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EDITORIAL

The recesses of the mind

So at the present time I seem to be thinking rationally again in the style that is characteristic of scientists. However this is not entirely a matter of joy as if someone returned from physical disability to good physical health. One aspect of this is that rationality of thought imposes a limit on a person's concept of his relation to the cosmos.

—John Nash
Autobiographical Essay
Le Prix Nobel, 1994

The Oscars are to Hollywood and films, what the Nobel prizes are to science. There are, of course, more Oscars; even awards for the best supporting actors and actresses, costume designers, screenplay writers and music directors, unlike in science where the major prizes go to the big stars, with the supporting cast generally forgotten. This year's Oscar ceremonies were especially significant for Indians, who, by and large, were rooting for *Lagaan* and Aamir Khan. As the interminable Oscar show on TV dragged on, I was struck by the number of times the movie, *A Beautiful Mind* was mentioned in various categories. A few weeks later, I accidentally ran into a prominent Indian sportsman, who on hearing that I was a scientist immediately asked: 'Have you seen the lovely movie, *A Beautiful Mind*?' By this time I knew that this was a movie about a scientist. A few days later I acquired a copy of Sylvia Nasar's book *A Beautiful Mind*. And, it is this book which has since occupied my thoughts.

Nasar chronicles the life and times of John Nash, the mathematician who received the Nobel prize (or more correctly, the Nobel Memorial Prize, instituted by the Bank of Sweden) for Economics in 1994. Until the prize, Nash was a forgotten genius; but the call from Sweden catalysed not only Nasar's remarkable biography, but also the Hollywood movie. The Princeton University Press, undoubtedly driven by the surge of public interest, has produced *The Essential John Nash*, edited by Harold Kuhn and Sylvia Nasar. The story of Nash's life is riveting; a compelling mix of madness and pure creativity. It is the story of genius trapped in the mists and shadows of schizophrenia. It is the story of a deeply troubled man, who laid the foundations of game theory, develop-

ing concepts that have had a far-reaching impact on disciplines as diverse as economics and evolutionary biology.

Nash did his remarkable work as a graduate student in the Department of Mathematics at Princeton University, in a spectacular creative burst in 1949–50. His first paper appears to have developed from an undergraduate course in international trade, that he took at Carnegie Tech in 1948, 'simply to fulfil degree requirements'. His analysis of 'The Bargaining Problem' may not have excited pure mathematicians, but it signalled the beginning of a new approach to economic analysis. It also heralded the arrival of an original thinker, with an ability to make the intuitive leaps, which separate men of genius from others. Soon after, Nash laid the cornerstone of modern game theory, when he defined the concept of an equilibrium, which would eventually bear his name. Today, the Nash equilibrium is an idea which influences not only the applications of the theory of games in economics, but its imprint has extended to the idea of an 'evolutionarily stable strategy' in biology. Nash's seminal work led to an extraordinarily slim Ph D dissertation of only twenty-seven pages. Unaware of the impact that his work would eventually have, Nash himself seemed untouched by success in pointing towards strategies for solving practical problems; he appeared more consumed by the need to prove himself as a 'pure mathematician'. It is in the years after his extraordinary period as a graduate student at Princeton that the first signs of the tragedy that was to follow become evident. Nasar's biography paints a haunting picture of his period at the RAND Corporation, a symbol of the collective paranoia of the early years of the Cold War. Nash's period on the faculty of MIT marked his major success as a 'pure mathematician' in attacking the 'embedding problem' in differential geometry. It also marked, as his biographer notes, the beginning of his 'slide from eccentricity to madness'. Only thirty when he experienced the first crippling episode of paranoid schizophrenia, Nash's academic career lay ruined. From 1959 to 1970 Nash led a tortured existence and from the 1970s until the Nobel prize, Nash was a 'phantom' who haunted the campus of Princeton University. Nasar's

description of the Swedish Academy's deliberations, before deciding to honour a man, who had stepped past the borders of rationality, makes gripping reading. There is also a poignant episode. In a move, unprecedented in the Nobel awards process, one of Nash's colleagues at Princeton is forewarned, to prepare both the recipient and his surroundings for the inevitable glare of publicity that follows the prize. In Nash's case in the years that followed, every detail of his tortured years becomes a matter of public record in Nasar's, at times, brutal but riveting biography.

But more than anything else the story of John Nash, is the story of a disease; an illness of the mind that is estimated to affect a staggering one per cent of the world's population—schizophrenia. The term itself was coined by Eugen Bleuler in 1908 and for long has been associated in popular perception, with a 'split personality'. Rather, it is a deep-rooted disorder of the brain, which profoundly affects behavioural patterns. Schizophrenics may have difficulty in distinguishing real from unreal experiences, be gripped by delusions and sometimes incapable of normal emotional responses. As a crippling disease of the mind, the spread of schizophrenia over the past century has been frightening. The evolution of the disease, in history, is shrouded in mystery; its recognition and management using anti-psychotic drugs is of relatively recent origin. The efficacies of treatment regimens are still a matter of serious debate. In the not too distant past, as in the case of Nash, psychotherapy, insulin and electric shock treatment have been advanced as palliatives, although their efficacy remains uncertain. The first major signs of the disease appear in young adulthood, apparently spontaneously, with limited correlation to heredity or environment. The symptoms are disparate. A general consensus that seems to be emerging is that the best course of management may be a combination of anti-psychotic drugs and a supportive environment. Nash's dramatic improvement in the years immediately preceding the Nobel prize may have been facilitated by the 'structured, predictable and supportive' environment provided by his wife, the familiar surroundings of Princeton and the company of sympathetic mathematicians. In current approaches to the management of the illness, family support has acquired a major role.

The 1990s were declared the 'decade of the brain'. But, the decade has long since faded into history. Despite the enormous progress of neuroscience over the past several years and the increasing power of new methods for probing brain function, functional magnetic resonance imaging (fMRI) among them, disorders of the brain remain among the most poorly understood of the illnesses that affect man. The case of schizophrenia clearly indicates that neither genes nor environment, nature nor nurture, can be entirely held to be the sole causative agents of the disease. Like many other poorly understood disorders of the brain, which remain lumped together as mental illnesses, in the case of schizophrenia too, management of the disease may be more accessible than a cure.

The story of John Nash raises many questions about creativity and the mind. In her prologue to her biography of Nash, Sylvia Nasar notes: 'Many great scientists and philosophers... have had similar strange and solitary personalities. An emotionally detached, inward looking temperament can be especially suited to scientific creativity.' She notes that exercise of a creative mind may also provide a defence 'against anxiety stimulated by conflicting demands for detachment and human contact'. Nasar recalls Wordsworth's famous lines:

I was taught to feel, perhaps too much
The self-sufficing power of solitude.

Indeed, it was Wordsworth who spoke of 'that inward eye which is the bliss of solitude'.

In reflecting on creativity, Nasar notes that 'men of scientific genius, however eccentric, rarely become truly insane—the strongest evidence for the potentially protective nature of creativity'. But on reading *A Beautiful Mind* I came away with a feeling that schizophrenia is an affliction that may defy our understanding for some time to come. Its victims will often continue to be 'incomprehensible and inaccessible' to those around them. While modern science may bring to bear its most powerful weapons to probe the brain, the secrets of the mind may be very hard to prise out. The wellsprings of creativity emerge from the deepest recesses of our minds; but for some of the most gifted amongst us, so too do the demons which haunt the mind.

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