

Number theory, stuttering research produce top talent search winners

Curiosity over a puzzle that stumped ancient Greek numerologists gave a Brooklyn high-school senior, Eric S. Lander, the idea that this week earned him a \$10,000 scholarship in the 1974 Science Talent Search (STS). By applying the techniques of modern number theory to the ancient problem—and showing up some contemporary mathematicians along the way—the 17-year-old from New York's Stuyvesant High School received the highest award in competition among 40 winners of the annual talent search, held in Washington each year by Science Service and the Westinghouse Corporation.

Greek numerologists attached great significance to what they called "perfect" numbers—those like 6, 28 and 496 that are equal to the sum of their divisors. But a modern Italian mathematician pointed out that the ancients had cheated a little, including in each case the trivial divisor "1" in the sum. He then proceeded to produce two theorems about what he called "quasi-perfect" numbers—those equal to the sum of only nontrivial divisors. For his Science Talent Search project, Lander set out "to put an end to this 2,000-year-old prejudice" against quasi-perfect numbers, quickly disproving one of the Italian's theorems and showing that if quasiperfect numbers exist at all they must be very large.

This project is only the latest for young Lander. The top-ranking student in his class of 700 (with an overall academic average of 99), he has previously conducted independent work in pollution studies, biblical history, the statistics of fruit fly populations, a study of the abstruse mathematical "Hilbert Space," which can be used to describe the consequences of Einstein's theory, and an investigation of algae growth. Lander is a member of the ski patrol, plays in the high-school band and participates in student government.

Two STS winners received scholarships of \$8,000 apiece. Frank T. Leighton also did his project work in number theory, developing a formula for predicting prime number sequences that a subsequent computer program he designed showed to be more accurate than previous formulas developed by professional mathematicians. Leighton, who attends Washington-Lee High School in Arlington, Va., is a varsity debater and tennis player.

Linda K. Bockenstedt of Wayne High School, Dayton, Ohio, won \$8,000 for basic research into the causes and suppression of stuttering. Having found that stuttering could be produced in

normal subjects using delayed voice feedback, she proceeded to block the (presumably defective) auditory feedback loop of some stutters by having them listen to "white sound" through earphones. The procedure inhibited stuttering in these subjects, and Bockenstedt believes the results show that stuttering may sometimes be caused by a defect in the stapedius muscle of the inner ear. Bockenstedt is the second member of her family to become an STS winner and says she was inspired to pursue her work by her sister's previous achievement.

Three winners received \$6,000 each. Emmett Evanoff of Cheyenne, Wyo., won the award for studies of fossils found in his native state. John C. MacGuire of Casper, Wyo., built his own wind tunnel and used it to test the effectiveness of an airplane wing he had designed. Richard A. Dargan of Palm Bay, Fla., experimented with yeast to study processes similar to those of cancer.

Winners of \$4,000 scholarships were Edward H. Frank of Great Neck, N.Y., for increasing the work efficiency of a small computer; Carl Taswell of Rochester, Minn., for studies he conducted at the Mayo Clinic on blood coagulation; Jordin T. Kare of Narberth, Pa., for determining why holographic images change in size in various positions; Linda C. Rabinowitz of Bronx, N.Y., for work in number theory.

While they were in Washington, the STS winners had a chance to meet with experts in their fields to discuss further work on their projects. One young researcher learned ruefully how she could have done her experiment more easily, another was encouraged to keep pursuing his project when he goes to college, another was told how to submit her work for publication in a scientific journal.

The young scientists varied widely in background and in their approach to the contest. One winner had worked in a Chinese restaurant for three years to finance a trip to Africa to observe a solar eclipse. Most agreed that one of the most important parts of their STS experience was just having a chance to meet each other.

At the awards banquet, winners heard Atomic Energy Commission Chairman Dixy Lee Ray challenge them to help make science more understandable for the public. "There are two kinds of people," she said: "Those who think science can do anything and those who are afraid it will." This polarization of society has led to hostility surrounding



Eric S. Lander



Frank T. Leighton



Linda K. Bockenstedt

science and the determination of science policy, she said, and only the efforts of scientists, like the young STS winners, to make their knowledge meaningful to the layman will allow society to accept necessary responsibility for the proper application of science. □