Chapter 4
Film and the Medical Humanities: The 'Romantic Science' of Neurocinema

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Abstract Oliver Sacks and Alexander Luria advocated for 'a romantic science', a literary form at the intersection of fact and fable, which Sacks employed to introduce lay readers to the complexities of the brain, providing an excellent example of how the two cultures of science and humanities could be reconciled. This is the goal of the medical humanities, which emerged in recognition of the fact that medicine is an art just as much as it is a science. Here we argue there is a particular affinity between film and the brain that the medical humanities, which have hitherto mostly focused on literature, music and the fine arts, could fruitfully develop.

Keywords Neurocinema · Film and the brain · Medical humanities · Romantic science · Requiem

Oliver Sacks and Alexander Luria famously advocated for what they called a 'romantic science' (Sacks 1985 [2015], p. 184), a literary form operating at the intersection of fact and fable which Sacks employed in his vast oeuvre to introduce lay readers to the complexities of the brain, thus providing an excellent example of how the two cultures of science and humanities could be reconciled. This is ostensibly the goal of the medical humanities, which first emerged as an interdisciplinary field in the United Kingdom in the 1990s, in recognition of the fact that medicine is an art just as much as it is a science. In this context, we argue that there is a particular affinity between film and the brain that the medical humanities, which have hitherto mostly focused on literature, music and the fine arts,[1] could well fruitfully develop further. We first outline two ways in which film and medicine have been related within the medical humanities, namely, for pedagogical and theory

[1] Both visual arts and music are also used therapeutically, encouraging patients to engage in creative pursuits, particularly in psychiatry and in hospitals (Jordanova 2014, p. 43). It is not only consuming but also performing and producing the creative arts that relate medicine to the arts and humanities.

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A. de la Garza, C. Travis (eds.), *The STEAM Revolution*,
https://doi.org/10.1007/978-3-319-89818-6_4

development purposes, and outline a new paradigm, the biocultural, more concerned with physiological intervention. We then discuss memory, schizophrenia and hallucination in connection to film and illustrate these with a discussion of the film 'Requiem' by Alain Tanner (1998). We finish the chapter with concluding remarks.

Film and the Medical Humanities Project

Initially, the aim of the medical humanities was primarily the pursuit of educational goals, to restore to students 'many common-sense qualities of empathetic understanding that they come to lose in the course of medical training […] and which can be summarised as empathy, reflection and trust' (Greco 2013, p. 234), enacting in this way the logic of accountability that is often ascribed to interdisciplinarity (i.e. interdisciplinarity for social relevance and engagement). Narrative was crucial since fiction allows medical students 'to enter the worlds of their patients, if only imaginatively, and to see and interpret these worlds from the patients' point of view' (Whitehead 2014, p. 107). In the case of cinema, the evolution of ethical attitudes to medical dilemmas such as mercy killing and abortion can be seen on film, as well as depictions of illnesses and of medical practitioners, underscoring the changing regard in which societies have held their professions and eliciting discussion and reflexion. Coma, stroke, meningitis, encephalitis, multiple sclerosis, seizure and dementia are among the neurologic disorders that have been depicted on film. And the contention that 'the secret of being a good doctor is act[ing] like one' (Wijdicks 2015, p. 3) puts forward the performative dimension of the practice. Many have found in films elementary scripts to cue in action.

In addition, the medical humanities have sought to highlight the similarities between the medical epistemologies and the interpretive, hermeneutic ways of knowing that are traditional of the humanities, arguing that a practice 'is often at its most rational when it does not exclude subjectivity' (Greco 2013, p. 236). Theories traditionally employed in the humanities, such as postcolonial studies, have been innovatively deployed to account for the relations between patients and medical practitioners in a postmodern context characterised, as put by Monica Greco, by chronic rather than acute illness, in which patients lack a voice: 'Just as colonised peoples claim recognition of what their labour has contributed to the prosperity and civilisation of colonising powers, the ill are demanding […] that medicine recognise its need for them' (p. 235), not least through case history in clinical texts, and the calls for volunteers in randomised control trials, among others. By the same token, developments in film theory during the 1970s were informed by psychology and psychoanalysis, and later by cognitivism, and conversely the study of perception that is today the concern of neurology has been informed by the technology of film. It has been widely acknowledged that the models and metaphors employed by scientific theories to represent the phenomenon under study condition the scientific imagination and have important epistemological dimensions since they 'enable us to see aspects of reality that the metaphor's production helps to constitute',

