A Beautiful Mind

INTRODUCTION

BRIEF BIOGRAPHY OF SYLVIA NASAR

Sylvia Nasar was born in Germany but moved with her family to the United States in 1951, followed by Turkey in 1960. After earning her BA in literature from Antioch College, Nasar went on to study economics at New York University and earned her Master's degree in 1976. Throughout her career as a journalist, she's written for *Fortune*, *U.S. News & World Report*, *The New Yorker*, and the *New York Times*. She was formerly the John S. and James L. Knight Professor of Business Journalism at Columbia University and is known best for her writing on economics and mathematics. *A Beautiful Mind*, published in 1998, won the 1998 National Book Critics Circle Award for biography. Her second book, *Grand Pursuit: The Story of Economic Genius*, was published in 2011. She currently resides in New York and is married to a fellow economist, Darryl McLeod. The pair have three adult children.

HISTORICAL CONTEXT

The chronology of John Nash's life given in *A Beautiful Mind* overlaps with both World War II and the Korean War: though Nash was too young to be drafted for World War II, he received a deferment for the Korean War draft. Nasar also discusses the activities of the American nonprofit think tank RAND, where John Nash was briefly employed in the 1950s, and its relation to Cold War politics. RAND was developed after World War II to help guide American military policy and strategy, particularly in the field of nuclear weaponry; as Cold War tensions grew between the Soviet Union and the United States, RAND helped to encourage nuclear deterrence, drawing on game theory, which was Nash's area of expertise. Additionally, *A Beautiful Mind* intersects with the history of homosexuality in America: Nash was arrested for indecent exposure in 1954, during a period in which intense, undercover police operations targeted America individuals, and especially men, who exhibited homosexual behavior. Nash himself made academic history by developing crucial contributions to game theory, lending his name to three major mathematical concepts: the Nash equilibrium, the Nash embedding theorem, and the Nash functions.

RELATED LITERARY WORKS

A Beautiful Mind is one of several well-known contemporary nonfiction works exploring the hidden lives of famous mathematicians and the cultural status of mathematics. Other examples include Paul Hoffman's *The Man Who Loved Only Numbers*, a biography of the mathematician Paul Erdos; like Nasar, who portrays John Nash as a brilliant thinker but deeply complicated individual, Hoffman describes Erdos as an academic who struggled socially, despite his talents. David Berlinski's *Newton's Gift* reflects on the life of the 17th-century mathematician Sir Isaac Newton, examining his breakthroughs alongside his personal struggles. *A Beautiful Mind* might also be compared to Amir D. Aczel's *Fermat's Last Theorem*, a popular nonfiction exploration of a famous mathematical theorem devised in the 17th century and solved by Andrew Wiles (of Princeton University, like Nash) in the late 1990s.

KEY FACTS

- **Full Title:** *A Beautiful Mind*
- **When Written:** Late 1990s
- **Where Written:** New York City
- **When Published:** 1998
- **Literary Period:** N/A)
- **Genre:** Biography
- **Setting:** Bluefield, West Virginia; Roanoke, Virginia; Pittsburgh, Pennsylvania; Princeton and Trenton, New Jersey; Cambridge and Boston, Massachusetts; Santa Monica, California; Paris, France; Geneva, Switzerland; Washington, D. C.
- **Point of View:** Third Person

EXTRA CREDIT

Movie Adaptation. The 2001 movie based on the book, starring Russell Crowe and Jennifer Connelly, won four Academy Awards, including the award for Best Picture.

Nobel Prize. John Nash won the Nobel Memorial Prize in Economic Sciences in 1994. However, this award is not technically a "Nobel prize," since the money given to recipients is endowed by the Swedish Central Bank, not through the estate of Alfred Nobel, the founder of the Nobel prizes in Chemistry, Literature, Peace, Physics, and Medicine.

PLOT SUMMARY

Sylvia Nasar, an economics journalist working for the *New York Times*, first hears about the story of John Nash, an acclaimed mathematician whose career was derailed by schizophrenia, from a Princeton University professor whom she is interviewing for an article. Intrigued, Nasar decides to pursue the story of Nash, who was a rising star in the field of game

theory—an area of mathematics with applications to economics and human behavior—before he began experiencing psychotic episodes in his early 30s.

Nasar tracks Nash's humble beginnings in Bluefield, West Virginia, where he was a bookish child whose eccentricity made him a social outcast. She follows his story to Carnegie Institute of Technology in Pittsburgh, Pennsylvania, where he attends college at the height of World War II. Nash's talents as a mathematician are discovered and encouraged by his professors at the Carnegie Institute, and he goes on to attend the PhD program in math at Princeton University. It is at Princeton that Nash develops his most famous contribution to game theory—a mathematical field that studies interactions, decisions, and strategy among rational actors, with applications to many social sciences—which served as the basis of his graduate dissertation. This is the "**Nash equilibrium**," which attempts to describe how two players or individuals in a game or conflict might interact, given that individuals do not always make decisions out of self-interest, but often cooperate, acting in ways that take their opponents' decisions into account.

Despite Nash's clear genius and propensity for innovative thinking—which sets him apart from other Princeton graduate students and allows him to make groundbreaking discoveries—Nash is also deeply troubled. Intensely independent and self-assured since childhood, Nash can be awkward or even downright cruel in his interactions with others, and he often regards his relationships with his peers as "games," applying his own research to his social life. Throughout his life, Nash is attracted to a number of young men, many of them mathematicians, though these affairs are usually fleeting. He is eventually arrested for lewd (and likely homosexual) conduct during a police sting in Santa Monica, where he is employed as a summer research analyst for RAND, a Navy-sponsored think tank specializing in military strategy.

Nash later becomes an instructor at the Massachusetts Institute of Technology in Cambridge, Massachusetts, where he is nicknamed "the Kid Professor": his eccentricity and arrogance earn him both the respect and ire of his students and colleagues. In Cambridge, Nash meets and dates Eleanor Stier, a nurse, who becomes pregnant and gives birth to their son, John David Stier. Nash also has a torrid affair with Jack Bricker, a gifted young graduate student at MIT. Later, he begins a romance with Alicia Larde, another MIT student, though he conceals his relationship with Eleanor from her. Eventually, Nash and Alicia marry, and Alicia becomes pregnant.

Around this time, Nash's behavior becomes markedly more bizarre and disturbing, and he starts to imagine that "**men in red neckties**" are following him around the MIT campus. Nash is committed to a psychiatric institute in Massachusetts, where he is diagnosed with schizophrenia. Alicia gives birth to their son while Nash is in the hospital, though he is released shortly after the birth.

Around this time, Nash decides to resign his MIT professorship in order to move to Europe, hoping to shed his American citizenship and become a "citizen of the world." Unable to obtain refugee status in a number of European countries, he returns to Princeton and is hospitalized several more times, since his delusions continue to recur; he then moves to Boston, then to Roanoke, Virginia, where his family lives. Overwhelmed by the responsibility of caring for her very sick husband, Alicia obtains a divorce from him.

Eventually, Nash ends up in Princeton again, where he becomes the "Phantom of Fine Hall," an enigmatic figure who haunts the classrooms in which he used to study, scribbling obscure equations on blackboards. Unbeknownst to Nash, his contributions to game theory are beginning to gain significant traction in the world of economics, and in 1994, he is awarded the Nobel Prize in Economics—a controversial decision, given his fragile mental health and the 30-year hiatus he took from research.

In the 1990s, Nash slowly begins to recover from his schizophrenic episodes and enters a period of remission, which he credits to a careful, conscious process of "reorganizing" his own thinking: separating delusion from reality. He is given a research post at Princeton, and he reunites with Alicia and many of his former colleagues. Most importantly, he learns to value his relationships with others, becoming a kinder, more caring man—one who still possesses a brilliant, "beautiful" mind.

CHARACTERS

MAJOR CHARACTERS

Sylvia Nasar – The author of *A Beautiful Mind*, Sylvia Nasar is a journalist who is working for the *New York Times* in the 1990s when she first hears about John Nash, a Princeton professor who suffered from schizophrenia. Intrigued by Nash's story—one of redemption and recovery—Nasar decides to write a biography of the famous mathematician, meticulously gathering information from a wide variety of sources (though Nash famously did not agree to be interviewed for the book). Nasar's book is eventually turned into a popular film and, as she claims in her Foreword, helped to inspire greater understanding, awareness, and acceptance of mental illness.

John Forbes Nash Jr. – John Forbes Nash Jr. (1928-2015) was an American mathematician and Nobel Prize Laureate, and he is the subject of Sylvia Nasar's biography *A Beautiful Mind*. In the book, Nash is described as a young math prodigy who quickly ascends the academic ranks to become a pioneer of game theory, a field of mathematics studying interactions, negotiations, and decision-making. Yet his difficult, eccentric personality makes him somewhat of a pariah among other academics. Intensely competitive, often aloof, and unsympathetic to others, Nash struggles to form lasting

friendships. He also represses his sexual desires for other men, causing numerous rifts in his relationships. At the age of 30, Nash begins to experience severe psychotic delusions, and he is diagnosed with schizophrenia. He retreats from the world of mathematics and spends several decades in limbo, cut off from friends and family and unable to return to his research. During this period, he becomes known as the "Phantom of Fine Hall," since he spends much of his time wandering through the Princeton campus, where he had been a graduate student, his mind clouded by delusions. Nash credits his eventual recovery from schizophrenia to his own powers of mind: he works to separate reality from delusion, and his mathematical talents help to restore his capacity for rational thought. In 1994, Nash receives the Nobel Memorial Prize in Economic Sciences, and he reconciles with his friends and family, including his ex-wife, Alicia, whom he eventually remarries.

Alicia Larde (Alicia Nash) – Alicia is John Nash's wife and the mother of his son, John Charles Martin Nash. Alicia and Nash meet at MIT, where he is employed as an instructor. Alicia, an undergraduate student studying physics, takes one of Nash's math courses and develops a crush on her professor. Nasar describes Alicia as a "bright, vivacious, playful, and talkative" young woman, from an "aristocratic" family from San Salvador, who is drawn to Nash's intelligence, upper-class background, and good looks. Alicia and Nash eventually marry, and Alicia becomes pregnant. However, Nash is hospitalized for schizophrenia shortly before Alicia is due to give birth, throwing their lives into disarray. Though Alicia is supportive of Nash for years—traveling with him to Europe after his paranoid delusions force him to leave MIT, supporting him through rounds of hospitalizations, and enduring his erratic, often aggressive behavior—she eventually obtains a divorce from her husband, exhausted by the strains his mental illness has put on their marriage. Later, though, as Nash begins to recover, Alicia invites him to live with her as a "boarder" in her house in Princeton. Alicia's actions help Nash to regain his grasp on reality and return to Princeton's academic community. Loyal yet firm, Alicia plays the most important role in Nash's remission from schizophrenia, demonstrating the power of love, patience, and forgiveness.

Martha Nash Legg – Martha Nash Legg is John Nash's young sister, born in 1930. Martha—described as "tall and striking" and "extremely intelligent"—attends the University of North Carolina in Chapel Hill and becomes a teacher. As Nash begins to experience symptoms of schizophrenia, Martha and Virginia, Nash's mother, take over care of Nash, helping to coordinate various hospitalizations. Later, Nash moves to Roanoke, Virginia, where Martha and Virginia live. Nash's erratic behavior takes a toll on Martha's life; after Virginia's death, Nash briefly lives with his sister, but she finds it hard to cope with him and arranges to have him committed to a hospital in Virginia. Nash, who fears hospitalizations, is furious, vowing to cut all ties with Martha. The two reconcile later in Nash's life, during his remission from schizophrenia, though Martha acknowledges that Nash's illness greatly affected her own well-being.

Eleanor Stier – Eleanor Stier and John Nash meet in 1952 when Nash visits the Boston hospital where Stier is employed as a nurse to have some varicose veins removed. Eleanor is an "attractive, hardworking, tenderhearted woman" from a working-class background, five years older than Nash. She is attracted to Nash, a MIT professor from an upper-class background, despite their dissimilarities. After meeting again by chance, Stier and Nash begin dating. Eleanor later becomes pregnant, and although she hopes that Nash will decide to marry her, he chooses not to. Eleanor and Nash's relationship grows troubled, and they fight frequently: Nash often belittles Eleanor for her lower-class status and lack of education, and he keeps their relationship a secret from his friends, family, and colleagues. John David Stier, their son, is born in June 1953. Nash refuses to pay child support, leading to the dissolution of his relationship with Eleanor, who reacts angrily by informing Nash's parents—who didn't know about their grandson—of Nash's "secret." As Nash begins to recover from schizophrenia in the 1980s and 1990s, he makes some conciliatory visits to Eleanor and John David, who live together in Boston, though Eleanor remains frustrated with his behavior as a father.

John David Stier – John David Stier is the son of Eleanor Stier and John Nash, born in 1953. John David has a troubled childhood, since Nash—who was unmarried to his mother and was not listed as his father on his birth certificate—is frequently absent from his life, and Eleanor struggles to find employment. John David is shuttled between foster homes, some abusive, before returning to live with Eleanor as a teenager. He later becomes a registered nurse, much to the disappointment of his father, who hoped that he would become a scientist. Nash and John David reunite later in Nash's life, during Nash's remission from schizophrenia. Throughout *A Beautiful Mind*, John David often expresses his resentment of Nash, who was a distant and uncaring father during his childhood, though he also acknowledges that their relationship improved after Nash's recovery.

John Charles Martin Nash (Johnny) – John Charles Martin Nash, known as "Johnny," is the son of John Nash and Alicia Larde, born in 1959. Though Johnny has a more stable childhood than his half-brother, John David Stier, and is an "excellent student" as a teenager, he begins to experience delusions and hear voices during high school. He is eventually hospitalized at the Carrier Clinic, where his father had also been hospitalized and, like his father, is diagnosed with schizophrenia. Despite Johnny's mental illness, he demonstrates remarkable talents in math (also like his father), and completes a PhD in the subject at Rutgers University. However, he is never well enough to live on his own. At the time

that *A Beautiful Mind* is published, Johnny, Alicia, and Nash are living together in Princeton. Throughout *A Beautiful Mind*, Nash expresses guilt at the fact that his son suffers from the same illness as him, and he describes his experiences with Johnny as both heart-wrenching and rewarding, as life with Johnny both "draws Nash and Alicia together and tears them apart."

John Nash Sr. – A "proper, painstaking, and very serious" man with a "sharp, inquiring mind," John Nash Sr., John Nash's father, is a commanding patriarch and engineer who helps to stoke his son's early interest in science and mathematics. Nash Sr. seems to have played less of an active role in his son's life than his mother, Virginia, but he helps to provide Nash with a comfortable, middle-class childhood, which affords his son many of the academic opportunities that would help him to become a successful mathematician. Nash Sr. dies before his wife and shortly after Eleanor Stier contacts Nash's parents to tell them about the birth of her and John Jr.'s son, John David Stier —an event that may have hastened John Sr.'s death.

Virginia Martin Nash – Virginia Martin Nash, John Nash's mother, is described as an "outgoing and energetic" woman who is "less rigid" than her husband, John Nash Sr., and is the caring, capable matriarch of the Nash family. Throughout *A Beautiful Mind*, Virginia provides for John Nash, her only son, helping to care for him between his hospitalizations for schizophrenia and providing funds to bail him out of trouble. "A born teacher," Virginia helps to encourage Nash's early talents as a young student, though she also struggles to come to terms with Nash's erratic behavior as an adult. She dies in 1969, throwing her family into further disarray.

Lloyd Shapley – A fellow graduate student of John Nash's at Princeton, Lloyd Shapley is a veteran, a Harvard graduate, and, by the time he arrives at Princeton, one of the "brightest young star[s] in game theory research." Nasar draws comparisons between Shapley and Nash, noting that Shapley, like Nash, has a "violent temper" and a "harshly self-critical streak." Yet Shapley is also an intense perfectionist, which ultimately dampens his career as a mathematician, since he is unable to publish much of his research (Nash, though, publishes research as a young graduate student).

John von Neumann – Von Neumann is a Hungarian American mathematician and polymath (an individual with a broad knowledge base who studies a variety of subjects) and one of Princeton's most famous professors during John Nash's PhD studies at the university. Nasar describes him as "possibly the last true polymath," a "worldly and engaged" scholar who forged connections between his academic work and the political sphere: for example, he was a member of the Atomic Energy Commission and the top member of the Manhattan Project, advising the United States on the atomic bomb and military strategy during the Cold War. Though in *A Beautiful Mind*, von Neumann is initially disparaging of Nash's research, Nash would build on von Neumann's foundational work in game theory, describing a scenario—a solution for a non-cooperative game—that von Neumann failed to sketch out in his and Oskar Morgenstern's 1944 treatise on game theory, *The Theory of Games and Economic Work*.

Harold Kuhn – Kuhn is a Princeton math professor and a close friend of John Nash. He is described as a "shrewd, vigorous, sophisticated man" who—unlike other academics—tends to take a close interest in other people's lives. Kuhn and Nash meet as graduate students at Princeton, and Kuhn directly observes Nash's mental deterioration over the years.

Solomon Lefschetz – Solomon Lefschetz is a Princeton mathematician who recruits students for the graduate program in math. He has an "entrepreneurial and energetic" presence and helps to augment Princeton's status as a top institution for mathematicians. Like John Nash, he values "independent thinking and originality" and is known to be commanding and cantankerous. Nonetheless, he offers Princeton students the opportunity to focus on original research—a focus that helps Nash to develop his famous advances in game theory.

Albert Tucker – Tucker is a Princeton mathematician who works on topology (the study of properties of geometric objects as they are preserved under certain deformations) and Lefschetz's "right-hand man." Tucker, who possesses a "rare willingness to defend unconventional ideas and individuals"—such as John Nash—serves as Nash's thesis adviser and supports him throughout his career, helping to arrange replacement positions for Nash as his mental health begins to flag and he quits his academic posts.

Oskar Morgenstern – Oskar Morgenstern is a "tall, imposing expatriate from Vienna" and an economics professor at Princeton who collaborates with John von Neumann on the "Bible" of game theory, *The Theory of Games and Economic Behavior*. In it, Morgenstern and von Neumann argued that the "prevailing paradigm" in economics up to that point—an emphasis on individual incentives and behavior—was inadequate, turning instead to the theme of cooperation and competition among rational actors.

William Ted Martin – The chairman of the MIT mathematics department, Martin offers John Nash an instructorship at the university in the 1950s. Martin is a "loquacious" mathematician known for luring "young hotshots" to the department. At the height of the McCarthy era during the Cold War (a period in which the aggressively anti-communist U.S. Senator Joseph McCarthy led a committee to weed suspected Communists and Soviet spies out of the U.S.), Martin's "secret past" as an underground member of the Communist Party in the late 1930s and early 1940s is exposed.

Norbert Wiener – Wiener is "the most attractive figure at MIT" for John Nash, a polymath known as the "father of cybernetics" ("the scientific study of control and communication in the animal and the machine"). Wiener, like Nash, is famously

eccentric and suffers from a mental illness; as a result, he has "an acute empathy for other people's trials," including Nash's, and serves as a mentor to Nash, who views him as a "kindred spirit."

Norman Levinson – Levinson is a "first-rate mathematician" at MIT who acts as a "sounding board and father substitute" to John Nash. Like William Ted Martin, Levinson's Communist past is revealed during the McCarthy years; nonetheless, Levinson remains the "most respected member" of the math department, a "thoughtful, decisive," and empathetic leader who becomes a "role model" for Nash. Levinson defends Nash after Nash begins to suffer psychotic episodes and exhibits erratic behavior that leads to his resignation from MIT; he later attempts to recruit Nash back to MIT.

Donald J. Newman (D.J.) – Newman is a Harvard graduate student who befriends some mathematicians at MIT in early 1950s, including John Nash. He is considered a "genius and is "a big, brash, blond swaggerer" who becomes "friendly friends" with Nash and helps to draw him into a tight social circle of mathematicians. Nash makes sexual advances on Newman, who laughs them off; Newman is one of Nash's first friends to realize that Nash might be attracted to men.

John Milnor – Milnor, a math student at Princeton during John Nash's year there, is "the most brilliant freshman in the history of the Princeton mathematics department." He is a "tall, lithe" young man "with a baby face and the body of a gymnast." Milnor is one of the few students Nash chooses to interact with, believing Milnor to be more gifted than other Princeton mathematicians; indeed, Milnor goes on to become a highly successful mathematician, winning the top three mathematical prizes in the world. In 1952, Milnor and Nash travel across the country to Santa Monica, where both men are working for the summer; Milnor later claimed that Nash made a "sexual overture" toward him, and it is possible that Nash had romantic feelings for Milnor.

Warren Ambrose – Ambrose is a colleague of John Nash's at MIT who strongly disapproves of Nash, believing him to be a "childish bright guy" who foolishly takes on difficult problems. Ambrose is a "moody, intense, somewhat frustrated" mathematician who cultivates a rivalry with Nash, challenging him to solve the notoriously difficult "embedding problem for manifolds"—which Nash later goes on to solve successfully.

Woodrow Wilson – Woodrow Wilson was the 28th president of the United States and the president of Princeton University in the early 20th century. Nasar notes that Wilson "despised mathematics"—which he regarded as a "mild form of torture"—and did not envision math playing an important role in academic life at Princeton, though the Princeton math community would later become one of the most well-respected in the world.

Henry Burchard Fine – Fine was Woodrow Wilson's best friend, a mathematician and a former dean of science at Princeton in the early 20th century who helped to recruit top-tier mathematicians and scientists for the university, transforming it into a research powerhouse. Fine Hall, the math building in which John Nash spent most of his time as a graduate student (and later, as the "Phantom of Fine Hall"), was named for Henry Burchard Fine.

Jack Bricker – Bricker is a first-year graduate student at MIT when John Nash becomes an instructor there, a "self-deprecating" yet engaging, "undeniably bright" student who becomes fast friends with Nash. Nash and Bricker make "no secret of their affection" for each other, often kissing in front of other people; Nash would later describe his relationship with Bricker as one of three "special friendships" he had had in his life. Bricker and Nash's relationship becomes troubled when Nash reveals that Eleanor Stier is pregnant with his child; Nash also behaves erratically and jealously around Bricker, and in the late 1960s, after the onset of his mental illness, Nash begins to send Bricker "disturbing" letters. Nasar suggests that the strain of his relationship with Nash causes Bricker to drop out of graduate school.

Amasa Forrester – Forrester and John Nash meet as graduate students at Princeton, later reuniting at a summer institute at the University of Washington in 1956. Forrester, like Nash, is eccentric, sharing Nash's "predilection for insult and one-upmanship." However, he is also "exceptionally sweet" and empathetic, qualities that may have drawn him to the troubled Nash. He is also openly homosexual, and it is likely that Nash and Forrester had a short affair while Nash was in Washington.

Paul Cohen – Cohen, an MIT instructor, is a "self-obsessed, suspicious, aggressive, and charming" mathematician who often engages Nash in competitions. Nash views himself as a mentor to Cohen, though he also drops hints about his attraction to Cohen. Later, some of Nash's colleagues blame Nash's mental breakdown on the "disappointed love" and "intense rivalry" between Nash and Cohen.

Jorgen Weibull –Weibull is a Swedish professor of economics at the University of Stockholm who proposes John Nash as a candidate for the Nobel Prize in Economics. Weibull also meets with Nash after Assar Lindbeck, the chairman of the Nobel Prize selection committee, expresses concern about Nash's mental state; after their meeting, Weibull becomes an "ardent advocate" for Nash.

Assar Lindbeck –In 1994, Assar Lindbeck—regarded as Sweden's most important economist—is the chairman of the committee for the Nobel Prize in Economics. Though Lindbeck is at first skeptical about John Nash's merits as a candidate for Nobel Prize (after Jorgen Weibull puts forward Nash's name), Lindbeck later suggests a three-way prize for achievements in game theory for Nash, John Harsanyi, and Reinhard Selten. He defends Nash against Ingemar Stahl's objections, believing that the Nobel Prize would help "lift [Nash] into daylight," relieving

some of the suffering he had faced because of his mental illness.

