

Memory (Enhancement) and Cinema: an exploratory creative overview

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Abstract

What is the relationship between memory and cinema? What are the links between memory enhancement and cinema?

Several authors have been trying to answer the first question. Their approaches varied from the relationship between 'memory and imagination' (Lefebvre), to the 'puzzled plots' and identity construction (Buckland) and to the 'flashback technique as a visual tool of what it must be like to remember (Kilbourn). On the other hand the second question is a challenge. The discussion on memory and cognitive enhancement is a current hype under the investigation of several multidisciplinary research groups worldwide.

On this paper and presentation we will depart our overview from the established understanding of the intertwined relationships between memory and cinema and the important role of the viewer towards a reflexion on the possible role of movies in the current debate on memory enhancement. We will use our artistic methodologies and projects alongside with many feature films as examples to explore some possible scenarios on the complexities of the representation of memory, remembering and forgetting.

Keywords

Memory, Cinema, Art, Flashback, Science fiction.

Introduction

Memory has been a recurrent theme in the movies. Cinema allows us to play with perception and visual paradox, being extremely realistic or absolutely fictional. Cinema proposes images that articulate in a differing way several times and places, establishing a dialogical relationship with the past and memory. Memory articulated by the movies presents a recovery of events from past in a temporal flux commanded by the present submitting the past to an enduring re-signification. Movies have a role in depicting, constructing and reflecting public opinion and therefore may be a tool to analyse and entice dialogue about memory and its enhancement.

Memory and the Media

Memory is a complex construction, a biological phenomenon rooted in the senses, that begins with perception and actively utilizes many areas of the brain to reassemble a thought into a coherent whole. When a person rides a bicycle, for example, the memory of how to ride it comes from one set of brain cells, the memory of how to get from here to the end of the block comes from another, and the memory of cycle safety rules from another. We are never consciously aware of these separate mental experiences, nor that they are coming from different parts of the brain, because they work together so well. In fact, experts say there is no firm distinction between how we remember and how we think.

Human memory is complex, fragile and defines our individuality. We mentally store our experiences and knowledge of the world as memories. However, memories are easily forgotten, and the retrieval of memories, through the act of remembering, is inexact and faulty. Human societies have produced a series of devices for storing memory in external formats. These have evolved from bone implements, clay, wax and stone tablets, carved stones, and later, maps, drawings, phonographs, photographs, film and other recording technologies, to the computer and cell phones. The intensification of the use of media in our daily life has prompted a series of fears on the loss or subversion of human memory and Andreas Huyssen confirms the critical worries by asking

"Could it be that the surfeit of memory in this media-saturated culture creates such overload that the memory system itself is in constant danger of imploding, thus triggering the fear of forgetting?" (Huyssen 2000, 27-8)

With the use of photography, film and other recording devices and image construction technologies the idea of external/artificial memory has been further discussed and led to the development of many different related theories. There is a shift in the meaning of memory mediated by technological innovations and the proliferation of an image based world. Merlin Donald,

instead of defending a perspective of technology as a numbing device system comments on the relationship between the external memory supporters and the evolution of our biological mind works and natural memory. He claims that,

“external memory has introduced new properties into the collective storage and retrieval systems of humans (...) the role of biological working memory has been changed by the heavy use of external memory”. (Donald 1997, 737-791)

Each of these external devices and technologies offers an increasing capacity for the storage of memory acting as an ever more efficient prop and metaphor for human memory modelling our neurological networks. Recent neurological research (Kandel, 2006) has shown that our brains are not hard wired but present a plasticity that allows the formation of new synapses according to the experience of new situations. As Andy Clark asserts

“our behaviour is often sculpted and sequenced by a special class of complex external structures: the linguistic and cultural artefacts that structure modern life, including maps, texts, and written plans.”(Clark 1998, 53).

We wonder how may cinema and art appropriating cinema (image1) be considered an external memory structure.



Image 1 – SO PRETTY. Paulo Bernardino Bastos + Maria Manuela Lopes, Installation view Room 325, London Ontario, Canada, 2003.