narrowing the distance between science and the humanities since from this perspective 'both are affairs of the imagination' (Guldin 2016, pp. 12–14). The zoetrope[2] provided one of the first metaphors of the brain in order to theorise consciousness, considered discontinuous, a succession of separate sensations and images like those of the zoetrope that only resembled a flow on account of an illusion that connected them together, provided by the brain. Moreover, the technical and conceptual devices of cinema such as zooming, fading, dissolving, allusion and juxtaposition have been acknowledged to closely resemble the 'stream' of consciousness (Sacks 2017). Certain forms of brain malfunction such as seizures or migraine or the use of drugs lend credence to the view that consciousness is indeed discontinuous, since perception in such cases is experienced as a series of discrete moments. And because focusing on any given perception out of the thousands available is an active and selective process that depends on our memories and feelings—and thus highly subjective—an analogy between the perceiving subject and a film director seems pertinent: 'we are the directors of the film we are making, but we are its subjects too: every frame, every moment, is us, ours' (Sacks 2017).

Apart from the pedagogical and theory development applications of the medical humanities, a biocultural approach to cinema has recently emerged in which methods and tools from the laboratory are combined with materials and artworks from the arts. Functional magnetic resonance imaging (fMRI) and PET scans focusing on cortical activity have started mapping the network of brain parts that are activated when viewing narrative sequences on film (Young 2012, p. 108). Along with computerised neural modelling using networks of virtual neurons that organise themselves in response to a variety of stimuli and constraints, these techniques are today enabling the study of the physiological effects that watching films and nonnarrative moving images have on the brain, opening the possibility of their eventual use as treatment.[3] For as put by Torben Grodal, 'When we watch a film, our heart rhythms change, we sweat, and our muscles alternately tense and relax […] these bodily changes are linked to emotional reactions that also play a central role in memory, cognition and consciousness' (Grodal 2009, p. 4), on account of mirror neurons, which allow viewers to experience themselves an action viewed (Smith 2014, p. 34). In experiencing an emotion, a plethora of interconnected neuropsychological changes 'sweep through the brain and the body […] hormonal and neuro-chemical processes are integral in shaping affect' (Robertson 2014, p. 239). Indeed, because emotions are now not conceptualised as binary (i.e. as existing or not in a given time) but rather 'as a process which is dynamically shaped vis-à-vis environmental and internal factors' (Raz et al. 2013, p. 286), films, which unfold over time, provide the ideal means to empirically research the neural correlates of emotion and have

[2] A pre-film animation device that produces the illusion of motion by displaying a sequence of drawings or photographs showing motion in its progressive phases

[3] At the moment, however, these findings are being capitalised upon by the Hollywood film industry, which increasingly relies on fMRI techniques as opposed to the previously widely used focus groups, to monitor audience's reactions to specific scenes in films and indeed to whole films, for creative and marketing purposes (Randall 2011).

become the favourite method employed by researchers because they excel in capturing attention and triggering emotion.

Video has also been successfully employed for the support of (left) hemi-field extinction resulting from stroke, in which case patients lose all awareness of the existence of the left side of their bodies. With a camera and monitor both facing the patient, it is possible to turn the screen into a mirror of sorts, so that the left side appears on the right, showing much promise as a form of video feedback for patients (Sacks 1985 [2015], p. 82).

Film and Memory: Schizophrenia, Hallucination and Dream

Being able to remember has profound philosophical implications, since our sense of self, identity and personhood is closely entwined with our memory (Foster 2009, p. 94). Memory requires the brain to be physically altered by experience. While a full account of the process is beyond the scope of this chapter, suffice it to say here that this requires the formation of new synapses (i.e. connections between neurons), facilitated by puffs of serotonin, a neurotransmitter found in all animals which strengthens a synaptic connection in both the short and the long term, depending on the amount 'puffed' upon the connection (O'Shea 2005, p. 95). Synaptic change, or plasticity, is thus fundamental to memory formation and learning. The metaphor of a library is often employed to describe memory, with the hippocampus, the part of the brain involved in its production, likened to a 'printing press' for new memories, which are then 'filed' as 'books' for access (retrieval) in the cerebral cortex (Foster 2009, p. 84). On the other hand, the formation of new memories leads to an ongoing recategorisation, updating and re-correlating, in such a way that remembering is a constant process of recreation. Emotional events also have an impact upon memory, and situations of threat or reward tend to enhance the process—the so-called 'flashbulb' memory (Foster 2009, p. 61). Whether we experience events in real life or watch them on film, we build perceptual and memory representations in the same format. It has thus been argued that when information from a film is plausible and similar enough to information from real experience and if enough time has gone by, they might indeed be confused. For this reason, the ability to build event representations by means of film viewing has been regarded as a form of behaviour that fosters adaptation: by watching films we can construct memories 'on the cheap, that we can use to get around in the world' (Zacks 2014, p. 111).

