

# The Portrayal of Great Mathematicians in Movies: A Review

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**Abstract---** *Mathematics, the queen of science, is inevitable in every field of study. And it forms the basis for almost all the subjects related to the realms of science and technology. To attain mastery in mathematics is a real feat and the world needs to celebrate those masters. This paper reviews four films celebrating four great mathematicians the world has ever seen. Also, the reason behind their genius and their contributions are described in this paper in detail.*

**Keywords---** *Biography, Film, Mathematics, Review, Queen of Science.*

## I. INTRODUCTION

A film is an advanced edition of a book in this current era. Many mathematicians have criticised the exposure of mathematics in Good Will Hunting as too fundamental to represent the mode of advanced research of which will be supposed to be accomplished. However, as the writers note, the movie is more about psychology than mathematics, as may also be said of this Nash film. One of the investigators points out that it is difficult to come up with visually engaging, but articulate and mathematically related, document to be shown on the screen that puts in the picture the story or provides some background. According to the developments in the field of literature, films have started a discussion on many topics and portray the authentic problems faced by society. At the same time, mathematics plays an indispensable role in all the domains. To attain mastery in mathematics is a real feat and the world needs to celebrate those masters. This study reviews four different films – The Imitation Game (2014), Agora (2009), A Beautiful Mind (2001) and The Man who Knew Infinity (2015). These films concentrate on celebrating four great mathematicians the world has ever heard. This paper also focuses on their intelligence and involvements which are portrayed in a detailed manner.

## II. REVIEW OF LITERATURE

Bai, C. and Gosman, A., (1996) revealed that solution of the full film equations is obtained in an efficient hybrid integral/numerical method, which allows numerical calculations to be performed in a two-dimensional framework. An implicit finite volume scheme is employed for this purpose. The methodology is first tested against some simple problems with analytical solutions. The assessment is performed against several sources of

experimental data for films formed by impinging sprays. Wilson and Latterell (2001) claimed that mathematicians are portrayed in popular culture (also in movies, literature, comics, and music) as insane and socially inept beings. SuseeBharathi T and Ajit I (2018) portrayed on the techniques used in the film The Truman Show, which convey the hyper-real experience to the listeners. This research found out the hyper-reality applied by media in the modern age through the film The Truman Show, which describes the present situation of the real world. Nikita DeMare (2016) demonstrated the 'exaggerations and stereotypes of schizophrenia in contemporary films'. This research focused on violence, traumatic procedures and hallucinations when illustrating characters with schizophrenia and critics have scrutinised the demonstration of mental disorders in modern films for years. The findings of the study explained a high frequency of violent behaviour in films depicting schizophrenic characters, indicating that those individuals are overwhelmingly dangerous and to be feared.

Latterell (2004) expressed that young people will not be drawn to a field in which those in it are consistently portrayed as either nuts or nerds. This view has upped our concern. It is bad enough to describe mathematicians as nuts or nerds. But, at least that is an extreme portrayal, and perhaps people can take it all with an understanding of stereotypes. NithinKalorth (2016) showed that a new wave in Tamil cinema is happening on screen which contrasts the conventional film techniques of Kollywood (the film land of Chennai). A visible layer of difference between urban and rural characteristics and different standpoints of nationhood is currently noticed in Tamil cinema. This study attempts to understand these characteristics and outline the Tamil new generation (new wave) cinema. Ranganathan .M & Velayutham. S (2012) illustrated that the Tamil cinema, because of its origin, is mostly preoccupied with Tamil traditions, people and society.

This is in contrast to the famous Hindi movies of Bollywood that describe a Hindi-speaking and an ethnically similar middle-class pan-Indian personality. This research critically analysed the depictions of Eelam Tamils in Tamil movie in the light of the thirty years of struggle, at the majority times led by the Liberation Tigers of Tamil Eelam, against the Sri Lankan government. Sri Lankan Tamils felt profoundly impacted on how Eelam Tamils had portrayed in Tamil cinema. MonisaQadri&Sabeha Mufti (2016) expressed that their feelings on PK (2014), the Bollywood grosser of all times, lifted.

**Revised Version Manuscript Received on 22 February, 2019**

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This satirical comedy is based on taxing the fallacies labelled as religious practices in Indian society. The series of events regarding religion in the Indian society lend meaning to a study on this film as a mediated reality of Indian culture. The present study, in the same vein, conducts a qualitative analysis of the films which relate to the life histories of four great mathematicians and their accomplishments. All the four movies analysed provide some innovative information to the society at large.

