Noesis

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Editorial

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The July 4th meeting: Chris Cole suggested that there be six three-hour sessions starting at 9 a.m. and at 2 p.m. on Saturday, Sunday, and Monday, July 2, 3, and 4, with each of the six anticipated participants taking charge of one of the discussion periods.

Word quizes: Part of my own contribution will be the testing of participants on the two word quizes given in this issue. These quizes are purely for your entertainment. If you do not come to the meeting but would like to try the quizes and send me your answers prior to looking up the answers for yourself, please do. You can then see how your responses compare with those of other members.

Stephen Wolfram: I believe Chris Cole mentioned Mr. Wolfram to me in a conversation a few months ago in connection with progress in the field of artificial intelligence, so I thought the clipping about him from the New York Times might be of interest, especially since many of our members are interested in computer software.

David Geiger: Mr. Geiger, whose inquiry concerning the four-color problem appeared in the preceding issue of this journal, sent me a copy of an entry about him in Who's Who in the Midwest, which I attach below. I am somewhat surprised that any mathematician would have asked the question about whether there would ever be another problem like the four-color problem and would express the opinion that the answer is no. A mathematician ought to know better than anyone else about such as yet unsolved problems as Fermat's Last Theorem. If Mr. Geiger meant unsolved geometrical problems or topological problems, he ought have to said so in order to make his question more precise. My thanks to Mr. Geiger, in any case for the $20 contribution he sent to our organization after his query was published.

Bayesian regression: My impression is that the assumptions behind the marble problem ought to be spelled out with greater precision than I originally did, especially in an intelligence test, where philosophical ambiguities ought to be avoided.

Omni: I still have no word from Omni concerning when and if they will publish my Titan Test. I'm still hopeful that the test will be published by or before the end of 1988.

WHO'S WHO IN THE MIDWEST

GEIGER, DAVID SCOTT, mathematician, b. N.Y.C., Jan. 3, 1928, s. Earl Russel and Margaret Rose (Scott) G., student U. So. Calif., 1946-51, B.S., U. Ill., 1954, Ph.D., 1961, Computer programmer U. Ill., Urbana, 1960-64, engaged in math research. Served with U.S. Army, 1946-47. Mem. Am. Math. Soc., Friends of Animals.

THE NEW YORK TIMES
FRIDAY, JUNE 24, 1988

A Top Scientist's Latest: Math Software

By ANDREW POLLACK

Special to The New York Times

SANTA CLARA, Calif., June 23 — A man widely regarded as one of the world's most brilliant scientists formally entered the computer business today with a program intended to do for mathematics what the calculator did for arithmetic.

Stephen Wolfram, who earned a Ph.D. in physics when he was 20, is the force behind the new program, Mathematica, which seems to be a dream come true for math students who have trouble factoring complex polynomials, graphing elliptical functions or calculating pi to 2,000 decimal places.

Mathematica, which is also intended for use by scientists and engineers, can solve equations in algebra and calculus and draw two- and three-dimensional graphs instantly.

Math Done the Old Way

Dr. Wolfram, who is 28 years old, said that, surprisingly, mathematics is still done largely with pencil, paper and calculator.

Whether Dr. Wolfram, a professor at the University of Illinois, proves to be as good an entrepreneur as he is a scientist remains to be seen. His program is not the first directed at mathematics, and many previous ones have not been great commercial successes.

Dr. Wolfram's program has attracted unusual attention, partly because of who he is and partly because of the companies that are backing him. Steven P. Jobs, the co-founder of Apple Computer Inc. who now heads a new company called Next Inc. that is developing computers for use at colleges, said at a news conference here that Next would include a copy of Mathematica with each of its still unannounced machines.

Other companies, including Sun Microsystems Inc., the International Business Machines Corporation and Silicon Graphics Inc., said they would offer the program for use on their work stations, the computers intended primarily for scientific and engineering work, although they would not include it with each machine.

A version of Mathematica for the Apple Macintosh will be sold directly by Wolfram Research Inc., a 25-person company that Dr. Wolfram set up in Champaign, Ill., to develop and sell the program. Prices start at $500 for the Macintosh version.

A Ph.D. at 20

Dr. Wolfram, who was born in Britain, never graduated from college but was awarded a Ph.D. by the California Institute of Technology when he was only 20. The following year he was the youngest of the original crop of people who were dubbed geniuses by the MacArthur Foundation and given huge grants.

One of his major contributions has been in the field of cellular automata, in which complex physical systems can be viewed as a collective result of individual components acting independently and doing relatively simple things.

To some, Dr. Wolfram's turn from physicist to software vendor might seem like the loss of a good scientist, but Dr. Wolfram denied this.

"Developing a computer language is as difficult as the most difficult science I've done," he said, and it is more useful than spending years adding a tiny new wrinkle to some arcane scientific theory.

"Unfortunately, a large fraction of the basic science that's done doesn't lead to major breakthroughs," he said. "It's solving problems that didn't need to be solved."

The New York Times/Terrence McCarthy

Stephen Wolfram, with a frame from his software, Mathematica, that shows a three-dimensional plot of the wave pattern on a drum head.

Days Instead of Months

Steve Christensen, a theoretical physicist at the University of Illinois, said that Mathematica allowed him to solve complex equations involving thousands of different terms in a few days. The alternative, he said, would have been to write his own program. That would have taken him months,. he said.

William P. Thurston, a mathematics professor at Princeton University, said Mathematica seems to be easier to use than some of its predecessors and has better graphics.

