Mimicry beats consciousness in gaming's Turing test

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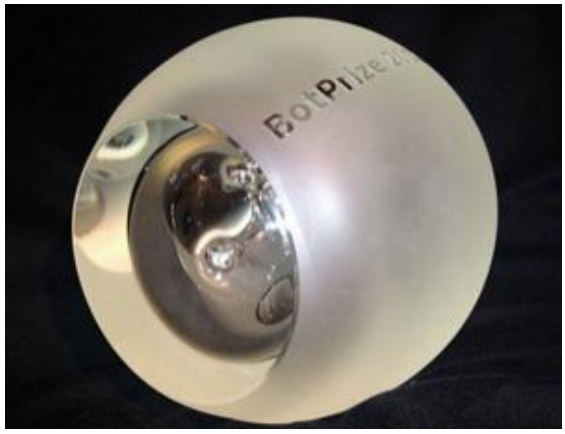
The Turing test might still be too hard for software to crack – but two programs have already aced video gaming's answer to this famous evaluation of machine intelligence.



Gaming bots with the human touch *(Image: Peter Reynolds/BotPrize)*

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The two winning programs, or bots, relied on strategies of direct human mimicry to win an annual software tournament called BotPrize – and beat an intriguing rival based on a stripped-down model of human consciousness.

As in the original Turing test, BotPrize bots attempt to convince human judges that they too are human. But whereas Turing test bots are judged on their ability to converse, in BotPrize, it's the ability to play and navigate the 3D shoot-'em-up video game Unreal Tournament in a human-like manner that counts.

Multiple bots and human judges play simultaneously, all-against-all, and anonymously, in the same arena of battle. The idea is to design more realistic virtual characters, which, in turn, should make video games more compelling and software simulations used for training more useful. In the future, the software could drive physical robots capable of navigating the real world in a human-like manner.

In only the fifth ever BotPrize contest, the UT^2 bot devised by Risto Miikkulainen and colleagues at the University of Texas, Austin, and Mirrorbot, the brainchild of Mihai Polceanu, currently studying at the European Centre for Virtual Reality in Brest, France, each persuaded the four judges more than half of the time that they were humans. That's more "human" votes than the average human received – and almost twice as many as any bot has ever scored before. That means the "human-like barrier" has been cracked for the first time: the two teams shared the AU$7000 (£4500) prize – which has never been awarded before – for bots considered to be on a par with humans.

How did the winning bots do it? As its name suggests, Mirrorbot's key strategy is mimicry. When the bot meets other players in the game, it observes their behaviour. If it judges a fellow player to pose no immediate threat, it engages in a brief "social interaction", in which it simply copies the actions of that player, including movement, shooting, weapon choice, jumping and crouching. "It plays back what it sees," says Polceanu. The fact that this strategy proved successful at fooling the human says something interesting about AI and about ourselves, says Polceanu. "This result may indicate that our perception of intelligence is not flawless, but significantly influenced by our social nature".

Mimicry is also one of the features of the other winner, UT^2, though not in real time, and only for one of its behaviours. During training, Miikkulainen's team found that the bot's most "un-human" behaviour arose when it became confused by obstacles such as walls. For example, a human knows intuitively how to navigate out of a doorway. A bot, by contrast, relies on its programming to work out that it must turn 90 degrees.

"There are bots that bounce back and forth and don't realise the way out," says Miikkulainen. "It's amusing and interesting how challenging a very basic phenomenon can be."

His team recorded dozens of humans playing Unreal Tournament, spliced out the bits where the human released themselves from different geometries and then programmed the bot to deploy the human strategy used in a situation most similar to whatever it finds itself in. For other aspects of play, UT^2 deployed evolutionary learning, in which successful strategies were bred to produce offspring strategies that were even more human-like.

Neurobot, meanwhile, a bot that came a close second in last year's BotPrize – and interested *New Scientist* in the run-up to the contest because it was based on a leading model of human consciousness – lagged in fourth place out of a total of six bots.

Its creator, Zafeirios Fountas, of Imperial College London, blames this on technical constraints which forced him to "prune" 20 per cent of his bots' simulated "neurons". "As the results indicate, unfortunately, the removed neurons and synapses played a more crucial role than I believed," he says. "The good news is that now I know that and I can investigate what exactly caused this change."

Where does all this leave AI? BotPrize is certainly considered a lesser challenge than the original Turing test. "I am not making any claim that because the bots can appear human that they are intelligent," says Philip Hingston of Edith Cowan University in Perth Australia, who created BotPrize in 2008.

Still, Miikkulainen says that intelligence is made of up of components, at least one of which has now been solved. "In terms of spatial reasoning, it is possible to act human," he says. "Language is a much bigger problem, but it's nice to know that in this part of intelligence, we can do well."

When this article was first posted, Mihai Polceanu's surname was misspelled

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