A MATHEMATICIAN GOES TO THE MOVIES

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In recent years there have been several films featuring a mathematician as the central character. In this article I focus on four of these: A Beautiful Mind, Enigma, Pi and Good Will Hunting. I offer my own analysis of the films, and make connections to the teaching and learning of mathematics. In particular, I argue that the films create gendered pictures of what being a mathematician and doing mathematics mean, and that these pictures have powerful impacts on the ways in which learners' construct their relationship with the subject.

This exploration has several starting points. My increasingly hybrid identity is one of those as are the pleasures I find in films and other forms of popular culture, and my desires to make explicit some of what I have learnt through my interaction with these media and to explore what these might mean for the teaching and learning of mathematics. The quotes below capture some of these sentiments:

> Trained in algebra and analysis, I identify professionally as a teacher of mathematics. I have applied for a visa for an extended stay in the permeable territories of sociology-as a resident alien or a cross-specific hybrid, naturally. But my real home is the ferociously material and imaginary zones of popular culture, into which I and hundreds of others have been interpellated. (personalised from Donna Haraway, 1997, p. 49)

> We practice culture criticism and feel the fun and excitement of learning in relation to living regular life, of using everything we already know to know more. (bell hooks, 1994, p. 2)

> If media fictions are part and parcel of the living of life in the present, these need to be explored as one aspect in which the fictions and fantasies of the subject are constituted through, or in relation to, the regimes of deeply interdiscursive meaning through which subjects understand themselves and others. (Lisa Blackman & Valerie Walkerdine, 2001, p. 196)

> [My] concern is to provoke others to ponder the role of the school in the 'age of desire', and to consider what all this means for the nature and purposes of contemporary schooling. Indeed, [I] ask readers to contemplate the purposes of schooling if the distinctions between education, advertising and entertainment diminish. (Jane Kenway & Elizabeth Bullen, 2001, p. 7)

Theoretically, sociological work on the media has been torn between top-down approaches that look at media texts independent of how people engage with them and bottom-up approaches based exclusively on how people respond to them. Many people, myself included, are interested in engaging in both of these aspects. I have been very influenced by studies that see young people as active 'readers' of cultural texts, such as work by David Buckingham (1993) and Bronwyn Davies (1989), but

which also understand that such texts place important constraints on the kind of work that young 'readers' can do with them.

Yet another starting point for this research was the data I collected during my doctoral research exploring how people come to choose to study mathematics at 16+. The ideas in this paper came out of my attempts to make sense of what the 43 participants said to me in their interviews and how they formed their relationships with mathematics. Key features of their accounts that the analyses that follow help me to understand are:

- The oppositional construction of mathematics: for example, they spoke of the subject as objective, rule-based and ordered as opposed to subjective, creative and emotional. Subjects such as languages, arts and humanities sat on the other side of the divide.

- The oppositional construction of mathematicians: most participants divided the population into maths people and non-maths people. The former were variously depicted as socially incompetent 'nerds' and as active problem-solvers.

- The gendering of identification with mathematics and as mathematicians (6 out of the 24 boys interviewed strongly identified with the subject compared to none of the 19 girls).

DOMINANT REPRESENTATIONS

The dominant discourse around mathematicians in popular culture depicts them as boring, obsessed with the irrelevant, socially incompetent, male, and unsuccessfully heterosexual. Even a 'quality' newspaper described the two mathematicians who solved a puzzle, earning a £1,000,000 prize, as posing "for pictures resplendent in patterned jumpers and sensible haircuts, seem[ing] to typify a certain academic type renowned-to put it diplomatically-more for their fluency with numbers than for their acquaintance with the cutting edge of dance music" (Oliver Burkeman, 2000). Such figures are closely related to computer 'nerds'/hackers who:

> Are invariably male, usually in their late adolescence or early adulthood, …are typically portrayed as social misfits and spectacularly physically unattractive: wearing thick, unflattering spectacles, overweight, pale, pimply skin, poor fashion sense. Their bodies are soft, not hard from too much physical inactivity and junk food…According to the mythology, computer nerds turned to computing as an obsession because of their lack of social graces and physical unattractiveness. Due to their isolation from the 'real' world they have become even more cut off from society. (Lupton, 1995, p. 102)

There is an opposition between the softness of their bodies and the 'hardness' of the mathematics they do. Similarly, Deborah Lupton (1995, p. 103) points out the stark contrast between the body of the 'nerd' and the "rationalized, contained body of the masculine cyborg".

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However, in popular culture, in addition to the other-ing of mathematicians as 'nerds' there is the other-ing of mathematicians through their idealisation as adventurers and as geniuses.

HEROES AND GENIUSES

'The mathematical genius' was at the centre of the recent films *A Beautiful Mind* (Goldsman, 2001), *Enigma* (Stoppard, 2001), *Good Will Hunting* (Affleck & Damon, 1997) and *Pi* (Aronofsky, 1998). Celluloid presentations of mathematicians largely avoid the 'fact' of the mathematics and bring the stereotypes discussed above into play in covert and overt ways. The plots of these films interweave conventional storylines, for example, of generational change, finding love and espionage and counter-espionage, with narratives that depend on mathematics. I focus here on two such mathematical narrative strands each of which is central to three of the films: tales telling of quests for rationality and those depicting the costs of that same rationality.

