How Environment Impacts OCD
New Mexico
Supercomputing Challenge
Final Report
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Team 144
The MASTERS Program

Behavioral Science

NetLogo

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Summary:

Starting this challenge, our team wanted to observe how environmental variables impact a persons mental health. We decided that we would focus on one mental disorder, rather than two or three, just because that way we could interpret our results more precisely. In order to track environmental impact, we had to research case studies and statistics that showed how and why certain diseases are developed as a result of environment. After research, our team decided we would observe OCD because there is quantifiable data that proves environment influences development of this disease. Next we had to decide what and how many variables to track. Conveniently, our research lead us to find the four major risk factors for developing OCD. These risk factors are drug use, socioeconomic, home life and genetic history, so we decided to use them as our variables. Once we found our disease and variables, we had to outline our code. The general idea was to have 100 turtles, in the shape of people, “walk” on the interface and encounter our four variables that would be represented by agents. While researching, we discovered that individual resistance to disease development varies. To account for individual resistance, we gave each “person” an energy level of 7, and gave each variable a specific energy level, according to research, that would attribute to a “persons” overall energy level after encountering the variable. Similarly, we had to represent individual environmental circumstance, so we represented each one of our variables, in the code and on the interface, as a slider that we could manipulate to individual situations. Then, we added in a monitor, to graph, and a tracker, to count, how many people developed OCD at the end of every run.

Defining Our Problem:

In modern psychological diagnosis, psychologists have been exploring the idea that certain mental diseases and are caused by a person’s surroundings (ocdeducation.org). Results of

an environment on a person's psyche when an individual experiences trauma, such as sexual abuse, then develops a disorder like DID (Dis-associative Identity Disorder). Diseases like these are developed to help their brain cope with the residual stress. Another disorder frequently developed as a result of stress or trauma is OCD (Obsessive Compulsive Disorder). Some believe that OCD is caused from early experiences in which a person is taught that specific actions are dangerous and that if they are not avoided then they will happen, with that person to blame (drugs.com.ocd). OCD causes a person to become psychologically vulnerable and obsess on compulsions that they think will help keep you safe (Durand, Barlow, 157).

OCD is also an anxiety disorder that causes people to live in a disaster state. This can be a debilitating/crippling mental disorder that is more common than people think. When a person has OCD, they develop compulsions to try and keep themselves safe from the harm they think will come. Compulsions are repeated acts that are developed in response to an irrational fear (OCD Risk Factors). It's important to remember that not all people who have OCD have compulsions about germs. People develop these rituals around objects or subjects that give them anxiety, and by participating in these rituals the person believes they can keep themselves safe (Holmes, 92-96).

Our team will explore if four environmental factors (drug use, socioeconomic, genetic predisposition and home life) cause or increase an individual's likelihood of developing OCD (OCD Risk Factors). It can be difficult to identify why or how a person develops OCD, but without NetLogo computer program we hope to make that process slightly easier by monitoring how these would factors impact agents in the code. We believe that this simulation will be beneficial because it could have the capability to determine if an individual will be threatened (impacted) by a mental disorder such as OCD as a result of their environment. Our program will

also be able to calculate which variable is the most threatening. With this program, we might even be able to predict if someone will become psychologically dangerous.

Computational Solution:

