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Is a Technological Singularity Near also for Bots in MMOGs?

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Abstract

Using the idea of the Technological Singularity this essay offers some reflections on the possible future of bots in Massively Multiplayer Online Games (MMOGs). The paper starts by briefly introducing the notion of Technological Singularity as the advent of a super-intelligent Artificial Intelligence that could threaten human existence. Bots are computer programs that automate repetitive and time consuming activities for the Internet user. In MMOGs, bots are often used to cheat and could have nefarious effects on the gameplay. Assuming that bots are rudimentary forms of Artificial Intelligence that also pose a threat to MMOGs and their players, the paper presents some evidence-based trends of the future evolution of bots and the implications of these for Virtual Worlds research.

1. Introduction

Artificial Intelligence (AI) is a subject of intense debates and we increasingly see scholars (e.g. Bostrom, 2014) and experts (e.g. Pamlin and Armstrong, 2015) advocating the coming of a dangerous future: AI will surpass human intelligence capacities, and it will become independent from humans. This could also see humanity subjugated to AIs or lead to the end of the human race. One concept that underpins this debate is the *Technological Singularity* (Kurzweil, 2005), a sort of near future condition in which, due to the acceleration of technological innovation, our AIs will become independent, and develop at their own pace. In a critical paper Floridi (2015, p. 8) discusses how the idea of a *Technological Singularity* is grounded on three aspects: "*First, the creation of some form of artificial superintelligence—a so-called technological singularity—is likely to happen*

in the foreseeable future. Second, humanity runs a major risk of being dominated by such superintelligence. Third, a primary responsibility of the current generation is to ensure that the Singularity either does not happen or, if it does, it is benign and will benefit humanity".

Massively Multiplayer Online Games (MMOGs) are games – mostly based on 3D virtual environments – that are played online by a large number of players (Castronova, 2005). The key goals for the players are to level their avatar and interact with other players. This essay offers some reflections on the possible future of so-called *bots* in Massively Multiplayer Online Games, and whether bots display signs of the Technological Singularity. Posing the problem in this way assumes that the Singularity – as a phenomenon impacting humanity – will happen. However, scholars have also argued that the Singularity does not appear a provable scientific hypothesis (Eden*,* Moor, Soraker, & Steinhart, 2013; Floridi, 2015). But for the goal of reflecting about the future of Virtual Worlds (VWs), let us, for a moment, assume that the Singularity is indeed near.

In the Internet jargon, bots are computer programs that automate repetitive and time consuming activities for the user. Many bots provide positive outcomes to humans, in terms of productivity increases and relief from tedious activities. For example, search engine crawlers are bots that automatically index web pages. Wikipedia is also managed by a large number of bots that relieve users from repetitive and time consuming tasks (see on Wikipedia bots: https://en.wikipedia.org/wiki/Wikipedia:Bots). MMOGs, however, are affected by bots that have malicious intents, causing harms and disruptions. These bots also offer automation capacities for repetitive and time consuming actions. In MMOGs, bots are used to automate the avatar levelling or for gold farming, and they offer to their owners opportunities for fast achievements. However, this is usually a form of cheating and a violation of the legal agreements of games.

The key aspect of MMOGs bots is that, in order to remain undetected to automatic monitoring software and to players, they need to mimic human behaviour and pass as humans. This happens both at the level of software infrastructure and of avatar behaviour within the game environment. For instance, if an avatar is behaving like an automata, always repeating the same actions and paths, then players can spot that the avatar is controlled by a bot and send a report to the game company. Likewise, this behaviour can be identified with monitoring software that detects constant repetition of movement (e.g. Mitterhofer, Platzer, Kruegel, & Kirda, 2009) or of communication (e.g. Chen et al., 2009). Therefore, a challenge for bot makers is to develop software that can act in and through the virtual environment in a possible human-like way. This could entail the inclusion of random communication functions, variations in the path of movements, or the ability to make mistakes in a way that emulates human behaviour (De Paoli, 2016). MMOGs bots are hence a very basic form of AI in the way this could be defined by the Turing Test (Turing, 1950) as – via the meditation of the game avatar – there is a tendency to make their external behaviour appear human.

Furthermore, bots have analogies with intelligent automatic production machines in workplaces, and some links can be made with the current debate. According to Brynjolfsson and McAfee (2011) in contemporary society there is an increasing tendency toward the replacement of human intellectual work with AI technologies. They called this the *Race Against the Machine.* This is the outcome of the acceleration of technological innovation and a process that moves forward with its inner logic. This process would seem in itself a sign of the Technological Singularity (Andersen, 2014). A similar perspective can be applied to bots in MMOGs as they demonstrate skills that usually belong to human players and we can already see some replacement of human-play with automatic-play (De Paoli, 2013). Also in MMOGs we have a *Race Against the Machine*, as bots can produce achievements faster and using less resources (e.g. play-time) than human players (De Paoli, 2012). Due to the difficulties arising from the competition with bots, players often advocate for strong measures against their diffusion, such as harsh punishments (De Paoli and Kerr, 2012) or use of monitoring software (De Paoli and Kerr, 2010; Kerr, De Paoli, & Keatinge, 2014).

