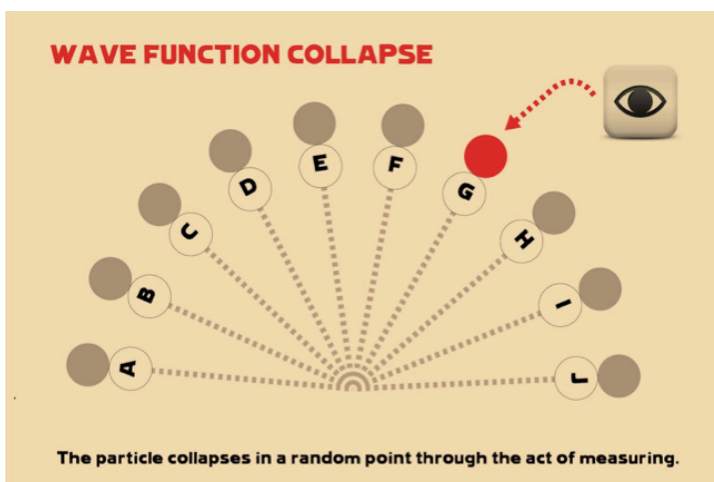


Figure 5. Wave Function Collapse

The Copenhagen interpretation of Quantum Mechanics was a revolutionary shift in Physics and sciences in general. It was the first time that a scientific experiment took the role of the scientist into account. The act of observation in Quantum Physics plays a decisive role in the research as “the reality varies, depending upon whether we observe it or not” (Heisenberg, 1958, p. 20). The connotation is that the observer changes reality.

Just as the 1920s, developments of Quantum Physics epistemologically influenced the evolution of Surrealism, the Hiroshima and Nagasaki atomic bombings in 1945 could be said to have generated the Surrealist group’s general rejection of nuclear physics. In 1952, Breton demonstrated his visceral rejection of atomic physics, asserting in an interview that artists had “unanimously been uninterested in Quantum Mechanics and Heisenbergian Physics.” Further, when referring to scientists, Breton quoted the German Romantic Georg Christoph Lichtenberg, claiming sardonically “what more could we say about atomic scientists? (...) Their heads are most often filled with junk” (Parkinson, 2008, pp. 213-4). This rejection would continue among later generations of avant-garde artists during the 1950-60s. John Cage’s Fluxus practice seemed to have been conceptually influenced by Quantum Theory. Yet, the artist eludes any theoretical connection to it, possibly because of his Dadaist and pacifist Zen beliefs.

Danvers cites Cage referring to Aquinas’ dictum asserting that he is interested in making and discussing a kind of art “that imitates nature in her manner of operation” (2006, p. 313). This claim is very interesting because although Cage does not make any direct reference to Quantum Theory, it suggests that he is aware of the recent discoveries in regards of the unpredictable and uncontrollable behaviour of the subatomic particles in the inner reality. Is he imitating the subatomic realm in its manner of operation? Cage follows the same procedure as Bohr and Heisenberg devised in the Copenhagen Interpretation of Quantum Mechanics, letting chance facilitate stylistic choices through the operations of the I Ching, in such way that all the possibilities of the wave-function of the music score were randomly reduced to one. Further, during the course of the interview “*Chance conversations: An interview with Merce Cunningham and John Cage*” (Walker Arts Centre, 1981) they expound on their collaborations led by chance operations, in which music and dance are developed separately and collaged during the performance, which allows a certain degree of surprise in the outcomes. Cage states that he stops the music when the curtains close and the observers start applauding. In regards of the role of the observer, Cage invokes Duchamp, “When you have the independence between the music and the dance that we have, then the observer becomes the third point in a triangle; he completes the work and each triangle is a different triangle” (Perez, 2010). The fact that they continuously use the term observer when referring to the audience denotes the epistemological influence of Quantum Theory in their practices.

The immediate event in Quantum Physics that may have influenced the evolution of Expanded Cinema in the 1960s was Claus Jönsson’s demonstration of the double-slit experiment using electrons instead of light (1961). The experimentation empirically demonstrated the agency of observers in changing reality, while questioning reality’s innermost nature as matter, light, space, and time (also, the paradigms of cinema). A cinematic connection was manifest at the time through deconstructing the film medium

by expanding it in space in the form of multiscreen collages, e.g. Stan VanDerBeek's *Movie-Drome* (1963-66). The medium was also developed in time to the present tense through performance, encouraging observer's participation in telecommunication projects such as Robert Whitman's *Telephony Performances* (1972-2012).

