

## ARTIFICIAL INTELLIGENCE

### The Story of Shaky and his Friends

I want to talk about intelligent machines. Most people would say that this means I am going to talk about nothing since intelligent machines don't exist and further, *can't* exist. The arguments go: "All the machines I have ever seen are stupid, hence no machine can be intelligent." However, what may be surprising to these people is that electronic digital computers *are* intelligent machines.

More curious is the heat generated when one mentions the work done so far on artificial intelligence. Many people deny the results ("you're just making them up") or deny that the *machine* is doing anything intelligent — "machines do only what they are told."

It is worth looking at this argument, that "machines do only what they are told." When we teach someone the integral calculus, we teach them some standard integrals and some techniques of integration. We would normally say that to solve the indefinite integral  $\int \frac{x^4 dx}{(1-x^2)^{5/2}}$  we would have to think. A machine can do this integral quite rapidly, and many more besides. Most of us feel that when we play checkers we must think if we wish to win. We would probably feel that to beat a world champion checkers player, we would have to think quite hard. A machine did this some years ago. We all know how hard we have to think to prove theorems in Euclidean plane geometry. In 1962 we had a report of a geometry theorem proving machine. Another report tells of a machine able to prove most of the 56 theorems in the first section of Whitehead and Russell's "Principia Mathematica." Recently at Stanford a new result in algebra was first proved by a machine.

So if we accept it as true that machines do only as they are told, we may be led into accepting that humans do also. Consider: a human starts off as a cell and grows because of its heredity material. This material enables it to learn from its environment after birth and so do unpredictable things like thinking. The parallel with machines is obvious — they are programmed with material that gives them the capability of learning from the environment and they then do unexpected things.

Much of the recent work on artificial intelligence is reported in a book by M.J. Apter called "The Computer Simulation of Behaviour." The chapter on "Pattern: recognition and creation" is particularly interesting. At the University of Illinois, a computer has written a 20 minute "Suite for String Quartet"; at Cambridge

their computer writes Japanese Haiku poetry; and a computer generated picture, similar to a Mondrian, was preferred by many people when exhibited with a Mondrian.

Perhaps the most interesting work is being done at Stanford Research Institute. There they have made Shaky the "first electronic person." Shaky in one demonstration is told to "push the block off the platform." He searches the building to find the platform; then once found, realizes it is too high for him to get onto; so finds a ramp, pushes it against the platform, rolls up the ramp onto the platform and pushes the block off. To quote, "The task I saw him perform would tax the talents of a lively four year old child and his designers say he is capable of far more sophisticated routines."

Marvin Minsky, one of the leaders in this type of research has said "In from three to eight years we will have a machine with the general intelligence of an average human being. I mean a machine that will be able to read Shakespeare, grease a car, play office politics, tell a joke, have a fight. At that point the machine will begin to educate itself with fantastic speed. In a few months it will be at genius level and a few months after that its powers will be incalculable."

If you are not convinced that machines are intelligent, you could write in for a list of articles to read on the subject. But beware, the machines may have already read them!

Joe Goozeff



### A Short Competition

One day, the school held a tennis tournament and 69 students took part. Because they were short of time, the teachers arranged a "knock-out" competition in which the students were divided into 34 matches. The 69th student did not play in the first round but entered the second round, together with the winners of the first round. This continued until only one student remained who was declared the winner. How many matches were played altogether?

*Answer on page 36*