
EMBLEMS OF MIND: The Inner Life of Music and Mathematics. By Edward Rothstein. *Times/Random*. 263 pp. \$25

The composer Igor Stravinsky once remarked that in mathematics a musician should find a study "as useful to him as the learning of another language is to a poet." What Rothstein, chief music critic of the *New York Times*, attempts to explain is why. Few dispute the strong connections between music and mathematics. Even at its most improvisational, music follows structural rules of meter and tempo. Similarly, even the most abstract mathematical equations are built from known axioms in an elegant pattern not unlike the movements of a sonata. But Rothstein wants to delve deeper into the two disciplines, to discover whether their inner workings yield insights into the act of creation itself.

The journey he undertakes—through the higher reaches of philosophy, musical composition, and mathematical theory—is so satisfying that the elusiveness of its destination finally becomes irrelevant. Along the way, the lay reader learns to appreciate how mathematicians derive such principles as Fermat numbers, the Fibonacci Series, and Gödel's incompleteness theorem. One of Rothstein's more intriguing observations is that the process driving mathematics is "no more dominated by compulsion or mechanism than musical composition is by the 'need' to follow one type of chord with another." Rather, mathematicians extrapolate proofs through surprisingly playful experimentation with the relations between numbers. The numbers represent an unmapped universe; if the mathematicians' work is successful, they uncover an internal relationship between the elements.

Rothstein suggests that listeners arrive at a sense of a composer's work in a similar way: "Mappings are made within music—from one phrase to another, from one section to another... [and] to our varied experience as listeners." Depending on that experience, the connections may become more refined. It may be possible, for example, for a given listener to recognize the style of the music—baroque or classical or romantic—or

to identify a piece as a fugue or a waltz, but even the uninitiated will recognize that there is order behind the notes.

Rothstein deftly reveals the beauty and elegance of certain mathematical principles, but his argument tends to reduce music to a consideration of form and function—at least until the visionary final pages of the book, where he describes the poet William Wordsworth's encounter with a spectacular view emerging from morning mist. "The mist, the moon, the sky, and the ocean are each distinct objects," writes Rothstein, "each seemingly subject to its own law, possessing its own character. But they are also tied together, exercising powers and influences on one another." As the poet seeks to apprehend the influences and make sense of the whole scene, so composers struggle to make music out of silence and mathematicians to show connections where none appear to exist.

Yet something about the two arts of music and math—so similar in their "inner and outer life," in their reliance on "metaphors and analogies, proportions and mappings"—hovers always just out of reach. They remain mysteries, "too close to Truth to be merely human, too close to invention to be divine."

WRITING AND BEING. By Nadine Gordimer. *Harvard*. 176 pp. \$18.95

WRITING WAS EVERYTHING: Life as a Critic, 1934–1994. By Alfred Kazin. *Harvard*. 152 pp. \$17.95

What makes writers tick? In these two books, each a blend of memoir, criticism, and history, a famous novelist and a famous literary critic reflect on their shared craft. What surprises is how very direct the American critic's reflections are, and how very theoretical the South African novelist's.

When a life is made particularly vivid in fiction, a reader can't help but wonder how much of it is true. Gordimer, winner of the Nobel Prize for literature, plays this "prurient guessing game" as writer, reader, and critic, all "fumbling to find out where fiction [comes]