Since its early days, Expanded Cinema as an artistic phenomenon has resisted definition as the ontological spell and effects of quantum indeterminacy. (That is, the Ψ -function ranging from cinema to performance, collage, participation, synaesthesia, semi-immersion, cybernetics, and intercommunication, coexisting in superposition). Expanded cinema artists recovered the values of Dziga Vertov, who in 1922 claimed, "Film drama is the opium of the masses." They also rejected Aristotle's cathartic linear narrative, dominant in mainstream cinema, because they found it "manipulatory, mystificatory, repressive" (Gidal, 1976). Instead, they defended the discourse of the autonomy of cinema as art, exploring its medium specificity. Expanded Cinema was intended to "expand consciousness" (Youngblood, 1970, p. 75). In other words, to de-alienate society from false consciousness generated by the mainstream media, which in turn disguises capitalist structures of exploitation and oppression.

Thus, Stan VanDerbeek created the first multiscreen film-collage while living in the artistic commune of Stony Point in New York with John Cage and Merce Cunningham (his former tutors from Black Mountain College, North Carolina). In this artistic environment and influenced by the quantum indeterminacy of his mentors, VanDerBeek started working on his *Movie-Drometheatre* (1963-66). Using multiple screens, he spatially expanded the iconoclastic collage animations he had been working on up to that moment at *Bell Labs*.

Other manifestations of the influence of Quantum Physics would be in participatory telecommunication projects, such as Robert Whitman's *News* (1972). Participants were each allocated a payphone in Manhattan. They then called him, describing their location while broadcast live over the radio station WBAI in New York City. During 2012, the artist performed *Local Report*, an international participatory mobile cinema project. The artist mixed live video and audio reports sent by mobile phone from approximately ninety accomplices around the world, composing what he called "a cultural map of the world."

Since the market availability of the first camera-phone in 2004, the technology of video mobile phone formats has evolved from the amateur status of low resolution to professional standards such as High Definition. This has also motivated the creation of gadgets such as zoom lenses, tripods, LED lights, and monopods in the search for mainstream standards of image quality and narrative filmmaking. Practitioners are using mobile technologies for the production of single-screen fiction, animation, and documentaries. In this context, Quantum Filmmaking stands out as a pioneer of participatory mobile phone cinema, merging art with everyday life. The practice is especially addressed to participants with little knowledge about filmmaking, inviting them to co-create video-collages by making use of new technical skills that most of the population have developed through the standardization of mobile social media.

According to the International Telecommunications Union, during 2013 an estimated 77% of Internet users accessed the web through fixed and mobile broadband (International Telecommunications Union, 2013). We are effectively surrounded by sequential waveforms of invisible zeros and ones. They are waiting to be collapsed from bits to pixels to moving images by observers with a mobile phone or a computer, and then transformed into multi-spatial, multi-temporal, and multi-textual narratives. Past, present, and future co-exist in superposition as the moving images represent a past action in the present tense, offering the possibility of further editing in the future. ON line narratives, as subatomic particles in the microscopic universe, can be simultaneously in more than one place. The ubiquity of the network permits multiple parallel screenings anywhere with an Internet connection.

Quantum Filmmaking marks the action of making video-collages in the present tense. The performative aspect of the role of the observer interacting with the OFF and ON line realms is highlighted during the process. This performativity duplicates the third region of time/space experience in Expanded Cinema devised by Le Grice (Curtis, 2008, p. 228), during the (im)material processes of production and reception. Over the course of the Physics of Narrative, observers transform electromagnetic waves of variable frequency from the visible to the invisible range of the light spectrum and vice versa. While filming with mobile phones, observers write the videos with light transforming the corpuscular photons into digital waveforms ready for either immediate reproduction through mobile handsets or for sending/uploading onto the Internet. When playing back the videos with the mobile phones received via Bluetooth or from a 3-4 G network, observers transform the invisible digital bits into visible light composing the pixelated moving images.