Cinema as a privilege medium to construct memory

Cinema relying on its capacity to play with time and images has the property of exploring with memory. A number of science fiction films since the 1980s have introduced this subject successfully, depicting the relationship of memory, time and technology and the succeeding creation of artificial memories, their connection with real memories as well as the implications for personal identity.

As Susannah Radstone has argued in *Memory and Methodology* in relation to science fiction films

“the subject of memory has become a recurrent narrative theme(...) science’s potential challenge to memory’s place in the constitution of identity’s essence has been raised.” (Radstone 2000, 82)

Films such as *Blade Runner* (1982), *Total Recall* (1990), *Strange Days* (1995) or *The Final Cut* (2004) examine links between film, identity and artificial memories. These films directly address the threshold of reality and fiction; memory from first hand experience or a construction from another mediated memory. They present futuristic scenarios where the artificial memory is the everyday reality undistinguishable from another sensual experience; a world where fantasy, expectation, imagination and dream may be exchanged in a silicon ship, erased, transformed, implanted and of course a marketable commodity.

Memory is not just private but a socially embedded action and is mediated and manipulated by different technologies and media. Thus, the different techniques that make memories reproducible and transportable in space and time become an analogy for ‘prosthetic memories’ (Landsberg term). They are memory aids that translate the experience of memory into a new form. In his book *Metaphors of Memory: a History of Ideas About the Mind*, Douwe Draaisma examines the different memory supports that have been used throughout the years and discusses the concept of artificial memories.

“These artificial memories have not only supported, relieved and occasionally replaced natural memory, but they have also shaped our views of remembering and forgetting. Over the centuries memory aids provided the terms and concepts with which we have reflected on our own memory.” (Draaisma 2000, 3)

If in one hand, photography appeared as a great memory supporter offering a permanent record of our visual experience, on the other hand, film, extends temporal duration; and its form and style along with the aid of montage ensures a more flexible and fragmented representation of the self and experience that seems to depict more successfully the fluidity of memories. Cinema’s representational techniques share many similarities with the way memory works¹, externalizing

¹ Film has the ability to depict flashes of memory, since linear time progression can be suspended and the action can jump back and forth approximating the mental function of memory and projecting it onto the screen.

interior mental states and functions. One of the most popular science fiction examples that emphasize the connection between images and memories, introducing the importance of photographs as proof of past and memory trace, is *Blade Runner* (Ridley Scott, 1982).

Science has used cinema as a metaphor to explain the way that memories are stored in the human brain. Neurobiologist António Damásio speaks of a 'movie-in-the-brain', using the term metaphorically: as if the brain was a camera, a screen, a filmed production and a moviegoer (Damásio 1999, 11). Thus, it is evident that film has a close link to memory and its workings. The hippocampus (a brain structure that is densely interconnected with any part of the neo-cortex, thus allowing information to migrate between zones) is responsible for memory consolidation; neuropsychologist Belinda Nunes (2008) proposes that one function of the hippocampus is as an 'editing suite' that allows a recreation of the global representation of events. In her view events are relived and re-enacted, thus transforming memories and their expression in time and adjusting the distance to the present moment.

Flashbacks and Amnesia

Cinema has developed a particularly compelling technique for the representation of memory, visualizing what it must be like to remember in the form of the 'flashback' – the externalization of the private act of remembering. Russell Kilbourn, in *Cinema, Memory, Modernity: The Representation of Memory from the Art Film to Transnational Cinema* (2012) compares the flashback in distinct film styles and claims that memory has been 'de-ontologized,' by which he means that it is now primarily artificially, constructed by media such as cinema (i.e. cinematic memory). He invokes ideas of cinema as 'prosthetic memory', whereby film images become an extension of an individual's personal memories. Arguing for connections of involuntary memory and film, he uses Marcel Proust's idea of the madeleine image expanded into an intertextual reading of films such as *Vertigo* (1958), *La Jetée* (1962), and Tarkovsky's *The Mirror* (1975), exploring connections between the use of the female body and their past representation. The Brazilian movie *City of God* (2002) is considered a reflection on memory or 'film as memory' (2012, 216), in using specific codes and vocabulary of flashback (e.g. rapid editing, free ranging camera movement and simultaneous differing of lens focal length) and intertextuality.

