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# Computer Simulation of the Pattern Transfer of Large Cerebellar Neuronal Fields

A. PELLIONISZ

Institute of Anatomy, Medical University, Budapest

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A computer simulation method is applied to the cerebellar neuron circuit, giving an opportunity to study the activity of many neurons simultaneously. As a morphological basis a schematic connection chart is deduced from the original neural net. Each neuron is supposed to fire if the number of their excited input channels reaches a threshold value. The patterns of excited neurons at a particular instant of time are computed and displayed. Four types of cerebellar neurons are taken into consideration in the model. The simulated structure contains altogether 64,260 neurons. Through the patterns displayed one can get an insight into the possible activities in neuronal fields composed of 31,510 neurons, where the complete set of connections of each element has been considered.

## I. Introduction

This work aims at simulating the holistic behaviour of neural fields of realistic structure. Earlier attempts at modelling hypothetical networks built up of "formal neurons" show that their study requires simulation methods that permit to consider the networks as a whole.

The earliest discrete representation of a network was made by Rochester et al. (1956) to test the postulates of Hebb and Milner on a quasi-random connected net of 512 formal neurons. Farley and Clark (1961) simulated the propagation of activity-spots in a planar net composed of 1296 elements with interconnections specified by two dimensional probability distributions.

The attempt, to be reported in the present paper, at simulating the neuron network of the cerebellar cortex differs from preceding studies in two important aspects:

(1) The structural characteristics of the network are deduced from the known histological structure of the cerebellar cortex.

(2) The smallest part of the cerebellar cortex that might be considered as a functional unit of higher order and hence worth while to be simulated is composed of far more (in the order of $10^4$) neurons even if the model were drastically simplified.

Owing to limitations of the computer available the network, although conforming in principle to the real neuron network of the cerebellum, has been reduced in neuron numbers. It has additionally been simplified by placing all kinds of the neurons considered into two-dimensional fields and by considering their state of