Quantum Filmmaking is the art of the fact. Collages created through this process are the documentary record, the trace of activities that have taken place in the virtual, private, and public realms. It is the cinema that transforms reality. During the Physics of Narrative, observers interact with the ON line realm through the live actions of filming, playing, sending, uploading, and editing videos. The performance of these activities transforms the reactive OFF line realm. The cause and effect process of production generates spontaneous choreography narratives. The intention is to merge art with everyday life through the practice of demystifying art, expanding it beyond the museum, the white cube, or the black box, making it accessible to everybody for art's sake. Thus, the method is promoting values such as creativity. It is an invitation to re-think daily life through the lens of the mobile phone and teleological collaboration. This process will eventually be reflected in society, with the possibility of transforming it.

Examples of these transformations are apparent during interventions in the public domain of *Kino-Present*. Observers receive fifteen-second video files on their mobile phones through Bluetooth, thus creating ephemeral multi-screen mobile cinemas. In *Now&Here=Everywhere*, observers perform in a present continuous action of filming with their mobile phones, framing and recording a part of their reality. They collapse all the possible angles of this reality into one single thirty-second take, thus creating situations and choreographies in their everyday lives. During these actions, there is an element of surprise or chance relation. This element engages people in the immediate environment that may not be aware of the project. A set of unpredictable

relations and encounters are created. (See for example, videos shot in Balham and Clapham [London] in *Moment 7*).

During the live mechanics of production, mobile phones become performative tools. Their size and lightness enable the performance of all kinds of camera movements in the realm of everyday life where the private becomes public and the local turns global. The Physics of Narrative creates scattered, improvised choreographies occurring simultaneously in different cities across Planet Earth. Movements include panning left to right or right to left, tracking in and out, or tilting upside down. Other original camera actions are also involved, such as diagonal 360 degrees shots (as depicted in Spitalfields [London], *Moment 5B* of *Now&Here=Everywhere*, and the Marrakech video in *Moment 8*).

Quantum Filmmaking is the art of probabilities and possibilities where the artwork emerges organically. There is not a definite outcome, since the process varies and changes every time observers interact with it. As in Quantum Physics, these variations are unpredictable. In *Kino-Present*, the form of collages edited online depend on the wave-function or subjectivity of the observer who performs the editing. Conversely, with *Now&Here=Everywhere*, multi-screen collages are randomly generated, collapsing into one possibility every time observers log into or refresh the website. During each project's Physics of Narrative, there is a high degree of human and technological quantum indeterminacy. It is not possible to predict who or how many people will participate in the projects, what contributions they might make, and whether they will have technical knowledge *a priori*.

Video-collage is an indeterminate signifying system; it does not contain any meaning *a priori*. This feature challenges classical concepts of narrative inherited from literature, theatre, and traditional cinema. These ideas hold that a narrative is "a discourse ... made by someone" (Metz, 1974, p. 20). In other words, there needs to be a pre-determined story, with a beginning and end, told by an omniscient narrator.

Video-collage narrative moves beyond the chronological dichotomy between linear and non-linear narrative established through the classical perspectives of literature and theatre. The participatory single-screen collages created in *Kino-Present* are time-based, but they are not chronological since there is not an exposition of events. There is a beginning and an end, a before and an after. However, because the different collated fragments are unrelated, the most significant time paradigm is now which is a continuous fluctuation of the present tense becoming past where the future coexists in superposition. There is the possibility of observers re-editing the video-clips online at any stage. The temporality of reception is relative and depends upon the subjectivity of observers because the narrative is composed while experiencing the process. Therefore, although this happens in the present continuous, if the nature of the video-collage demands a complex set of associations, the narrative may unfold in the past tense through the future tense of the screening time. Meaning thus arises from the dialogue or collision between different segments, where "the spectator (presence) becomes implicated in the unfolding (encounter) and becomes part of the development of the work in a unique time" (Le Grice, as cited in Rees et al., 2011, p. 169).

Subsequently, the taxonomy established from single-screen collages produced in *Kino-Present*, can be classified through the observer's intellectual and/or emotional response to them. The temporality of reception depends upon the perceptual or cognitive response and action of the observer. The former takes place in the present tense, whereas the latter requires further intellectual activity. Consequently, it takes place in the immediate future after the first impression, and paradoxically in the past tense depending on the projection of new fragments. Intellectual or conceptual video-collage narratives are those where meaning arises from the juxtaposition of different shots (following Lev Kuleshov's formula [1922], later adopted by Sergei Eisenstein [Bordwell, 1993]). This type of narrative is generated through written text in the montage. It enables observers to make their own sense out of the potential gap between images represented and the signified of the text. This feature depends upon the *a priori* knowledge of the observer because the text may be written in different languages unknown to them.

