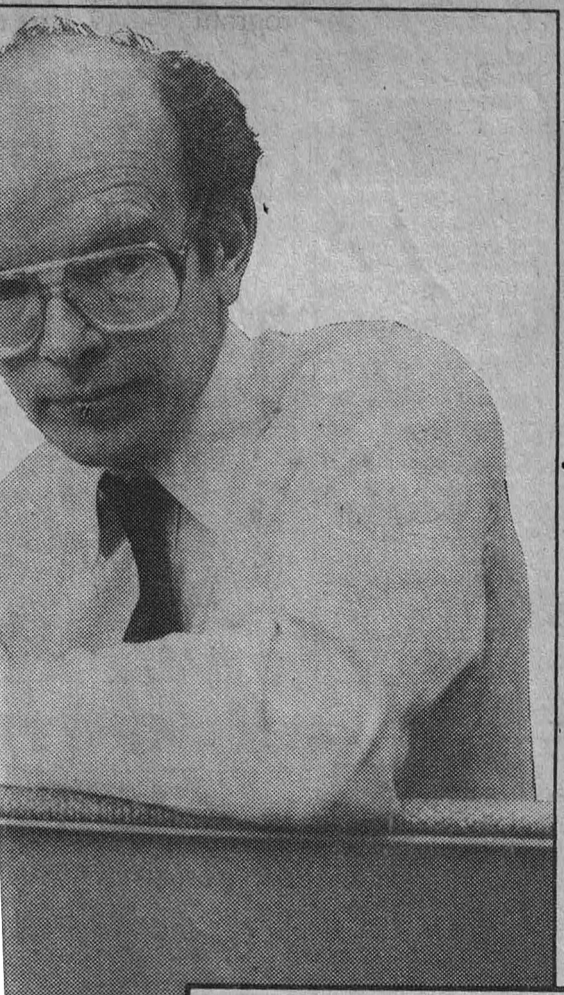
m World,' He Collects Patterns



Mathematician's list now contains 5,000 number sequences.

By JAMES GLEICK

WITHOUT quite meaning to, Neil J. A. Sloane has become the world's clearing-house for number sequences.

He keeps track of easy ones, like 1, 2, 4, 8, 16, 32 . . ., the powers of two. He keeps track of hard ones, like 1, 1, 2, 5, 14, 38, 120, 353 . . ., the number of different ways of folding ever-longer strips of postage stamps. Among his sequences are the famous and the obscure: perfect, amicable and lucky numbers; Fibonacci, tribonacci and tetranacci numbers.

When a physicist stumbles upon a sequence he cannot explain, or a computer scientist creates a sequence he thinks is new, he writes to Dr. Sloane, a mathematician at AT&T Bell Laboratories in Murray Hill, N.J. Dr. Sloane then retrieves it from, or adds it to, his master list, now numbering around 5,000 different sequences.

It is a pursuit with an element of whimsy, as he readily admits. But it also reaches toward the heart of something that gives mathematics its universality. Over and over, the same sequences pop up in many different contexts — one day in number theory, the next day in solid-state physics — demonstrating unsuspected connections in nature.

"It emphasizes the fact that what mathematics is looking for is patterns in a world that really looks rather random," said Richard K. Guy of the University of Calgary, editor of the Unsolved Problems department of The American Mathematical Monthly and a frequent contributor to Dr. Sloane's collection. "Often these sequences tie things together which you wouldn't normally tie together."

So Dr. Sloane's mail is heavy — recent letters have come from places as various as Finland, the Philippines and Kalamazoo. His life has been taken over by numbers that start to seem as familiar as faces. To mathematicians and scientists working in seemingly distant fields, Dr. Sloane has become a strange and useful pipeline.

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N. J. A. Sloane: Enclosed find a sequence of numbers, single digit, for which I am seeking a fraction or formula. . . . Read horizontally: 9, 3, 2, 4, 8, 9, 1, 1, 6, 5, 8, 3, 7, 1 . . . Any charge for this, please let me know.

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Like so many of his correspondents, Dr. Sloane got interested in number sequences by coming across one he could not reduce to a formula, in the 1960's, when he was a graduate student at Cornell University. The sequence began with 1, 8, 78, 944 . . . "I remember the 944 very well," he said the other day, pacing energetically in his box-strewn office.

More and more, such sequences turn up in applied sciences. Physicists studying the behavior of molecules in solid lattices, for example, produce sequences by adding up all the possible paths through a regular geometric space, and that makes it a problem of combinatorics.

It is natural for any scientist, trying to understand the rules governing combinations of many things, to see what happens with one thing, then two, then three . . . and so create a number sequence. If it is a sequence that mathematicians already understand, he is in luck.

So Dr. Sloane began to assemble a book. Many papers dealing with the properties of numbers or the different ways of combining or arranging ob-

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A Sequence Sampler

Below are five number sequences of the kind used, for better or worse, on intelligence tests. Like the sequences often uncovered by physicists or chemists, some follow straightforward rules — but not all.

a) 1, 3, 6, 10, 15, 21, 28, 36, 45, 55. . .

b) 1, 1, 2, 3, 5, 8, 13, 21, 34, 55. . .

c) 4, 6, 7, 9, 10, 11, 12, 14, 16, 17. . .

d) 1, 2, 5, 12, 29, 70, 169, 408, 985. . .

e) 14, 18, 23, 28, 34, 42, 50, 59, 66, 72. . .

es/William E. Sauro

— Fibonacci numbers: each is the sum of the two previous. c) 18 — all the numbers that do not occur in the last term and add the second-to-last. e) 79 — West Side IRT local stops.

Common Man for all seasons, page C13./ **THEATER:** Vonnegut's 'Time and T

dies,' by Leonard Schapiro, page C17./ **TV:** 'The Real Stuff' examines the space