Kilbourn explores the links between trauma, repetition and memory using *Eternal Sunshine of the Spotless Mind* (2004), which we will explore further later, with the

flashback scenes into the main characters vanished memories as symbol for a nostalgic re presentation of the past.

Other genres of modernist 'art cinema', such as Ingmar Bergman *Cries and Whispers* (1972) or Alain Resnais *Last Year at Marienbad* (1961) also use masterly the techniques of flashback to depict a relationship between present and past or between mental associations and psychological meaning or significance of past events for the different characters. In both films the cuts between sections the use of sound and the pauses, also contribute to the construction of simultaneous monologues and psychological time travel resulting in complex and ambiguous films exploring the confusion between remembrance and imagination, and the intricate nature of memory, its constructedness and implications on the self identity.

It is not the aim of this paper to reflect on the ontological status of the images presented. Our overview intends only to drive attention to examples of links between memory functioning and cinema. In *Dark City* (1998), a recurrent visual motif (i.e. spiral) triggers the protagonist's presumably original memories and past, which appear as a flash. Other fiction films such as *Robocop* (1987), *The Manchurian Candidate* (2004) and *Cypher* (2002), also use flashback to allude to past memories that have been wiped off via various means.

Other examples of memory addressed directly in film:

Akira Kurosawa's *Ikiru* (1952) and *Rashomon* (1950) construct the main character slowly by either the narrative of the friends memory on the main character funeral, or by the memory of witnesses of a crime (including the death person via a transmedium), enrolling the viewer in an active role of their own self-constructed version of each story.

Other movies such as *Memento* (2000) or *Mulholland Drive* (2001) present their main character without an ordinary sense of memory lacking notions of the context or identity placing the audience in a privilege position of knowing a bit more than those characters but not enough to understand the plot before the movie develops. Other examples of movies describing memory could be: *D.A.R.Y.L.* (1985); *The Long Day Closes* (1992); *The Hangover* (2009) or *Trance* (2013).

The loss of memory and other cognitive functions through pathologies such as Alzheimer's disease or Dementia are the main subject in several other movies such as: *Iris: A Memoir of Iris Murdoch* (2001), *Firefly Dreams* (2001), *Son of the Bride* (2001), *The Notebook*

(2004), *Aurora Borealis* (2005), *The Savages* (2007), *Away From Her* (2007), *Cortex* (2008), *Nedar* (2008) *Pandora's Box* (2008) and *A Separation* (2011)². But if in all these movies the characters lose their memories unwittingly a different version of a possible restart and a new identity is portrayed in *Eternal Sunshine of the Spotless Mind* (2004) and *Inception* (2010) in which the surreal aspects of memory, dream and imagination are merged. The protagonists of *Eternal Sunshine* decide to erase the memories of a failed love relationship but during the erasure process (sleeping), the male protagonist experiences a dream with his girlfriend that messes up the brainwashing process. In *Inception* a corporate thief sets out on an impossible mission: to plant an idea in another person's subconscious through a dream, a thing referred to as "inception."

We all instinctively feel that to lose our memory is to lose ourselves, a prospect that stirs audiences with mixed feelings. The majority of amnesic characters in films bear little relation to any neurological or psychiatric realities of memory loss attributing their loss of memory to a psychological condition that may be re-established to normality. Although playing in less scientific analyses of the pathologies movies have an informative role and construct and reflect public opinion. Considering the loss of specific kinds of memory (usual autobiographical one) alongside with the possibility of other faculties' remaining more or less intact, memory-lessness is portrayed in some films as a fresh start.