There are instances of people who enter dissociative states, such as in schizophrenia, in which they become partly or completely separated from their memories. Studying how exactly this happens has been important to be able to discriminate between different types of memory processes and to link deficits in remembering with specific neurological structures, for 'with complex systems such as the brain we learn more about the functional relationships […] when they cease to function properly than when everything is working smoothly' (Foster 2009, p. 89). Generally speaking, schizophrenia implies a breakdown in the signifying chain: if we are

unable to unify the past, present and the future of the sentence, then we are 'similarly unable to unify the past, present, and the future of our own biographical experience of psychic life. With the breakdown of the signifying chain, therefore, the schizophrenic is reduced to an experience of pure material signifiers, or, in other words, a series of pure and unrelated presents of time' (Jameson 1991, p. 27), the frozen frames of the zoetrope.

Fredric Jameson famously extrapolated these insights to theorise artistic production in postmodernity,[4] a period characterised by profound changes in our collective experience of time, partly due to technological change.[5] In short, he contended the schizophrenic feature at the heart of the postmodern condition is evident in an acute and emotional state of the mind that he described as 'a whole new type of emotional ground tone […or] "intensity". A disturbing sense of unreality in the shape of an extreme experience in which there is a sudden collapse of temporality, which releases the present from all activities and intentionalities that might focus it and makes it 'a space of praxis' (Jameson 1991, p. 27). Thereby isolated, that present suddenly engulfs the subject in an extremely vivid fashion, even overwhelming in the materiality of its perception.

Compulsive access to specific memories can also occur, as if the normal process of revision and recategorisation mentioned above failed to apply to those and they became 'fossilised' or 'petrified' as a result, in what has been called the interictal personality syndrome. By contrast, cases have also been recorded of patients whose illnesses lead their brain to gain seemingly unrestricted and random access to memories, some of which they had long forgotten. A patient suffering from astrocytoma with frequent temporal lobe seizures characterised by dreamy states and involuntary reminiscence without loss of consciousness described images of family, neighbours and landscapes from her home village, seemingly in the state of dream madness that is called oneirophrenia, which sometimes occurs in schizophrenia (Sacks 1985 [2015], pp. 162–163). However, these 'phantasms'[6] were all memories, 'doubling' her consciousness, and 'they seemed more like certain paintings or tone poems'.

[4] According to Jameson, in society a sort of schizophrenia has eroded historicity 'in the new forms of our private temporality' and has established 'new types of syntax or syntagmatic relationships in the more temporal arts' (Jameson 1991, p. 6). However, Jameson uses Lacan's account of schizophrenia as a description rather than a diagnosis, insofar as 'it seems […] to offer a suggestive aesthetic model' (p. 26).

[5] Ever since personal computers became widespread at the turn of the century, an increase in narrative complexity in popular cinema has taken place, a trend variously termed 'modular narrative' or 'database aesthetic' (Cameron 2008, p. 1). These films articulate a sense of time as divisible and subject to manipulation, essentially as consisting of discrete, segments that can be accessed in a non-linear manner, in the same way that files stored in a computer—or memories in a brain. See, for instance, 'Eternal Sunshine of the Spotless Mind' (2004), 'Vanilla Sky' (2001) or 'Memento' (2000).

[6] Many cultures regard hallucinations and dreams as privileged states of consciousness, actively sought through diverse means such as drugs, meditation or isolation. Western cultures however ascribe negative connotations to hallucinations, including madness or brain damage or malfunction, and admitting to them carries a stigma. But hallucinations may well be at the origin of art. The geometric patterns of migraine might prefigure the motifs of aboriginal art and also the visions of

Requiem

This is exactly the case of the main protagonist of the film 'Requiem' by Alain Tanner (1998), after the novel by Antonio Tabucchi entitled 'Requiem: a Hallucination' (1994), set in Lisbon. Although described as a 'heavy on atmosphere and 100% *cerebral* picture [that …] offers little to rouse the enthusiasm of even art house regulars unless they are planning a trip to Lisbon' (Young 1998, emphasis ours), we claim that from the perspective of neurocinema, 'Requiem' provides an excellent figurative entrance into the mind of a protagonist that may be suffering from schizophrenia and hallucination or from an experience such as the one that the patient with astrocytoma described above had. But while the clinical disciplines are 'deeply invested in delineating the aberrant, diseased, dysfunctional or distressing from what we might call "normal"' (Woods and Fernyhough 2014, p. 84) and most genre cinema subscribes to this representation—especially in science fiction—the lack of fixed conventions in art cinema and the subjectivity that the shooting style conveys value all experience and take it seriously, including the hallucinatory experience, depicting it as meaningful. Normalisation or, in other words, recognising and valuing the diversity of experience as part of what makes us human is arguably an important contribution of the arts, in this case art cinema, to the realm of medicine.

