

Science Funder Jeffrey Epstein Launches Radical Emotional Software for the Gaming Industry.

Virtual gaming is about to warp through a black hole, thanks to a band of scientists in Hong Kong and a hedge funder with a zealous science background, called Jeffrey Epstein. Indeed, game programming is moving away from algorithmic robots to a twilight realm of emotional thinkers, taking online, video and toy entrepreneurs, one step closer to Star Trek's 'Holodeck'.

For years, in virtual gaming, the only intelligent player was the person playing the game, responding to non-reactive obstacles. At most, opponents could blow up or morph into something else. Whatever the reaction, it was a simple linear or algorithmic response (if A, then B, if A+D, then C).

By the 1970's, opponents became more complex with the development of virtual chess, where the program responded to a vast network of algorithmic possibilities: up to 10^{123} chess board variations to be exact. But even in those scenarios, the program remains purely reactive and deterministic: it does not have any goals, nor does it aim for check mate, but simply responds to a series of steps that lead to that direction.

Today's gaming characters from virtual soldiers to Tinkerbell are also vastly more complex than their dash line tennis, Pac Man or Pong forbearers. Like the chess program, virtual soldiers can react to a wide variation of landscape scenarios and respond in a myriad of ways, based on each case.

The Artificial Intelligence (AI) group in Hong Kong behind this new emotive software is called Open Cog. As an open-source foundation, Open Cog ('Cognition for All') led by co-founder Ben Goertzel, develops programming language for the AI community to share, in what is still a very fragmented field. However, in efforts to map the architecture of the human mind, Open Cog also programmed three game characters, a ghost, a robot and a girl that push past traditional gaming algorithms:

Each character has programmed into them a database called an AtomSpace. AtomSpace consists of hundreds of 'atoms' which are knowledge concepts such as objects (chair, table, shelf), actions (sitting, running, singing) and feelings (anger, joy, fear). Every time an algorithm, called MindAgents, leads a character to more than one an atom, the associative link gets stronger, influencing the characters' future pathway choices. In this sense, a character builds and incorporates associative memory. At the same time, links can decay over time if not used by algorithms, weakening a character's memory.

Another unique feature is the use of several algorithms functioning at the same time, called, "cognitive synergy". In this sense, each character is a compilation of multiple pathways, occurring simultaneously.

The theory behind this synergy is that humans have multiple thought processes going on simultaneously, some prioritized over others in order to function.

OpenPsi, inspired by AI scientist Joscha Bach in Berlin, is another program built into these novel characters. OpenPsi governs a character's motivations, its basic drives, emotions and thus decisions on which pathway to take. OpenPsi is also based on German psychologist Dietrich Dörner's theory that animal behavior is driven by five basic needs: existence preservation (food, water, body integrity—avoidance of pain), species preservation (sexuality, reproduction), affiliation (need to belong to a group, social interaction), certainty (need to predict events and their consequences), competence (capacity to master problems and tasks). Each of these drives gets filled or depleted based on time and interaction with various atoms. The status of these drives has a significant impact on which pathways a character chooses to take. For example, if the need for water is extremely high, a character will prioritize a water atom in its pathway choice.

For entrepreneurs, Open Cog, together with M Lab from Hong Kong Polytechnic University, supplies a software toolkit to incorporate their characters into whatever applications the market is using: from virtual landscapes to toys and even robots. As a showcase, Open Cog has also developed its own 3D landscape for its characters to function in, inspired largely by the popular building game called Minecraft.

Open Cog's goals differ from the gaming industry which is already lining up to exploit the new software. While it intends to make a profit, they are primarily interested in using a virtual platform to test their hypothesis about the mind. "The disparity between these models and our experience of the mind is an invaluable guide to follow," Jeffrey Epstein remarked, the financial guru behind this effort, along with the Hong Kong government and Hong Kong Polytechnic University. "It's somewhat like building a car, with no instructions, but our impression of what a car can do."

Over the last ten years, Jeffrey Epstein has become one of the largest backers of cutting edge science around the world. Like Open Cog, he is motivated by learning more about the mind, versus creating a new start-up product. He currently sits on the board of the Mind, Brain and Behavior Committee at Harvard. According to *New York Magazine*, Epstein has donated up to \$200 million a year to eminent scientists, including: Stephen Hawking, Marvin Minsky, Eric Lander, George Church, and Nobel laureate physicists Gerard 't Hooft, David Gross, and Frank Wilczek. In 2003, Epstein founded the Program for Evolutionary Dynamics at Harvard University, with a \$30 million dollar gift to the university. The Program studies the mathematical evolution of micro-biology and has made key discoveries into the treatment of cancer, HIV and other infectious diseases.

While Open Cog's game software has not yet been commercialized, it is aimed for the market by the half of 2014. The software has already had an impact however on the robot industry where companies such as Hanson Robotics, developed by David Hanson, are incorporating it to advance the way their human-like robots function and interact with people.

While far from being a replica of the human mind, the result of Open Cog's software are characters that have needs, continuously adjusting and even evolving. And as scientists get closer to mapping the mechanics of the human mind, it's possible that we'll discover that we are more pre-determined than we think: that pain is just an electrical impulse, and that free will, though weighing a million different neural filaments or 'atoms', is set in genetic stone—but it's also known that the mind, as in the virtual world, changes its own architecture, and thus will continue to change our destiny.