Examples of people getting a second chance or a repetition in life may be encountered in movies such as *Groundhog Day* (1993), *Sliding Doors* (1998), *Twice Upon a Yesterday* (1998), *Me Myself I* (1999), the trilogy of *Back to the Future* (1985; 1989; 1990) and the more recent *Midnight in Paris* (2011). Traveling in time or repeating time deals with the ambiguity of our feelings toward our memories by using memory loss or repetition as metaphor. In *50 First Dates* (2004), for example, the hero played by Adam Sandler is a womanizer who lives in Hawaii and dates only tourists, which he always quickly forgets. He falls in love with a girl that has real amnesia due to a car accident and he experiences a bit of his own poison being constantly forgotten by the person he loves. In *After Life* (1998), by the Japanese director Hirokazu Koreeda, the plot consists of a vast, Japanese-style bureaucracy in which the newly dead have to be processed by civil servants in the task of choosing their life's happiest memory. The

ones that plead amnesia and cannot decide became trapped in time guiding others in their memory choice.

Amnesia has been a plot device, and a means of generating some laughs without any deeper significance and it is used even in children's movies such as *Finding Nemo* (2003). *Memento* (2000) is considered an exception once it deals with amnesia as a subject and a tool, exploring its complexities (remembering and telling the story) in two simultaneous directions, both in reverse and chronologically. In it, a man with anterograde amnesia (Guy Pearce) is not able to store new memories, and thus uses tattoos, notes and Polaroid's to give himself bits and pieces of his dark, complex reality in chasing his wife murderer. The story is told backwards, each scene taking place *before* the last, allowing the audience to know more than the hero but still feeling equally lost.

Memory holds on to feeling so without it there would be no Hero's, guilty ones, no moral, ethics or revenge. On a contrasting note and approaching Nicholas Agar (2014) position, an enhancement of memory could result in an enrichment of human values. Atom Egoyan explores this in *Ararat* (2002) by telling in fiction the story of the Armenian genocide in Turkey in 1915, exploring scenes from the actual massacre as background images. Reflecting on memory altering as a result of moral information is addressed in Alejandro Amenábar's *Open Your Eyes* (1997) — later remade as *Vanilla Sky* (2001). In this film the moral implications of memory are much serious and much further explored than in *50 First Dates*, although still leaving some of the main questions it rises unsolved

An idea of memory revision is successfully depicted in *Solaris*, both the Tarkovsky original (1972) and the American remake (2002). In the film Dr. Kelvin, during his stay at the space station orbiting the planet Solaris, has regular visits from replicas of his dead wife, who materializes due to the memories he has of her. His encounters with his memories make him rethink his remembrance and re-evaluate the circumstances in which they were created deciding to reform them retrying proximity with his wife. The suggestion that memories can be shaped by the present experiences even of a mediated version of them questions their construction structure and emphasizes the link with imagination.

Memory Imagination and Perception

The *Final Cut* (2004) takes place in a future society when biomedicine and nanotechnologies allow the surgical placement of a biochip in the brain of unborn fetuses to perform the recording of all human audio-

² This genre is so recent and necessary that the authors are currently editing another paper devoted exclusively to the representation of Dementia in the movies.

visual perception. Hackman, the memory editor (the main character), always thought that he knew what happened during a traumatic childhood event, but by re-experiencing the event itself through the video images he realizes that he had a deceiving idea of an image which proved not to be real. He had filled in the gaps with his imagination, and mistakenly remembered a spill of red paint as a pool of blood that made him believe many years that his childhood friend had died.

The above theories and films offer different approaches to memory, though all recognize that memories are mediated through representations and that imagination comes to fill in the gaps in order for us to create a coherent meaning. According to Nunes (2008) in normal circumstances, the process of memory reassembly is similar to an editing process, in which each registered fragment must be inserted in a coherent narrative built from those fragments. This is usually interpreted as a sense of self-identity. Nunes (2008) explains that we have evolved to generate stories with a beginning, middle and an end, which provide a consistent sense of self. When the information necessary to evoke a certain event is missing, we establish connections with other areas of the brain that hold similar archived information, and use it to fill the gaps in order to provide a cohesive narrative.

