Film Review: *Proof*

Proof is a sophisticated 2005 film that examines what may be a thin line between genius and insanity. On the surface, mathematics appears to be its subject matter, but the film is really about mental illness and those who must endure living with it. The film accurately depicts the toll that manic and paranoid episodes can have on psychotic patients and their caretakers. While the film includes a lot of math vernacular, viewers needn't be skilled at math to appreciate it.

Catherine Llewellyn (Gwyneth Paltrow) is the 27 year-old daughter of a retired, but once highly-celebrated Mathematics Professor at the **University of Chicago** named **Robert Llewellyn** (Anthony Hopkins.) For several years, *Robert Llewellyn* has suffered from what appears to be a *Delusional Psychosis with Paranoid Manifestations*. However, as with most psychotics, he is oblivious to what the rest of the world sees all too clearly. Much of his retirement years have been spent in a reclusive existence trying to develop a new and revolutionary mathematical proof to regain his professional prominence.

Dr. Robert Llewellyn

Catherine Llewellyn

Catherine Llewellyn is a skilled mathematician, herself, having inherited the gift from her father. However, she has subordinated her graduate studies and social life to care for her father for the last five years. As the film opens, *Robert Llewellyn* has just died and *Catherine* is having a difficult time coping with his death. Like her father, *Catherine* has had minimal contact with the outside world for the last five years, and fears that she may have inherited her father's mental illness, as well. Yet, the more she interacts with normal people, the more normal she seems.

However, the hurt and burden of caring for her father for five years were on painful display at the eulogy that she gave to a large assemblage of her father's former friends and colleagues at his funeral:

"Wow, I can't believe how many people are here: I never knew he had this many friends. Where have you all been for the last five years? I guess to you guys he was already dead, right? Once a great man is past greatness, he's just some old guy.

So, you probably want to catch up on what you missed out on. He used to read all day. He kept demanding more and more books. I was getting them out of the library by the carload. There were hundreds. Then one day I realized he wasn't reading. He believed aliens were

sending him messages through the Dewey-Decimal numbers in the library books. He was trying to work out the code.

He used to shuffle around in slippers. He talked to himself. He stank. I had to make sure he bathed, which was embarrassing. Oh, then he started writing 19, 20 hours a day. I got him a huge case of notebooks: he used every one. I dropped out of school. You see, he was convinced that he was writing the most beautiful, elegant proofs. Proofs, like music. I'm glad he's dead."

One of her father's former doctoral students, **Hal Dobbs** (Jake Gyllenhaal) has volunteered to sort through *Professor Llewellyn's* study to see if any of his hundreds of notebooks contain anything of merit. *Hal* believes *Robert* must have experienced some lucid moments when his *"machinery worked."* After their first night of romance, *Catherine* gives *Hal* a key to her father's top desk drawer in which he finds what appears to be an original and unique mathematical proof involving prime numbers. Initially, *Hal* is ecstatic that *Robert Llewellyn* was still able to contribute to the field of mathematics despite his illness. However, *Catherine* shocks him by declaring that it is **her** work.

There's enough ambiguity in this film that a reviewer needn't worry about divulging the full plot or its *denouement*. For example, did *Catherine* inherit her father's mental illness along with his brilliance in math, or is she merely withdrawn and depressed from the lack of human contact? Did she actually write the proof, or is it a delusion? Ironically, *Catherine* is furious at *Hal* for doubting her authorship of the newly discovered proof, yet at the same time, **she demands that he believe her claim based exclusively on *FAITH* and without resorting to *EVIDENCE!***

There are some recurring themes in the film that probably intrigued those who frequently deal with abstractions. Some conversations are in the form of syllogisms and some involve what logicians call *"reverse*

reasoning." For example, in a dream her late father reassures Catherine about her own sanity by declaring that *"Crazy people don't sit around wondering if they're nuts."* Also, the film may suggest that residing in a world consisting primarily of abstractions might bring one closer to madness than living a more well-rounded life with normal, human interactions. Thus, the more *Catherine* interacts with *Hal*, the more she smiles and the closer she approaches normalcy.

The recurring theme of *reverse reasoning* was evident in *Hal's* conversation with *Catherine* the night of her father's wake. *Hal* tells *Catherine* how attractive her new dress is, to which she replies that it doesn't fit. *Hal* disagrees, and states that it fits great as he stares longingly at her. She then tells Hal to *prove* that it fits, to which he replies that he can't do that, but he **CAN DISPROVE** the idea that it **DOESN'T** fit. The principle that one can *prove* a hypothesis by *disproving its opposite* plays a role later in the film when the authorship of the disputed proof is questioned. (Btw, *Hal* had little difficulty removing Catherine's dress that night, suggesting that it fit pretty well, after all...)

***Catherine Llewellyn** & **Hal Dobbs** at the Wake*

This film is reminiscent of **A Beautiful Mind** (2001,) the true story of Economist **John Nash** (Russell Crowe,) who won a Nobel Prize in Economics for his contributions to *"Game Theory."* Nash was another genius who developed *Paranoid Schizophrenia* during his career. (25 years later, I can still recall the **John Nash** character stating to someone near the end of the film: *"I still see things that are not here. I just choose not to acknowledge them..."*)

I might also add that at my *Alma Mater*, **Washington University** in St. Louis, there was a tenured math professor who lost his mind (and presumably his house,) but continued to live for years afterwards with his sister in their car. They attended every lecture that served coffee and rolls and, thanks to a compassionate administration, they were nearly a permanent fixture on the campus in the early-to-mid 1970s.

So, the line between genius and madness may be narrower than many of us had presupposed. (Editor's Note: this reviewer is **not** at risk on either count...)