Ingemar Stahl –Stahl is a Swedish economics and law professor on the selection committee for the Nobel Prize in Economics who strongly objects to John Nash's winning the Nobel Prize. Stahl is a "brilliant debater" who is skeptical of game theory and concerned about Nash's reputation, given Nash's long hiatus from mathematics. Stahl makes inquiries about Nash's mental state, arguing that Nash is too unstable to handle the fame associated with becoming a Laureate. Ultimately, though, Assar Lindbeck and other members of the selection committee overrule Stahl's objections.

Albert Einstein –Arguably the most famous scientist of the 20th century, Einstein is a resident scholar at the Institute for Advanced Study while John Nash is a graduate student at Princeton (the Institute, while not affiliated with Princeton, is located near the university campus). Nasar draws numerous comparisons between Nash and Einstein, discussing their shared eccentricities and devotion to studying seemingly impossible problems. Nash and Einstein meet briefly while Nash is a graduate student; Nash shares an idea about "gravity, friction, and radiation" that he has been working on, and Einstein tells Nash that he "had better study some more physics."

MINOR CHARACTERS

George Mackey – Mackey is a Harvard professor and friend of John Nash who visits Nash in the hospital in the spring of 1959. Mackey expresses astonishment that Nash believes his paranoid delusions (about "extraterrestrials" sending him messages) to be true.

Norman Steenrod – Steenrod is a Princeton math professor who becomes John Nash's "sounding board" during Nash's years as a graduate student. Steenrod believes that Nash's ideas are "mathematically interesting and important"—a rare feat for a young graduate student.

Emil Artin – Emil Artin is one of the math faculty members at Princeton while John Nash is a graduate student there. He strongly opposes Nash's appointment as a professor at Princeton after he finishes his PhD, believing Nash to be "aggressive, abrasive, and arrogant."

David Gale – Gale is one of John Nash's fellow graduate students, with whom Nash collaborates on a game that becomes popular among the math students (which the two called "Nash" or "John").

John Williams – Williams is a member of the RAND think tank who helps to recruit mathematicians, including John Nash, for the organization, and oversees research operations there.

Donald Spencer – Donald Spencer is a Princeton math professor who helps John Nash to develop his theorem on manifolds, a type of geometric object.

Harold Shapiro – Harold Shapiro is a RAND mathematician John Nash works with in summer 1952.

Ruth Hincks – Hincks is a college friend of John Nash's sister, Martha, who travels with Nash, Martha, and John Milnor to Santa Monica in the summer of 1952. Nash tries to set Hincks and Milnor up, but their romance fizzles out.

Ervin Thorson – Thorson is an applied mathematician with whom John Nash develops a "special"—likely romantic—friendship in Santa Monica. Nash often referred to Thorson as "T" in letters in the late 1960s, more than a decade after they met, suggesting the lasting importance of their brief affair.

Jurgen Moser – Moser is a math faculty member at MIT with whom John Nash begins to collaborate in the late 1950s, forming an "intense" bond. Nash and Moser develop the "Nash-Moser theorem" together, combining Nash's method for embedding manifolds (a type of geometric object) with Moser's expertise in celestial mechanics.

Eugenio Calabi – Calabi is a graduate student in mathematics at Princeton during John Nash's years there, though he is not close friends with Nash. In 1959, Calabi delivers a lecture at MIT, attended by Nash, who begins to interrupt Calabi, making nonsensical comments; Calabi quickly realizes that Nash is mentally ill.

Emma Duchane – Emma Duchane is one of Alicia Nash's college friends at MIT who helps Alicia as Nash begins to unravel mentally, straining their marriage.

Robert Lowell – Robert Lowell was a famous poet who was hospitalized at McLean Hospital with John Nash in 1959. Lowell and Nash spend "a good deal of time" together at McLean; Lowell could often be found delivering "monologues" to other patients from Nash's room, while Nash stood by quietly.

Howard S. Mele – Mele is a psychiatrist at the Carrier Clinic, where John Nash is hospitalized in 1963. He plays an "important and positive role" in Nash's life, providing Nash with therapy sessions and overseeing his recovery.

John Harsanyi and Reinhard Selten – Harsanyi and Selten, both mathematicians who worked on game theory, were the co-recipients of the 1994 Nobel Memorial Prize in Economic Sciences, along with John Nash.

Eugen Bleuler – Bleuler was a Swiss psychiatrist who coined the term *schizophrenia*, the disease from which John Nash suffered, in 1908, to denote "a specific type of alteration of thinking, feeling and relation to the external world"—an illness often characterized by delusions and extreme personality changes.

TERMS

Game Theory Game theory is a field that centers around decision-making, interactions, and strategies among rational actors in competitive scenarios. The word "games" is used broadly, as the theory can be applied to all sorts of situations where people are trying to win or gain something. Nash becomes famous for his advances in game theory.

THEMES

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MENTAL ILLNESS, RECOVERY, AND THE QUEST FOR KNOWLEDGE

A Beautiful Mind is the biography of acclaimed mathematician John Nash, who suffers from fits of delusion that severely hamper his career as a mathematician. Nash experiences a meteoric rise to fame and develops what biographer Sylvia Nasar calls "one of the most influential ideas of the twentieth century," a crucial development in mathematical theory. Yet at the age of 30, he begins to experience severe schizophrenic episodes that derail his career. Nash is a driven and "compulsively rational," qualities that directly contribute to his excellence in mathematics: paradoxically, though, his desire to find order and meaning in the world, which makes him a great thinker, also makes him succumb to irrational thoughts that he believe will help him make sense of his own schizophrenic delusions. Ultimately, Nasar shows that Nash's mental illness is both at odds with and connected to his genius as an academic and his remarkable commitment to the pursuit of truth and knowledge: at different stages in his life, Nash's quest for meaning helps him to gain eminence as a scholar, lose control over his own mind, and ultimately recover his own reputation.

As Nash begins to collapse mentally, his performance as a mathematician suffers, and he seems to lose the characteristic that made him an outstanding scholar in the first place: his determined pursuit of truth and meaning. As a young academic, Nash is known for thinking unconventionally and defying accepted truths about mathematics. Game theory, the subject he helped to develop—a category of mathematical thought that analyzes interactions in competitions—was not a codified field until Nash's research, which linked key math concepts to economics and political decision-making. "Nash's faith in rationality and the power of pure thought was extreme, even for a very young mathematician," Nasar writes, describing Nash as shrewd, brilliant, and unafraid of challenging authority in his drive for knowledge.

Nash becomes a rising star in mathematics, stunning his peers and professors with his ground-breaking work as a PhD candidate at Princeton and an instructor at Massachusetts Institute of Technology (MIT), where he first begins to exhibit symptoms of schizophrenia. With the onset of his mental illness, though, Nash is no longer able to carry out the rigorous academic work he had become known for. He is distracted by writing incoherent and politically motivated letters, intense attacks of paranoia, and disruptive behavior at MIT. Though Nash is initially able to keep his mental illness from interfering with his academic life, his mask of normalcy quickly begins to slip. Seeking truth, reason, and meaning no longer seems important, overshadowed by his disorienting hallucinations. While presenting a paper on the Riemann Hypothesis, an important work of number theory, Nash begins spouting "lunacy" and is "laughed out of the auditorium," "scorned" by colleagues who believe that he has lost his abilities as a scholar. Nash's career is unexpectedly stalled by schizophrenia, throwing his life into disarray. His academic outputs have been the entirety of his life up until this point, but becoming mentally ill impacts his ability to focus on the pursuit of knowledge. Eventually, he loses his job at MIT and fades into obscurity.

At the same time that Nash's propensity for high-level, intelligent thinking—his attention to patterns, order, and finding higher meaning—serves his work, it compounds his mental illness. Even as he loses his grip on reality and, subsequently, his job as an academic, Nash's talents as a thinker continue to affect his life. Describing Nash's self-imposed exile in Geneva in 1959, Nasar notes that Nash grows obsessed with trying to obtain "refugee status" in order to free himself from the binds of American citizenship, since his delusions make him view America as a dangerous military state. Nasar argues that this fixation "mirrored his former pursuit of mathematical insights": his paranoid obsession with becoming a "refugee," and finding a place for himself outside of American society, parallels his obsession with finding meaning outside of conventional mathematical insights. However, Nash's obsession with leaving his American identity behind also marks his own separation from the world, a sealing-up of himself. In Europe, he is plunged into isolation and confusion. Moreover, Nash's delusions make him believe that he is "regarding a secret world that others around him were not privy to." While still an instructor at MIT, he begins to believe that **men in red neckties** around the MIT campus are signaling to him, extrapolating a "definite pattern" from his hallucinations—just as he had extrapolated patterns in his mathematical work. Nash's desire to understand the world by seeking out unique solutions and insights contributes directly to his paranoia and mental decline.

While Nash's talents as a thinker and knowledge-seeker in many ways compound his suffering, they also help him to find a

way out of the disorder of his own mind. As he begins to recover, Nash becomes the "Phantom of Fine Hall"—a nickname he receives for wandering the mathematics building (Fine Hall) at his alma mater, Princeton, where he settled after his mental breakdown. Here, he continues to try to make meaning out of the disordered world around him. Though many of his actions as the "Phantom" seem nonsensical, including writing strange messages on blackboards, he also writes mathematical equations and seems to be puzzling out different ideas, attempting to return to scientific thinking. Nash's delusions are, in Nasar's words, "conscious, painstaking, and often desperate attempts to make sense out of chaos." These attempts are both harmful—connected to uncontrollable, paranoid thinking—and profoundly restorative, helping to reconnect him to the world of academia. His return to Princeton, even as the "Phantom," eventually leads to the rediscovery of his work and his winning the Nobel Prize. Moreover, Nash credits his recovery from schizophrenia to the recovery of his own rationality and his commitment to separating truth from paranoid ideas: "it is a matter of policing one's thoughts, he has said, trying to recognize paranoid ideas and rejecting them."

Nasar's biography portrays Nash's life as cyclical, showing that his desire for knowledge, order, and meaning have always defined him, in both illness and health. Though standard narratives about mental illness often describe those who suffer from debilitating disorders like schizophrenia as having sacrificed their own identities, Nasar's narrative of Nash paints an image of a man who never loses his striking skills as a thinker. In fact, his "beautiful mind" may have been inseparable from his mental suffering, though it also proved redemptive.

GENIUS, MORALITY, AND RELATIONSHIPS

Throughout Nasar's biography, John Nash is portrayed as a wholly complicated figure. Though exceedingly intelligent in the world of academia, he lacks a sense of social awareness and is often cruel, commandeering, and downright uncaring to the people around him: his friends, family, and peers. In *A Beautiful Mind*, Nasar does not attempt to excuse or justify Nash's behavior. Instead, she suggests that while Nash was able to get ahead as a mathematician in part because of his intense aversion to sociality, his actions made his life much more difficult. In this way, Nasar resists the commonly accepted idea that individual genius transcends questions of morality and culpability.

Nasar notes that Nash's contemporaries find him "immensely strange," "aloof," "haughty," "cold," and "without affect." These are qualities Nash demonstrates throughout *A Beautiful Mind*, as he continually alienates those around him in order to focus on academic success, which he gains easily as a result of his own antisocial attitudes. Because Nash is not especially mindful of other people's opinions of him, he is able to resist authority and become a fiercely independent thinker, seeking out contrarian answers to problems and criticizing others' approaches and ideas: "When he focused on some new puzzle, he saw dimensions that people who really knew the subject [...] initially dismissed as naïve or wrongheaded. Even as a student, his indifference to others' skepticism, doubt, and ridicule was awesome." Instead of deferring to the judgments of more established mathematicians, Nash "thumbed his nose at the received wisdom, current fashions, established methods," confidently following his own path—and receiving accolades for his work as a result.

Throughout *A Beautiful Mind*, Nasar painstakingly details the negative consequences of Nash's difficult personality: his childhood as a loner, his alienation in college (where his new peers "found him weird and socially inept"), and his contemptuous attitude toward even those who are friendly to him. However, Nasar argues that Nash succeeds at Princeton because of its intensely competitive academic atmosphere. At Princeton, Nash's often nasty, intensely supercilious, and downright immoral behavior make him a kind of alpha male. He is not concerned with others' feelings—or even his own—and is thus able to channel all of his energy into succeeding as a mathematician.

Yet even as Nasar shows that Nash's success and genius are tied to his negative personality traits, she also depicts Nash as an individual whose life is undone not only by mental illness, but also by his own thoughtless actions, highlighting that his genius does not alleviate him of his own personal problems and struggles with morality. For one, Nash's troubled relationship with Eleanor Stier, a woman he meets while working at MIT, results in a troubled relationship with his and Eleanor's son, John David Stier—one that Nash is never able to fully salvage, even after his remission from schizophrenia, since he effectively abandoned Eleanor and his son. In a cruelly ironic twist, while in the throes of mental illness, Nash is abandoned by essentially all of his friends and family members, save for his mother, Virginia, and his wife, Alicia. Nash's personality, viewed as troublesome and eccentric even before his illness, means that few people take his suffering seriously. Even fewer hope to help him, given the extent of his alienating behavior as a student and junior academic. Nasar portrays Nash in his "Phantom of Fine Hall" phase as a man left utterly to his own devices, cast out by family and old Princeton colleagues.

Though Nash's reputation is redeemed after he wins the Nobel Prize for his work on game theory, Nasar is careful to explain that he continues to live a life "full of regrets." Nash attempts to reconcile with those around him, including his son with Alicia, Johnny, who also suffers from schizophrenia. Yet reconciliation proves intensely difficult, given the damage he inflicted on these relationships as a younger man. Nash's "immediate future is uncertain," Nasar writes, referring to his precarious mental state but also to his emotional life. Nasar argues that Nash's

great achievements, both early and late in his career, cannot fully make up for the relationships he strained or lost, suggesting that genius cannot transcend the consequences of loss and personal conflict. Nasar also suggests that as Nash seeks to improve his relationships with others, he has focused less intensely on his research: "he may be less than he was intellectually, he may never achieve another breakthrough, but he has become a great deal more than he ever was." Thus, while genius and eccentric, antisocial behavior may be linked—Nasar compares Nash to other troubled geniuses like Einstein and Kafka throughout the biography—extreme intelligence does not make up for failures of emotion and interpersonal connection, and ultimately, it is not more important than stable relationships with others.

As Nasar represents Nash's path from eccentric combativeness to mental collapse to recovery and redemption, she uses Nash as a key example to debunk the myth that genius somehow justifies immoral or antisocial behavior. Nash is now a better person, she contends, though he has lost the intensely competitive spirit of animosity that helped him to achieve genius in the first place. His personal development is ultimately more important than his status as an academic icon, and he is now content to live a "quiet life," focusing on relationships instead of his own narrow-minded pursuit of intellectual success.

LOVE, DESIRE, AND THE IMPACT OF HIDDEN LIVES

A major part of Nash's story remains more or less hidden in accounts of his life outside of *A Beautiful Mind* (including the popular film adapted from the book). Nash was likely a closeted bisexual who had turbulent relationships with both men and women. He kept this side of his identity somewhat concealed, though his involvement in the mostly male academic world produced some complicated affairs with other men. However, he was unable to keep his desires completely under wraps. While working as a consultant for RAND, a military think tank, he is arrested in a police raid targeting homosexual men cruising others (seeking out sex partners) in public bathrooms. In a parallel thread of narrative, Nasar details the hidden life of Alicia, Nash's wife and a brilliant scientist in her own right. Alicia's own career was significantly overshadowed by her husband's achievements and spectacular mental collapse. Yet Alicia Nash becomes her husband's savior, caring for him even after they divorce, when he lives as a boarder in her house in Princeton (the two later remarried). Through these two distinct but thematically similar currents in Nash's story, Nasar emphasizes that private, hidden lives have a way of inevitably affecting public lives and highlights the power of love and desire—which often lead people to hide or sacrifice parts of their lives in the first place.

Though Nasar notes that Nash "did not think of himself as a homosexual," he often expresses his homosexual desires in subtle ways, revealing his "private self" to the men who become the objects of his affection. The most notable of these is Jack Bricker, a graduate student at MIT who captures Nash's attention when they meet in 1952. Nash and Bricker "made no secret of their affection, kissing in front of other people" and maintaining a "secret friendship"; Nash describes his relationship with Bricker as "one of three 'special friendships' in his life." At the same time, though, Nash begins to date Eleanor Stier, a nurse whom he views as a more societally acceptable match. Nash realizes that openly engaging in relationships with men will make him even more of a social pariah. Yet Nash never commits to marrying Eleanor, even when she becomes pregnant, likely because of his strong feelings for Bricker. Nash writes that "he experience of loving and being loved" by Bricker "subtly altered Nash's perception of himself and the possibilities open to him," though he also viewed the relationship as incompatible with his desires for fatherhood, family, and normalcy.

Despite their public displays of affection, Nash and Bricker's relationship ultimately crumbles, and he turns back to Eleanor, abandoning Bricker and quashing the bisexual desires he had experienced so strongly. But shortly thereafter, Nash is arrested in California, charged with "indecent exposure" in a men's bathroom. Though this is part of a police set-up, Nasar suggests that Nash was indeed attempting to solicit men for sex, unable to repress his sexuality. In the end, Nash cannot keep his mostly private desires from interfering with his public life, despite his best attempts. This hidden part of his identity proves too powerful.

Similarly, Alicia Nash's hidden role as Nash's behind-the-scenes caretaker and supporter greatly impacts his public life, helping to restore him to health, and to academic prominence, after his mental collapse. Though Nasar implies that Alicia was mostly invisible to those around Nash because of the countless sacrifices she made for her husband and family, she also shows that Alicia was indispensable to her husband's recovery, and that her love for him was powerfully influential.

Nash and Alicia meet at MIT, where he is an instructor and she is an undergraduate student. Nash "was the closest thing to royalty" to Alicia as a student, and despite his slightly aloof manner, she finds him and his intellect irresistible. Alicia becomes determined to woo her teacher, but her relationship with Nash proves to be her undoing: this "romantic girl [...] would most agonizingly disappear in just a few years" after meeting Nash, subsumed by the crushing impact of his mental illness. Alicia and Nash marry, and Alicia becomes pregnant shortly after Nash begins experiencing severe schizophrenic episodes. As Nash grows more emotionally distant and turbulent, "her starry-eyed view of her new life" as Nash's wife "gives way to a darker, more somber perspective." Alicia's love for Nash leads her to sacrifice her own job as a scientist to take

care of Nash and prevent him from doing harm to himself or others. Alicia manages to "hide her fear" about her life with Nash from her friends and confidants, becoming mostly invisible: she sacrifices her life for the sake of his well-being.

Though Nash and Alicia divorce after his mental collapse, Alicia offers to let him live with her in Princeton in 1970, since she is "moved by the conviction that she had something more to offer Nash than physical shelter." Alicia is convinced that living in Princeton, in an academic community, will do Nash well. "Moved by a very personal and direct identification with his suffering," Alicia feels strongly about helping Nash, despite the aggression he has shown her in the past during his worst schizophrenic breaks. Nasar credits Alicia with healing Nash, since she provides him with a kind of sanctuary as he begins to recover. Alicia is gentle but encouraging and firm, helping Nash to find a comfortable home in Princeton and likely saving him from homelessness. Living in Princeton allows Nash to reengage with intellectual life, eventually leading to the rediscovery of his seminal work on game theory.

By focusing closely on Alicia's side of the story, Nasar restores her to a position of importance and emphasizes the redemptive power of love and desire. Alicia's love for Nash leads directly to his recovery, and though she often seemed invisible, Nasar insists that Alicia played a central role in his survival. Though Nash's romantic relationships with other men are not as positive overall as his relationship with Alicia, Nasar underscores the importance of both of these hidden parts of Nash's life. Nash is an aloof, highly rational individual who nonetheless experiences the profound effects—both positive and negative—of love and desire and whose private life influences his public identity.

SYMBOLS

Symbols appear in **teal text** throughout the Summary and Analysis sections of this LitChart.

THE NASH EQUILIBRIUM

In *A Beautiful Mind*, mathematical ideas—especially the "Nash equilibrium," Nash's most important contribution to game theory—come to represent Nash's own independent identity, his competitive and often vindictive spirit, and his self-interested approach to life. Nash becomes famous for his advances in game theory, a field dedicated to decision-making, interactions, and strategies among rational actors in competitive scenarios. Game theory applies the idea of "games" broadly, studying negotiations in various situations in which individuals are attempting to win, make a profit, or otherwise gain something. In his own life, Nash is intensely competitive, often challenging other mathematicians to "games." He also develops rivalries with his colleagues and strategizes about how best to one-up his opponents or exploit others for his own benefit. Additionally, Nash often uses the language of mathematics to explain himself and his own relationships. In a letter, he describes himself as a "singularity," a special point around which "variables," other people, are arranged—a comparison that speaks powerfully to his own narcissism. Indeed, as a younger man, Nash's relationships were unbalanced. He views himself as superior to his romantic interests, considering his own needs, or "payoffs," before theirs. Alicia, Nash's wife, sacrifices her own life for him, sparing no cost to help him recover from the devastating effects of schizophrenia; he rarely acknowledges her efforts.

Yet for all of his arrogance, Nash also longs for human connection. He wishes to love and be loved, in spite of his flaws, and the Nash equilibrium might be seen as a symbol for the kind of life he eventually learns to lead. In a Nash equilibrium between two players in a game, neither player can improve their strategies; they have both made the best decisions possible to them, and they share the payoff. As Nash slowly begins to return to society after years of suffering from schizophrenic delusions that severed his connection to reality, he realizes the error of his ways, and he attempts to make amends with those he has wronged, including Alicia. Nash acknowledges the importance of caring for those who have cared for him, and he comes to value love over rivalry and competition. By the end of *A Beautiful Mind*, Alicia and Nash are living together in a kind of harmony, an "equilibrium": they take care of each other and their son, Johnny, sharing the "payoff" of this life—happiness.

MEN IN RED NECKTIES

As Nash begins to unravel mentally, he believes that "men in red neckties" are following him around the MIT campus, tracking his movements and interactions with others. The men in red neckties carry two layers of symbolic significance in the book. Firstly, they highlight how fear and paranoia don't often spontaneously emerge but are instead feelings that are rooted in reality. Although these men in neckties are only paranoid delusions—figments of Nash's imagination, which schizophrenia has forced into overdrive—Nash is deeply fearful of them, and as he begins to worry that the government is surveilling him, he writes nonsensical letters to government officials, attempting to put a stop to the "surveillance." Nash's paranoia is grounded in reality. In the 1950s, the U.S. government tracked down and arrested many academics accused of spying for the Soviet Union, including several MIT professors who had been active members of the Communist Party. Though Nash was not a communist, his mentor at MIT, Norman Levinson, is questioned and treated with suspicion; Nash himself begins to feel worried about the government's "witch hunt."

The men in red neckties also speak to the way that Nash's mental illness was in many ways compounded by his own experiences and unique skills as a thinker. As a mathematician, Nash sought to find patterns in the notoriously difficult math problems he researched, discovering meaning, order, and solutions where other mathematicians saw only chaos. By imagining these men in red neckties and attempting to understand patterns in their movements, Nash demonstrates the very skills that made him a great mathematician. The men might therefore be seen as a symbol for Nash's obsession with "patterns," which contributed to both his skills as a mathematician and his own mental deterioration. Ironically, Nash's schizophrenia is heightened by his own powers of mind; the mental illness wreaks havoc on his life, forcing him to quit his job as a professor and straining his relationships with friends and family.

QUOTES

Note: all page numbers for the quotes below refer to the Simon & Schuster edition of *A Beautiful Mind* published in 1998.

Prologue Quotes

❝ No one was more obsessed with originality, more disdainful of authority, or more jealous of his independence. [...] In almost everything [Nash] did—from game theory to geometry—he thumbed his nose at the received wisdom, current fashion, established methods. [...] Nash acquired his knowledge of mathematics not mainly from studying what other mathematicians had discovered, but by rediscovering their truths for himself.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 12

Explanation and Analysis

John Nash, the subject of Sylvia Nasar's biography *A Beautiful Mind*, stands out as a mathematician because of his profoundly "independent" nature. Whereas other mathematicians seek to collaborate with others, building on the work of established scholars, Nash prefers to return to problems that established mathematicians haven't been able to solve—discovering insights that they might have missed by looking back over their work and coming up with new methods for solving these complex problems. While Nash's independence makes him a daring and highly original thinker, it is also a fatal flaw. For much of his life and career, Nash finds himself unable to relate to others, to take their ideas seriously or respect their own perspectives. This attitude wreaks havoc on his relationships with friends, family, and colleagues, many of whom he treats with disparagement and even indifference (a dynamic that begins to shift after his recovery from schizophrenia). In other words, Nash's genius is as much a hindrance to his personal life as it is a source of his own success as a mathematician.