These collages can also be phenomenological or synesthetic narratives experienced as visual music by the observers. Moreover, every observer has a different reading or experience.

Semantically, the narrative unfolds by contrasting the perception of visual signs with the models stored in the mental schemata of the observers. These vary depending on the cultural backgrounds of observers (Bordwell, 1989). This idea is derived from William James' concept of apperception (1890). He argued that incoming ideas or sensations are apperceived by the ideas already stored in the mind. There are three qualities determining this association, "RESEMBLANCE, CONTIGUITY in time or place, and CAUSE and EFFECT" *sic*. (Hume, 1739, p. 16).

The association of different collaged fragments carry a network of connotations that function as metaphor and metonymy. Observers interpret this through narrativity or mythopoesis, drawing from the inherent faculty of humans to generate myth. Giambattista Vico first devised this mechanism while writing *The New Science* (1725) where he coined the term Sapienzia Poetica or Poetic Wisdom. Vico, analysing primitive human beings, recognised an innate poetic faculty inherent to human cognition. He claimed, "Being ignorant of all things, the first people were amazed by everything. In them, poetry began as literally divine" (Vico, 2001, p. 145).

Quantum Film Theory argues that indeterminate multiple narrative fields co-existing through superposition in a video-collage collapse during the Physics of Narrative into one reading and/or experience. This associative process is a consequence of the interpretation of observers. Quantum narrative is rendered through an encounter between all possible interpretations that the video-collage can generate, with the scope of interpretations that the subjectivity of an observer can decode (reception). This process will affect the wave functions of the video-collage and the observer. The narrative experience of video-collage would be different if it were watched at home in a computer, through a mobile phone on the street, or projected onto a screen in a public space. Quantum narratives are chance narratives because of the aleatory combination of these factors. The following formula synthesises this proposition:

$$\{ \Psi \text{ video-collage} + \Psi \text{ observer} \} + \Psi \text{ circumstances} = \text{Quantum Narrative}$$

Multi-screen collages from *Now&Here=Everywhere* re-create simultaneous moments every time observers log into or refresh the website. Just like the quantum universe, all possible configurations coexist in superposition, collapsing into one option when interacting with the observer. Observers have a different narrative experience every time they interact with the project. The random composition of the video-collage, the speed of the computer, and the bandwidth of the Internet connection conditions the freedom to choose where to focus their attention. These factors establish the tempo of narrative rhythm. When Broadband is fast, videos open at the same time to provide a homogeneous experience. When Broadband is slow, they open randomly and rhythmically, playing and pausing out of sync. Sound plays a significant role in the project, blending and collating the sometimes-antagonistic micro-narratives of each moment. The whole narrative experience is a synergy of effort greater than the sum of individual contributions.

Quantum Filmmaking aims to introduce the eutopian discourse of Quantum Physics into society, raising participatory and creative awareness of the potential for mobile technologies. It is possible to use mobile social media in a truly democratic system legislated by citizens through referenda. Projects are promoting values such as creativity and collaboration while emphasizing the agency of observers to transform society. This is an epoch where the ethical problems of Neoliberal economic structures have already started awakening a growing section of the population from delusional dreams fed through mainstream media.

Technology and media began to permeate society in the late 1960s when television acquired value and social status as a “live” medium. This was particularly apparent during the broadcast of the Apollo 11 landing on the moon (White, 2010, p. 93). Nowadays, the technological evolution of mobile social media and the standardization of these tools in the daily life of post-industrial societies have produced a synthesis of technology, media, and culture. It has provoked a socio-cultural paradigm shift, subverting the unidirectional ideological ontology of the mass media and the cinematic apparatus. Audiences for traditional cinema now have the potential to access the tools of film production, distribution, and exhibition in an instant – anytime and anywhere. This paradigm shift has fostered audiences’ creative and critical approach to reality. It leads us to conclude that if Expanded Cinema in the 1960-70s intended to expand consciousness, Quantum Filmmaking stresses the agency of contemporary observers and cinema to transform society.

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The Journal of Creative Technologies (JCT)

<https://ctechjournal.aut.ac.nz>

ISSN: 2230-2115

Colab, Auckland University of Technology, New Zealand

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JCT is a research communication platform published by Colab at the Faculty of Design and Creative Technologies, Auckland University of Technology.