# Examining the Mechanisms of the Human Brain with Computer Science

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Background:

One goal of artificial intelligence is the simulation of the human brain at some level.   This project studies one of the mechanisms of the human brain. One popular theory for the process of learning in the human brain is pattern recognition. This project undertook a study of this process by constructing a program mimicking pattern recognition in the brain and then testing the learning process in the game of tic-tac-toe against a perfect computer opponent.   In order to study learning in the human brain, this project was divided into 3 stages: studying artificial intelligence today, formulating a program, and testing that program in a game of tic-tac-toe. Ultimately, the goal was to use the analysis from the tic-tac-toe learning simulation to assess the validity of a pattern recognition theory of learning.

Results of the Tic Tac Toe Game
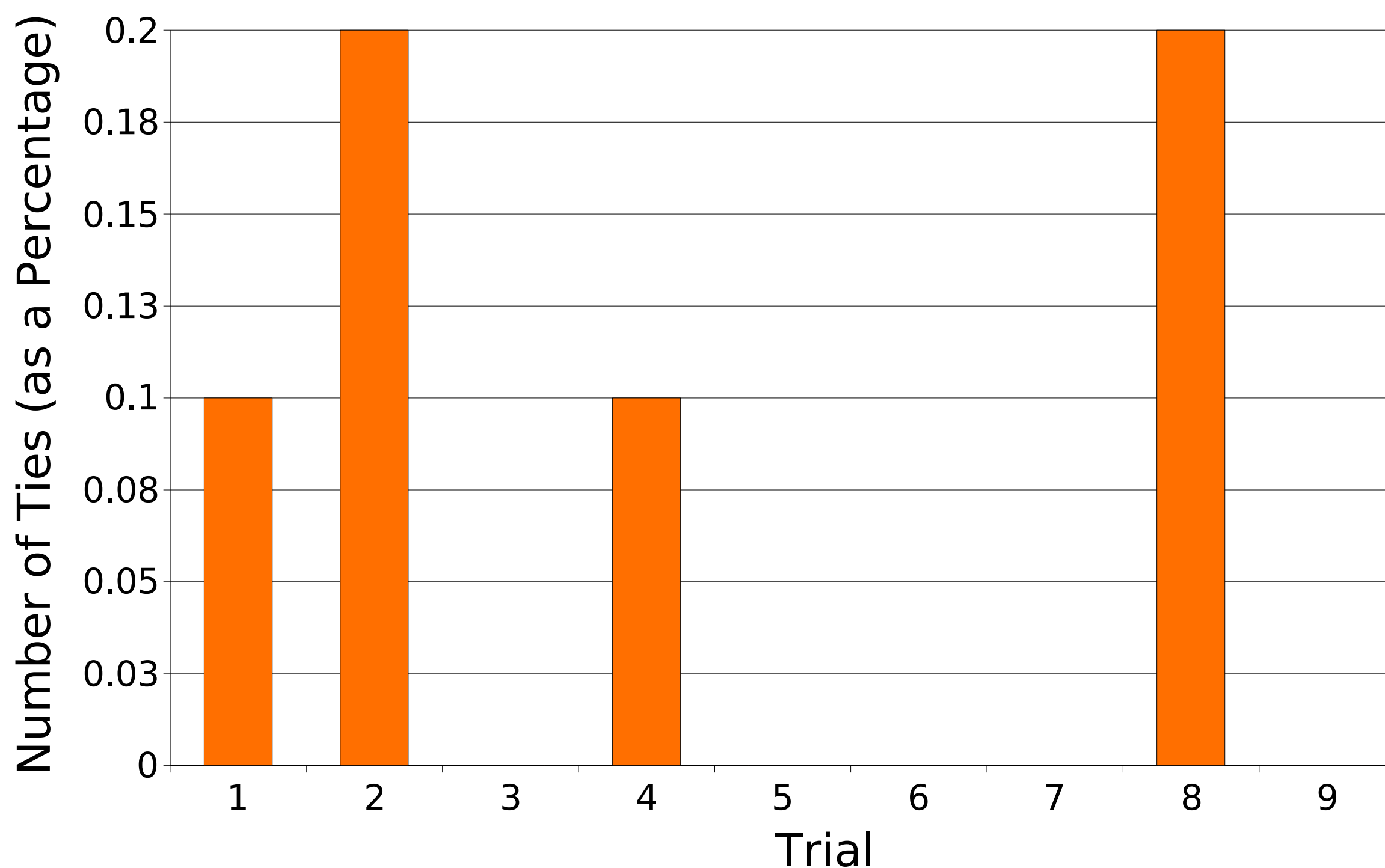
Methodology:

My project involves simulating pattern recognition to judge its effectiveness as a possible learning agent. To construct the simulation, I created a program that could simulate as much of the human brain as was possible in the time frame. This program included a message processing center, data conversion, and crude memory storage. I used a process of layers of abstraction in my program. Second, I programmed a tic tac toe game with an unbeatable artificial intelligence so that the computer could practice and learn winning strategies. Finally, I ran the program repeatedly to obtain adequate results for scientific analysis.

Testing:

The testing was divided into four stages. The first test of the core program was the message processing unit. The goal in this test was for data to be read by the console, passed on by message units to the message processing unit, and finally progress to the brain. The second test of the core program was numeric-translating capability.   A third test had to be performed on the pattern-recognition aspect of the brain. The goal was the for the computer to correctly identify the pattern of "01"s in the data. The brain outputted to the console the number of recognized repeated two-digit patterns. The final test was the tic-tac-toe game. The game itself "plugged in" to the already developed unbeatable AI. Results were measured by reported tie percentage. The results were not favorable, as the computer never improved, the specific numbers can be found in the bar graph presented.

Conclusions:

The final results of my program indicated that pattern recognition alone would not suffice as a learning mechanism. It was clear that the Human Brain did need an original sense of correctness in order to interpret the results.