The narrative centres on Paul, a writer who has a rendezvous with a friend and fellow writer, the Portuguese poet Fernando Pessoa, who is no longer among the living and who can quite plausibly be interpreted as Paul's alter ego since one of the fundamental archetypes of schizophrenia is the collapse of identity, closely associated, in art, with the everlasting tradition of the doppelganger (in the novel too, the character of Paul is sometimes interpreted as author Antonio Tabucchi's alter ego). It is a circular story, which starts at midday and concludes at midnight. It is also a hallucinating oneiric experience in which barriers of conventional time fall apart to allow the people of the present and past to meet and communicate. As an allegory of the vicissitudes of the self, in 'Requiem' the return of ghosts becomes the nucleus of the narrative.

Requiem is a journey ridden with ambiguity and uncertainty. Paul is in search of himself via reliving fragments from his past, and he passes the day 'meeting long-dead friends from his memories, who materialise out of nowhere with complete naturalness' (Young 1998). This is quite similar to the way in which the theatrical film-viewing experience was initially conceptualised, that is, as meeting 'shadows', in a way long dead, that materialised seemingly out of nowhere, which viewers would engage on their own personal terms depending on previous experience. Film director and surrealist artist Luis Buñuel indeed famously characterised film as

light or halos that viewers attributed to saints and apparitions. Lilliputian hallucinations may account for imps, elves and fairies, and 'ecstatic' seizures may play a role generating a sense of the divine (Sacks 2012, p. xii).

inherently germane to dream.[7] Among the people Paul encounters is his friend Pierre, a poet with whom he had a romance in common with a woman called Isabel; Isabel herself, who committed suicide, apparently out of remorse following the abortion of a child that may have been Pierre's or perhaps Paul's; and Paul's own father, who pays him a visit while in a dream in which he appears as a young sailor and demands that Paul recount to him the way he died. Finally, his journey culminates in the meeting with his friend, the ghost of the late Pessoa.

Illness, suffering and pain, including the pain arising from the sense of loss that death brings, constitute a large part of the recollections involved, not surprisingly since remembering is to a large extent mediated by the emotional commitment to and investment in the event (Foster 2009, p. 12), and also given that the need to bridge or reconcile separations from people or places, or discontinuities from events or situations is the cause of both unusual brain activity and the need to symbolically repair that is at the root of much artistic work. The protagonist's encounter with his father is related to death and agony because of the extreme physical and mental suffering his father endured. When he asks his son how his life will end, Paul replies he will die/died as a result of a long and painful disease, partly caused by medical negligence during an operation as described on the film.

Other artworks the film presents are music and painting. A requiem is both a mass offered for the dead and the piece of music that is played at these ceremonies. Music is of course a powerful means to evoke memories. In 'Requiem', Paul's memories of his stay at a now dilapidated lighthouse are awoken by music. He calls to mind those times in front of the rickety piano when he 'sat down and with one finger, from memory, […] played the melody from a nocturne by Chopin'. As Paul now tries to play the piece, he finds the piano is broken, but his procedural memory, i.e. the embodied memory that comes from physical performance and survives even in cases of amnesia, is intact. As for painting, close to the end, Paul visits the *Museum of Ancient Art* to see *The Triptych of Temptation of St Anthony* by Hieronymus Bosch, dating from around 1501. The painting tells the story of the spiritual torments endured by Saint Anthony Abbott throughout his life. This visit gives rise to a reflection on the nature of art. First, there is reflection on its capacity for reconstructing and restoring its meaning throughout time, by means of the viewer's perception. Pondering on whether the painting has remained the same, the protagonist maintains it actually had changed because his own perspective had already changed, through a process not unlike the continuous updating of memories in the brain, which reclassifies them while ascribing to them to new meanings. Moreover, the extravagant fantastic of the painting gives rise to two contrasting points of view about the artist: on the one hand, a painter who is copying the triptych argues that

[7] As the character of Pessoa puts it later in the film 'if "the evocation" has the power to recall the dead, if its faculties of medium allow them to recall the deceased, it is because it is also a *convocation*. The image of the deceased appears and materialises thanks to the [director], it returns to life: we are in the presence of a ghost. The voice [of the director] has the power to establish a dialogue with the ghosts' or, from our perspective, with memories (Tabucchi, *Requiem*, 165–166, my translation).

the artist, having a 'perverse imagination', created a personal interpretation that exceeds by far the saint's torments; in contrast, the protagonist thinks that Bosch would have painted 'the storm in the saint's delirium'. The relation between art and medicine is also alluded to by the copyist apropos Bosch's triptych, which had formerly possessed the virtue of curing disease, as 'sick people would file past it hoping that some miraculous intervention would put an end to their suffering'. Indeed, the painting has been exhibited at the St. Anthony Hospital of Lisbon.

