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COG 366
Assignment 10
The Architecture of Jumbo, Part 1

The main theme of this section is about Jumbo and the way that Jumbo is structured and the way it runs and interacts within itself. While many cognitive theorists believe nothing under the 100 milliseconds brain response, the time it takes for recognition, is important for computing. Hofstadter believes Jumbo is the first project to target this ambitious goal. The goal of Jumbo and other AI projects is to establish a human-like artificial intelligence. This means that smaller processes sometimes are overlooked in programs but for small processes, they play big parts. The idea of programming, to Hofstadter is to mimic these systems according to the way our brains function. Even if there is a faster solution, it is more beneficial for us to see the way a program works if it processes information in a way like our brains. Herb Simon is not in favor of Hofstadter's remarks of what AI should be. Simon believes everything that occurs under 100 milliseconds in the brain is not of importance for depicting intelligence in comparison to Hofstadter who believes it is important. If AI can mimic the same result of what our brains do, it does not matter if it does it in the same exact way.

Hofstadter believes deep perception is the core mystery of all intelligence. He believes there is a significant difference between vision or hearing and the actual understanding of what is being seen. The Purpose of Jumbo is to imitate the way humans try to solve a Jumble problem. These problems were commonly found in newspapers at the time. The program attempts to create English like words out of the given letters. Hofstadter's reference of Jumbo as a building program suggests that Jumbo does not use brute force to solve its puzzles. Jumobo does this process by trying to create gloms within the following steps. Jumbo attempts to create words using Step 1: relationships between consonants and vowels; Step 2: syllables out of clusters; Step 3: words out of those syllables.

Jumbo's main purpose is to model the human brain's mental processes of assembly and transformation. The program is very good at unjumbling words, but it does so in a way not to be better than a human but to mimic a humans' thought process when looking at a jumble. If successful, this should allow for the use of Jumbo to be taken and used in a way the reutilizes its process in a different way the brain functions. Jumbo's task domain is important due to the fact that it represents a feature of human intelligence. Jumbo replicates a humans' ability to juggle and manipulate many small pieces and combine them into larger pieces to present a more meaningful thought. The back-and-forth involvement in perception is how the mind thinks about something, comes up with a solution which is not the correct one, and then tries to use the same thoughts in a different manner to get the correct answer.

The biological analogy refers to the strength of bonds between letters in a jumble. The letters in the puzzle alone only represent

the smallest structure, or the atoms. Typical groupings of letters, including “th”, represent commonly formed molecules in the natural world. As the letters continue to combine, their bindings become much weaker, similar to the way molecular bonds weaken with the more molecules combined. Once the brain processes all the letters at once, if a word is not created, it first removes the weakest bonds between letters before completely restarting. This is similar to how in nature, when molecular bonds are broken, the atoms rarely completely separate. Instead, they break into smaller molecules. The sociological analogy functions in a similar way. Humans are the atomic variables in this case. With each interaction between different people, bonds of variant strength are created. Occasionally, people will get along and form strong bonds as friends, where other times the people interacting are just not meant to have any type of relationship. The different strengths in bonds can also be seen in letter grouping, where “qu” could be the closest thing to marriage, but “lx” will rarely be seen together, if at all. Also, some letters may appear to have a strong relationship, but later in the solving process, it’s discovered they aren’t the proper fit. This could be seen as a romantic relationship between people.

Jumbo’s parallelism functions similar to a cell. This meaning that When one cell is working on something another cell can be working on something as well. Sometimes there is a wait for information before there can be processed in the parallel way due to information not being available yet.

A spark is the affinity, or attraction, between two letters in Jumbo. When the two letters are placed next to each other in a specific order, such as the letters t and h respectively, have a high affinity, or chance to “spark”. But when the letters are switch so that they are h and t respectively, the affinity level decreases. This results in a less possible spark between the letters, or no spark at all.