Thus imagination plays a role in the creation of memories for most people. In the end of the XIX century Henry Bergson (1990), wrote the now seminal book *Matter and Memory*, in which he defines both our body and the universe as a group of images. Bergson elaborates a theory on the workings of memory, understanding it as processing of information by synapses and neuronal networks of the brain. Several times Bergson employs the figure of light and darkness, as a metaphor for a cinematic experience. Accordingly "pure memory is a virtuality, which resides in 'darkness'; memory can be realised only in the 'light' of an image; in becoming materialised, memory follows a 'continuous progress (...) from darkness into light.'"(1990,106) While pure memory is theoretically independent, it "manifests itself (...) only in the *coloured* and *living* image which reveals it."(1990,107). As Marcel Proust, in his seven books novel *A La Recherche du Temps Perdu*, when sensually and synesthetically describing the experience of involuntary memory events, Bergson uses figures of light, heat, space and life action. Alain Resnais in his movie *My American Uncle*, (1980) recognizes Bergson ideas by introducing dialogues claiming that 'the brain is not purposed to think but to act' or even a 'living being is a memory with action'.

French philosopher Martin Lefebvre (1999) extends the idea that the field of images (photography, cinema, television) transports the direction of the imagination towards the vision apparatuses. For him

"memoria is not a simple transposition or even duplication of 'things' or 'words,' which might then engrave themselves, unchanged, in one's mind; rather, it results from a process of *appropriation* and *integration* which is simultaneously *symbolic* and *imaginary*."(1999, 479)

So the role of the cinema spectator relies on a 'symbolic process' resulting from an interaction between the film and the memory and his/her imagination.

He claims that the viewer does not try

"actively to memorize what he is watching by means of a consciously constructed mnemonic device, but rather that what he retains from a film, what makes an *impression* on him while leaving a trace in the 'soft wax' of his memory, implies equally the work of the imagination and the creation of a *memoria* or as I call it, a figure. The figure corresponds to that which the spectator and, by extension, to what a culture retains from a film."(Bergson 1999, 479)

Following this lead we will now consider the mutual cultural power of film and the role of the spectator's imagination. Robert Burgoyne (2003) argues that some films like *Forrest Gump* (1994) can create national myths, excluding the histories and experiences of minorities and counterculture in an effort to separate cultural memory from public history, promoting a cinematically improved and virtual image of the nation.

So, if memories of events or cinema are all part of the same cultural network and our memories are dependent on electronic records and data and their preservation is crucial for the conservation of these memories, remembrance is threatened by oblivion in case this technology breaks down. Chris Marker in *San Soleil* refers to this interdependence on the level of his own autobiographical memory claiming " I can only remember what I record in film" (1983).

Total Recall, a 1990 sci-fi classic, successfully depicts various opposing ideas around preservation of memory in digital format and artificial memories. Arnold Schwarzenegger (Quaid) is a construction worker who buys implanted memories of a vacation to Mars; the procedure backfires and he discovers that he's already

been there, and had those experiences of an entire life on the red planet wiped out his memory. Alison Landsberg commenting on this technological permeation writes,

“In *Total Recall* the proliferation of mediated images – and of video screens – forces us to question the very notion of an authentic or an originary presence.” (Landsberg 2004, 243)

Quaid’s meets his double or his real (before) me in a mediated video he recorded to a future self. As Landsberg (1995) argues these ‘prosthetic’³ memories can prove valid and enable the individual to react, as in the case of Quaid of *Total Recall* or the main character or *Oblivion* (2013) in which the Hero decides to believe in recordings of himself from the past and fixes what the present/past him has done wrong.

Alison Landsberg (2004) suggests that prosthetic memories mediated through cinema have the ability to produce empathy and social responsibility forging previously unnoticed alliances. Landsberg feels that technology empowers the individual, however Kilbourn argues that such an empowerment would have to “entail a mode of technical mediation beyond the capacities of conventional cinema” that recognizes that the full spectrum of human psycho-emotional experience is determined primarily through the visual senses. Kilbourn claims that

“In the twenty-first century, cinema’s role vis-à-vis memory continues to provide us with the means to remember, even as the commodified content of much popular cinema militates against this very process” (Kilbourn 2012, 227)

concluding that memory today has become harder to define through cinema.