### III. THE IMITATION GAME

The film *The Imitation Game* portrays the life of a brilliant cryptographer Allan Turing. He graduated from both Cambridge and Princeton Universities. Before being recruited into the British Secret Service, he was a part-time employee of the British Cypher School. Later he was drafted into MI6, a unit of British Secret Service which required his service instrumental in decoding the Enigma-coded messages used by the Germans during World War II. The movie starts off with an investigation of Allan Turing's House as it was burgled the previous night. During the investigation, he begins to tell his role in breaking the Enigma code. He also reveals his difficult childhood where he was bullied by his friends and classmates all the time. As he is fond of numbers and formulas, he always likes to spend his time alone. He has also faced difficulties because of his homosexual nature. Homosexuality was considered a severe offence during those days by the British government. In spite of working in MI6 to which the personnel were handpicked and recruited by the then Prime Minister Winston Churchill, he faced discrimination because of his homosexuality.

When Britain declared war on Germany in 1939, Turing under the direction of Commander Alastair Denniston joins the cryptography team of Hugh Alexander, John Cairncross, Peter Hilton, Keith Furman and Charles Richards. This team was formed by the government to decrypt the Enigma codes sent by the German Submarines. As the nature of Turing is very complicated and challenging to work with, he split ways with his team and sought help from Winston Churchill to fund his project of constructing his machine to decode Enigma. Churchill accepted his proposal and granted him fund. Immediately he removed all of his teammates and recruited on his own Joan Clarke, a new assistant from Cambridge University.

Together they constructed a machine called Turing Machine. He programmed the device to decode the messages which had already been decoded manually. After the recalibration, the device could decrypt new signals. It was a considerable feat and considered as one of the greatest inventions in human history because Enigma comprised 159 million setting combinations, and only one of the combinations would be correct. And this too changed every other day. Even if ten of the efficient mathematicians were working one setting per minute for twenty hours, all seven days a week, it would still take 20 million years to break a single code. Even in mathematics if the probability of an event is 0.0000001 or so, it is assumed to be zero. And in this case, there were 18 zeros behind the decimal point. So it was almost impossible to break the Enigma code. Only because of Allan Turing's genius, the British could crack the

Enigma code and reduce the war by two years and save 14 million lives. But sadly, Allan Turing was convicted of homosexuality and sent to jail by the British government after the war in 1952. Later, he was chemically castrated, which led him to his suicide in 1954. Not many had known about Allen Turing and his genius before the release of the Oscar-nominated film *The Imitation Game* in 2014. He was given a royal pardon, honouring his unprecedented achievements in the field of mathematics by Queen Elizabeth II in 2013 for his arrest in 1952 by the British government. Turing's work inspired a generation of research into what scientists called Turing Machines, which has led to the evolution of computers.

### IV. AGORA

This movie portrays a brilliant mathematician Hypatia who lived in the 4th century A.D. in the city of Alexandria. During that time, there was civil unrest as there was a constant religious conflict between pagans and Christians. Hypatia and her father Theon were the keepers of the Alexandria Library. A few centuries back, during the haying period of Greeks, Alexandria was the knowledge capital of the world. The Alexandria library was constructed by Alexander the Great to honour the great philosophers and scientists of his time and the past. This library was considered as the one of the biggest in the whole world. Later many wars and Roman conquests led to the destruction of the library. Only a few works were remaining in the library during the time of Hypatia. So the duty of Hypatia and her father was to protect the remaining tasks. Since Hypatia was brought up in the library, it was natural for her to be intelligent. She was teaching science, astronomy and mathematics to her pupils in the library. She decided to dedicate her whole life to science, and even though she had many proposals, she rejected all of them straight away. Meanwhile, a conflict broke between Pagans and Christians, and soon the Christians outnumbered the pagans. Hypatia's father, who was a follower of pagan religion, had to abandon the library. Hypatia and her pupils took away some the scrolls which they could save from the riots. Later, the movie shows about the investigation of the heliocentric model of the solar system, where through an object dropped from the mast of a moving ship Hypatia demonstrates to Orestes that a possible motion of the Earth would not affect the movement, relative to Earth, of a falling object on Earth.

This made the Christians more furious, as they felt that Hypatia was spreading false propaganda against their God and challenges what was in the Bible. So she was prohibited from teaching. But this didn't stop her from investigating the motions of Sun, Moon and the planets and even stated that the Earth was not the centre of the Universe and it was not flat. This created a massive uproar among the Christians, and while she was travelling alone in her carriage, she was dragged out and stoned to death by a mob. A bishop of Alexandria, Cyril, was in the forefront in attacking Hypatia.



He had failed in a direct attack on the government, so he decided to do away with Hypatia, one of its most powerful assets. He ordered a mob of monks to drag her through the streets of Alexandria as they tortured her all along. They burnt her and scraped her skin off with the shells of oysters. At last, she was taken to a church where they stripped her naked, beat her and tore her limbs from her body. Thus the life of a great mathematician came to a tragic end. Her calculations and theories are found to be correct, and her findings are proved right even after 1400 years after her death. Many of her works in mathematics and astronomy were burnt along with her body. She died at a very young age. Had she been alive for more years and her actions protected, humanity could have progressed much quicker than we are today.