According to Jameson, extreme instant of schizophrenia can best be grasped by a return to older theories of the sublime (p. 6). The sublime was associated by Edmund Burke to the limits of terror and an extreme state of mind and emotion so powerful that it would make human beings collapse in an instant. Parallel to the main theme of death and nostalgia for the past times, 'Requiem' is imbued with a sense of the sublime by means of the strong yet subtle emotions that the encounters convey. This overwhelming feeling reaches its climatic point when the protagonist meets Isabel, a crucial presence in his past. This scene delivers emotional and poetic reconciliation between the three persons involved, Paul and the two shadowy presences of Isabel and Pierre, through a waltz that they dance together. The denouement—conceived as sublime—shows that the collapse of identity leads to reconstitution, reconciliation and death of the self, respectively. Paul, unable to unify the temporality of the biographical experience or his psychic life, can live only a collapsed temporality that is all present and makes of the people that he meets in Lisbon the 'space of praxis' that Jameson alludes to.

Conclusion

This chapter has briefly sketched out the spaces where the study of medicine and the arts and humanities intersects, with a focus on film and brain science. These spaces have mainly been the pedagogical, with the use of films as teaching aids, and, at the deeper level of epistemology, the innovative application of theories from one field into the other. We have then outlined a third—and in our view more fruitful—paradigm, namely, the collaboration between film studies and brain science for physiological intervention, a field that shows much promise in advancing our understanding of emotion, memory and cognition in general. We ended with a demonstration of how a medical humanities framework can be useful in the analysis of 'Requiem', an art film understood in this light as portraying schizophrenia, hallucination and a compulsive access to memory from a deeply humanising perspective, as opposed to the so-called medicalisation approach characteristic of the health sciences and which much science fiction cinema reifies.

We note that from an interdisciplinary perspective, the first two approaches in particular, namely, the pedagogical and the theory-building uses, have been regarded as merely additive at best and in any case as a stage to be superseded by an integrative approach in which 'the nature, goals and knowledge base of clinical medicine itself might be challenged and reshaped by its encounters with the humanities'

(Whitehead 2014, p. 108). We however find this characterisation of the pedagogical and theory-building uses of the medical humanities misleading, for these and other more negative terms used to describe interdisciplinary research in general such as 'trespassing', 'poaching' or 'indulging in creative parasitism' or even 'promiscuity' (Osborne 2013, pp. 86–91) are discipline-centric and lack a historical perspective of how disciplines originated in the first place, taking them for granted.[8]

Drawing from Michel Foucault's investigation of the process of disciplinary formation, Roberto Pacheco et al. argue that just as the scientific disciplines evolved in the nineteenth century to obtain strict subjection of a body of knowledge (2017, pp. 307–308), in a time in which analogue media allowed limited access to the production and dissemination of knowledge, the present time in which digital media have dramatically expanded these, can instead be characterised as a moment of experimentation with new combinations and structures, a dynamic of innovation through creative destruction. Whether described positively as 'collaboration' or negatively as with the terms mentioned by Osborne above is immaterial. The outcome will most likely be problem or issue-centric and post-disciplinary.

Be that as it may, what is relevant to us is that, as Marina Roseman puts it, up to now allowing our respective disciplines 'to remain opaque to one another has historically served a segmented political design of institutionalised knowledge and power' (Roseman 2011, p. 20), which is totally unnecessary. Indeed, she continues, 'given the weight of suffering around us, on the one hand, and the amount of knowledge available to us on the other, it may not be morally viable' to continue to do so. Far beyond what they can offer each other, various combinations of film studies and neuroscience have much to offer to patients, their families and society in general.

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[8] Felicity Callard and Des Fitzgerald offer a more nuanced approach: they do not see the medical humanities as a meeting point for demarcated territories, but see them instead as a series of knowledges, materials and practices mixed a priori 'whose ongoing embroilment is entirely indifferent to covetous claims regarding disciplinary contribution' (2014, p. 16).

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