❝ He was beguiled by the idea of alien races of hyper-rational beings who had taught themselves to disregard all emotion. Compulsively rational, he wished to turn life's decisions—whether to take the first elevator or wait for the next one, where to bank his money, what job to accept, whether to marry—into calculations of advantage and disadvantage, algorithms or mathematical rules divorced from emotion, convention, and tradition. Even the small act of saying an automatic Hello to Nash in a hallway could elicit a furious "Why are you saying hello to me?"

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 12-13

Explanation and Analysis

In this passage, Nasar begins to flesh out the idea that Nash's intellectual and private life are tightly intertwined, especially prior to his struggles with schizophrenia. For Nash, every decision in life can be examined through a mathematical, rational lens—even decisions that seem wholly uninteresting and unimportant (like which elevator to get into) or decisions that seem like they should be guided by one's emotions rather than cold and austere "algorithms or mathematical rules," like whether or not to get married.

This passage also begins to introduce Nash as a brilliant, albeit abrasive, figure. Far from being an agreeable colleague, Nash appears short-tempered, brash, and very much lost in the "Compulsively rational" world of his own mind. The word "Compulsively" here has a negative connotation, implying that this is a habit that Nash can't turn off—even once he's outside of an academic research context. As the book goes on to show, a life lived with this kind of compulsive rationality that tries to do away with "emotion, convention, and tradition" is a one-dimensional,

unsatisfying life. And as Nash comes to learn at the end of the book, empathy, love, and human connection are what make life rich and satisfying—and the only things that can outpace professional prestige

❝ Underneath the brilliant surface of [Nash's] life, all was chaos and contradiction: his involvements with other men; a secret mistress and a neglected illegitimate son; a deep ambivalence toward the wife who adored him, the university that nurtured him, even his country; and, increasingly, a haunting fear of failure. And the chaos eventually welled up, spilled over, and swept away the fragile edifice of his carefully constructed life.

Related Characters: Sylvia Nasar (speaker), Alicia Larde (Alicia Nash) , John David Stier, Eleanor Stier , John Forbes Nash Jr.

Related Themes:

Page Number: 16

Explanation and Analysis

Though on the surface, John Nash seems extraordinary—he's a gifted mathematician with a PhD from Princeton and a young professor who conducts groundbreaking research and makes remarkable discoveries in his early 20s—these accomplishments obscure the "chaos" of his life behind the scenes. In addition to his crushing perfectionism (his "haunting fear of failure"), Nash feels alienated from others, which leads him to make selfish decisions that greatly affect the lives of those around him: namely, his mistress, his illegitimate son, and his wife. Throughout *A Beautiful Life*, Sylvia Nasar shows that Nash's genius does not outweigh his many flaws and failures as an individual. His inability to form lasting relationships with others has serious consequences, since after he begins to experience schizophrenic episodes, most of the people around him basically abandon him. By comparing Nash to other troubled intellectuals, such as Albert Einstein and Franz Kafka, Nasar suggests that in the supposedly "beautiful" minds of many geniuses, "chaos and contradiction" actually reign supreme.

Chapter 5 Quotes

❝ Nash was always on the lookout for problems. "He was very much aware of unsolved problems," said Milnor. "He really cross-examined people on what were the important problems. It showed a tremendous amount of ambition." In this search, as in so much else, Nash displayed an uncommon measure of self-confidence and self-importance. On one occasion, not long after his arrival at Princeton, he went to see Einstein and sketched some ideas he had for amending quantum theory.

Related Characters: Sylvia Nasar (speaker), Albert Einstein , John Milnor, John Forbes Nash Jr.

Related Themes:

Page Number: 69-70

Explanation and Analysis

At Princeton, where Nash is a graduate student in mathematics, Nash begins to develop a knack for addressing and solving notoriously difficult "unsolved problems." These include the Riemann Hypothesis, on the distribution of prime numbers, and a theorem for embedding manifolds, a type of geometric object that can be fit into certain spatial dimensions. Throughout his career, Nash comes to define himself as a thinker capable of finding elegant solutions to problems that generations of mathematicians have been unable to solve. He is motivated by a desire to achieve the impossible and to become as famous as other scientific stars, including Albert Einstein (whom Nash briefly encounters at Princeton). Yet this desire to prove the impossible possible leads Nash to develop an inflated sense of self, and he develops a reputation as an egotistical, arrogant, and sometimes misguided young scholar—a reputation that later causes problems in his career, overshadowing his own skills as an academic.

❝ Nash was choosy about whom he would talk mathematics with. […] "You couldn't engage him in a long conversation. He'd just walk off in the middle. Or he wouldn't respond at all. I don't remember Nash having a conversation that came to a nice soft landing. I also don't remember him ever having a conversation about mathematics. Even the full professors would discuss problems they were working with."

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 72

Explanation and Analysis

In this passage, Nasar explains how Nash is "choosy" about who he interacts with at Princeton, especially when it comes to talking about mathematics and current work. This quote emphasizes that, far from being a champion of comradery or an advocate of teamwork, Nash prefers to work alone during his time at Princeton. That none of his conversations "came to a nice soft landing" also points more generally to his abrasive, awkward nature in social settings—despite his brilliant mind, Nash struggles with forming social bonds, often seeing himself as superior to his peers and setting himself apart from them as a result. It isn't until the end of *A Beautiful Mind*—when Nash is in recovery from schizophrenia—that he begins to develop real empathy for and interest in other people. But at this point in his life, prior to having those experiences with his mental health that will humble him, Nash is arrogant and rude, with little patience for or interest in anyone.

Chapter 10 Quotes

❝ Today, Nash's concept of equilibrium from strategic games is one of the basic paradigms in social sciences and biology. […] Like many great scientific ideas, from Newton's theory of gravitation to Darwin's theory of natural selection, Nash's idea seemed initially too simple to be truly interesting, too narrow to be widely applicable, and, later on, so obvious that its discovery by *someone* was deemed all but inevitable. […] Its significance was not immediately recognized, not even by the brash twenty-one-year-old author himself.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Related Symbols:

Page Number: 98

Explanation and Analysis

Nash's most famous mathematic discovery, the "Nash equilibrium," describes a scenario in a competitive situation between two rational actors (or "game players," in the parlance of game theory) in which neither actor is able to improve their position in the situation, or reap more of a benefit than the other actor. The brilliance of Nash's equilibrium idea lies in its deceptive simplicity: by recognizing that noncooperative games could have stable solutions, Nash addressed a problem that few other mathematicians would have found interesting or valuable. Although this idea would have seemed fairly intuitive to any scholar of game theory (a field that Nash himself pioneered), it was one that had not been proposed by any mathematician prior to Nash. Nash's genius was his ability to find elegant solutions with wide applications: his work on game theory would come to redefine central tenets in the field of economics.

Chapter 17 Quotes

❝ In this circle [at MIT], Nash learned to make a virtue of necessity, styling himself self-consciously as a "free thinker." He announced that he was an atheist. He created his own vocabulary. He began conversations in midstream with "Let's take this aspect." He referred to people as "humanoids."

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 143

Explanation and Analysis

At the Massachusetts Institute of Technology, where Nash becomes an instructor in the early 1950s, Nash develops a reputation as a strikingly independent and eccentric figure on campus. Nasar suggests that Nash's persona is a conscious performance, calibrated to give off an impression of brashness: many other students and professors at MIT are similarly eccentric, since a "lack of social graces was considered part and parcel of being a real mathematician." Yet Nash's careful performance of eccentricity often tips over into arrogance and alienates him from students and other faculty members. Nash becomes notorious for his exhibitionistic displays of bravado, and he often engages others in public math competitions that turn nasty and aggressive. Later, some of his friends and colleagues will fail to notice that Nash is experiencing schizophrenic episodes, since his delusions cause him to exhibit behavior that is only somewhat more peculiar than his typical behavior.

Chapter 20 Quotes

There is no way of knowing what enables one man to crack a big problem while another man, also brilliant, fails. Some geniuses have been sprinters who have solved problems quickly. Nash was a long-distance runner. [...] He went into a classical domain where everybody believed that they understand what was possible and not possible. [...] His tolerance for solitude, great confidence in his own intuition, indifference to criticism—all detectable at a young age but now prominent and impermeable features of his personality—served him well.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 160

Explanation and Analysis

In this passage, Nasar explores the specific qualities that make Nash an exceptional thinker, going beyond simply labeling him as a genius. Though many of Nash's characteristics—namely, his fierce independence, "indifference to criticism," and supreme self-confidence—create rifts between himself and his peers, these very qualities also help him to crack seemingly impossible math problems. Whereas other mathematicians focus on quick, flashy puzzles, Nash has a temperament uniquely suited to thinking through complicated problems with equally complicated methods. (As John Milnor says in Chapter 5, "[John Nash] was very much aware of unsolved problems"—in other words, Nash seeks out problems that are long-winded, complex, and notoriously unsolved). During his career, Nash's eccentric approaches prove effective, but they also make him somewhat of a pariah in the mathematics world: few other mathematicians can relate to him and his techniques. With this, Nasar begins to flesh out the idea that Nash's genius doesn't abdicate him of responsibility for his moral failings.

Chapter 21 Quotes

More than a decade later, when he was already ill, Nash himself provided a metaphor for his life during the MIT years, a metaphor that he couched in his first language, the language of mathematics [...] The equation represents a three-dimensional hyperspace, which has a singularity at the origin, in four-dimensional space. Nash is the singularity, the special point, and the other variables are people who affected him—in this instance, men with whom he had friendships or relationships.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 167-168

Explanation and Analysis

Throughout *A Beautiful Mind*, Nasar uses excerpts from Nash's own letters to show that Nash often thought about his life, and his relationships with the men with whom he became romantically involved, in terms of mathematics. Math is arguably the most important part of Nash's life—a veritable obsession as well as a career—and it makes sense that he would use this aspect of his life as a means of understanding his own relationships with others, which he often finds difficult to handle maturely. Indeed, Nash's "singularity" comparison shows that he thinks of himself as superior to or more important than the men in his life, who are only "variables" to him. Nash has a tendency to treat his friends, family members, and love interests as expendable, demonstrating indifference and even cruelty toward them. Only later in his life, once he has lost nearly everything to schizophrenia, does he come to realize the importance of empathy and mutual respect, love, and kindness.

Chapter 23 Quotes

Nash displayed a rather curious inconsistency in his attitude and behavior toward his son. At the time of his birth, he had reacted in neither of the ways one might have expected of a young man confronted with the pregnancy of a woman with whom he has recently begun sleeping, eschewing both the high road that would have led to a shotgun wedding, as well as the more commonly elected low road of flat-out denying his paternity and simply vanishing from his girlfriend's life. He doubtless behaved selfishly, even callously [...] But...it is natural to conclude that Nash, like the rest of us, needed to love and be loved, and that a tiny, helpless infant, his son, drew him irresistibly.

Related Characters: Sylvia Nasar (speaker), John David Stier, Eleanor Stier , John Forbes Nash Jr.

Related Themes:

Page Number: 179

Explanation and Analysis

A Beautiful Mind examines many of the "curious inconsistencies" and contradictions in Nash's personality,

showing that Nash's mind, though "beautiful" in its genius, was also deeply troubled and full of strange paradoxes. One of these paradoxes is Nash's behavior toward his newborn son with Eleanor Stier, a woman with whom he is briefly involved while he is an instructor at MIT. Though Nash does not claim to be the father on his son's birth certificate, he also does not deny his paternity. Likewise, although he behaves selfishly—failing to help Eleanor when she needs him most—he also displays a real tenderness toward his son and even seems proud to be a father. In other words, Nash is alternately callous and loving towards the people in his life. Indeed, throughout *A Beautiful Mind*, Sylvia Nasar shows that beneath Nash's cold and even cruel demeanor lies a fierce desire "to love and be loved." Ultimately, it is love that redeems Nash, since his wife Alicia's loving sacrifices help him to recover after a sequence of devastating schizophrenic episodes.

Chapter 26 Quotes

❝ Despite Alicia Larde's crush [on Nash], which seemed to have erased the earnest student of science, she was playing a serious game. Her romantic dreams of becoming a famous scientist herself hadn't survived the harsh reality test provided by MIT. As she put it later, "I was no Einstein." Pragmatically, she recognized that marriage to an illustrious man might also satisfy her ambitions. Nash seemed to fit the bill.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr., Alicia Larde (Alicia Nash)

Related Themes:

Page Number: 197-198

Explanation and Analysis

In *A Beautiful Mind*, Sylvia Nasar gives a voice to the woman behind John Nash: his wife, Alicia Nash, who rarely shares the spotlight with her famous husband throughout their marriage. Though Nasar shows that Alicia is an intelligent, gifted, and independent woman—a member of one of the first generations of American women scientists—she also describes the young Alicia as a "pragmatist" who believes that marriage to an "illustrious man" might be her ticket to a happy, successful life. Tragically, Alicia's marriage to Nash is not happy: shortly after they marry, Nash begins experiencing severe schizophrenic episodes, and the two eventually divorce. Yet Alicia's "hero worship" of Nash—her intense devotion to him—leads her to sacrifice her own happiness and security for his well-being, giving up her own career ambitions in order to help him recover from his mental illness. Alicia's deep and enduring love for Nash nearly ruins her own life, but she cares for him nonetheless, demonstrating a kind of empathy and generosity that Nash himself doesn't possess until much later in his life.

Chapter 34 Quotes

❝ [Nash] began, he recalled in 1996, to notice men in red neckties around the MIT campus. The men seemed to be signaling to him. "I got the impression that other people at MIT were wearing red neckties so I would notice them. As I became more and more delusional, not only persons at MIT but people in Boston wearing red neckties [would seem significant to me]." At some point, Nash concluded that the men in red ties were part of a definite pattern.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Related Symbols:

Page Number: 242

Explanation and Analysis

As an instructor at MIT, the Massachusetts Institute of Technology, in the late 1950s, Nash begins to experience severe schizophrenic episodes, which lead him to imagine things that do not exist. In this passage, "men in red neckties" appear around the MIT campus and the city of Boston, apparently flashing secret signals at him. Throughout *A Beautiful Mind*, Nasar emphasizes how Nash's mental illness is compounded by his own gifts as a scholar: as a mathematician, he has a knack for finding "patterns," unique insights and meaning, where other mathematicians can see only chaos and confusion. However, Nash's persistent desire to find "patterns" in the world is precisely what leads him to believe that the imaginary men have some kind of real purpose, though they are only delusions. As Nash begins to unravel mentally, he finds it more and more difficult to distinguish fact from fiction, since the fictions his mind invents seem to have "patterns" in them for him to examine.

Chapter 38 Quotes

Nash's lifelong quest for meaning, control, and recognition in the context of a continuing struggle, not just in society, but in the warring impulses of his paradoxical self, was now reduced to a caricature. Just as the overconcreteness of a dream is related to the intangible themes of waking life, Nash's search for a piece of paper, *a carte d'identité*, mirrored his former pursuit of mathematical insights.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 274

Explanation and Analysis

In *A Beautiful Mind*, Sylvia Nasar continually relates Nash's mathematical pursuits to his experiences as an individual suffering from a debilitating mental illness, showing that mental acuity and mental illness can exist side by side instead of being mutually exclusive. As Nash begins to experience schizophrenic episodes, his tenacious pursuit of "meaning, control, and recognition"—which makes him such a powerful force in the mathematical world—is transformed into the pursuit of "a piece of paper": overcome by paranoia and lost in his delusions, Nash hopes to obtain refugee status in Europe, shedding his former identity as an American. Nasar shows that even as he loses his grasp on reality, Nash never loses his "quest for meaning, control, and recognition," which are all fundamental parts of his personality. Instead, this "quest" leads him to behave in strange, erratic ways. With this, Nasar paints Nash in a nuanced light, portraying him as a man with a "beautiful," albeit deeply troubled, mind.

Chapter 41 Quotes

A man experiencing a remission of a physical illness may feel a renewed sense of vitality and delight in resuming his old activities. But someone who has spent months and years feeling privy to cosmic, even divine, insights, and now feels such insights are no longer his to enjoy, is bound to have a very different reaction. For Nash, the recovery of his everyday rational thought processes produced a sense of diminution and loss. The growing relevance and clarity of his thinking, which his doctor, wife, and colleagues hailed as an improvement, struck him as a deterioration.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 295

Explanation and Analysis

Though Nasar draws comparisons between physical illnesses and mental illnesses throughout *A Beautiful Mind*, showing that both types of diseases can be powerfully debilitating, Nasar also outlines a key difference between these maladies: mental illnesses such as schizophrenia can cause individuals to feel "heightened," even euphoric, by creating powerfully intricate, intoxicating delusions. So unlike those who recover from a physical illness and "feel a renewed sense of vitality and delight in resuming [their] old activities," Nash has difficulty recovering his "everyday rational thought processes" because the fictions his mind has invented are "divine," seductive, and strangely compelling. By contrast, then, reality feels mundane, empty, and lifeless by comparison.

In detailing the "cosmic, even divine" nature of Nash's delusions, this passage suggests that the title of *A Beautiful Mind* applies to Nash's mind in its state of rational genius *and* when it's in the throes of schizophrenia. In this way, Nasar presents a more nuanced picture of mental illness and of Nash himself.

Chapter 44 Quotes

In particular, although Nash later referred to his delusional states as "the time of my irrationality," he kept the role of the thinker, the theorist, the scholar trying to make sense of complicated phenomena. He was "perfecting the ideology of liberation from slavery," finding "a simple method," creating "a model" or "a theory."

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 325-326

Explanation and Analysis

Nasar again shows that Nash often thought about different aspects of his life—including his "delusional states"—in terms of mathematics, comparing his intellectual pursuits to his relationships with others. Just as Nash the mathematician searched for new "methods," "models," and "theories" in the academic world, seeking out patterns among "complicated phenomena," as Nash begins to experience schizophrenic

episodes, he searches for meaning in these episodes. Yet as Nash unravels mentally, he becomes more and more frustrated: there are no explanations to be found in his delusions, since they are only imaginary—the product of deeply disordered thoughts.

At the same time, Nash's skills as a "thinker," "theorist," and "scholar" trying to make sense of the world are ultimately what help him to recover from schizophrenia (along with support from Alicia), since he begins to consciously separate out fact from fiction, attempting to use logic to restore his connection to reality and rationality.

Chapter 49 Quotes

❝ The prize itself was a long-overdue acknowledgment by the Nobel committee that a sea change in economics, one that had been under way for more than a decade, had taken place. As a discipline, economics had long been dominated by Adam Smith's brilliant metaphor of the Invisible Hand. Smith's concept of perfect competition envisions so many buyers and sellers that no single buyer or seller has to worry about the reactions of others. […] But in the world of megamergers, big government, massive foreign direct investment, and wholesale privatization, where the game is played by a handful of players, each taking into account the others' actions, each pursuing his own best strategies, game theory has come to the fore.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 374-375

Explanation and Analysis

Though *A Beautiful Mind* is a biography of one man, the mathematician John Nash, it can also be seen as a broader exploration of the field that he pioneered: game theory, a field with connections to both math and economics. In short, game theory focuses on the decision-making, interactions, and strategies that color any situation where individuals are trying to win, profit, or gain something. In this passage, Nasar shows that Nash's innovations in game theory, which earned him a Nobel Prize in 1994, were influential in ways that Nash himself could hardly have envisioned. Game theory would help to describe the state of modern economies in the late 20th century, a "world of megamergers, big government, massive foreign direct investment, and wholesale privatization," all situations in which different "players" (such as businesses, government entities, and investors) compete for resources based on the actions of other "players." Nash's discoveries were both groundbreaking and strangely prescient—hence why he received the Nobel 50 years after he made most of his discoveries.

Chapter 50 Quotes

❝ It is a life resumed, but time did not stand still while Nash was dreaming. Like Rip Van Winkle, Odysseus, and countless fictional space travelers, he wakes to find that the world he left behind has moved on in his absence. The brilliant young men that were are retiring or dying. The children are middle-aged. The slender beauty, his wife, is now a mature woman in her sixties. And there is his own seventieth birthday fast approaching. […] The Nobel cannot restore what has been lost.

Related Characters: Sylvia Nasar (speaker), John Charles Martin Nash (Johnny) , John David Stier, Alicia Larde (Alicia Nash) , John Forbes Nash Jr.

Related Themes:

Page Number: 381

Explanation and Analysis

One of the most tragic effects of Nash's schizophrenia is his loss of almost 30 years of his life. During those three decades, Nash was too ill to work on research, interact with friends and family, even to develop any memories, leaving a significant hole in his life. Though Nash's Nobel Prize proves the value of his research and genius, it cannot make up for the pain that he continues to feel: he has been forced to reckon with the damage his behavior caused to his family and to admit that he may never again achieve the kinds of brilliant mathematical insights he achieved as a much younger scholar. Throughout *A Beautiful Mind*, Nasar shows that schizophrenia humbled the formerly arrogant, overconfident Nash, but she is also careful to show that the illness proved incredibly detrimental to his life, career, and feelings of self-worth: positive and negative consequences exist side by side.

❝ The truth, however, is that the research has not been the main thing in [Nash's] present life. The important theme has been reconnecting to family, friends, and community. This has become the urgent undertaking. The old fear that he depended on others and that they depended on him has faded. The wish to reconcile, to care for those who need him, is uppermost.

Related Characters: Sylvia Nasar (speaker), Alicia Larde (Alicia Nash) , John Forbes Nash Jr.

Related Themes:

Page Number: 383

Explanation and Analysis

Though Nash, recovering from schizophrenia, will never be able to conduct the kind of groundbreaking research he became famous for as a young mathematician, he no longer feels that research is his top priority in life. Nash's struggles with schizophrenia have profoundly changed him as a person, showing him, for the first time in life, the value of strong, empathetic relationships with others. Relationships, after all, are largely what helped him to recover from schizophrenia: Alicia, as well as many of Nash's former colleagues, made enormous sacrifices to help Nash. Now, Nash seems determined to show the same empathy to others that they showed to him, and he is no longer fearful of others depending on him (as he was with Eleanor and his first-born son, John David Stier, whom he virtually abandoned). Ultimately, Nash seems to come to the conclusion that genius may fade and careers may fall away, but love remains.

"The extraordinary journey of this American genius, this man who surprises people, continues. The self-deprecating humor suggests greater self-awareness. The straight-from-the-heart talk with friends about sadness, pleasure, and attachment suggests a wider range of emotional experiences. The daily effort to give others their due, and to recognize their right to ask this of him, bespeaks a very different man from the often cold and arrogant youth. [...] In deed, if not always in word, Nash has come to a life in which thought and emotion are more closely entwined, where getting and giving are central, and relationships are more symmetrical.

Related Characters: Sylvia Nasar (speaker), John Forbes Nash Jr.

Related Themes:

Page Number: 388

Explanation and Analysis

At the end of *A Beautiful Mind*, Nasar does not attempt to prove that Nash has suddenly become a "perfect," totally reformed individual following his recovery from schizophrenia; instead, she highlights the ways in which he still struggles to be a good father and husband. Yet Nash's transformation is nevertheless extraordinary. He has grown from a "cold and arrogant youth" who failed to understand the value of emotion and relationships to a more self-aware, humble older man who genuinely values the people around him—not merely for what they can offer him, but for what he can offer them, too. Though the title of *A Beautiful Mind* emphasizes Nash's stunning intellect and groundbreaking work as a scholar, Nash's heart and personal relationships become just as important to his story. In the end, the love he learns to give to others, however imperfectly, is just as "beautiful" as his own mathematical mind.

Epilogue Quotes

"The festive scene at the turn-of-the-century frame house opposite the train station might have been that of a golden wedding anniversary: the handsome older couple posing for pictures with family and friends, the basket of pale yellow roses, the 1950s photo of the bride and groom on display for the occasion.