## V. A BEAUTIFUL MIND

The film *A Beautiful Mind* was released in the year 2001, and it won four Academy Awards. It tells the story of the real life of mathematician John Forbes Nash who is a significant contributor to Game Theory, Differential Geometry and also the study of Particle Differential Equations. His works help with analysing the thought process which governs the act of decision making in everyday life. Dr. Nash was considered as one of the greatest mathematicians of the 20th century. He was known for his originality in thinking and for his fearlessness in wrestling down problems. His theories known as Nash equilibrium provided a conceptually simple but powerful mathematical tool for analysing a wide range of legislative decision making. His approach and methods are now being used in economics, social sciences and other fields as well, including evolutionary biology.

John Nash has also made contributions to pure mathematics which is more significant than his Nobel Prize-winning work on Game Theory, and his achievements are more remarkable, and he had published most of his papers before he turned 30. The very fact that John Forbes Nash, who has schizophrenia was still teaching at Princeton University at the time of the release of the movie made the audience feel more sympathetic to the film. He was also believed to be receiving coded messages from the Russians when it was covered on the front page of the famous daily *New York Times*. The movie distinctly portrays a man who has gone from extremely intelligent to genuinely insane. In between, he managed to pull off the complexity when he had to excel in the academic world.

Unfortunately, he was diagnosed with paranoid schizophrenia and had to spend most of his time in and out of mental hospital till his death. The film traces his treatment depicting his consultation with a psychiatrist, getting insulin shock therapy and medication which were vital for his mental health. The documentary fascinated the audience by exhibiting his life on the campus, wandering around the hallways, talking to no one, drinking coffee and so on. To conclude, the director has done a fantastic job at letting the audience inside the paranoid mind of Nash and giving us the glimpse of what it feels like to be mad and not knowing it.

## VI. THE MAN WHO KNEW INFINITY

The British movie *The Man Who Knew Infinity* was released in 2015. It tells the real-life story of the great Indian mathematician Srinivasa Ramanujan, played by the talented actor Dev Patel. The film was adapted from the book of the same name written by Robert Kanigel in 1991.

The film opens at a temple in Madras (now, Chennai), where the young 12-year-old Ramanujan gets married to a 12-year-old girl. He has tough time earning money through his menial jobs, and he is at the edge of poverty. But right from his childhood, Ramanujan has been obsessed with mathematics as he gets possessed by something. His employers make use of his extraordinary mathematical skills for their benefit, and after a point of time, they begin to realise that he has got places to go with his exceptional skills. This uncontrollable flow of his mathematical equations makes them contact Prof. Hardy (played by Jeremy Irons) at the Cambridge University. Impressed with the theories of Ramanujan, Hardy invites him to study in England immediately, because his letter gives him the impression that he has found the missing link since Isaac Newton.

At the very age of 12, Ramanujan goes through and completes the Carr's volume of six thousand theorems. Some of the formulas and theorems formulated by Ramanujan have led to the creation of new fields of study. Still, some of his recipes are believed to be accurate and yet to be unproven. He has given some significant contributions to many mathematical fields, including complex analysis, number theory, infinite series and continued fractions. Dev Patel and Jeremy Irons have played engaging characters which deal with the lifestyle differences between the east and the west. Even though the scenes portray Madras are laughable, those exposition scenes help the audiences to feel empathy with the lead character Ramanujan when he feels fish out of water in England. Through the course of time, we can feel the character development in Jeremy Irons when he understands that the life is not just a binary for Ramanujan. This gives us the beautiful picture of the two great minds understanding each other - Hardy and Ramanujan.

Even though the acting and the set pieces have been well-crafted with care, the film mostly relies on the sensitive side of Ramanujan, which starts to feel like racial prejudice after a point of time. Unfortunately, his scientific career gets curtailed by health problems, and he returns to India and dies when he is only 32 years old. Considering the fact almost a century has passed since his death, modern intellectuals with advanced calculating devices are still baffled by Ramanujan's integrals and integers.

## VII. CONCLUSION

Thus we have seen the portrayals of four brilliant Mathematicians in movies. Though we cannot learn mathematics from the film, sometimes they can give us a real insight into the intellectual process. All the mathematicians in these films are remarkably gifted, but the world seems to be harsh on them.

They all had a tragic end to their lives which appear to be a curse for those who are gifted with high intelligence. Anyway, these movies serve the purpose of showcasing these great individuals in the world at large. Until the release of these movies, they were unknown to the world, at least to the common public. These movies made them immortals and took their legacy to every part of the world which they truly deserve.

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