In *A Beautiful Mind* and *Enigma*, the love stories are central. In both films the main characters start with the social unease of the 'nerd' and end as heterosexual heroes. In *A Beautiful Mind*, based loosely on Sylvia Nasar's (2001) biography of the mathematician John Nash, our hero conquers his mental illness and wins the Nobel Prize. In *Enigma*, set in Bletchley during World War II, he uses his mathematical skills to triumph over German codes and his action hero skills to triumph over British spies. In both films our hero gets the girl; *Enigma* includes no reference to Alan Turing the gay real life hero of Bletchley and *A Beautiful Mind* leaves out John Nash's bisexuality, first family and marital problems. The images they present of mathematicians are flattering. Mathematicians are puzzlers/problem solvers, active, independent thinkers; they follow their own road and triumph in the end. These are stories of masculinity, of separated rather than connected ways of relating to the world (Carol Gilligan, 1993), of the love of a good woman, and, above all, of the determined pursuit of a quest.

Quests, with the exception of Jo Boaler's (1997) appropriation of the word to describe girls' mathematical activity as a 'quest for understanding', are usually discursively constructed as masculine enterprises from *Lord of the Rings* to *To the Lighthouse*. In the latter book Virginia Woolf uses an interesting metaphor for Mr. Ramsay's philosophical progress. She describes how he uses his "splendid mind" (Woolf, 1994, p. 57) to range across all the letters from A to Q one by one, but he cannot reach R:

> Qualities that in a desolate expedition across the icy solitudes of the Polar region would have made him the leader, the guide, the counsellor, whose temper, neither sanguine, nor despondent, surveys with equanimity what is to be and faces it, came to his help again. R-…Feelings that would not have disgraced a leader who, now that the snow has begun to fall and the mountain-top is covered in mist, knows that he must lay himself down and die before morning comes, stole upon him, paling the colour of his eyes, giving him, even in the two minutes of his turn on the terrace, the bleached look of withered old age. Yet

he would not die lying down; he would find some crag of rock, and there, his eyes fixed on the storm, trying to the end to pierce the darkness, he would die standing. He would never reach R. (p. 58)

In this passage Woolf makes explicit the masculinity of Mr. Ramsay's intellectual project in the connection of mental challenges with physical ones. There is a sense here of a boys' own adventure. Woolf's writing also highlights the linearity of the imagined quest and its futility and narrowness. That the rational thought processes demanded by mathematics impose restrictions and that these have consequences is another theme of films about mathematicians.

In all four films the central mathematician has mental health problems. In *Good Will Hunting* and in *Enigma* the suggestion is that these are only indirectly related to mathematics, deriving instead primarily from experiences of childhood abuse and romantic abandonment respectively. However, in *Pi* and *A Beautiful Mind* the character's madness is directly linked to his mathematics. In both films this connection is made in the way that the process of doing mathematics is presented as individual, fevered, mysterious and intuitive. In *A Beautiful Mind*, John Nash is shown scribbling formulas on every available surface, in a state that is indistinguishable from his later insanity. His original work on game theory, the only one of his mathematical results mentioned in the film, is presented as the result of a flash of inspiration brought on in an attempt to maximise his and fellow mathematicians chances of 'success' with a group of women they encounter in a bar.

The connection between mathematics and madness is more marked and more disturbing in *Pi*, being achieved through the use of high contrast black and white film, a fast paced dance soundtrack and the rapid inter-cutting of visual sequences. The main character's unusual and reductive 'philosophy of life' is repeated in voice-over at various points in the film:

> 1: mathematics is the language of nature; 2: everything around us can be represented and understood through numbers; 3: if you graph the numbers of any system patterns emerge. Therefore there are patterns in nature.

He also repeatedly recounts details of how, as a six year-old child, he stared at the sun for a very long time:

> The doctors didn't know whether my eyes would ever heal. I was terrified alone in that darkness. Slowly daylight crept in through the bandages and I could see. But something else had changed inside of me. That day I had my first headache.

He is seen self-medicating, injecting drugs to control his headaches and seizures. The final scene comes immediately after a breakdown and depicts him as now unable to calculate and seemingly having found the inner calm denied him while he was mathematically active.

Good Will Hunting initially looks rather different from *Pi* and more like the other two mainstream films. It too is a love story, telling of a socially awkward young man who

overcomes his own background of childhood physical abuse and poverty, to find his true love and true self. However, like *Pi* it is a story of the costs of rationality and of the pain of mathematics that ends with the central character, Will, abandoning the subject. Although this time leaving behind mathematics in order to "go see about a girl" is Will's choice, the internal logic of the film presents this choice as inevitable because of the nature of mathematics. It does this through a series of binaries: mind/body, separation/connection, theory /experience, reading books/living life. Mathematics is attached to the first terms in these oppositions and Will's relationship with his girlfriend Skyla is associated with the second terms. At first, Will, who lives the life of the mind absorbed in books, refuses the emotional connection and experience offered by his relationship with Skyla. He lies to her and, when they begin to get close, denies his love for her and ends the relationship. When, through counselling, he becomes ready for this emotional connection, he abandons mathematics. The idea that mathematics requires such separation is reinforced in the film for example by the actions of the professional mathematician who takes Will under his tutelage. This man relates to women only as conquests and not as partners. Since Skyla is the only female character who gets to say more than one line in the film, femininity too is associated with embodiment, connection, experiencing and living. The film presents these as more valuable ways of being but as ones that exclude mathematics.

In conclusion, these stories of mathematicians work to maintain rationality as masculine and being good at maths as a position that few men and even fewer women can occupy comfortably. Further, although they widen a little the range of behaviours that might be considered to be part of the 'mathematical personality' (to include heroism and madness along with social incompetence), they persist in constructing the mathematician as something you are or are not 'naturally'. Thus they support a key feature of the 'nerd' stereotype. So while literacy is seen as an essential part of being fully human, "in contrast to this framing, arithmetic is not naturalized as genetically human, but as *genetically determined within humans*" (Damarin, 2000, p.76, original emphasis).

Acknowledgements

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