In fact, John and Alicia Nash were about to say "I do" for the second time, after a nearly forty-year gap in their marriage. For them it was yet another step—"a big step," according to John—in piecing together lives cruelly shattered by schizophrenia.

Related Characters: Sylvia Nasar (speaker), Alicia Larde (Alicia Nash) , John Forbes Nash Jr.

Related Themes:

Page Number: 389

Explanation and Analysis

In the Epilogue, Nasar describes John Nash and Alicia's second wedding ceremony, which comes 40 years after their divorce—a separation that stemmed from Alicia's pure exhaustion in the face of the daunting task that was caring for John in the midst of his schizophrenia. This passage emphasizes the new, important role that family, friends, and human connection in general play in Nash's life in the aftermath of the worst years of his schizophrenia. While Nash was once described by collogues as walking away in the middle of conversations or lashing out when someone said a simple hello to him, he's now described as being surrounded by family and friends. It's also significant that Nash sees his formal reunion with Alicia as "a big step," as it highlights how rebuilding his relationships is central to his efforts of "piecing together" his life and the lives of those around him.

SUMMARY AND ANALYSIS

The color-coded icons under each analysis entry make it easy to track where the themes occur most prominently throughout the work. Each icon corresponds to one of the themes explained in the Themes section of this LitChart.

FOREWORD

The writer Sylvia Nasar travels to St. Petersburg, Russia, in 2006 to try and locate a mathematician who solved the Poincaré Conjecture, a "hermit" who lives in the woods. The mathematician is in the running for a Fields Medal, a prestigious math prize. After four days of research, Nasar hasn't been able to find the mathematician, but on the last day, she stumbles upon his mother's apartment. The mathematician is there, and he and Nasar begin to talk; she introduces herself as a journalist from New York, and he says that though he didn't read her book, he "saw the movie with Russell Crowe." Nasar remarks that "no matter where in the world you are, you'd have to be a *real* hermit not to know the inspiring story of John Nash."

Nasar begins her Foreword with an amusing anecdote that shows just how popular the story of A Beautiful Mind *has become in the years since she published her book. Even a "hermit" mathematician, isolated in Russia, knew about her reporting on the prominent mathematician John Nash, demonstrating the wide-ranging implications of his "inspiring story" of genius, crisis, and recovery.*

Nasar then notes that there are "very few stories" about "the rise and fall of remarkable individuals" with a "genuine third act," but John Nash's story has one—a "third act" that has resonated with those who, like Nash, have suffered from mental illness. Nasar describes a letter she received from a reader, a homeless man and former *New York Times* editor who lost his job after being diagnosed with paranoid schizophrenia, who wrote that "John Nash's story gives me hope that one day the world will come back to me too."

Nasar attempts to show why Nash's story—one of many stories about geniuses who have suffered from mental illnesses—is unique. Nash's story has a "third act," since he was able to recover from the most severe effects of his illness, regaining his capacity for rational thought.

In the early 1990s, Nasar is an economics reporter for the *New York Times* who hears about a "crazy mathematician" at Princeton University from another Princeton professor whom she was interviewing: this "crazy mathematician" was John Nash, of the famous "**Nash equilibrium**." In 1994, Nash won a Nobel prize in economics, and Nasar pitched a story about him to her *Times* editor. Though at first, few were willing to go on the record about Nash, Nasar was able to obtain interviews with his friends, family, and colleagues. Lloyd Shapley, a mathematician who knew Nash as a graduate student, described Nash as "immature" and "obnoxious" as a youth—but "what redeemed him," said Shapley, "was a keen, logical, beautiful mind."

Shapley's comments about Nash reflect a perspective that many shared. Nash was disparaged, even reviled, by others for his arrogance as a young mathematician, though his "genius" seemed to make up for these personal failings. However, throughout the biography, Nasar does not attempt to explain away or justify Nash's poor behavior, arguing instead that ultimately, his brilliance did not obscure his flaws as an individual.

Nasar explains that in June 1995, she decided to travel to Jerusalem to meet with Nash, who was going to attend a game theory conference there; she hoped to begin writing her biography of him. Nash had already written to Nasar to tell her that he wouldn't be cooperating with her efforts. Eventually, though, Nasar was able to "stitch together thousands of bits and pieces" from interviews, letters, and documents, into a biographical narrative. Nasar credits Alicia Nash, John Nash's wife, with allowing her to tell Nash's story, since Alicia thought "it would be inspiring for people with mental illnesses." Nash never agreed to give Nasar an interview.

Alicia plays an important role in the story of John Nash, though her own life, desires, and passions were often disguised by Nash's own. Later in life, though, Alicia would exercise her own authority and agency, helping Nash to recover from his illness and allowing his story of redemption to be told.

Nasar and Nash met after the publication of *A Beautiful Mind*, and Nash explained to Nasar that he now felt that he had his life back after a debilitating struggle with mental illness. Nasar notes that readers of her book have told her that "they'll never again pass someone on the street with matted hair and filthy clothes who's shouting at the air" without thinking of them as someone like John Nash, someone with talents, with a past and a future. Nasar also explains that the movie adaptation of *A Beautiful Mind* turned John Nash into a celebrity: his story had a broad appeal, especially to children and teenagers, since Nash was himself young when he made many of his famous discoveries. Nasar closes the Foreword with an excerpt from a letter from a nine-year-old girl who wrote to Nash to tell him that she admired his work.

Before A Beautiful Mind, *few narratives involving individuals who recovered from debilitating mental illnesses had been written. Nasar's biography helped to destigmatize mental illness, encouraging readers to think of those who suffer from illnesses like schizophrenia as complex, fully formed individuals—not crazy or hopeless—and suggesting that even people who seem abnormal or outcast can be brilliant, impactful thinkers.*

PROLOGUE

John Nash is sitting in a hospital lounge with a visitor, also a mathematician, George Mackey, on a weekday afternoon in May 1959. Mackey asks Nash how he, as a mathematician, "a man devoted to reason and logical proof," could believe that extraterrestrials were sending him messages. Nash looks directly at Mackey and says that the ideas he had about extraterrestrials came to him "the same way" his ideas about math did, and as a result, he "took them seriously."

Throughout the biography, Nasar suggests that Nash's skills as a thinker and his desire to find meaning in all aspects of life made him both a brilliant scholar and more susceptible to schizophrenic delusions. These two apparently separate regions of his life, math and mental illness, were in fact merged.

Over the course of a decade, from the late 1940s to the late 1950s, Nash, a man from Bluefield, West Virginia, became "the most remarkable mathematician of the second half of the century." Nash's genius as a mathematician was similar to the genius of artists: he experienced "visions" about mathematical problems that allowed him to construct solutions, though the methods he used for these solutions remained mysterious to others who tried to follow them. Nash was also highly independent and "disdainful of authority." He did not follow other mathematicians and preferred to subscribe solely to his own brand of "rationality and the power of pure thought," hoping to turn all of life's decisions, no matter how big or small, into "calculations of advantage and disadvantage."

Again, Nasar links Nash's genius to his mental illness, describing the "visions" he experienced as both a mathematician and an individual suffering from schizophrenia. Intensely private and independent, Nash's methods of mathematical reasoning could seem obscure to others—just as Nash's paranoid delusions, though real to him, seemed inscrutable or incomprehensible to his friends, family, and colleagues.

Nash's contemporaries found him "immensely strange," and his aloof manner set him apart from his peers. Yet his achievements in game theory, algebraic geometry, and nonlinear theory—applicable to understanding dynamics of human rivalry—were some of the most significant ideas of the 20th century. John von Neumann, the Hungarian-born mathematician, paved the way for Nash's ideas as the first academic to suggest that human behavior could be analyzed as a game, using poker as a point of comparison. Nash postulated that games could be solved when every player chose a response that he or she thought was the best response to the other players' best strategies. This is the basis of the **Nash equilibrium**, which forever changed the guiding principles of economics.

Ironically, though Nash was highly independent and "strange" compared to other mathematicians—an aloof loner of sorts—his research focused on the community (specifically, interdependent decisions among group members). After his illness, Nash would seek to reconnect to communities from which he had cut himself off: his family, friends, and colleagues in mathematics.

By his late 20s, Nash was a successful mathematician: he was also married and a father. But like other famous scientists and philosophers—Descartes, Wittgenstein, Kant, Newton, Einstein—he had a solitary, detached personality, the kind that is often attributed to genius. However, "men of scientific genius, however eccentric, rarely become truly insane." Nash was an exception. When he turned 30 and went up for tenure as a professor at MIT, he began to experience schizophrenic episodes. He eventually resigned his position and was committed to a psychiatric institution, the first of numerous hospitalizations throughout his life.

Nasar notes that "men of genius," though often eccentric, do not usually become "truly insane," though Nash's eccentricity devolved into delusion and psychosis—showing that mental acuity can exist alongside mental illness.

Schizophrenia was first described in 1806, but its origins in the human mind are uncertain. 1% of the population in the world suffers from the disease, though it is unclear whether schizophrenia develops from hereditary or environmental factors, or a combination of the two. Eugen Bleuler coined the term "schizophrenia" in 1908 to refer to the "splitting of psychic functions": those who are schizophrenic experience delusions and hear voices, among other psychotic symptoms, though the severity of these symptoms varies wildly from person to person. Many schizophrenia sufferers have been "people with fine minds," and some even experience episodes of mental "heightening." Indeed, at the beginning of his illness, Nash believed "he was on the brink of cosmic insights."

Nasar provides a scientific explanation of schizophrenia, describing its uncertain origins and wide range of symptoms. Again, Nasar makes clear the idea that individuals with mental illnesses are not necessarily mentally impaired: in fact, they may often be gifted thinkers with powerful talents, and, like Nash, their minds may seem even sharper while they are in the throes of the illness.

In the 1970s and 1980s, Nash became a "phantom" who haunted Princeton, New Jersey, where he settled (and where he had obtained his PhD), often writing obscure equations on classroom blackboards after hours. At the same time, his work on game theory was becoming influential in the field of economics; many mathematicians and economists assumed that the "Nash" of the "**Nash equilibrium**" was dead. Yet Nash was also beginning to show signs of recovery. He interacted with other Princeton mathematicians at the Institute for Advanced Study, a research center also based in Princeton, and corresponded with famous mathematicians by mail, tentatively venturing back into the world of research.

Nash was well-known to members of the Princeton community as a seemingly unstable man, a "ghost" who haunted the math department. However, Nash's skills as a brilliant mathematician never faded. After a hiatus of 30 years, in which he was unable to engage rationally with the world, his reappearance at Princeton marked the beginning of his remission from schizophrenia and the recovery of his "beautiful mind."

In 1994, after attending a Princeton math seminar (Nash was regularly invited to these seminars, though he was not technically affiliated with the university), Nash's close friend, Harold Kuhn, a Princeton math professor, told Nash that he could expect a phone call from the Swedish Academy of Sciences the next day, informing him that he had won a Nobel Prize.

The Nobel Prize was the pinnacle of Nash's career, confirming his talents as a mathematician—despite the years he lost to schizophrenia—and helping to restore him to a position of prominence in the math world.

CHAPTER 1: BLUEFIELD

Nash's parents marry in Bluefield, West Virginia, in September 1925. Nash's father is a Texas native who had a troubled childhood: his father was "strange," "unstable," and a "philanderer," and after his father left, John Nash Sr., who became an electrical engineer, was raised by his mother. Virginia Martin Nash, Nash's mother, a teacher, is a "freer, less rigid spirit" than her husband. Bluefield, where they decide to settle, is a working-class town that became white-collar in the 1920s, with a sizeable population of working men with scientific interests and engineering skills.

Throughout the biography, Nasar attempts to provide explanations for Nash's brilliance as a scholar, exploring his family background and childhood with depth and detail. Growing up in Bluefield with an engineer for a father, Nash was surrounded by science. Yet there are also fault lines in this picture of Nash's childhood that foreshadow the difficulties Nash's family will face after the onset of his illness: Nash Sr., like Nash Jr., was troubled and "unstable."

Nash is born four years after his parents' marriage, in "comfortable circumstances": the Nashes were fairly well-off. As a child, he is "solitary and introverted," labeled an underachiever in school, but he has a loving family, who encourage his curiosity and interest in reading. Eventually, though his parents begin to "push" him "socially," entreating him to go to church, Boy Scout camp, school dances, and other activities. Nash's early interest in math comes from a book called *Men of Mathematics*, by E. T. Bell, an experience he alludes to the autobiographical essay he writes after winning the Nobel Prize.

From an early age, Nash struggled socially, despite his parents' best efforts. By focusing on these early details of Nash's life, Nasar begins to flesh out an image of Nash's complicated personality.

The beginning of World War II shakes Bluefield, but Nash, unlike other young men, is not eager to "hurry and grow up lest the war be over" before he can join the military. His brainy reputation makes him somewhat of a loner, but he also has an aggressive side; he is known to play nasty pranks, including building homemade pipe bombs. Eventually, another boy—with whom Nash had often built explosives—dies in an accident while building one of these bombs. Nash grows up without many friends, though he performs well academically, eventually winning a prestigious Westinghouse scholarship and going on to attend the Carnegie Institute of Technology in Pittsburgh, Pennsylvania (now Carnegie Mellon University), in 1945.

For all of his intelligence and academic success, Nash has a cruel and sometimes violent streak, even as a child: this is a quality that will later distinguish him as a difficult, impersonable individual, causing rifts between him and others.

CHAPTER 2 – CARNEGIE INSTITUTE OF TECHNOLOGY

Though Nash goes to the Carnegie Institute to become a chemical engineer, he quickly finds himself drawn to mathematics. His professors are impressed by his "originality" and his "appetite for difficult problems." Meanwhile, Nash's peers find him "weird" and "socially inept," and he is excluded from social gatherings with other Carnegie men.

Nash begins to lead a double life: on the one hand, he is praised for his skills as a mathematics prodigy; on the other, he is socially awkward and inept. This split persona provides the key to understanding his eventual mental collapse, since those who suffer from schizophrenia—like those who are considered "geniuses"—often have difficult personalities.

During college, Nash discovers that he is attracted to other men, a fact that is quickly discovered by his classmates, who torment him: he responds with acts of physical violence. Despite his talents in the classroom, Nash is disappointed to learn that he hasn't been a finalist in the William Lowell Putnam Mathematical Competition, a prestigious math tournament for undergraduates. Nonetheless, by the age of 19, Nash "already ha[s] the style of a mature mathematician," adept at solving large, general problems—more complicated than the minor math puzzles at which other students excelled.

Nash first begins to develop feelings for other men in college: these desires are considered taboo in the 1940s, and Nash struggles to come to terms with them throughout his life, often repressing them—only to lash out in cruel, violent ways later. Lurking behind Nash's prodigy-like genius is a deeply confused, tormented individual.

Nash is accepted to Harvard, Princeton, Chicago, and Michigan for graduate study in mathematics. Though Harvard is his first choice, the Princeton faculty are more selective with their graduate admits, and in order to entice Nash, the chairman of the math department offers him a prestigious fellowship. Ultimately, Nash chooses Princeton, though as his time at Carnegie comes to an end, he becomes worried about being drafted for the war—which would certainly put his graduate studies on hold. Nash secures a summer job with a Navy research project after his last semester at Carnegie, convinced that working on military research will allow him to eventually avoid military service.

Nash's paranoia about being drafted leads him to take on military research projects throughout his career as a mathematician. Later, after the onset of schizophrenia, this paranoia will twist into something far more vicious—delusions that he is being followed by the government.

CHAPTER 3 – THE CENTER OF THE UNIVERSE

Nash arrives in Princeton in September 1948 as a 20-year-old and is greeted by a "genteel, prerevolutionary village," a small town with polished houses and "college-Gothic" buildings. Fine Hall, the university's mathematics building, was built in the style of Oxford University, an imposing but luxurious "red brick and slate fortress." Princeton in 1948 became a Mecca for mathematicians: "what Paris once was to painters and novelists, Vienna to psychoanalysts and architects." Fine Hall's faculty members are top-notch, though Princeton had not always had this reputation. In the early 1900s, when Woodrow Wilson was its president, Wilson's best friend, mathematician Henry Burchard Fine—Fine Hall's namesake—convinced him to hire scientists in order to diversify the university faculty.

Nasar describes the origins of Princeton's world-class math program, describing Princeton as an imposing yet vibrant community of scientists conducting cutting-edge work. Nasar suggests that Princeton was the reason Nash became a world-class scholar, since it offered an environment in which his genius was sought-after and nurtured.

In the first half of the 20th century, Princeton had become a home for Europe's rising stars in mathematics—including John von Neumann—who were financed by research fellowships funded by the wealthy Rockefeller family. Princeton's Institute for Advanced Study, a research center unaffiliated to the university but located close to its campus, also helped to attract leading European scholars, including Albert Einstein. This "brain drain" from Europe "electrified" the American scientific scene and coincided with World War II. Scientists at Princeton were recruited to help with code-breaking, strategy, and weaponry: the war demonstrated the usefulness and wide applications of mathematical theory, as well as the "superiority of sophisticated mathematical analysis over educated guesses." Princeton benefitted from the newfound popularity of mathematics, and math itself became a "dynamic enterprise."

Throughout A Beautiful Mind, *Nasar shows how Nash's quest for knowledge as a mathematician helped him, and other prominent Princeton scientists, to forge connections to fields outside of mathematics, including economics, military strategy, and human behavior. Ironically, Nash himself was a loner, often disconnected from the outside world.*

CHAPTER 4 – SCHOOL OF GENIUS

On Nash's second day at Princeton, Solomon Lefschetz, a Princeton math professor, gathers the math graduate students for a meeting. An infamously grouchy professor, Lefschetz orders the graduate students to "dress well" and to come to tea with the math faculty every afternoon: Lefschetz's strict rules are intended to turn out "men who [can] make original and important discoveries." At Princeton, courses were hardly important: only qualifying exams mattered, and students who did not perform well were simply asked to leave the program. As it turns out, this sort of training is uniquely suited to Nash's temperament; when he left Princeton, he did so "with his independence, ambition, and originality intact."

Though Princeton encouraged its mathematicians to form a community, it also encouraged them to become independent thinkers and shied away from imposing strict guidelines on their behavior as graduate students. Princeton helped to shape Nash's own intense independence and unbounded ambition.

Nash lives in the Graduate College at Princeton, where life is "masculine, monastic, and scholarly": few of the graduate students interact with women, since women cannot yet attend Princeton. During the afternoon tea sessions, the graduate students meet to discuss math, but also to gossip and exchange news, creating a friendly but competitive atmosphere. Nash has never experienced "anything like this exotic little mathematical hothouse," which came to shape his career as well as his approach to academia.

Princeton's friendly but insular and competitive atmosphere contributed to Nash's own competitive behavior, which he displayed throughout his career—often challenging others and sparking intense conflict.

CHAPTER 5 – GENIUS

In 1948, a Princeton professor walks in on Nash—"the new graduate student from West Virginia"—lying on a table in the Professors' Room in Fine Hall, "obviously lost in thought." This event comes to epitomize Nash's reputation with the other students and professors: he is young and arrogant (and "handsome as a god," according to one student) and a "self-declared free thinker." Nash later stops attending classes, though he regularly meets with others for discussions; he seems to spend most of his time "simply thinking," pacing the corridors of Fine Hall. Nash "overflows" with ideas, and he is determined to learn on his own—a quality that betrays his own self-importance.

At Princeton, Nash becomes convinced of the powers of his own mind, choosing to focus on his own development and ideas instead of collaborating with others (or taking his classes seriously). Though at first, Princeton's faculty and graduate students find Nash's behavior amusing and even somewhat charming, these quirks will later lead to significant problems for Nash's career and relationships with other mathematicians.

Nash often catches glimpses of Albert Einstein walking near the Princeton campus and wonders how he might be able to forge a connection with the renowned scientist. At this point, Einstein is hard at work on a theory uniting the phenomena of light and gravity, his second major project after his groundbreaking development of the theory of relativity. A few weeks into his first semester, Nash arranges an appointment with Einstein, and the two meet in Einstein's office: Nash has an idea about "gravity, friction, and radiation," which Einstein gently rebuffs, telling him, "You had better study some more physics, young man."

Throughout A Beautiful Mind, *Nasar draws a parallel between Nash and Einstein. Both were eccentric, somewhat antisocial geniuses who worked on innovative solutions to difficult problems. Nash, though, was also overconfident as a young mathematician, as evidenced by his somewhat disastrous meeting with Einstein; this overconfidence often created issues for him throughout his career.*

Despite his arrogance, Nash occasionally takes an interest in learning from his fellow students and exchanging ideas, though he is "choosy" about whom he engages in discussion. In general, Nash is "respected but not well liked," due to his awkward demeanor and childish, eccentric sense of humor. Though several of the Princeton faculty members support him, others believe that he doesn't belong at the university at all, including Emil Artin. Though Lefschetz and Albert Tucker, Lefschetz's right-hand man, defend Nash, his unpopularity with the faculty will become a problem later in his life, when he tries to join the department as an assistant professor.

Nash's professors take note of his difficult personality. For some, his skills as a thinker outweigh his faults, but for others, including Artin, his lack of social graces make him a liability, no matter how brilliant he is.

CHAPTER 6 – GAMES

John von Neumann is walking through the graduate common room one afternoon in spring 1949 when he notices two students leaning over a piece of cardboard covered with hexagons, putting black and white stones down on the board. When he later asks Tucker what the students were playing, Tucker responds, "Nash." This is a game that Nash—a fan of board games and a highly competitive player—invented, based on the German game *Kriegpiel* and the Chinese game *go*. David Gale, another graduate student, helped to design the game board, and the two developed the game together, a zero-sum two-person game in which each player (playing with either black or white stones) attempts to construct a chain of their own stones. "Nash," or "John," beomes incredibly popular with the math graduate students.

Nash first becomes interested in game theory—his specialty as a mathematician—by developing a popular game with another graduate student. Nash's interest in the communal decisions involved in games is unusual, given his fierce individualism and sense of self-importance (as evidenced by his naming the board game after himself). Nonetheless, Nash becomes interested in dynamics of cooperation and strategy among individuals competing in group games—ideas that will lead him to find success as an early career mathematician.

CHAPTER 7 – JOHN VON NEUMANN

John von Neumann is the "very brightest star" in Princeton's mathematical scene, a "role model" for mathematicians of Nash's generation. His ideas have wide applications, ranging from game theory to the implosion device for the A-bomb to quantum physics to computational programming. Von Neumann is also an academic consultant who works on military research—advising American military officials on how to think about the atomic bomb during the Cold War—and a dazzling, if slightly aloof, presence on the Princeton campus, with an "astounding" memory, work ethic, and capacity for solving complex math puzzles. By looking for intersections between mathematics and other fields, Von Neumann "inspired other young geniuses," including Nash, encouraging them to apply similar approaches to a wide diversity of problems.

In addition to comparing Nash to Einstein, Nasar sketches out similarities between John von Neumann and Nash, showing how both mathematicians sought to connect their mathematical work to fields and ideas outside of the world of math (even though Nash often isolated himself from the outside world).

CHAPTER 8 – THE THEORY OF GAMES

At Princeton, Nash becomes interested in game theory, invented by von Neumann in the 1920s. Game theory can be defined as "an attempt […] to construct a systematic theory of rational human behavior by focusing on games as simple settings for the exercise of human rationality." Von Neumann is the first to suggest that the theory of games might have wide applications, including to economics. Oskar Morgenstern, an Austrian economics professor at Princeton, convinces von Neumann to collaborate with him on a treatise arguing that game theory is the "correct foundation for all economic theory." *The Theory of Games and Economic Behavior*, von Neumann and Morgenstern's treatise, argues that the "prevailing paradigm in economics"—an emphasis on individual incentives and behavior—is inadequate, proposing that math (and especially a new theory of games) should form the basis of economic logic.

Game theory forever reshaped the relationship between economics and math, placing new emphasis on theories of cooperation and strategy among rational actors in group scenarios. Cooperation was central to the founding of game theory itself, since Morgenstern and von Neumann worked together on their groundbreaking treatise. Yet as a game theorist, Nash shied away from similar types of collaboration, choosing to focus on his own ideas. This behavior had negative consequences for his links to the math community: Nash was often viewed as difficult and abrasive.

