Machine to Copy Brain's Methods

Investigators in neurology at University College London are building a massive automatic computer for the principal purpose of testing theories about the learning capacity of the brain.

The machine will "think"; that is, it will scan shapes such as the letters of the alphabet and simple words and after analyzing and absorbing this visual information it will "say" (through a loudspeaker) what it has seen at precisely the same rate as that of a fairly intelligent human subject.

This is being achieved by building into the computer an electronic network regulated by about 4,000 tubes, each one of which is an electro-mechanical equivalent of the nerve cells of the brain and body, known as neurons.

Part of the machine was on display in the anatomy department of University College this week when it was announced that the Nuffield Foundation had given a further $100,000 toward the basic hardware. The computer should be in action by 1960.

The theory underlying the apparatus is that individual living nerve cells or neurons do not have a simple "on or off" or "yes or no" action; that is, they are capable of doing far more than merely stopping a message or sending it flying on toward other reception centers as do the tubes in a digital computer.

According to Dr. Wilfred W. Taylor, designer of the machine, nerve impulses (generated by neurons) change the message transmission power of the spark gaps (known as synapses) that link the fibers of one nerve cell to the next. This, in effect, is how the brain (or the new machine) "learns."

On the basis of this theory, he is building a net work of interconnected tubes into an analog or non-digital computer whose output efficiency depends on what has previously been fed into it. Its "memory," therefore, is not centralized but is distributed through billions of possible permutations in route-circuits and signal strengths.

For instance, the machine will almost certainly recognize and instantly spell out the letter O, but it may have some initial difficulty in distinguishing between an O and the addition of a tail in the letter Q. But by practice, that is by the repeated use of the extra circuits put into operation by the "sight of the tail of the Q (as seen through a battery of photoelectric eyes), it will eventually add Q to its repertoire of immediately recognizable shapes.

Electronic counters distributed throughout the apparatus will tell the investigators how long the machine takes to "make up its mind" and also the electronic strength of its spoken "convictions."

This mechanical representation of learning can be done best by what communication engineers call an analog computer or a machine that simulates the basic activity of another machine or a living process.