To solve and evaluate how these factors impact a person mentally, we will use yes/no switches and sliders to manipulate each of our four variables (drug use, genetic predisposition, home life, and socioeconomic). Our interface will start with 100 “turtles” that will represent 100 people. 98 of these turtles will have a specific color to identify them as healthy. The remaining, about 2 turtles will have a different color to indicate that they have OCD from birth, (approximately 2% of Americans have OCD) this will account for genetic predisposition (FamilyDoctor.org). Thus, our team will have two breeds in the beginning of the program: one will be people who have OCD from birth, and the second will be people who haven’t yet developed OCD. At the end of our program we will have made three breeds, the two previous breeds and one that will account for people who develop OCD after encountering the variables. Next, we will program a yes/no switch for home life which is defined as abuse. The remaining three factors, socioeconomic, genetic predisposition and drug use, will be manipulated with sliders. In our code, will we account for differing personalities, that is to say that some people will develop OCD easier than others, by making each turtle have a resistance level to certain factors. The resistance will make it so that turtle won't develop OCD immediately after one encounter, but will develop OCD after three or four. The energy levels will be represented in the code by a specific energy level that we will match to data that we find on how influential each factor is. Each variable will have its specific resistance level that will represent its statistical impact on people. In order to make this program active, we will have our breeds run into the variables. Variables will be represented by different colored agents spread out on the interface.

After this interaction we will determine if they develop OCD as a result of encountering one or more variables. After a turtle develops OCD from a specific variable, their color will change in correlation to the variable. We plan to run our program many different times, and each time manipulate one variable and track the results of that run. By running the program multiple times with different variations of the variables we will be able to do two things: see which of the four variables has the greatest impact on an individual and be able to graph the results of each run and see how some variables relate and contrast each other. To find the most effective variable, we will first start by counting how many turtles each breed has (the healthy from the non-healthy). Then, after running the program, we will count how many turtles developed OCD, and from which variable they developed it. By doing this we can see how impacting the variables are on a population.

By running our program a number of times with each trial having different degrees of impacting variables, we will be able to graph and track which of the four variables has the most significant impact on an individual.

Validity and Verification:

To ensure valid results, our team ran our program several times and manipulated the variables according to individual circumstance. That is to say that when we ran the program, we asked a person to rate their home life, socioeconomic and drug use out of 100, then represented those numbers on the sliders. After we got the results of a few runs, we compared the data to studies and made sure it wasn't completely off base.

Results: Given from the trial runs this team has done, it is clear that drug use has the most impact on a persons chance of developing OCD, which is an accurate statement, according to our research. Mostly, when we ran our program, we did so with the variables correlating to a real

persons circumstance. We had real people describe and rate their home life, drug use and socioeconomic status on a scale from 1 to 100, 100 being the greatest. After drug use, socioeconomic levels had the second most impact on the population. Lastly, home life had the least impact on the population, which was surprising to find out, but accurate with our research.

Result Analysis:

Moderate OCD only significantly appears in the population when socioeconomic is greater than 50. Before 50 “home life” agents appear on the interface, the number of people with moderate OCD is only 2, which could be due to genetic predisposition (2% of Americans have OCD), which we accounted for in the code. Home life only creates sever OCD after 65 agents appear on the interface. Once the socioeconomic level is greater than 55, severe OCD starts to over populate moderate OCD in the population.

Moderate OCD, from socioeconomic factors, appears in the population after socioeconomic agents exceed 10. Severe OCD appears after socioeconomic levels are greater than 25.

home life seems to have little effect on development of OCD in the population

drug use seems to have the greatest impact on OCD development, it effects the population immediately, causing four people to develop OCD when there are only five drug patches on the interface. The effect drug use has on the population correlates perfectly with the research we found. Drug use was one of the top three risk factors for developing OCD, and the program accurately represents this. This means that if you use drugs, even in low amounts, regularly, your chance of developing OCD increase immediately after your first use. Drug use creates more moderately OCD people than sever OCD people in the population up until there are about 34

“drug” agents on the interface, after that, people who will develop sever OCD as a result of drug use exceeds the number of people with moderate OCD. Once drug use gets to 100 agents, all of the turtles develop severe OCD, excluding the two turtles who started off with OCD due to genetics.

Achievements:

This teams greatest achievement was being able to finish this competition and meeting all the deadline for the interim report, Feburary project evaluation and now the final report. This team has only two members, who are both new to the Super Computing challenge. Completing our program and being able to send in accurate results was this teams greatest achievement.

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