Though "the bible"—as von Neumann and Morgenstern's book was referred to by Princeton's graduate students—is groundbreaking, Nash and other students realize that von Neumann and Morgenstern's work does not contain any new theorems, other than one von Neumann formulated (the min-max theorem). Nash is especially intrigued by von Neumann and Morgenstern's focus on "zero-sum two-person games," a problem they left open to further research.

Throughout his career, Nash was drawn to challenging problems without clear-cut solutions, or even methods for producing solutions. Always hungry for knowledge, he hoped to find order and meaning where others had failed to.

CHAPTER 9 – THE BARGAINING PROBLEM

During his second term at Princeton, Nash writes his first paper, "The Bargaining Problem," which later became a masterpiece of modern economic theory. Drawing on the classic economic notion of exchange, Nash takes a "completely novel" approach to a fundamental game theory problem: how will two rational bargainers interact, given that people do not always behave in purely competitive or individualistic ways, but often collaborate and cooperate? Nash's theory shows that both sides expect each other to behave in a certain fashion, and that the bargain they ultimately decide on depends on a combination of two factors: "the negotiators' back-up alternatives and the potential benefits of striking a deal."

Nash's "bargaining problem" analyzes negotiations between two players deciding on a bargain, helping to describe the ways in which these players will interact based on the joint payoff possible.

Later, Nash would maintain that he first developed his interest in the bargaining problem while taking a course on international trade at Carnegie Tech—the only economics course he ever attended—and that he was encouraged to further explore this idea by the presence of the game theory group (von Neumann and Morgenstern) at Princeton. His initial exposure to economics, it seems, was most influential in his development of the bargaining theorem.

Nash helped to transform economics into a field interested in explaining not only individual choices but also group dynamics—though he himself often struggled in group settings.

CHAPTER 10 – NASH'S RIVAL IDEA

In summer 1949, Nash asks Albert Tucker to supervise his thesis, surprising Tucker, who had had little direct contact with Nash. After a summer of preparing for his general examinations, Nash is prepared to dive back into his own research; he also decides to visit von Neumann to discuss his ideas for an "equilibrium" in games of more than two players. Von Neumann quickly rejects Nash's idea, though Nash would later claim that the meeting had still been useful. He had actually tested out his theories by meeting with von Neumann: "I was playing a non-cooperative game in relation to von Neumann rather than simply seeking to join his coalition." David Gale realizes that Nash's equilibrium idea might apply to a "far broader class of real-world situations" than von Neumann's own ideas on zero-sum games.

Throughout his career, Nash often treated his interactions with others as "games," applying the same game strategies he studied to his social life—just as he "tested" von Neumann, engaging him in a non-cooperative game. Though this "testing" may have helped Nash to model his own research, by continually reducing relationships to games of strategy, Nash often had difficulty empathizing with others, a quality that would later wreak havoc on his relationships.

Later, Tucker would claim that he wasn't sure if Nash's equilibrium, the basis of his thesis, would be useful to economists. Nonetheless, Tucker manages to convince Nash to stick with his research topic, with the addition of a few changes. Importantly, Nash's theorem is the first to draw a clear distinction between cooperative and noncooperative games: whereas cooperative games involve agreements among players, there are no agreements to be made in noncooperative games. Nash defines his equilibrium as the event in which players in a game are unable to improve their own positions, since no better game strategy exists: the player picks a "dominant strategy," their best choice for a move, based on the best choices made by other players. Nash's theory is elegant and deceptively simple. Though it attracted some criticism at first, it would later become a fundamental paradigm in economics.

Nash's equilibrium theorem demonstrates his characteristically unusual yet effective brand of mathematical thinking. Determined to find meaning in chaotic situations, Nash discovered simple but powerful solutions to complicated questions with which generations of mathematicians had struggled. Though at the time, Nash's achievements in game theory were not thought of as highly significant, later, they would have a sizeable impact on the field of economics; the brilliance of Nash's thinking was to explore connections between math and other fields, refusing the limitations of "pure mathematics."

CHAPTER 11 – LLOYD

As a 21-year-old, Nash's mathematical genius is beginning to flourish, but as an individual, he is still isolated: his fellow students believe that he "had felt nothing remotely resembling love, friendship, or real sympathy." Yet Nash does long for friendship, and at the beginning of his second year at Princeton, he finds the first of a series of intense "emotional attachments" he would come to form with other men, mostly mathematicians, throughout his life—with Lloyd Shapley.

Though Nash places a high value on his own independence, he also begins to long for human connection, though his intensely aloof, self-centered behavior makes it difficult for him to form lasting bonds with others. Throughout his life, Nash would struggle to reconcile these two warring factions of his personality.

Shapley is a veteran and Harvard graduate who had also worked at the RAND corporation, a think tank in Santa Monica using game theory applications for work on military problems. Shapley is somewhat neurotic, with a temper and a "harshly self-critical streak"—unlike Nash, who is self-assured by contrast. Yet Shapley finds Nash and his "keen, beautiful, logical mind" intriguing. Nash, meanwhile, is drawn to Shapley, too, attracted by his intelligence and popularity with the other students and professors. Nash expresses his attraction to Shapley by playing cruel pranks on him and his friends, whom he views jealously. Nonetheless, Shapley remains loyal to Nash, helping him to come up with convincing examples for his equilibrium concept.

Shapley is the first of several men Nash comes to love throughout his life, though the ways in which Nash expresses this love hardly appear healthy or positive. Tormented by his own desires, Nash kept most of his feelings private and could only prove his attraction to Shapley in cruel ways.

Though Nash's thesis idea attracts a great deal of attention, it is Shapley who is viewed as "the real star of the next generation" of mathematicians, by von Neumann and other Princeton professors. However, while Nash publishes three important papers in one year, Shapley finds himself unable to formulate a thesis topic; 50 years later, Shapley would deny that he and Nash "had ever been close friends."

Throughout A Beautiful Mind, *Nasar makes note of other mathematicians who, though seemingly destined for success, did not become as eminent as Nash. Nasar suggests that Nash's intense ambition and self-centeredness helped him to succeed, while other mathematicians, who lacked similar drives, failed.*

CHAPTER 12 – THE WAR OF WITS

Nash takes a flight from New York to Los Angeles in 1950, his first ever journey in an airplane: he is to become a consultant for the RAND corporation, where Shapley had worked. "The original think tank," RAND's employees intended to "think the unthinkable," coming up with unique solutions to problems of American military defense, ranging from "narrow technical problems" to broader discussions of strategy (often involving the atomic bomb). The Air Force, which originally contracted RAND, recruited scientists, offering them a private research center for the development of wide-ranging scientific studies. Even after the war, the military hoped to use scientists' skills in operations research, linear programming, dynamic programming, systems analysis, and, perhaps most importantly, game theory, linking these fields to issues of military strategy.

RAND appeals to Nash as a research center that encourages cutting-edge, interdisciplinary research. Its scientists seek out solutions to problems that seem impossible or "unthinkable": this is a guiding principle that Nash shares.

Located in the Santa Monica Mountains, just west of Los Angeles, RAND is a heavily guarded collection of buildings that "bristled with self-confidence, a sense of mission": in 1949, President Truman informed Americans that Russia had developed the atomic bomb, and RAND was prepared to respond to the Soviets' advances in nuclear weaponry. RAND scientists "worshipped" the rational, believing that all choices could be reduced to solutions in the form of mathematical formulae.

The RAND scientists, like Nash, believed that mathematical ideas, particularly game theory, could be applied to all areas of life, from human relationships to questions of global interactions. Though this belief wreaks havoc in Nash's own life—since he struggles to view his relationships realistically and emotionally, rather than as games—it is also fundamental to the development of game theory as a field with broad applications.

RAND is pervaded by an "atmosphere of paranoia and intimidation." Nash, who works on "highly theoretical exercises" instead of actual issues of military strategy, is not approved for top-secret clearance, and as the Cold War continues, fears about potential leaks and security breaches grow. At the same time, RAND's employees tend to be "quirky people"; the think tank fosters a culture of practical jokes and informal chatter, especially among the mathematicians. John Williams, a RAND astronomer, oversees the affable, somewhat disorganized atmosphere. Williams believes that the scientists need a freer schedule—fewer strict impositions—and negotiates with engineers and Air Force generals to ensure that his mathematicians have free reign over their research. Nash is well known in the RAND offices as a "young genius who can do anything, a guy who likes solving problems." Nonetheless, he mostly keeps to himself, though his odd, sometimes childish behavior attracts attention.

Later in his life, after beginning to experience schizophrenic episodes, Nash would become highly paranoid, convinced that he was being followed by spies. It is possible that the "atmosphere of paranoia" he experienced at RAND contributed to these delusions—one of many ways in which Nash's academic experiences overlapped with his experience of mental illness. At the same time, RAND offered Nash the opportunity to conduct innovative research, seeking out answers to the kinds of difficult, complex problems he found most engaging.

CHAPTER 13 – GAME THEORY AT RAND

Even before Nash arrives at RAND, mathematicians there have been working on game theory, though they had focused mainly on two-person zero-sum games—"games of total conflict," which produce a "fixed payoff." Yet these models are beginning to prove inadequate for investigating military strategy during the Cold War. As nuclear weapons become more dangerous and potentially destructive, strategists realize that the idea of "mutual dependence" has merit, since it is not always in the United States' best interest to make decisions that inflict the greatest amount of damage on an opponent: strategy has to focus on cooperation as well as conflict.

Ironically, though Nash often sought to "inflict damage" on his mathematical rivals, the research he conducted at RAND focused on cooperation rather than "total conflict," underscoring the tension between his own behavior and the mathematical work that afforded him success.

At RAND, game theory is used to model tactics, particularly in air battles between fighters and bombers. RAND's mathematicians are "cold" to the idea of applying cooperative game theory—for which stable, straight-forward solutions have already been generated—to military strategy, since they believe that true cooperation between opponents in war would be impossible to come by. By proving that noncooperative games had stable solutions, too, Nash's equilibrium provides a "framework" for RAND research.

Nash's equilibrium proves invaluable to RAND's military research objectives, once again proving Nash's incredible ability to think beyond the boundaries of his field.

Shortly after Nash formulates his famous **equilibrium**, Albert Tucker formulates a similar theorem, the "Prisoner's Dilemma," to describe a situation in which two individuals acting in their own best interests do not necessarily "promote the best interest of the collective"—using a hypothetical story of two prisoners who given the choice of confessing, implicating the other, or keeping silent. Since neither prisoner is aware of the other's actions, the best choice for each of them—considered without the other—is confessing. Ironically, both prisoners, considered together, would be better off *not* confessing. Though RAND scientists do not use the "Prisoner's Dilemma" as a basis for their research, Nash's own ideas prove useful. Nash solves a problem that two RAND scientists set up—designed to test whether the Nash equilibrium would occur as an option in a real game between two individuals—by proving a case in which his equilibrium would function stably.

Though Tucker is a more established mathematician, it is Nash's ideas, not Tucker's, that prove most useful to RAND, demonstrating that Nash's mathematical thinking is unusually advanced and widely applicable. Moreover, Nash is able solve the difficult challenge that the RAND scientists pose to his equilibrium idea: Nash is determined never to "lose" to any rival, applying the competitive strategies he studies as a mathematician to his own behavior.

The most important application of game theory to a military problem involves RAND's "most influential" strategic study, on the SAC operational project: a plan to fly bombers from the United States to bases overseas, where an attack could be mounted against the Soviet Union. The RAND study allows the Air Force to understand the potential vulnerabilities of this plan, viewing America's best tactics through the lens of the Soviet Union's best tactics. However, by the 1950s, the "golden age" of RAND is drawing to a close, and game theory falls out favor, as "mathematicians got bored and frustrated," becoming "disillusioned" with their own game theorems.

Though game theory was incredibly useful to RAND's military research, the field lost traction in the 1950s, as scientists moved onto other fields as a basis for conducting high-level research. Nash's ideas, too, would fall out of the favor in the 1950s and 1960s, though game theory experienced a resurgence in the 1980s and 1990s—leading to the rediscovery of Nash's important work.

CHAPTER 14 – THE DRAFT

Though Williams offers Nash a "handsome salary" as a permanent employee at RAND, Nash isn't interested in working for RAND after the summer. He wants "freedom to roam all over mathematics," and to find this, he realizes that he will have to become a professor at a top university. Nash returns to Princeton, where he serves as a temporary instructor and research assistant (for a project run jointly by the Navy) while he looks for an academic job.

To Nash, who values individualism above all else, nothing could be more important than the freedom to seek out knowledge and meaning without restrictions.

As Nash leaves Santa Monica, the Korean War begins, and his parents write to inform Nash that he might be drafted. Nash is determined to avoid the draft, since he despises the idea of life in the army, with "its mindless regimentation, stultifying routines, and lack of privacy." Nash enlists the help of two members of the draft board in Bluefield—where he returns before heading back to Princeton—whom he believes could help him obtain an "occupational deferment." Nash files out a deferment form and is supported by Princeton and RAND. The draft board postpones his designation for active service until June 1951.

Because of his fiercely independent spirit, Nash is terrified by the idea of being drafted into the military and having to lead a restricted life as a soldier—a fear that comes back to haunt him when he begins to experience paranoid delusions later in life. Nash's genius helps him to obtain a deferment, since his gifts as a scholar on the home front are deemed essential by Princeton and RAND.

CHAPTER 15 – A BEAUTIFUL THEOREM

During the 1950s, Nash's work on game theory (a kind of "applied" mathematics) is not considered important enough to earn him a position as a professor at a top academic department. As a result, Nash begins working on a paper that he hopes will connect his work to "pure" mathematics, focused on geometric objects called manifolds. Nash develops a theorem related to manifolds, deriving the solution before he works out the steps of the proof—just as he had with the bargaining problem. Donald Spencer, a visiting Princeton professor, helps Nash to finetune the theorem, which connects the object of the manifold to a much simpler class of objects, called real algebraic varieties. By finding a link between these kinds of objects, Nash "opened up new avenues for solving problems" in topology, the study of geometric properties.

Though Nash is disappointed that his work in game theory will not help him to become a professor at a top university, he is not daunted. Characteristically stubborn and determined to achieve success at all costs, Nash decides to shift his focus to "pure" mathematics: his skills as a brilliant thinker help him to make important discoveries in this field, as well as in applied mathematics.

Though Nash's paper on manifolds helps to establish him as a "pure mathematician of the first rank," it does not help him to obtain an assistant professorship at Princeton. Emil Artin voices his opposition to appointing Nash as a professor, viewing Nash as "aggressive, abrasive, and arrogant." However, MIT (Massachusetts Institute of Technology) offers Nash an instructorship, which Nash accepts.

Despite his genius, Nash's abrasive behavior makes him a less-than-ideal candidate for a professorship at Princeton, suggesting his achievements and intelligence cannot make up for his significant personal failings.

CHAPTER 16 – MIT

At the end of June 1951, Nash is living in Boston and working in Cambridge. MIT, where he is employed as an instructor, is the nation's "leading engineering school," though it is not yet a renowned research university (as it is now). MIT looks very different from Princeton: the buildings are "utilitarian," not Gothic, and a number of important military research projects require a large amount of military personnel on campus. Additionally, MIT's faculty members are less established than the famous professors at Princeton. But MIT is also less exclusionary—for example, it regularly offered admission to Jewish students, who were often snubbed at Princeton.

Nasar suggests that Nash is somewhat less suited to the atmosphere at MIT than the atmosphere at Princeton, since MIT is less prestigious and competitive, and Nash thrives on prestige and competition.

Nash is somewhat dubious about starting his position at MIT, but as he arrives, the university is beginning to attract top-tier talent, thanks to the work of the mathematics chairman, William Ted Martin. Martin is known for "lur[ing] young hotshot" researchers like Nash to MIT to improve the university's research focus. The "most attractive" mathematician at MIT to Nash is Norbert Wiener, known as the "father of cybernetics": like Nash, he is "famously eccentric" and suffers from manic upswings and depressive episodes. Nash and Wiener form a bond, and Nash begins to view Wiener as a "kindred spirit." Nash also becomes close with Norman Levinson, a prominent MIT professor who, like Al Tucker at Princeton, plays the role of "sounding board and father substitute" to the young mathematician. An early pioneer in the theory of partial differential equations, Levinson, like Nash, is interested in exploring difficult, novel problems.

Due to his difficult personality, Nash has struggled to form bonds with other mathematicians in the past, but he feels connected to Wiener and Levinson, with whom he shares certain personality traits. Though Nash hasn't expressed an interest in having friendships before, he begins to find that relationships such as the ones he forms with Wiener and Levinson greatly enrich his life; later, he will serve as a mentor to other mathematicians, too.

CHAPTER 17 – BAD BOYS

Because he graduated from both college and his PhD program early, Nash is only 23 when he becomes an instructor at MIT: he is nicknamed "the Kid Professor." Nash finds teaching tiresome, since it interferes with his research interests, and he is known to the undergraduates he teaches as an aimless lecturer and tough grader. He often puts trick questions on his exams, including famously unsolved problems, which earns him the ire of his students—save for the few he regards as intellectually exceptional.

Nash's teaching style reflects his troublesome personality: his intense arrogance and penchant for turning interactions with others into competitions or games.

The common room for math students at MIT is a "brasher, rougher crowd" than the common room at Princeton, but this atmosphere is more suited to Nash's temperament: like him, the other mathematicians are eccentric, narcissistic, and often "exhibitionistic." Nash begins to play up his own eccentric affects—often calling other people "humanoids"—and avoids small talk and social conventions. He expresses a cynical, often politically conservative view of the world but also dresses flamboyantly and reads about illicit drugs. This strange admixture of interests can be seen as the first signs of his "growing alienation from convention and society."

Though Nash's strange personality quirks do not make him an outsider at MIT, where others share his eccentricities, certain aspects of his person seem to show that he is losing touch with "convention" and "society"—moving toward the mental illness that will eventually consume him.

At MIT, Nash's strangeness earns him the respect of his students and peers. Whereas at Princeton, Nash was somewhat of an outcast, he is regarded as an "interesting" genius at MIT and "a bad boy, but a great one." Nash's "closest equal" is D.J. Newman, also considered a genius with a flair for the eccentric: "a big, brash, blond swaggerer." Nash makes friends with Newman and garners respect from Newman's friends; for the first time in his life, he has found something like a social circle.

Nash's social life improves dramatically at MIT, where he meets other like-minded mathematicians. Unfortunately, this new social circle is ill-fated: in a few years, after he is diagnosed with schizophrenia, Nash will lose touch with many of his friends and colleagues.

Nash is determined to constantly demonstrate "his own uniqueness, superiority, and self-sufficiency" to his new friends at MIT, and often acts in punishing or supercilious ways. At parties, he enjoys "performing"—attempting to solve difficult math puzzles—and flaunting his "social snobbery" and upper-class status.

Though Nash is accepted for his quirks at MIT, he continues to act in competitive, outlandish, and often aggressive ways, alienating some of his new friends in the process.

CHAPTER 18 – EXPERIMENTS

Nash returns to RAND for another summer of research in 1952. One afternoon, he and Harold Shapiro, another RAND mathematician, are swimming at Santa Monica Beach when they are swept under by a powerful current. The two men struggle back to shore, and Shapiro feels relieved that they fought their way out of the current; Nash, though, decides to go back into the water, saying, "I wonder if that was an accident [...] I think I'll go back in and see."

1952 is a turning point for Nash. He begins to exhibit stranger, more erratic behavior, and he often seems to lose his grasp on reality, as evidenced by this incident with Harold Shapiro: Nash seems strangely unaware of the danger of wading back into the ocean.

Nash is living in Santa Monica with his younger sister Martha; her college friend, Ruth Hincks, a journalism student at the University of North Carolina; and John Milnor, a brilliant math student Nash knew at Princeton, where Milnor was an undergraduate student. Hincks later recalled that the journey the four of them made out to California from Bluefield was "strange," noting the seemingly "distant" relationship between Nash, Milnor, and Martha. Nash persuades his parents to let Martha live with him in Santa Monica for a summer, since she has never been away from home except to go to college: secretly, though, Nash wishes to set Martha up with Milnor, though he is also "charmed" by Milnor—who has a "self-effacing personality," "a brilliantly lucid mind," and "lanky good looks"—himself. Later, Milnor would claim that Nash made a "sexual overture" toward him, and that their friendship fell apart shortly thereafter.

Though Nash plots to set up Milnor and Hincks, this matchmaking scheme seems to serve only as a cover-up for his own feelings for Milnor. Nash is beginning to find it difficult to disguise his attraction to other men, and these feelings seem to torment him, given his attempts to cover them up. Unfortunately, Nash's flirtatious behavior with Milnor causes an irreversible rift in their relationship—which may have made Nash even more uncomfortable with his own feelings.

Martha and Milnor do not connect romantically in Santa Monica, but Nash and Milnor collaborate on a project for RAND, testing out theories of coalition and bargaining. Nash, Milnor, and other researchers recruit subjects to play different games with cash rewards. Though Milnor later became disillusioned with game theory—since the results of the experiment "cast doubt" on the usefulness of game theory in predicting real-life outcomes—Nash and Milnor's research would serve a model for a new kind of economic research, encouraging researchers to attend closely to "elements of interaction" between players in actual game scenarios, rather than focusing solely on theoretical research.

Milnor is disappointed with the results of his and Nash's experiment, which seems to have negative implications for the usefulness of game theory. However, the experiment has merit: it demonstrates that creating actual game scenarios to test out different ideas can be a helpful way to study game theory. Though many of Nash's experiments and research ideas were controversial, many ultimately proved beneficial to the field of mathematics.

CHAPTER 19 – REDS

In 1953, at the height of the Cold War, fear of communism spreads to Cambridge: the FBI begins to investigate the MIT math department, eventually subpoenaing three professors who had once been leading members of the Cambridge Communist Party. Scientists at many institutions are beginning to feel "vulnerable"; Solomon Lefschetz is identified as a "communist sympathizer." Norman Levinson is questioned, though he refuses to name other suspected communists. Though Nash is not involved directly in this "angry, frightening, turbulent time," years later, when he is diagnosed with schizophrenia, it will come back to haunt him in the form of paranoid delusions.

When Nash begins to imagine that "men in red neck-ties" are following him around the MIT campus, his fears are not completely off-base: government officials did track down MIT professors suspected of being communist sympathizers. Many of Nash's schizophrenic delusions had some grounding in reality, which made it difficult for Nash to resist believing them; these situations seemed plausible to him.

CHAPTER 20 – GEOMETRY

Warren Ambrose, a colleague of Nash's at MIT, pens an angry letter to another mathematician in the spring of 1953, accusing Nash of being a "childish bright guy" with few practical skills in mathematics. A "moody, intense, somewhat frustrated" mathematician, Ambrose cultivates an intense rivalry with Nash, who makes him the target of several cruel pranks. Eventually, Ambrose challenges Nash to solve the "embedding problems for manifolds," a notoriously difficult problem. Nash does so, in part because he is a mathematician who views mathematics as a "collection of challenging problems" to be addressed and solved.

Since Nash treats his encounters with other mathematicians as games to be won, he thrives off of competition and rivalry. When Ambrose challenges him to solve one of the most difficult problems in all of mathematics, Nash gladly rises to the occasion. Nash's hunger for knowledge and success made him a formidable competitor, and he constantly challenged himself to come up with new ways to solve old (and famously difficult) problems.

"Embedding" is the process of portraying a geometric object as "some space in some dimension." Nash's theorem for embedding states that any kind of manifold embodying "a special notion of smoothness" can be embedded in Euclidean space, a certain kind of two- or three-dimensional space: in other words, "you could fold the manifold like a silk handkerchief, without distorting it." Nash had to solve a certain set of partial differential equations in order to come up with this result—equations that at the time were impossible to solve with existing methods. Though few believe Nash will solve the problem—even Levinson—Nash is like a "long-distance runner": he perseveres where others give up and is a "hard worker by habit," determined to prove that what seems impossible might be possible—in his own hands. In October 1954, Nash's manuscript on embedding is accepted to the *Annals of Mathematics*, the prestigious Princeton mathematics journal.