Susana Radstone (2010) in tandem with Kilbourn’s view, contests the passivity of the spectator considering Landsberg vision as an implant. Radstone argues that Landsberg’s vision builds on a “view that cinema can implant memories of the inexperienced, or reprogram existing memories.” (Radstone 2010, 335) and suggests a different approach that she calls ‘cinema/memory’ taking into account the inner worlds of spectators to demonstrate that personal memories are informed by cinema. The cinema/memory expands and revises

³ Alison Landsberg coins the term ‘prosthetic memories’ explaining that ‘Through watching films and television, by visiting experiential museums, and perhaps by entering virtual worlds on the Internet, people can and do take on prosthetic memories.’ (Landsberg, 2004: 48)

Landsberg’s idea of the prosthetic memory by proposing a mutual influence between film and memory. Introducing the idea of mutual influence we are driven to reflect on the subject of memory enhancement.

Enhancement and Cinema

According to Vincent Clark and Raja Parasuraman (2014), Humans have long used several cognitive enhancement methods to expand the competence and range of the various mental activities we perform.

“Neuroenhancement describes the use of neuroscience-based techniques for enhancing cognitive function by acting directly on the human brain and nervous system, altering its properties to increase performance (...) This includes transcranial electromagnetic stimulation methods, such as transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS), along with deep brain stimulation, neurofeedback, behavioral training techniques, and these and other techniques in conjunction with neuroimaging. (Clark and Parasuraman 2014, 889)

The methods described above and others described by Eduard deBono Foundation,⁴ such as lateral thinking or creativity, or many well know smart drugs promoted by pharmaceutical companies and advertisements can be used to improve perception, attention, memory, creativity and other forms of cognition or reduce the costs and duration of treatment in mental innless patients.

In this view neuroenhancement implies operating directly on our nervous systems, to improve our cognitive function and increase our capabilities. Clark and Parasuraman in a recent scientific review on the subject conclude that we are living in a period where scientific research has provided theories and methods to transform our dreams in reality.

On his recent insightful paper on a movie on neuroenhancement (*Limitless*) Hub Zwart (2014), resumes the scholarly debate around the themes of neuroenhancement referring post-humanism, bio-conservatism and the work of Peter Sloterdijk as the most important examples. Zwart claims that until recently the debate was polarized between the authors in favour of a complete technological remake of our human capacities (trans and post humanists), such as Bostrom⁵ (2005) and Bostrom and Sandberg⁶ (2009)

⁴ <http://edwarddebonofoundation.com/>

⁵ Bostrom, N. 2005. In defence of posthuman dignity. *Bioethics* 19(3): 202–214.PubMedCrossRef

and the opposed defenders of the natural evolution (bio conservatives) such as Habermas⁷ (2003) and Kass⁸ (2003). Zwart also refers to the nearly documental position of Outram⁹ (2010, 2011) on the actual situation of the occasional consumption of enhancing 'smart drugs' mostly by students (such as ritalin, methylphenidate and modafinil). He calls attention to Francis Fukuyama¹⁰ (2002) concerned evaluation of the possible alterations of the brain as matter and the human personality by the intake of the future genomically targeted neuropharmaceutics. This position echoes Brem et al. (2014, mentioned in Clark and Parasuraman, 2014) suggestion that cognitive enhancements might also come with some costs, leading to broader, long lasting changes in cognition and brain physiology. Boutang (2007, cited in Zwart paper) draws attention to still another concern, the exploitation of brains by the frensic capitalistic society. Peter Sloterdijk¹¹ (2009, cited in Zwart 2014) places the debate in a different platform considering the will to self enhance as typically humane condition and analyses this history of 'self-improvement' in a broader historical perspective extending Nietzsche and Foucault's views on our dependence of self improvement. In line with his review of Sloterdijk' self-enhancement as human trait Zwart calls attention to our neurological plasticity and the way our brain networks are "sculpted by our socio-technical environments. Zwart also draws attention to skills achieved by rigorous training schemes or by the use of substances that affect mood, libido and level of arousal.