Other programs that can do theoretical mathematics are Macsyma, developed years ago at the Massachusetts Institute of Technology and sold by Symbolics Inc.; Reduce, developed by the Rand Corporation; Maple, developed at the University of Waterloo in Ontario, Canada, and SMP, developed by Dr. Wolfram when he was at Caltech.

Programs for PC's

Less expensive and somewhat more limited equation-solvers are offered for personal computers. They include Mathcad, by Mathsoft Inc. of Cambridge, Mass.; Eureka, by Borland International of Scotts Valley, Calif., and TK!Solver, sold by Universal Technical Systems of Rockford, Ill., a program originally developed by Software Arts, the creator of the Visicalc spreadsheet program.

So far, many vendors have been disappointed. The market "wasn't as big as we thought it would be because not that many people think in equations," said Daniel Bricklin, the founder of Software Arts.

David Blohm, the president of Mathsoft, said his company was pleased with its sale of 30,000 Mathcad programs in a year and a half. He said Mathcad is aimed at engineers who need to do numerical calculations, while Dr. Wolfram's product is more geared to theoretical mathematicians, a much smaller market. Mathsoft said it would develop a program to work with Mathematica.

Bayesian Regression - II

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The Principle of Insufficient Reason terminates Bayesian regression. This Principle states that if there is no reason to prefer one hypothesis over another, then the probabilities of the two hypotheses must be equal. For example, suppose we are presented with an urn containing ten marbles, some of which are white. There is no reason to prefer the hypothesis that the urn contains one white marble over the hypotheses that it contains two white marbles, three white marbles, etc. According to the Principle, the probabilities of these hypotheses must be equal. Since these probabilities must sum to one, the probability of each is one tenth.

However, this reasoning is perfectly wild. If someone hands me an urn containing ten marbles (some of which are white marbles), am I really willing to bet one dollar against ten that it contains one white marble? I think not. Suppose the marbles in the urn were selected by flipping a coin; if the coin came up heads, a white marble was put in. Then it is more likely that the urn contains five marbles than one. Suppose a die was tossed, and a white marble put in only if a one came up. Then one marble is more likely than five. Suppose the urn was filled by dipping it into a bigger urn containing equal numbers of white and black marbles. Then one and five would be equally likely.

There is a difference between risk and uncertainty. Risk occurs when you know the odds; uncertainty when you do not. When faced with risk you can calculate your best option; when faced with uncertainty you cannot. When faced with uncertainty you try to get more information, delay or avoid the decision, etc.

There is also a technical problem with the Principle: assigning equal probability to all indistinguishable hypotheses leads to logical contradictions. The simplest demonstration of this problem occurs with one marble. If the competing hypotheses are white or non-white, the Principle sets the odds of white at one half. If the competing hypotheses are white, black, or red, the Principle sets the odds of white at one third. If the competing hypotheses are all possible colors, the Principle sets the odds of white at infinitesimal. These cannot all be correct. In fact, none of them are.

Word Quiz One

Of the following 50 words, 23 do not occur in Webster's Ninth New Collegiate Dictionary, copyright 1983 by Merriam-Webster Inc. Circle the numbers of those words that you believe are not in the regular vocabulary section of that dictionary.

1. teensy-weensy
2. itsy-bitsy
3. boob tube
4. couch potato
5. sexploitation
6. blacksploitation
7. lickety-split
8. upsy-daisy
9. widget
10. zillion
11. uh-huh
12. uh-uh
13. boo-boo
14. boo-hoo
15. yoo-hoo
16. time machine
17. time travel
18. time warp
19. martial arts
20. martial law
21. eye bank
22. sperm bank
23. B picture
24. X-rated
25. irregardless
26. stick-to-itiveness
27. Davy Jones
28. Sam Hill
29. Podunk
30. Timbuktu
31. zinky-dink
32. sowie
33. atchoo
34. kerplunk
35. yikes
36. bad (meaning good or great)
37. humungous
38. yuppie
39. gooky
40. grungy
41. six-o-six, or 606
42. six-sixty-six, or 666
43. pat-a-cake, or pattycake
44. peekaboo (as a noun)
45. panty raid
46. french (someone)
47. dianetics
48. engram
49. hyperspace
50. hyperdrive

Word Quiz Two

According to Webster's Ninth New Collegiate Dictionary, the following 50 words each entered the English language in written form between the year 1500 and the present. Guess the precise date that the dictionary assigns to each word for its first written occurrence in English. Write your answer to the left of each number below.

1. television
2. TV
3. android
4. robot
5. cyborg
6. space opera
7. horse opera
8. soap opera
9. spaceship
10. space suit
11. science fiction
12. sci-fi
13. newspaper
14. skyscraper
15. zipper
16. ballpoint
17. roller skate
18. miniature golf
19. lipstick
20. billionaire
21. limousine liberal
22. fingerprint
23. video game
24. artificial intelligence
25. artificial insemination
26. transfinite
27. axiomatization
28. bathroom
29. bathtub
30. toilet paper
31. big bang theory
32. tachyon
33. ice cream
34. banana split
35. telephone (as a noun)
36. radio (as a noun)
37. airplane (as a noun)
38. helicopter
39. orthodontics
40. bubble gum
41. baseball
42. basketball
43. gentrification
44. light bulb
45. laser
46. balloon (as a noun)
47. geosynchronous
48. typewriter
49. bicycle
50. Hilbert space

Marilyn vos Savant:
Japan 1988