Nash's genius as a truly innovative thinker lies in his ability to think outside of the box, coming up with ways to attack difficult problems that no other mathematicians would have considered. Nasar describes Nash as a "long-distance runner" to emphasize his unique skills as a scholar. Whereas other mathematicians might focus on fast, flashy puzzles, Nash spent years pondering solutions to seemingly impossible problems.

In the early part of 1953, Martin offers Nash a permanent faculty position at MIT, which comes as a surprise to faculty members who believe that Nash is "disdainful" and a bad teacher to boot. Nonetheless, when Nash solves the embedding theorem, many of the faculty members are pleased to support him—including Warren Ambrose, who had been skeptical of Nash's ability to produce a result.

For all of Nash's success as an early career mathematician, his difficult personality makes him the object of much criticism, even at his own institution: again, it is clear that Nash's genius cannot always make up for his faults as an individual.

CHAPTER 21 – SINGULARITY

For most of his life, Nash seemed to "live inside his own head," unable to form mature, lasting bonds with others: he is more interested in "patterns," not relationships, and the independence and resources of his own "powerfulness, fearless, fertile mind." Yet during his first years at MIT, he begins to discover that he does want—in fact, *needs*—to cultivate relationships with other people. During this period in his life, Nash would become "emotionally involved" with at least three other men, abandon a "secret mistress" who would have his child, and eventually marry his wife, Alicia Nash. As Nash begins to form complicated, intimate connections, his life begins to resemble a play in which the scenes are acted by two characters—one who remains a constant throughout the play, and another who periodically vanishes.

Up until this point, Nash seemed to place a high value on only one relationship in his life: his relationship with himself. Yet in his 20s, Nash realizes the power of his desire for others, and he begins to carry on passionate, often tumultuous affairs with both men and women. These affairs seem to transform him into a different person: as he becomes involved with different lovers, he leaves behind his persona as an aloof, detached mathematician, throwing himself into the murky waters of love.

In a letter he wrote in the 1960s, Nash compared himself to an equation representing a three-dimensional hyperspace, which has a "singularity," or a special point at the origin, in four-dimensional space: Nash is this "singularity," and the other variables in space are people with whom he interacted and carried on affairs. Nash often did not realize the effect he could have on others, wishing that the people around him could be "satisfied with his genius"—and not want any "emotional needs for connectedness" from him.

As Nash begins to form intense relationships with others, he thinks of himself as a "singularity"—an important individual around whom other "variables," other people, revolve. Though becoming intimate with others gives Nash the opportunity to become more attuned to others' feelings, he fails to learn empathy and continues to act arrogantly.

CHAPTER 22 – A SPECIAL FRIENDSHIP

Later in his life, John Nash wrote in a letter to his sister Martha that only three individuals had ever brought him "any real happiness." Before 1952, Nash had never experienced mutual attraction with any of the men he had loved—until he met Ervin Thorson, also a RAND employee, whom Nash referred to obliquely in letters as his "special friend," "T." Thorson, an intensely private man, never married, and eventually quit his job at the age of 47; he moved back to his hometown of Pomona and became a "virtual recluse."

A few of the men Nash was romantically involved with, including Thorson, became intensely reclusive or experienced mental breakdowns after their relationships with Nash collapsed. Though Nasar does not explicitly fault Nash for inflicting emotional damage on his lovers, she does suggest that his intense personality and erratic behavior may have played a role in Thorson's later difficulties in life.

CHAPTER 23 - ELEANOR

By Labor Day of 1952, Nash has moved back to Boston, living on 407 Beacon Street, a boardinghouse run by an elderly widow. Another male boarder later recalled that though Nash never had any visitors, he woke up in the middle of the night once to hear a sound coming from Nash's room: a woman's giggle. This is Eleanor Stier, Nash's first female love interest. Nash meet Eleanor, a nurse, when he goes to the hospital in September to have some varicose veins removed. They later run into each other in a department store in Boston. Nash seems fascinated with Eleanor and begins to joke around with her in public; she is charmed by his attention.

Though Nash never seemed interested in serious romantic relationships before, meeting Eleanor seems to change him. Nasar suggests that for all of his obvious eccentricity, Nash possessed a deep desire to be "normal": he was ashamed of his desires for other men and wanted to have a girlfriend, like other men his age.

Eleanor is 29, an "attractive, hardworking, tenderhearted woman" who had a difficult childhood. She feels protective of Nash, who is five years younger than her, even though he comes from a wealthier background and is an MIT professor. On their first date, Nash only seems to speak about himself, but Eleanor is somewhat relieved: she doesn't want to share much about her troubled background.

In some ways, Eleanor and Nash seem like a good match. She tolerates his narcissism, since she is infatuated with him and less inclined to talk openly about herself. Later, though, Nash's lack of empathy and self-centeredness will cause severe problems for their relationship.

It is not exactly clear why Nash begins to court Eleanor, since he hadn't seemed interested in Ruth Hincks, and he rarely expressed interest in women in general. Nash may have wanted to prove his own "masculinity" by dating Eleanor. Nash also feels that he maintains the "upper hand" with Eleanor, who is poorer and less educated than him. Yet Eleanor also embarrasses Nash: he considers introducing her to his friends at MIT and later thinks better of it

Nash's relationship with Eleanor may have served as a "cover-up" for his own homosexual desires, which he was determined to keep hidden away. Moreover, instead of providing Nash with an opportunity to become a more caring, giving, and empathetic person, dating Eleanor seems to provide him only with an ego boost: Eleanor reveres Nash, affirming his own self-confidence.

In November 1952, Eleanor realizes that she is pregnant. To her surprise, Nash is "pleased" and "proud" of having fathered a child. As the pregnancy progresses, however, Nash and Eleanor's relationship unravels: Nash finds himself "irritated" by Eleanor, and Eleanor is frustrated by his lack of commitment to her. Nash refuses to marry her, and when their child is born, he does not put himself down as the father on the birth certificate. After the birth, Eleanor manages to find a live-in position with an employer who lets her keep her infant with her, but because Nash often comes to visit—despite the employer's "no male visitors" rule—she loses the job and is eventually forced to place their child, John David Stier, in foster care.

Though Nash is excited by the idea of becoming a father—which seems to confirm his own masculinity and virility—he is also unable to commit to the responsibilities of fatherhood, and his reckless, thoughtless decisions negatively impact Eleanor and his son.

Eleanor is devastated by the idea of giving up her child and begins to feel resentful of Nash, whom she blames for most of their troubles. Nonetheless, Nash and Eleanor continue to see each other, though Nash does not tell his colleagues or friends about Eleanor or his son. Eleanor continues to hope that Nash will agree to marry her. At one point, Nash may have wanted to marry Eleanor, but he may have also believed that Eleanor was content to be his "mistress." Moreover, Nash has a strong sense of "social snobbery": Eleanor's lower-class background would not have made her suitable to be his wife.

Nash's actions with Eleanor prove his "singularity" comparison to be true. He thinks of himself as superior to Eleanor and wrongly believes that she is content to be a mere "variable" in his life: as their relationship grows strained, she becomes a person of fleeting importance to him, devastating her.

Eventually, Nash suggests to Eleanor that she put John David up for adoption, and their relationship falls apart shortly thereafter: Eleanor realizes that Nash does not want to marry her and become a real father for their son. Later, John David would say that Nash was too narcissistic to be a father. By 1959, Nash would disappear from John David's life altogether, though he later sent his son a "beautifully made wooden airplane": "a lovely thing," John David recalled.

One of the most devastating byproducts of Nash's inability to understand other people's needs and emotions is the loss of his relationship with his son, John David Stier. Though Nash makes an attempt to reconcile with John David by sending him a wooden airplane, this feeble effort does not seem to make up for his prolonged absence from John David's life.

CHAPTER 24 – JACK

Nash meets Jack Bricker in 1952 in the MIT common room. Bricker is a first-year graduate student from New York who is friends with Newman and others, and he is immediately taken with Nash—not only because of his intellect, but also for his "southern breeding," good looks, and confident demeanor. Bricker himself is from a poor background, and though he can be moody and sullen, he is often bright and engaging, too. Bricker catches Nash's eye because of his "way of putting others at their ease," and the two begin to play chess together: theirs is a friendship that grows to be more than a friendship, and they often openly display affection with each other, even in front of others.

After Thorson, Bricker is the second man who reciprocates Nash's romantic feelings. Nash and Bricker begin a tumultuous affair, and Nash begins to publicly display some of the private feelings of same-sex attraction he has long repressed.

By falling in love with Bricker, Nash realizes that he is "no longer a thinking machine whose sole joys were cerebral": though he is not "passionate" by nature, love serves to "modulate" his sense of detachment from the world. Yet Nash does not think of himself as homosexual: many other graduate students at Princeton also had same-sex relationships, though they considered themselves heterosexual, too.

Though Nash has always thought of himself as independent—and never as homosexual—falling in love with Bricker shows him just how much he needs other people in his life, helping to feel less disconnected from the world.

Bricker and Nash's relationship quickly grows troubled. Later, Bricker would recall that Nash could be "beautifully sweet one moment and very bitter the next." Bricker is unaware of Eleanor's existence until Nash lets him in on the "secret" in the spring of 1952. Bricker—who begins to accompany Nash to dinners with Eleanor—is disturbed and worried by Nash's treatment of his "mistress," with whom he is often openly cruel. Bricker's academic performance begins to suffer, and he eventually drops out of graduate school: "Nash's game was just too painful to play any longer." When Nash became ill in the 1960s, he sent many "disturbing" letters to Bricker, who evidently remained an important figure in his life.

Despite the bond that forms between Bricker and Nash, Bricker begins to feel burdened by Nash's cruel behavior toward him and Eleanor, his "secret mistress." Like Thorson, Bricker suffers because of Nash's actions, though Nash does not seem to understand how severely he has affected Bricker.

CHAPTER 25 – THE ARREST

At the end of August 1954, the head of RAND's security detail is called by the Santa Monica police station. An officer announces that two cops arrested a young man in a men's bathroom in Palisades Park that morning. The man claimed to be a mathematician employed by RAND. He was charged with "indecent exposure," a misdemeanor. RAND confirms that John Nash is indeed an employee: Nash has been targeted in a "police trap," and he will have to be fired, since criminal conduct and "sexual perversion" are grounds for dismissal and the cancelation of one's security clearance. Nash is fired, though he immediately denies being a homosexual—even pulling out an image of Eleanor and John David to show to the security officers who come to remove him from his office at RAND. The charge, "indecent exposure," means that Nash had likely been caught masturbating and making a come-on to another man in the bathroom.

Nash is caught in a "police trap" that discriminates against homosexual men (in the 1950s, sodomy—sexual relations between gay men—was a crime). Though it is never clear whether Nash was actually soliciting other men for sex in the Palisades Park bathroom, it is likely that Nash made some kind of sexual advance on an undercover officer: the desires he has long repressed have been publicly revealed. Still, Nash denies that he is a homosexual to the RAND security officers, showing that he has yet to come to terms with these private (though powerful) desires. Indeed, he will never publicly admit to them, since to do so would be dangerous.

In response to his firing, Nash "acted, weirdly, as if nothing had happened," though news of his arrest is quickly transmitted back to Princeton and MIT. Nash appears "unscathed" after the incident, but the course of his life has been forever altered: Nash realizes that he is no longer invincible. The stress his arrest causes him may have catalyzed his susceptibility to schizophrenia, since psychological stresses are thought to contribute to the onset of the illness.

Throughout A Beautiful Mind, *Nasar attempts to explain why Nash may have begun experiencing schizophrenic episodes later in life, at the age of 30 and the height of his academic career. Many schizophrenics begin experiencing episodes earlier; so why did Nash become ill later in his life? Though it is not clear to scientists and psychiatrists what exactly causes schizophrenia, stress is one potential contributing factor. In addition to humbling him somewhat—showing him, perhaps for the first time, that his actions could have consequences—Nash's humiliation in California may have contributed directly to his eventual mental breakdown.*

CHAPTER 26 – ALICIA

After returning to Cambridge, Nash begins to make frequent visits to the quiet music library to study, where he often interacts with the music librarian at the front desk. One day, he notices a young woman who had been his student is now working behind the desk: this is 21-year-old Alicia Larde, a "delicate and feminine" young woman. Alicia's family—bourgeois, upper-class, and well-educated—was from San Salvador, and Alicia and her parents moved to Atlanta in 1944, during an insurrection against the dictator Hernandez Martinez. They later settled in Biloxi, Mississippi, where Alicia's father worked as a doctor. The Lardes then moved to New York, following Alicia's uncle, who had settled in the United States before them.

Back in Cambridge, Nash meets the woman who will become his wife, Alicia Larde. Unlike Eleanor, Alicia is of Nash's own social class.

Alicia dreams of becoming a "modern-day Marie Curie." In her senior year of high school, she is accepted to MIT to study physics—one of seventeen women and two female physics majors in the class of 1955. At MIT in the early 1950s, women are able to juggle a number of pursuits: they are able to study science, form alliances with other women scientists, and meet male love interests. Alicia finds her courses difficult but manages to scrape by with a C-average in her freshman year.

As a MIT student, Alicia possesses uncommon intelligence: this seems to make her a better match for Nash, who tends to judge others severely for their class statuses and level of education.

During her sophomore year, Alicia takes a course taught by John Nash, whose good looks and reputation as a genius catch her eye: Alicia would later call her attraction to him "a little bit of a hero worship thing." When Nash begins coming to the music library where Alicia works, she engages him in conversation, hoping to spark a connection between them. Though Alicia wants to become a famous scientist, she believes that marriage to an "illustrious man" "might also satisfy her ambitions."

By describing Alicia's belief that marrying an "illustrious man" like Nash might satisfy her, Nasar foreshadows a development to come: later in her life, Alicia will sacrifice her career to help Nash recover from schizophrenia. Though Alicia loves Nash deeply and is satisfied to devote her life to him, she does so at the expense of her own happiness and security—a major sacrifice that goes unnoticed by many in the Nashes' orbit, including Nash himself.

CHAPTER 27 – THE COURTSHIP

Nash is attracted to Alicia because of her "aristocratic lineage," "social ease," and her own good looks; he also finds her "interesting" and intelligent, perhaps more so than other women he had met. Nash and Alicia are also similar in many ways: they grew up in households in which intellectual achievement was prized, and they both feel themselves to be outsiders in some way. By July 1955, Alicia and Nash are dating on and off.

A Beautiful Mind *is not only a biography: it is also a love story about the relationship between John and Alicia Nash. Nasar suggests that in many ways, Nash and Alicia were destined for each other; unlike many of Nash's other lovers, including Eleanor, Alicia and Nash had much in common.*

Alicia does not manage to graduate from MIT with the rest of her class in summer 1955, and she and Nash continue to see each other in the fall: Nash also begins to invite her to his friends and colleagues' houses, where she meets MIT's famous mathematicians. Nash is not always kind to Alicia, and he seems to regard her as "part of the background," a "decoration." He seems to want to have a girlfriend in order to fit in with the other mathematicians.

Though Nash and Alicia's relationship initially starts off positively, Nash's cruelty and self-centered attitude are soon revealed. Just as Nash seemed to use Eleanor as a way to "prove" his masculinity, Alicia seems to be a "decoration" for Nash to use to augment his own status at MIT.

In February 1956, Alicia and Nash are in bed together at his apartment when Eleanor walks in unannounced: seeing Alicia there, she begins crying and screaming. Angry and despondent, Eleanor makes numerous phone calls to Alicia over the next few days, and Alicia responds by inviting her to her apartment to discuss the situation. Alicia realizes that because Eleanor is almost 30, and Nash has still not married her, despite having known her for three years, the two are unlikely to ever be married. Alicia doesn't feel betrayed but relieved: she believes that she has begun to "matter" to Nash, and that she might be his first choice. Yet that summer, Nash leaves Cambridge without suggesting that the two marry, or that Alicia should follow him to New York, where he will be on sabbatical for the year.

Nash endangers his relationship with Alicia by hiding his relationship with Eleanor from her, but Alicia is too in love with Nash to break things off between them. This is the first of many sacrifices Alicia makes for Nash, despite his harmful actions and refusal to take responsibility for his own errors.


CHAPTER 28 – SEATTLE

Nash travels to Seattle in June 1956 to attend a month-long summer institute at the University of Washington, where he expects his embedding theorem to make him a center of attention. Instead, though, one of Milnor's proofs garners significant attention from the mathematicians, leaving Nash angry and embarrassed.

Nash's competitive nature is still intact, and he grows increasingly frustrated with the fact that some of his mathematical research is being overlooked by other mathematicians. Stubbornly self-centered, Nash believes wholeheartedly in the superiority of his own work.

Amasa Forrester, who had been a first-year graduate student at Princeton during Nash's final PhD year, recognizes Nash at the institute and invites him to come to see his living quarters. Forrester is as "brash and brilliant" as Nash, though he is also openly homosexual. Forrester has an "unusual capacity for connecting with troubled individuals," which may have drawn him to Nash. Though it is unclear whether Forrester and Nash had much of a relationship while Nash stayed in Seattle for the month, he referred to Forrester as "F" in various letters until the 1970s.

There is no evidence to prove that Forrester and Nash had a fully-fledged relationship while Nash was staying in Washington, but Nash's letters about "F" suggest that he thought of Forrester as a "special" friend throughout his life. Even though Nash was in a relationship with Alicia, he apparently continued to find it difficult to repress his feelings for other men.

That summer, Nash receives a call from his father, John Sr.: Eleanor had contacted Nash's parents to tell them about their grandson. In July, Nash returns to Boston, where he learns that Eleanor has hired a lawyer; she wants regular child support payments from Nash. Bricker tries to convince Nash to pay Eleanor, and to his surprise, Nash relents.

Nash agrees to take responsibility for John David's care, but Nasar suggests that this decision is not exactly motivated by a change of heart: Nash has been caught in a lie and feels guilty about his actions, but he is not yet reformed.

CHAPTER 29 – DEATH AND MARRIAGE

During his sabbatical year, which he is to spend at the Institute for Advanced Study, Nash decides to live in New York City instead of Princeton, finding an apartment in Greenwich Village. Nash is attracted to the Village's "Old World charm" and the "frenetic rhythms" of the city. Nash's parents have also decided to move to New York for John Sr.'s work, which worries Nash: he believes that they might try to convince him to marry Eleanor.

Though Nash eventually decides to marry Alicia, his decision to move to New York—and his fear that his parents will force him to marry Eleanor—betrays his own abiding sense of independence.

That September, John Sr. suffers a heart attack and dies at the age of 64. This loss is yet another "fissure in the foundation" of Nash's world, his carefully put-together life. Meanwhile, Nash begins to consider asking Alicia to marry him. Like Nash, Alicia has decided to move to New York; she takes a job at the Nuclear Development Corporation of America. By November, she and Nash are engaged, though he does not give her a ring. Nash and Alicia marry in Washington, D.C. in February in a small but elegant Catholic ceremony.

At the same time, the death of his father shakes Nash: "fissures" are beginning to form in his formerly stable life, which is slowly beginning to spin out of control.

CHAPTER 30 – OLDEN LANE AND WASHINGTON SQUARE

The Institute for Advanced Study in Princeton is a "scholar's dream," offering its researchers an idyllic setting, a private apartment, and a number of seminars, lectures, and parties to attend. By contrast, the Courant Institute of Mathematical Sciences at New York University, near Washing Square Park, is a newer, smaller institute, though it has begun to attract a number of brilliant students, mostly New York City Jews who have been shut out of Harvard and Princeton for reasons of antisemitism. Nash begins to spend time at the Courant Institute, though he is meant to be conducting research at the Institute for Advanced Study. Nash finds the atmosphere at Courant stimulating, though he is received controversially: one academic later recalled that he was prone to make racist comments.

As Nash takes up positions at different universities, his actions remain unchanged: he continues to alienate his colleagues with his difficult and often controversial behavior, despite the problems this behavior has caused in the past.

Nash has become interested in the problem of "turbulence," referring to the flow of gas or liquid over any uneven surface—a kind of applied math problem in which the scientists at Courant specialize. After solving the turbulence problem (in "an ingeniously roundabout manner"), Nash is offered a job at Courant, though he isn't sure whether to accept the offer or go back to MIT. Later, Nash learns that another problem he had solved had already been solved a few months before by an obscure Italian mathematician. Nash leaves the Institute for Advanced Study at the end of the summer with a new project in mind: he hopes to resolve certain contradictions in quantum theory, though this project will eventually prove "psychologically destabilizing."

Nash is deeply troubled by the fact that one of his supposedly novel solutions is not original: a problem that he thought he was the first to solve was in fact already solved by another mathematician. As a result, Nash's competitive nature kicks into overdrive, and he recommits himself to his academic work, more determined than ever to come up with new and unique solutions to math's most difficult problems.

CHAPTER 31 – THE BOMB FACTORY

Back at MIT in the fall of 1957, Nash and Alicia find an apartment in Cambridge, and Alicia gets a job nearby as a physics researcher. They often go out to dinner with Nash's old graduate student friends, since Alicia wants to make sure that she and her new husband are surrounded by "amusing people." Nash continues to work on the turbulence problem he had begun at the Courant Institute, addressing small gaps in the proof: it will take most of the year for him to be able to submit his research to a journal.

Always supporting Nash from behind the scenes, Alicia has to work hard to make sure that she and Nash seem normal and well-adjusted to the other graduate students.

Overall, Nash's 30th year is "looking very bright." In addition to his academic achievements, *Fortune* magazine is going to feature him in an upcoming series on the leaders of "New Math." Yet Nash is also highly dissatisfied with the state of his life, since he is not yet a full, tenured professor at MIT: his candidacy is controversial, since many MIT professors, like some professors at Princeton, feel that he is a "poor teacher and an even worse colleague."

Though Nash's career seems to be going better than ever, cracks are beginning to show up on the surface of his life. In particular, his personality continues to cause rifts between him and other faculty members.

In 1958, the Fields Medal—"the ultimate distinction that a mathematician can be granted by his peers," awarded to a mathematician under forty—is awarded to two mathematicians, a topologist and a number theorist, after an "unusually contentious" round of deliberations. Though Nash's name was up for consideration, he likely did not make the final rounds: no one could have predicted, though, that this would be Nash's final chance to win the prize. Nash had hoped that by putting one of his papers up for the Bocher Prize, another prestigious American math prize, he might increase his chances of winning the Fields—to no avail.

In the last few years before Nash's 30-year hiatus from mathematics, Nash experiences a series of disappointments that cast doubt on his feelings of self-importance and his confidence in his own work. Nash does not receive the Fields Medal, despite his accomplishments in game theory, and is devastated by this loss; he will not be recognized publicly for his work for another 30 years.

CHAPTER 32 – SECRETS

Nash turns 30 in June 1958 and becomes fearful that "the best years of his creative life were over": for even the best mathematicians, mathematics can feel "like an intramural competition, a race," and Nash feels that time was running out for him to accomplish something truly ground-breaking. As a result, he decides to start working on two new problems: one of these is the Riemann Hypothesis, known as "the holy grail of mathematics," about the distribution of prime numbers. Since 1859, a number of mathematical giants had attempted, unsuccessfully, to prove the hypothesis: now, Nash is determined to do what others had found impossible.

Concerned that his career might be bottoming-out, Nash doubles down on his intellectual pursuits and pushes forward with the mathematical "race." Determined to get ahead of other mathematicians, Nash is drawn to problems that others might find too challenging: he is utterly convinced of his own abilities as a thinker and scholar.

Nash decides to try to prove the hypothesis "by logic, by internal consistency of the system": he hopes to find another number system in which the hypothesis is true. Just as Nash's work in the past has been met with skepticism, his conjectures about the Riemann Hypothesis attract doubt. It is Nash's desire to "scale" this "most difficult, dangerous peak" that will prove to be his undoing. That summer, Nash also begins to exhibit compulsive behavior surrounding money and finances: he becomes interested in stocks and starts believing that there is a "secret theorem" to the market that will allow him to make significant returns on his investments.

Nash pushes forward with the difficult work of solving the Riemann Hypothesis, yet his mask of normalcy is beginning to slip: Nash is beginning to become highly paranoid and convinced of certain far-fetched ideas.