For us these ideas echoes in the scripts of movies such as *Kids in the Hall: Brain Candy* (1996), in which a happiness drug called Gleemonix that keeps you in a blissful state is developed and massively sold by a pharmacistical company. Problems start when the people who had taken part in its early trials start to

become catatonic. The movie is a bit *non sense* but runs alongside *Eternal Sunshine* or *After Life* allowing a progress from the paradise of no memories or only good memories to the richness of experience in life and the need we have of depression to surpass difficulties and self-improve (enhance). Nicholas Agar in his recent MIT book *Truly Human Enhancement: A Philosophical Defense of Limits* also refers to a 1965 movie¹² (we have not had the chance to see yet) where Aliens wipe off bad memories and negative feelings from certain Humans in order to subject them to a happy mood (a docile body in Foucault's words) and make them more cooperative. Agar, according to Fleck review (2014) uses this example to critique our desire for a 'radical enhancement'. A 'risky radical enhancement' is also what is presented as a plot of another movie we would like to bring into the scene - *Limitless* (2011).

Limitless is a 2011 movie based on a novel (published in 2001) about chemical neuroenhancement. The plot is around a tormented author who becomes an early user of an experimental designer drug (NZT), which makes him very mentally sharp. The amazing drug makes the writer highly productive overnight and even allows him to make a fortune on the stock market. The film is rich in visual strategies to depict the cognitive changes the main character undergoes. As Eddie (the writer and main character) experiments an altered perception of time and space, the scenarios, clothes, speed of movement and camera framing is also reformed and the spectator feels an 'enhanced' version of the film is at reach. As the side-effects become increasingly noticeable the plot guests more intricate and the audience experiments mixed feelings of excitant, hope and censure of the advantages achieved by the use of an non FDA approved drug, on the veracity of the story and the addiction problem. The movie is apparently straightforward but at a second look one finds the numerous metaphors for memory (as a upgradable computer), for the pharmaceutical industry and the seemingly Foucaultian structure of vigilance and control we all leave in (who's is controlling who and what) and even further on our contemporary understanding of navigation through maps, the city, perception and through a virtual world with no walls or matter (i.e. the internet or the stokmarket). As Zwart asserts

"Limitless the movie and Limitless the novel provide an interesting window into the various issues raised by cognitive enhancement. Not only because they make these issues accessible and tangible for broader audiences of non-experts in a lively and entertaining

⁶ Bostrom, N., and A. Sandberg. 2009. Cognitive enhancement: Methods, ethics, regulatory challenges. *Science and Engineering Ethics* 15(3): 311–341. [PubMedCrossRef](#)

⁷ Habermas, J. 2003. *The future of human nature*. Cambridge: Polity Press.

⁸ Kass, L. 2003. *Life, liberty, and the defense of dignity: The challenge for bioethics*. San Francisco: Encounter Books.

⁹ Outram, S.M. 2011. Ethical considerations in the framing of the cognitive enhancement debate. *Neuroethics* 5(2): 173–184. [CrossRef](#) and Outram, S.M. 2010. The use of methylphenidate among students: The future of enhancement? *Journal of Medical Ethics* 36: 198–202. [PubMedCrossRef](#)

¹⁰ Fukuyama, Francis 2002. *Our Post human Future: Consequences of the Biotechnology Revolution*. Farrar, Straus and Giroux.

¹¹ Sloterdijk, P. 2009. *Du musst dein Leben ändern*. Über Anthropotechnik. Frankfurt: Suhrkamp.

¹² the movie Agar refers to is *Invasion of the Body Snatchers*.

fashion, but even more so because (...) they open up important dimensions that allow us to add some extra depth to the philosophical and bioethical debates that have evolved so far.” (Zwart 2014)

Gattaca is a 1997 science fiction film that presents a ‘biopunk’ vision of a future society driven by eugenics where ‘enhanced’ children are conceived through genetic manipulation to ensure they possess the best hereditary traits of their parents. Vincent Freeman, the main character, was conceived naturally (outside the eugenics program) and struggles to overcome its ‘normality’ and genetic discrimination to realize his dream of traveling into space. In *Gattaca* although a genetic enhanced version of the society is presented, characters continually battle and compete both with society and with themselves to find their place in the world and their function according to their genetic determination. This movie presents a critique on the possible norm and the ‘choices’ given to people on the bio-enhancement. Although the humans in this film could be genetically superior the movie does not present a prosthetic solution for body damage or and easy fix for alcohol addiction or higher moral values.