CHAPTER 33 – SCHEMES

In 1958, Alicia discovers that she is pregnant. Though Alicia is dismayed—she had hoped to keep working for a few years—Nash is delighted, since he had hoped to start a family right away. At the same time, Nash is preoccupied with the future of his own career, since he is coming up for tenure at MIT in the winter. Nash begins to feel that he might not belong at MIT, and he is fielding a potential offer from the University of Chicago. Nash also begins to apply for grants for a sabbatical year, hoping to spend the spring term of 1959 at the Institut des Hautes Études Scientifiques in Paris.

Though Nash is "delighted" to become a father again, he is more concerned with the advancement of his own career, and worried that he might not achieve tenure at MIT: Nash continues to pay the most attention to his own life and pursuits.

In summer 1958, another brilliant young mathematician comes to MIT: Paul Cohen, who would later win both a Fields and a Bocher. Cohen is "self-obsessed, suspicious, aggressive, and charming by turns"—as "ambitious" and "arrogant" as Nash. The two men begin to challenge each other publicly, though Nash also serves as a kind of mentor to Cohen. He begins to drop hints to Cohen about his own homosexual desires, and soon, rumors spread around the department that Nash is in love with Cohen. Cohen is flattered, but he seems to think of Nash only as an intellectual sparring partner. Later, some will blame Nash's mental breakdown on the "disappointed love" between the two men.

Nash's romantic relationships with other men (including Bricker and Thorson) tended to be consuming and competitive, and his relationship with Paul Cohen is no different. Nash seems to have difficulty expressing his feelings for other men in healthy, productive, and transparent ways—instead, he "drops hints" and cruelly plays with their emotions.


CHAPTER 34 – THE EMPEROR OF ANTARCTICA

At a costume-themed New Year's Eve party at Nash's colleague Jurgen Moser's house on December 31, 1958, Nash and Alicia enter the house, causing a stir among the guests: Nash is "entirely naked" except for a diaper and a sash with the numerals *1959* written on it. Though by February of 1959, Nash will have deteriorated mentally, he seems to be in high spirits on New Year's. Shortly thereafter, though, Nash begins to seem more "withdrawn," and he begins ranting at people he encountered, sometimes about paranoid conspiracy theories about the government. His colleagues, though, take this as further evidence of the eccentricity for which he was already infamous.

Nasar carefully details the many warning signs that seem to show Nash on the brink of mental collapse. He begins to exhibit stranger behavior in public, becoming alternately paranoid and "withdrawn," and excitable and exhibitionistic—clear signs that his mental state is quickly becoming precarious.

Nash is beginning to imagine that "**men in red neckties**" are following him around the MIT campus, flashing secret "signals" at him. He believes that these men are part of a "pattern," a conspiracy against him. Nash begins to write to other mathematicians to inform them that "aliens from outer space" are ruining his career. Nash also write to the University of Chicago to refuse the offer of a prestigious chair, saying that he is "scheduled to become the Emperor of Antarctica" instead. MIT faculty members begin to realize that Nash is a "very sick man."

Though Nash's fear of "men in red neckties" is a fantasy, this delusion does not seem entirely far-fetched: government officials on the look-out for suspected Communists had policed MIT in the past. At first, Nash's delusions seem to have some kind of a basis in reality, but they quickly become more unrealistic. Yet Nash seems to have lost his ability to think clearly and rationally, distinguishing fact from fiction.

In the middle of a MIT lecture given by Eugenio Calabi, a member of the Institute for Advanced Study, Nash interrupts with nonsensical comments about being on the cover of *Life* magazine: he claims that he had been disguised as Pope John XXIII. Calabi, who knows Nash from Princeton, continues lecturing without acknowledging Nash's comments. On February 28, Nash is scheduled to give his own lecture, sponsored by the American Mathematical Society, at Columbia University in New York City. The mathematicians who gather for the lecture quickly realize that Nash's words aren't fitting together: the math is "lunacy." Later, Nash delivers a similarly "disastrous" lecture at Yale.

Nash's string of "disastrous" lectures is the first clear sign that he is losing his grip on reality. Though his colleagues take notice of his mental decline, they are not immediately alarmed: Nash is well known for his eccentric behavior, though his personality has never before seemed to negatively affect his skills as a mathematician.

CHAPTER 35 – IN THE EYE OF THE STORM

Alicia is beginning to feel isolated in Boston and worried about Nash's mental state: Nash is beginning to accuse her of knowing "secrets" that she won't t share with him. He claims that he has been "bugged" and paints black spots on their bedroom wall; he also seems "irritable" at times and "hypersensitive" at others. He threatens to take savings out of the bank and move to Europe, and he begins to write long, incomprehensible letters addressed to the U.N. and other government officials.

Nash displays clear symptoms of paranoid schizophrenias: his moods shift dramatically, he experiences delusions, and he exhibits compulsive, obsessive behavior. Nash's behavior is beginning to become a "storm," threatening Alicia's own safety and livelihood.

Alicia decides to quit her job and take another job closer to the MIT campus in order to keep an eye on Nash. At first, she tells no one that Nash is behaving irrationally; later, she confides in Virginia Nash and two psychiatrists, who each advise different courses of treatment—medication or shock therapy. In January, Nash is approved for tenure but relieved of his teaching duties, since Martin is aware that Nash seems to be suffering a "nervous breakdown." Alicia begins to wonder if she is exaggerating his mental decline, since many of his colleagues do not seem to be worried.

Alicia's decision to quit her job in order to be closer to Nash is the first of many sacrifices she will make for her husband as he becomes more mentally ill. Determined to hold her family together, Alicia tries to keep her suffering—and Nash's strange and aggressive behavior—under wraps.

In the spring, Nash abruptly leaves Boston for Washington, D.C., where he intends to deliver several of his incomprehensible letters to foreign embassies. Alicia goes with him, worried more for Nash's safety than her own. Yet it is fear for her own well-being, and for that of their unborn child, that eventually prompts her to hospitalize Nash a few weeks later.

Ultimately, it becomes too difficult for Alicia to handle Nash on her own, and she is forced to hospitalize him; these hospitalizations will punctuate Nash's life, and each one will cause him to become even more cut off from the world.

CHAPTER 36 – DAY BREAKS IN BOWDITCH HALL

On the day that Nash is hospitalized for the first time, he goes on a walk with Paul Cohen, who is disturbed by Nash's rambling speech and paranoia. Nash is hospitalized involuntarily, as MIT's psychiatrists have determined that Nash is a danger to himself and others. Police officers arrive at Nash's home and take him to the hospital in Belmont, Massachusetts. McLean Hospital has a reputation as a "sanitorium" where "high-strung poets, professors, and graduate students" are often committed. Nash is transferred to Bowditch Hall, a locked facility for men, where he is joined by the famous poet Robert Lowell, who suffers from manic depression. Lowell and Nash spend a fair amount of time together in the hospital: Lowell often delivers long, rambling monologues in Nash's room. Bowditch is an "oddly genteel" environment, populated by well-behaved, though seriously ill, men: Nash, though, feels like a prisoner, and he threatens to sue Alicia for divorce.

Nash is not the only academic to be hospitalized at McLean, which houses many professors and students from Harvard, MIT, and other Boston colleges. In A Beautiful Mind*, Nasar shows that often, those considered most intelligent also suffer from the most debilitating mental illnesses: genius and suffering are not mutually exclusive, and in fact, they often accompany one another.*

For two or three weeks, Nash is "watched, studied, and analyzed" by psychiatrists, who quickly realize that Nash is suffering from schizophrenia, evidenced by the "bizarre and elaborate character" of his delusional beliefs. Within a few weeks of medication and treatment, Nash's acute psychosis has faded, and he behaves quietly and politely as a patient; still, the residents assigned to his case believe that though his symptoms seem to have "disappeared," it is likely that he is only concealing them in order to be released early. Nash hires a lawyer to petition for his release from the hospital. Though his residents continue to argue that Nash is not yet recovered, Alicia decides that Nash can come home. One week after the birth of their son, on May 28, Nash leaves the hospital after 50 days there.

Nash treasures his independence above all else, and hospitalization feels like imprisonment. He seems to conceal his symptoms in order to petition for an early release, though leaving the hospital before he is recovered only serves to worsen his mental condition.


CHAPTER 37 – MAD HATTER'S TEA

Emma Duchane, a friend of Alicia's, helps Alicia to find an apartment after Nash is committed. Remarkably, Alicia seems calm and composed, despite Nash's hospitalization and her pregnancy: she believes that her husband's "mind and career could be saved." Since her future, as she sees it, depends on his, she is determined to help him regain his livelihood. As a result, she regards Nash as the only problem in her life—not her pregnancy—and fails to make arrangements for the birth. Alicia gives birth to a baby boy on May 20, 1959, in the Boston Lying-In Hospital, but does not name the child, who remains nameless for nearly a year.

Alicia's commitment to Nash and the sacrifices she makes for him are remarkable: despite the catastrophic circumstances, she remains calm and focused, prioritizing his needs above her own—and that of their unborn child.

Nash gets permission from McLean to leave for the evening to visit Alicia the day after the birth: there, he uses a napkin to cover up the "In" in the hospital's name, written on a sign nearby, so that it reads "Boston Lying Hospital." The suggestion is that Alicia is "lying"—though it is not clear what he believes she is lying about. After his release, Nash returns to the math department, where he hands out notices for a "coming out party," or a "Mad Hatter's Tea": a costume party, ostensibly for thanking the colleagues who visited him at McLean. Nash and Alicia hold at least two parties after his hospitalization, one of which was remembered by a guest as a "sad," "depressing," and "bizarre" evening.

Despite Alicia's sacrifices for Nash, his paranoia causes him to alienate himself from her, accusing her of "lying"; their relationship grows more troubled and complicated. Though he is able to return to the math department at MIT, he continues to exhibit odd, though strangely self-aware behavior—his "Mad Hatter's Tea" party seems to be an acknowledgment of his own "madness."

Nash decides to resign his MIT professorship so that he can move to Europe: he has decided that he wants to obtain Swiss citizenship. Nash submits a resignation letter, which Levinson tries to refuse; ultimately, though, MIT is unable to force Nash to stay on. Nash has been invited to spend a year in Paris at a leading center of mathematics, the College de France, and Alicia agrees to accompany him, leaving their son behind with her mother.

Nash's desire to flee America is motivated by his paranoid belief that he is being surveilled by spies for the American government. He hopes to become a citizen of Switzerland, a "neutral" country where he feels he will be safer. Whereas Nash once searched for meaning in his academic work, he is now searching for meaning in his own paranoid delusions—and in the chaotic fantasies generated by his own mind.

CHAPTER 38 – CITOYEN DU MONDE

Nash and Alicia leave from New York on a ship, the *Queen Mary*, which reaches Paris on July 20, 1959. Alicia hopes that their stay in Paris will be temporary and that it might offer a "cure" for Nash, but she soon realizes that the city might become their new home. That summer, Paris is a hotbed: a site of demonstrations, strikes, and explosions. These tensions animate Nash, who believes that he is acting with "a heightened sense of purpose" and "special" government knowledge. He also hopes to "shed the layers of old his identity"—the famous Cambridge math professor—in Paris, carving out a new place for himself in the world.

Alicia hopes that Paris will serve as a temporary refuge for Nash, but Nash—motivated by delusional beliefs—is determined to start his life over in Paris, becoming an anonymous citoyen du monde: *a "citizen of the world." Though Nash's desire to "shed" his old identity and discover a new one is a result of his schizophrenia, it also reflects a desire he has possessed throughout his life, even before he began experiencing schizophrenic symptoms. Nash has always been compelled to find meaning in the world, seeking out new solutions to difficult problems. Now, the "problem" in question has become his own identity.*

Nash hopes to follow in the footsteps of Garry Davis, a Broadway actor and former bomber pilot who renounced his American citizenship in 1948 at the U.S. embassy in Paris. By attempting to renounce his own American citizenship, Nash makes clear the "radical sense of alienation" at the heart of his illness. Nash travels to the U.S. embassy in Luxembourg, where it is less likely that turning in his American citizenship will result in his arrest. However, Nash's request to give in his passport is denied; he later formulates a plan to move to Switzerland, a country he "associated with neutrality, world citizenship, and Einstein." Nash's friends, family, and colleagues realize that Nash's stint at McLean has not slowed the onset of his illness.

Schizophrenia causes individuals to lose their grip on reality, severing their connection to the world. Nash's desire to renounce his American citizenship reflects the sense of "alienation" his disease has caused: it has disrupted his life, prompting him to feel disconnected from his own identity as an American.

Nash and Alicia arrive in Geneva on an overnight train from Paris in 1959. Alicia leaves almost immediately to stay with a friend in Italy, leaving Nash alone in a small hotel for five months, where he writes "letters that would never be answered" and fills out "endless forms, applications, and petitions that would be filed away." Nash's search for a new identity, and for "meaning, control, and recognition in the context of a continuing struggle" with the conflicting parts of his "paradoxical self," seems to be similar to his search for mathematical insights. But now, he finds himself at the whims of his own thoughts, unable to control them or find order in them, as he once had.

Nash's frantic attempts to obtain refugee status in various European countries speak to an impulse he has always had as a mathematician: his desire to make "meaning" and order out of his own mind, solving problems through flashes of insight. As he begins to experience psychotic episodes, Nash's "problem" becomes his own American nationality; he has become irrationally paranoid that being an American is a threat to his own safety. Whereas Nash was once able to harness the power of his mind to solve difficult mathematical problems, his schizophrenia makes it impossible for him to solve the problems that he believes he is facing; he is trapped by his own delusions.

Nash hopes to obtain refugee status from the U.N. High Commission for Refugees, but his request is denied: he is advised to contact the Swiss police with an asylum petition. Authorities in Geneva find that Nash hasn't committed any crimes that would force the American government to strip him of his citizenship, and they threaten to deport Nash. Meanwhile, Nash begins to feel caught between two different, contradictory identities: an "abject petitioner" and a "religious figure of great, but secret, importance." Finally, in the fall, Nash destroys his own passport and refuses to apply for a new one.

Nash's schizophrenia splits his personality: sometimes, he believes that is a helpless "petitioner" in need of government assistance; at other times, he believes that he is a "religious figure," a kind of Messiah endowed with great knowledge and abilities. Though these are delusions, Nash's personality shines through his psychosis. As a saner man, he believed himself to be endowed with great knowledge and abilities, suggesting that even as schizophrenia severs Nash's connections to reality, it also heightens his experience of himself, making it difficult for him to extricate himself from its detrimental, insidious influence.

In Italy, Alicia enjoys a holiday with her friend and begins to recapture some of her "old lighthearted, girlish self." After, she returns to Paris to try to make arrangements for her mother and child to come to France. Nash and Alicia's son is christened Washington, D.C., without his parents present; Alicia decides to name him John Charles Martin Nash.

In Italy, away from Nash, Alicia is able to have some time to herself, but this sojourn is brief. Because Alicia has followed Nash to Europe in order to take care of him, she has been forced to leave her own very young child behind—a tragedy that speaks to her intense commitment to Nash and the sacrifices she makes for his well-being.

Nash is arrested in December under a deportation order, but he refuses to return to the United States. Alicia arrives in Geneva to take Nash back to Paris, after which they will return to the United States, but Nash refuses to leave the Geneva jail in which he is being held. Eventually, he is escorted onto a train by police officers. In Paris, life seems to proceed somewhat normally: Alicia holds a Christmas party attended by several mathematicians, but after Alicia's mother leaves Paris, leaving her alone with her child, she begins to feel overwhelmed again.

Nash is still very ill, and he does not seem to be recovering, despite Alicia's patience and sacrifices. His persistent efforts to forfeit his American citizenship and obtain refugee status cause significant difficulties for Alicia, who is at the end of her rope.

Nash is issued a temporary residence permit in France before his return to the U.S., but he is still determined to obtain refugee status. At one point, he travels to East Germany, where he is permitted to enter as a refugee, though his request for asylum is eventually turned down. Back in Paris, Nash continues to write and send nonsensical letters to his former colleagues. Alicia and Nash are quickly running out of money: eventually, Virginia Nash wires funds to Paris to finance Nash's deportation, and Nash is escorted to the airport by the French police.

Alicia is unable to bring Nash back to Paris without police intervention, though Nash is still able to escape briefly to East Germany—a situation that emphasizes the exhausting position Alicia is in as Nash's wife and primary caretaker.

CHAPTER 39 – ABSOLUTE ZERO

Nash returns to Princeton, and Alicia finds a job near Princeton and rents an apartment for her, Nash, and John Charles to share. At first, Princeton offers a "respite" from the anxiety Alicia had faced in Paris, and the couple continue to socialize with Princeton mathematicians. Nash is hired on a one-year consulting contract for the university's math department, on the condition that Nash is able to "pull out of his present mental depression."

Nash and Alicia return to Princeton because it offers a supportive academic community for Nash, which Alicia believes will help him to recover. Although initially, Nash seems to get better in Princeton, this "recovery" is only short-lived; it will take Nash decades to pull himself out of psychosis.

After nearly two years of suffering, Nash has been "transformed" physically: he has grown his hair out and seems to be "clearly disturbed," often walking into restaurants with bare feet and talking to animals on the Princeton campus. Eventually, the consulting job at Princeton falls through, since Nash refuses to fill out tax forms needed to secure his employment, claiming that he is a citizen of Liechtenstein and cannot be taxed. A psychiatrist advises Alicia to have Nash committed again.

Early efforts to help Nash recover from his mental illness are ultimately unsuccessful: after two years of "suffering," Nash's behavior has only become more shocking and stranger, demonstrating the severity of his illness.

CHAPTER 40 – TOWER OF SILENCE

At the end of January 1961, Virginia Nash and Martha arrive in Princeton. They travel to the Trenton State Hospital, where Nash is confined. The Nashes can no longer afford to have Nash stay at a private hospital, and they have agreed to commit him to Trenton State, a crowded, no-frills institution. Upon admission, Nash is assigned a serial number—which makes him feel like a prisoner—and a psychiatrist.

Nash is hospitalized yet again. Once more, he experiences this hospitalization as a form of "imprisonment," since it severely limits his own independence.

Some of Nash's former colleagues are disturbed to hear that he has been incarcerated at the state hospital, which is known for its harsh treatments, including drugs, electroshock therapy, and insulin coma therapy. Despite efforts by his former colleagues to delay aggressive treatment, Nash is transferred to the insulin unit, where he is administered insulin injections that render him unconscious for several hours a day. Later, hospitals will phase out insulin shock therapy, which comes to be considered too dangerous; at the time of Nash's hospitalization, though, insulin is one of the few treatments available for schizophrenia. After six weeks, Nash seems to be recovering.

Nasar discusses Nash's insulin therapy, a controversial treatment for schizophrenia that has since been phased out by most mental healthcare providers. For Nash, though, insulin therapy proved effective. Though Nash would later claim that his own ability to separate reality from delusion—the power of his remarkably rational mind—helped him to recover from schizophrenia, aggressive medical treatment was also an important part of his recovery, helping to stabilize his mood and prevent psychotic breaks.

CHAPTER 41 – AN INTERLUDE OF ENFORCED RATIONALITY

As Nash begins to recover, his newfound clarity of mind begins to seem more like a "loss" than a sign of remission: Nash feels that the powers of mind he had before the onset of his illness are now lost to him. Nonetheless, with the help of former colleagues and some Princeton faculty members, he is able to secure a one-year research appointment at the Institute for Advanced Study.

Throughout A Beautiful Mind, *Nasar shows that Nash's mental illness in some ways compounded his own mental abilities: it seemed to make his powerful mind even sharper. As with many other sufferers of schizophrenia, Nash experiences his recovery as a kind of "loss." He no longer experiences intricate, powerful delusions, which—though they ruptured his own sanity—created a compelling fantasy world.*

Nash and Alicia are now living together in Princeton again, sharing a home with Alicia's parents. Nash attempts to care for his son and makes some visits to Eleanor and John Stier. At last, Nash is able to work again, and he finishes a paper on fluid dynamics, which is well-received by the math community. However, Nash still hopes to leave the United States and return to France: he begins learning French and attempts to translate some of his papers into French.

Though Nash seems to be somewhat recovered, he is still paranoid about his own American citizenship—hence his desire to return to Europe—and continues to exhibit strange behavior, suggesting that he is still finding it difficult to maintain his grip on reality.

In June 1962, Nash attends a conference in Paris. The other attendees are surprised that Nash is able to deliver his paper, which is received as "respectable" research. Yet Nash is still exhibiting "decidedly odd" behavior—for example, insisting to other guests that his food has been poisoned. By the time he returns to Princeton at the end of the summer, his condition has worsened, and Alicia decides to initiate divorce proceedings. In May 1963, the divorce is granted without a trial, and Alicia is awarded custody of John Charles.

Despite Alicia's best efforts, she realizes that she can no longer handle caring for Nash: the strain her sacrifices for him have caused are taking a toll on her well-being and their marriage.

Colleagues at Princeton and MIT help to set up a fund for Nash with the goal of sending him to the University of Michigan, where he will be treated at the psychiatry clinic while working as a statistician in the clinic's research program. Donald Spencer is enlisted to help convince Nash to accept the arrangement, but Nash insists that he isn't ill and therefore doesn't need hospitalization. As a result, Martha, Virginia, and Alicia decided that Nash would again have to be committed to a hospital in New Jersey.

Nash's colleagues, like Alicia, believe that he will have the best chance of recovery if he is in an academic environment, where he can be around colleagues and conduct research. But Nash's stubbornness makes it impossible for him to accept help: like many sufferers of schizophrenia, he finds it difficult to accept that he is ill at all.

CHAPTER 42 – THE "BLOWING UP" PROBLEM

Nash is sent to the Carrier Clinic, one of two private mental hospitals in New Jersey. Carrier is known to use aggressive treatments like "chemical straitjackets" and electroshock therapy; though Alicia is worried about committing Nash to this third hospital, she knows that failing to intervene will only lead to "further deterioration." However, Alicia insists to Carrier's doctors that Nash cannot receive electroshock therapy, which is frequently administered to schizophrenic patients at Carrier.

Despite the turmoil that Nash and his illness have caused for Alicia, she remains committed to him and worried about his safety, even after their divorce—demonstrating her intense loyalty to Nash. Many of the treatments used to treat mentally ill patients in the 1950s and 1960s were aggressive and even damaging: Alicia has the foresight to see that these treatments might be detrimental to Nash's health.

Carrier is more comfortable for Nash than Trenton, and it is here that Nash meets Howard S. Mele, a psychiatrist who will play an important role in his life over the next two years. Nash responds well to an initial drug treatment and is eventually released from the hospital, on the condition that he will find a job. Nash rents a room in Princeton, where he is offered a one-year membership at the Institute for Advanced Study. Eventually, Nash hopes to take up a visiting position at MIT or the University of California, Berkeley; he also hopes to resume his marriage with Alicia, though this seems unlikely.

Nash is fortunate enough to meet Howard S. Mele, an exceptionally kind and helpful psychiatrist who helps Nash to recover from schizophrenia. Though Nash credits his recovery to his own ability to "order" his thoughts, separating fact from fiction, Nasar emphasizes that his recovery is also the result of the tireless efforts of many individuals around him, including Alicia and Mele.

Milnor, impressed that Nash seems to be working on "interesting" ideas in algebraic geometry, offers Nash a lecturer position at Princeton, with some teaching duties. However, Nash's mental state has begun to worsen again: he resumes writing nonsensical letters and tries to arrange a research post in France. Nash is granted funds to stay at the Institute for Advanced Study during the summer of 1964 but leaves for Europe instead, where he spends time in Paris and Rome. In Rome, Nash begins to hear voices, which he believes to be "mathematicians opposed to [his] ideas." Nash returns to Princeton, where he takes to writing "strange messages" on the blackboards of seminar rooms. Mele takes over Nash's care again and imposes a prescription of antipsychotic drugs; soon, Nash is on his way to Boston, where he will be able to conduct research at Brandeis University, supported by grants that Norman Levinson obtained for him.

Throughout the latter half of A Beautiful Mind, *Nasar shows that Nash's recovery from schizophrenia was hardly a linear process. Nash becomes healthier, then regresses again; he refuses medication, then reluctantly accepts treatment, and his condition improves. Throughout this difficult process, one constant remains. Though Nash loses touch with many people in his life, a number of other people (including Alicia, Mele, and Norman Levinson) continue to take care of him, demonstrating the healing power of friendship and empathy.*

CHAPTER 43 – SOLITUDE

Though Nash tolerates his position at Brandeis, he is also lonely, and he feels that he has forfeited his former status in the mathematical community. Nash visits Eleanor and John David every week, and though these visits are mostly pleasant, old tensions between Eleanor and Nash resurface: John David later recalled that his father usually seemed "aloof." Later, John David would remember his childhood as "miserable," since he was shuttled between foster homes—some abusive—and orphanages before returning to live with Eleanor as a teenager. Eleanor herself was frequently ill and lost many jobs. But Nash's reappearance seems to promise the beginning of a better life for John David, since Nash promises to pay for his son's college education.

To Nash, Eleanor and John David have always been of secondary importance: they are his "second" family, and he has often neglected them throughout his life. Yet as he begins to recover, he slowly begins to realize the error of his ways, and he pledges to have more of a presence in their lives—acknowledging, for the first time, that his relationships with others are important, and that he will have to make amends for his past behavior.

Nash misses Alicia, who discourages him from visiting Princeton, though he finds a "friendly" community at Brandeis. Nash seems more reserved now and less arrogant and outspoken than he once was; he is able to complete research that is later published in the *Annals of Mathematics*, a "remarkable feat" for someone who has been experiencing psychosis for most of six years. Nash has lost some of his memories, but he is still capable of producing high-quality scholarly work, and he secures an appointment at MIT for the fall. In summer 1966, Nash begins to unravel again, writing delusional letters to his family and wandering around Harvard Square in a daze. In early 1967, he visits a cousin in San Francisco and Amasa Forrester in Seattle; he returns to Cambridge later that year very ill and leaves for Virginia to stay with his mother in June.

Though Nash's mental illness has affected his cognitive abilities—causing him to lose some memories of the past six years—he remains as perceptive and intelligent as ever. Even though he feels as if he has "lost" some of his mental abilities, he is still a brilliant thinker, speaking to the lasting power of his gifts as a mathematician. Again, though, Nasar shows that his recovery is hardly linear: though he is able to return to academic life for a short period of time, Nash quickly relapses again.

CHAPTER 44 – A MAN ALL ALONE IN A STRANGE WORLD

Nash turns 40 in 1968 after a year of living in Roanoke, Virginia, near his family. Exhausted and cut off from all friends and colleagues, "he had nowhere else to go." Nash continues to experience delusions, though—consistent with symptoms of schizophrenia—he is also able to discern certain aspects of reality, and seems to be aware that his "insights," or delusions, are not comprehensible to others. Nash suffers from paranoid schizophrenia, which causes him to feel "uniquely powerful" at times and "extraordinarily weak and vulnerable" at others. Though Nash's delusions are "bizarre," they also seem to have a coherent logic and shared features, and by attempting to understand patterns in them, Nash seems to be playing the role of the "theorist, the scholar trying to make sense of complicated phenomena."

Nasar emphasizes that Nash's schizophrenic episodes are seductive to Nash's skills as a perceptive scholar and researcher. His delusions seem to contain similarities and features that lead him to look for patterns in them, just as he looked for patterns in mathematical problems. In this way, Nash's mental illness continues to be compounded by his genius as a thinker, making it all the more difficult for him to acknowledge that his delusions are fictitious; like math problems, they seem very real.

As he continues to experience schizophrenic episodes, Nash often feels that he has been "cast out" and "ostracized," fearing that he is being threatened by external forces. He also experiences feelings of guilt that he attributes to the "really dubious things" he has done (including his homosexual relationships). Nash seems to be waiting for some kind of "deliverance" from the prison of his own mind. Ultimately, though, medication prevents Nash from existing in a "zombie"-like state; without medication, he would have become a shell of his former self. In 1969, Virginia Nash dies. Eleanor obtains a court order to force Nash to continue child-support payments, which Virginia had been paying for Nash. Nash moves in with Martha and her husband, but Martha finds the arrangement too difficult; she arranges to have Nash committed again, this time to a state hospital in Virginia, from which he is released in February 1970.

Though Nash's schizophrenia leads him to believe that he is being "ostracized," he also begins to feel intensely guilty about the ways in which he has alienated others, including Alicia, Eleanor, and his friends and family. He also continues to worry about his own homosexual desires, with which he has never been able to come to terms. Nash suffers not only because of the delusions that he experiences, but also because of his own actions in the past, which come back to haunt him; mental illness only worsens his own struggles with his identity.

CHAPTER 45 – PHANTOM OF FINE HALL

Young math and physics majors studying at Princeton in the 1970s would often catch a glimpse of a mysterious man, a "wraith," writing on chalkboards in New Fine Hall, the new math building, before classes. This is Nash, now known as the "Phantom" of Fine Hall, rumored to be a mathematical genius who "flipped" while giving a lecture—or, in other variants of the urban legend, after learning that his wife left him for a mathematical rival, or that another mathematician achieved a result that he had hoped to discover. The "Phantom" serves as a cautionary figure for students who "lacked social graces," and few students communicate with the "Phantom," though they mostly leave him alone.

As Nash returns to Princeton and begins to tentatively reenter the academic world, he becomes known as the "Phantom of Fine Hall." The rumors that circulate about Nash are mostly fictitious, though they have some truth to them. In many ways, Nash's worst fears have been confirmed: he has been "ostracized," turned into a pariah and a "cautionary figure." Nash seems doomed to remain in obscurity forever, trapped by the delusions generated by his own mind.

The messages Nash leaves on seminar room blackboards range from nonsensical to humorous to purely mathematical. Nash has also become obsessed with numerology, which seems to provide him with a sense of order—allowing him to "make sense out of chaos." Princeton provides a "therapeutic community" for Nash, offering him intellectual sustenance and human comfort he hadn't experienced in Virginia. Nash's abilities in math seem relatively unchanged: he begins writing an algorithm for a certain type of arithmetic, "base 26 arithmetic," that involves tedious calculations and complicated mathematical thinking. He also begins to learn how to use computers and often spends time in the main library's reference room, leading him to become known as "the mad genius of Firestone." In 1978, Nash wins the John von Neumann Theory Prize from the Operations Research Society and the Institute for Management Science, though he is not invited to the prize ceremony.

Re-immersing himself in the Princeton community proves helpful to Nash's recovery. At Princeton, Nash is given the opportunity to resume his research, which helps him to return to rational thinking and restore his connection to reality. But given his fragile health, Nash is still seen as a liability. Though he is awarded a prestigious prize for work he completed earlier in his career, he is not allowed to attend the prize ceremony: other faculty members are worried that Nash will "make a scene" at the event.

CHAPTER 46 – A QUIET LIFE

In 1970, Alicia offers to let Nash live with her, realizing that no one else will take him in. She believes that living near an academic community—Princeton—will help him to recover and prove more beneficial than another hospitalization. After Nash moved to Boston, Alicia began dating another math professor who had also been hospitalized, at one point, for mental illness. Alicia lost her original job in Princeton and struggled to find employment afterward; she moved into a small house with her mother and son, now known as "Johnny," in Princeton Junction, a township near the Princeton campus.

Meanwhile, Alicia cares tirelessly for both Johnny and the math professor he briefly dates, just as she made numerous sacrifices to care for Nash: Nasar emphasizes that Alicia is naturally giving and generous, motivated by love to protect the people closest to her.

Nash joins them there as a "boarder," contributing some income, from his mother's will, as rent. Eventually, Alicia manages to get a job at Con Edison in New York City, and she enrolls Johnny in private school, where he excels as a student. Later, though, Johnny begins to exhibit disturbing, psychotic behavior—like Nash, he believes himself to be a "great religious figure"—and as a result, Alicia has him hospitalized at the Carrier Clinic. Meanwhile, Alicia tries to cope quietly with Johnny's outbursts, just as she tried to cope with Nash's.

Alicia and Nash's son, Johnny, also suffers from schizophrenia; scientists have determined that if one individual experiences schizophrenia, multiple members of their family may also have the illness. Johnny's illness becomes yet another tragedy in Nash's life, though it also offers Nash the opportunity to redeem himself. Nash feels guilty that he may have passed the illness on to his son, but caring for Johnny helps him to learn the value of empathy for others, strengthening his relationship with his son.

In 1977, John David Stier comes to visit Nash in Princeton; the following year, Johnny goes to Boston to visit Eleanor and John David. John Stier and Nash do not see each other again for another seventeen years after this initial meeting, since John Stier finds Nash's behavior "disturbing." Johnny ends up majoring in math at Rider College in New Jersey, where he displays an aptitude for difficult math concepts; he later transfers to Rutgers University with a full scholarship and goes on to PhD study there.

At one point, Nash's broken ties to his family seemed irreparable: now, though, he is beginning to reconcile with his sons, and his sons are beginning to see him as a real father. Tragically, though, while John Stier experienced a difficult childhood because of his father's absence, Johnny is afforded valuable opportunities for education that John Stier never received. Nash finds it difficult to acknowledge that his sons have grown up to have very different lives—a direct result of his own actions.

CHAPTER 47 – REMISSION

By 1990, Nash—by now a regular presence at Princeton seminars—is beginning to meet with math professors for long discussions, demonstrating that he is still capable of original, innovative thought. Nash is now in remission from his illness, though it is unclear if he has fully "recovered": Nash would later note that regaining rationality was a "constant, conscious struggle," not unlike dieting, and that he had to make an effort to "police his thoughts," separating delusion from reality.

Nasar explains that though Nash attributes his recovery to the "constant, conscious struggle" of changing his own pattern of thought, it is possible that several other factors contributed to his remission, too.

Recent psychiatrist studies have shown that while schizophrenics can recover from their illnesses, only about 8% of sufferers can be considered "well" 30 years after the onset of schizophrenia. Nash may have had a better chance at recovery because of his high IQ, his record of high achievement, and the relatively late onset of the illness; additionally, by refusing to take antipsychotic drugs in the 1970s, he may have also avoided some of the negative side effects associated with these drugs. Nash would describe his remission as a "natural" process—one that involved consciously changing the pattern of his thoughts.

This passage reveals that those with high IQs and records of achievement, among other qualities, are more likely than others to experience remission from schizophrenia. Ultimately, Nash's recovery seems to be a result of both his own rational thinking and other factors outside of his control.

In the late 1980s, Nash's name has begun to appear in the titles of articles published in leading economics journals: his work on game theory is becoming influential once again. Yet Nash himself "remained in obscurity," assumed to be dead by many young researchers. In 1989, Nash's name is submitted to be nominated as a Fellow in the prestigious Econometric Society, a decision that attracts significant controversy: some Society scholars complain that Nash has no recent publications, claiming that he is not fit to be an active member. As a result, his nomination is blocked. It takes another two years for Nash to receive another nomination.

As Nash's career slowly begins to gain traction again, and he regains the status he once had in the mathematics community, other mathematicians cast doubt on his return to academia: Nash is still seen as unstable and undeserving of praise, given his decades-long hiatus from mathematics. Nasar suggests that prejudicial attitudes toward those who suffer from mental illness are pervasive in academia, as in other fields; in fact, given academia's emphasis on mental abilities, this prejudice may be even more pronounced.

CHAPTER 48 – THE PRIZE

On October 12, 1994, the Royal Swedish Academy of Sciences holds a press conference in Stockholm to announce the winners of the Nobel Memorial Prize in Economic Sciences: one of these winners is John Forbes, Nash, Jr., of Princeton, New Jersey. The Nobel Prize in Economics, as it is commonly known, was created 70 years after Alfred Nobel wrote his 1984 will, which created the Nobel Prizes in physics, chemistry, medicine, literature, and peace. Though it is not technically a "Nobel Prize," it is considered the "ultimate symbol of excellence for scientists and laymen alike," and it is awarded for specific achievements and discoveries.

Nash's genius is finally recognized in 1994 when he receives the Nobel Prize in Economics, the highest distinction in the world awarded to scholars in the field of economics. After many years of obscurity, Nash's achievements and contributions are acknowledged, and he is saved from a life of anonymity.

Nash's name first appears as a candidate for a Nobel in the mid-1980s. Jorgen Weibull, a Swedish professor of economics, is tasked with presenting a report on Nash's work to the Nobel Prize selection committee. Assar Lindbeck, Sweden's most important economist and the chairman of the committee, asks Weibull to find out if is true that Nash stopped conducting game theory research in the early 1950s. In response, Weibull set up a meeting with Nash at Princeton in 1989. Weibull finds Nash nervous and quiet, but also clearly engaged and intelligent. In 1993, the prize committee decides to award the Nobel Prize to scholars who have made discoveries in the field of game theory. This Prize will be announced in 1994, the 50th anniversary of Neumann and Morgenstern's great opus on game theory.

Weibull becomes Nash's greatest advocate in the years leading up to 1994, as Nash is actively considered for the Nobel. Weibull realizes that despite Nash's reputation—he is publicly known to have suffered a mental breakdown—he is also a gifted thinker who is deserving of the Nobel, and he sees Nash's story as inspiring rather than disturbing.

The prize committee now has to decide which mathematicians will be honored for their contributions to game theory. Ultimately, the committee narrows the field down to contributions to the field of noncooperative theory: here, however, the debates became contentious. Nash's reputation as a "ghost" at Princeton precedes him, and Ingemar Stahl, a professor of economics and law, expresses opposition to the idea of awarding the prize to him: Stahl informs the committee that Nash has a mental illness. Lindbeck, however, "knocked down" Stahl's objections, though he, too, is concerned that Nash might act peculiarly at the Nobel Prize ceremony. Yet Lindbeck feels that awarding the prize to Nash—who had been "forgotten" by the academy—would help to "resurrect" him, paying tribute to the longevity and brilliance of his ideas.

Unlike Stahl, Lindbeck and Weibull see Nash's Nobel as an opportunity for redemption. It will help to show him, and the world, the worth of his own work, despite the hardships he has faced. No Nobel Prize winner had experienced a decades-long hiatus in their career before Nash: Nash's win is unprecedented, proving the profound importance and value of his work on game theory.

The economics prize has never been especially popular within the Swedish Academy, and many scientists and mathematicians have questioned the quality of Laureates over the years. The debate between Lindbeck and Stahl over Nash's selection takes place against a backdrop of hostile relations within the academy: the economics prize is being transformed into a "social sciences" prize, and changes are being made to the organization of the selection committee, creating a fraught atmosphere among committee members.

Nasar suggests that Stahl's objections to Nash winning the Nobel may have had more to do with the internal politics of the prize committee than Nash himself. Though Stahl highlights Nash's mental illness, using it as a reason to contend that Nash does not deserve the prize, Stahl may have only been using this point as an excuse to express his own displeasure at the committee's internal dilemmas.

In the end, Nash is selected by a handful of votes during an academy meeting in October 1994. The Nobel vote is a "ceremonial affair" in which academicians in the field gather to hear a lecture on the candidates' contributions; during this session, Stahl questions the lecturer on the merits of the candidates as Laureates, including Nash, noting that Nash made his contribution to game theory—which Stahl considers "more mathematics than economics"—nearly half a century earlier. Lindbeck is stunned by Stahl's public dissent, since Stahl had eventually conceded that the prize should be given to game theorists.

Nash wins the Nobel Prize, but just barely: Stahl's unprecedented objections, which shock Lindbeck and the selection committee, nearly cost Nash the prize.

As a result of these tense negotiations, the announcement of the result—a prize shared by Nash, John Harsanyi, and Reinhard Selten—is delayed by one and a half hours. Nash is the last to be called of the three Laureates. He is woken up early in the morning by a phone call from the Nobel committee, and he receives the news in an "unusually calm" manner.

Nasar seems to regard this as one last obstacle in Nash's tremendous career—a final struggle before he finally reaches the pinnacle for which he has been striving for many decades.

CHAPTER 49 – THE GREATEST AUCTION EVER

On December 5, 1994, Nash travels to Stockholm to receive the Nobel Prize. At the same time, Vice-President Al Gore is announcing the opening of "the greatest auction ever": an FCC-run auction for airwave spectrums, which CEOs of American communications conglomerates are bidding for, in order to license cellular phone services. This auction was designed by young economists who used tools that the game theorists Nash, Harsanyi, and Selten had created for analyzing rivalry and cooperation among players. Though economics had long been dominated by Adam Smith's metaphor of the "invisible hand"—the idea that individualism shapes competition—game theory provided a way of understanding a new world, one in which economies are shaped by a handful of key players: private businesses, big government, and foreign investment.

Game theory helped the American government to auction off airwave spectrums, which were becoming important resources as the telecommunications industry expanded and cellular phones were invented. Though Nash's innovations in game theory could seem arcane or complicated on paper, they were vital to the development of the American telecommunications sector. Nash's genius—his "beautiful mind"—had a truly widespread reach, beyond the limits of the mathematical community.

Today, game theory is used to study and implement policy, the sale of government-controlled public resources, and auctions by government, including the FCC auction. Traditional auction formats would have been inadequate for the FCC auction, since the value of each individual airwaves license was dependent on what other licenses the users are able to purchase. Game theory—including the **Nash equilibrium**—helped the government to ensure that licenses could be purchased by corporations that could use them best. By late spring 1995, Washington had raised more than $10 billion from a series of spectrum auctions.

In the penultimate chapter of A Beautiful Mind, *Nasar shows why game theory is important today, tying together Nash's momentous Nobel Prize victory and developments in modern American economics.*

CHAPTER 50 – REAWAKENING

Upon learning that he has won the Nobel, Nash makes a short, humorous speech after a press conference at Fine Hall. He jokes that he wishes that he had won the whole prize, since "he really needed the money," and adds that he is glad that game theory, "a subject of great intrinsic intellectual interest," had been shown to be "of some utility." In Stockholm, at the prize ceremony, "everything [goes] swimmingly": at first, Nash seems uncomfortable with the attention he is afforded, but he becomes happier each day. Nash is even able to have a pleasant conversation with the King of Sweden during the private audience that each Laureate receives. He also gives a well-received talk at the University of Uppsala on the topic of developing a mathematical theory for a non-expanding universe.

Despite Stahl's fears that Nash's behavior might cause an upset at the Nobel Prize ceremony, Nash is composed and calm: he seems to have regained control over his own behavior. At last, Nash feels secure in himself and his own research; he is rewarded for his groundbreaking work on game theory, which—as he rightfully predicted in the 1950s—has proven to be a valuable field with broad applications.

Alicia and Nash still live in the same house in Princeton Junction and see friends regularly. Nash continues to spend his days at the Institute for Advanced Study and the Princeton University library. Some days, Nash feels energetic, as if he might be able to pick up with the research he began before the onset of his illness. Other days, he is unable to work, or he discovers that something he thought was novel has in fact already been discovered. He is often "full of regrets": "the Nobel cannot restore what he has lost."

Once again, Nasar emphasizes that Nash's recovery from schizophrenia is not a linear process: he will never really be "fully recovered," and he will continue to battle the side effects of the illness—exhaustion, memory loss—for the rest of his life.

In 1995, Nash turns down an offer of $30,000 from Princeton University Press to publish his collected works, since he is wary of "acknowledging that his life oeuvre [was] complete": he hopes to be able to complete more work in the future, though he, like other older colleagues, knows that mathematics is "a young man's game." Still, it takes "extraordinary courage" to be able to return after a hiatus of 30 years. Nash continues to encounter difficulties in his research, which shows that his "thinking is still sharp."

Nasar also emphasizes that though Nash may struggle to conduct research today, his genius—the product of his remarkable skills as a rational thinker determined to find meaning and order in the most difficult of problems—has been largely unaffected by his illness. Extraordinarily, he is still able to come up with elegant mathematical insights, and he still tackles difficult problems with ease and enthusiasm.

Currently, the most important part of Nash's life are relationships with others: he has made an effort to reconnect with family, friends, and his community. He speaks with his sister Martha once a week, and he takes care of his son Johnny, who was hospitalized for a psychotic break shortly before the Nobel announcement. Johnny has lived at home since his early 20s and does not work. Like Nash, he has experienced delusions and heard voices, and at 38 years old, he is on a number of antipsychotic drugs, which—though they have allowed him to stay out of the hospital—have also not prevented him from having angry, occasionally violent outbursts. Taking care of Johnny "draws Nash and Alicia together and tears them apart," sometimes causing rifts but also forcing them to collaborate and compromise.

Tragically, Nash's second-born son, Johnny, also suffers from schizophrenia, the result of a common genetic link. Whereas Nash was once taken care of by his family, Nash now takes care of his own family, helping to provide for Johnny—who remains very ill, despite medical intervention. Though providing for Johnny proves difficult, Nash also finds it rewarding. His relationship with Alicia is stronger than it once was, and he finally understands the power of empathy and generosity—qualities that he previously lacked.

As difficult as his life can be, Nash is hopeful that new medications or types of therapy for schizophrenia might be invented, and he experiences moments of joy with Johnny and Alicia. Alicia is still fond of taking care of Nash, and Nash defers to her wishes; she runs their household and encourages Nash—who often speaks his mind, to embarrassing results—to think before he speaks. There is now a sense of "reciprocity" between Alicia and Nash, and the two have considered remarrying.

After all of Alicia's sacrifices for Nash, Nash is now deferring to Alicia: she is no longer an invisible, behind-the-scenes supporter, but the head of the household, helping to shape Nash into a better person. Nash has finally learned to take responsibility for his own actions, and he now shows Alicia the same love that she showed him during his darkest moments.


In 1994, Nash boards a shuttle for Boston to reunite with his older son, John Stier, who lives in Boston with his mother and works as a registered nurse. This is a bittersweet reunion: Nash hopes to make up for his past failings as a father, but he also criticizes Stier's profession and calls him "less intelligent" than Johnny, sparking still more tensions between them. Nash's immediate future is uncertain: his remission seems to have held but could be precarious. Yet in recent years, he seems to have achieved a greater level of self-awareness and realized the importance of friends and family, making a "daily effort to give others their due." This is a "very different man" than the arrogant young mathematician he was before his illness. Today, Nash lives a life in which "thought and emotion are more closely entwined," rather than separate, and he has become a better—though not perfect—person.

Nasar shows that Nash is not yet a perfect person: he continues to act thoughtlessly at times, and his newfound efforts with his first-born son do not seem to make up for many years of neglect. Ultimately, Nash's "beautiful mind" does not outweigh the misguided, often cruel behavior he exhibited as a younger man—despite everything he has been able to achieve with this "beautiful mind." Yet he has become far kinder, gentler, and more empathetic, and he now understands that one cannot lead a purely intellectual life: emotions and relationships matter, too.

EPILOGUE

In 2001, John and Alicia Nash decide to marry after a nearly 40-year gap in their marriage. Nash is 73, but he "looks and sounds wonderfully well." He is not embarrassed to talk about his past, and he now speaks to groups about reducing the stigma of mental illness. He has returned to mathematics and has a grant from the National Science Foundation; he has also reunited with old acquaintances, colleagues, and many of his family members.

What is most spectacular about Nash's story is not his genius: it is his remarkable transformation from an arrogant scholar to a destitute man to a kinder, more thoughtful—yet still brilliant—individual.

Perhaps most importantly, Nash now enjoys some of the normalcy that many people take for granted: having a driver's license, living in a stable home, buying meals for himself. After the publication of *A Beautiful Mind*, he has come to see the biography as a "good thing": it has been helpful for him to "retrieve" and replay some of the memories presented in the book. He has also met Russell Crowe, the actor who played him in the movie based on his life. Just as Crowe had to undergo "transformations" to play Nash, Nash has undergone many incredible "transformations" of his own.

Nash leads a relatively "normal" life now, yet he takes none of this normalcy for granted. His is a story that proves that life as a genius means very little without love, kindness, and fulfilling relationships. Nash's story also proves that individuals are capable of redeeming themselves and changing their behavior, even when faced with seemingly insurmountable odds. By humanizing a public figure who suffers from schizophrenia, A Beautiful Mind *helps to show that mental illness is not a stigma. Nasar's narrative of Nash suggests that these illnesses cannot ever be truly "overcome," since recovery is a slow, difficult process, but individuals can fight back against the confusion and chaos of their own minds, finding peace, happiness, and contentment.*

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