Of a different nature and worth mentioning in this overview for its promise of another line of comment on a fictional future, is the prospective *Vincenzo Natali* film *Neuromancer* (2014?) based on the adaptation of William Gibson's classic 1984 novel "Neuromancer", a source of inspiration for the genre of 'cyberpunk' and subsequent themed films from *Johnny Mnemonic*, *Strange Days*, and to *The Matrix* trilogy.

Two more examples, of non-feature films but addressing this theme, are *Mnemophrenia*¹³ (2012 – 2014) and *Fixed* (2013) documentary.

Mnemophrenia was originally conceived as part of a PhD in film by Erini K.. According to her internet page *Mnemophrenia* is “a three-year project: a feature film anthology of three intertwining and interlinked short stories - one filmed per year - that explore the rise of a new (fictional) mental condition called 'mnemophrenia'. Linked to - and suspected to be caused by - a technological breakthrough in virtual reality films, the condition renders some people unable to distinguish artificial memories from real ones.” This film happens in a utopian future where feelings and moral values may

¹³ “Mnemophrenia: The Beginning, Total Cinema and Homo Mnemonicus are designed to exist as standalone short stories with their own cast and a distinctive look and feel. When all the parts are completed, they will mix to form a fourth film: feature-length, connecting and completing the ideas born in the three shorts.” In <http://www.eirinik.com/Mnemophrenia>

be downloaded and the new humans may be enhanced.

Fixed: The Science/Fiction of Human Enhancement (2013) is a documentary that uses a mixture of cinema verité, archival and interview footage, and dance, challenging notions of normal, the body and what it means to be human in the 21st century when prosthetic people perform better and faster than ‘normal’ ones, cosmetic surgery resculpts the body daily and ‘smart drugs’ are becoming recurrent in school and work competition. Heightening the issues and revealing the social tensions that underlie these emerging technologies, such as neural implants and bionic limbs, *Fixed* questions human perfection examining the possibilities for improving the human body.

Conclusion

In our time based installation work we take in consideration several elements that account for our identities: durations as the flux of change, memory as our acknowledgment of time and duration, and the sense of continuity from past, present and future from which our awareness is constructed, as well as the current debates and fictional worlds presented in this speculative overview.



Image 2 – CAGE SSI. Maria Manuela Lopes col. Alexandre do Carmo, Installation view Pavilhão do Conhecimento, Lisbon, 2008.

Cinema, as well as fine arts (image 2), may and should contribute to fuel the debate on cognitive and memory enhancement extending the public interest beyond the existing scientific research on bionic limbs or cosmetic surgery or speculations on the bio-ethical grammar, of permissions, policies or rules for research and on whether to and to what extent individuals will be allowed to make autonomous and informed choices (Zwart 2014), and how to minimize risks and harmful consequences.

If movies such as *Gattaca* address the enhancement issue from an historical fear of eugenics, and a documentary such as *Fixed* offers the promises of tested technological improvement of the body, films like mnemophrenic and limitless use the cinematic strategies of the 'puzzle plots' (Warren Buckland 2009) and the stylistic grammar of previous presented examples to mix entertainment, forms of addressing time and space perception, with some hints on philosophical issues such as what makes us human and unique.

Zwart (2014) concludes that cinema may play an important role in evaluating the implications of new technological developments as well as may use its freedom to provide possible scenarios for exploration of neuro-enhancement possibilities in a near future. In his own words "movies/novels such as Limitless can play a crucial role in "preparatory ethics", assessing fields of technology (such as cognitive enhancement) " that are in a pre-emptive stage. Steve Ramirez and Xu Liu, MIT neuroscientists, reflect in their TED talk,¹⁴ on the mutual influence between science fiction movies and scientific research and refer to their latest experiment as partially inspired by characters in some of the commented movies. Ramirez referred to his most recent study as "Project Inception" as homage to the film *Inception*. They both comment on several other movies and claim the movies to be a source of inspiring questions. The strength of cinema is, also a characteristic of memory, that the only limitation is the imagination.

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