In summary, bots in MMOGs are "illegal and cheating helpers" of humans who can boost their game productivity with automation. Bots are also rudimentary forms of AIs that seek to pass as humans, avoiding detection from monitoring software often used by game companies. We can then speculate if bots, at some point in the future, could become more intelligent and what consequences would this entail for players and game companies. We can speculate about some possible near steps using the three elements of the Technological Singularity as identified by Floridi (2015) and presented at the beginning of this manuscript. For this purpose these three elements can be "folded" as follows:

> Will we have super-intelligent MMOGs bots in the near future?

> Will MMOGs be dominated by such super-intelligent bots?

> Can we ensure that the bot Singularity either does not happen or, if it does, it is benign and will benefit MMOGs and their players?

2. Will We Have Super-Intelligent MMOGs Bots in the Near Future?

- Could bots be able to self-adapt themselves to changes of the Virtual Environment? At present, one aspect that game companies leverage in the quest against bots is changing the game code in ways that disrupt the functioning of the bots. An example was the so-called *bot nuke* – a code obfuscation – that happened in the game Runescape (Jagex Games Studio, 2001) at the end of 2011 (Jagex Games Studio, 2012a), which apparently disrupted 98% of the bots affecting the game at the time. It is a simple principle: if the game code upon which the bots act is changed then the bots will become unusable. These code changes force bot makers to start innovation cycles to make their bots effective again (De Paoli & Kerr, 2009). To become "super-intelligent" bots will have to be programmed so that they can self-adapt to these changes to the VWs code. In essence, rather than having algorithms re-adapted exogenously by their programmers each time the code changes, they might be able to self-adapt their parameters according to the changes (Bäck, 2001) of the VWs technical arrangements. At which point we will probably be able to speculate on the idea of MMOGs bots self-reproducing themselves.

- Could bots have increased problem solving capabilities? At present MMOGs bots operate with pre-programmed actions, with owners defining predefined parameters at set-up time. A major provider of MMOGs bots (MMOViper, 2013) defines this as a playback machine of pre-recorded mouse and keyboard actions. State-of-the-art MMOGs bots seem therefore based on static assumptions and simple plans. To move a step toward better intelligence, MMOGs bots will need to solve complex problems in real time and take autonomous decisions depending on changes in the VW. In other words to be dynamic rather than static. In a different family of games – First Person Shooters (FPS) – we already have examples of dynamic bots that rely on machine learning techniques to learn and adapt to the environment as it changes (Randar, 2013). These bots control legitimate Non-Player Characters, and their goal is to make the game appearing more real for single players. A possible strategy to have dynamic MMOGs bots would be to program them in the same ways as socialbots for Social Network Sites (SNSs). Socialbots act and decide based on mining existing user actions and interactions on the massive dataset offered by SNSs themselves (Gehl, 2013) and then acting based on the past and real human interaction example. While it is more difficult to access such type of data for MMOGs, we have already examples in which AIs for games are programmed to solve problems by reusing databanks of past human

interactions in games (Baraniuk, 2014; Holmgård, Liapis, Togelius & Yannakakis, 2014).

- Could bots become self-conscious and play for themselves? The Technological Singularity hypothesis appears to predict that the super AI will be conscious and self-aware. Whether this will happen to MMOGs bots remains to be seen. However, there is already ongoing research oriented at making game bots conscious (e.g. Arrables, Ledezma, & Sanchis, 2009), again, based on the assumption that due to their social complexity the gaming environments are an important research ground for improving AI techniques (Laird, 2002). The same research team, working on the subject of consciousness for robots and game bots, have in 2014 also taken over the organisation of the so-called Bot-Prize (Arrables, 2014), a competition where bots for the FPS game *Unreal Tournament* are tested against the Turing Test (Hingston, 2010). These are perhaps signs that VWs might be one of the grounds where we will actually see clear signs of consciousness of AI appearing.

3. Will MMOGs Be Dominated by Such Super-Intelligent Bots?

- MMOGs appear already suffering substantially from bots. At present it is not difficult to see in many MMOGs forums, players discussing actively the negative impact that bots have on the game, and players are already experiencing a *Race Against the Machine* for the dominion of games (De Paoli, 2012; De Paoli, 2013). Some players even call bots as "The Elephant in the Room" (Samlis, 2013), due to them be probably the major, but often neglected, issue that MMOGs face. Game companies are forced to invest in monitoring technologies to contrast bots in their games, and in taking serious violations to court (Jagex Games Studio, 2012b). A relevant aspect of monitoring technologies is their capacity to destabilise existing market relations between companies marketing bots and their customers (i.e. cheaters) (see De Paoli and Kerr, 2009 & 2010), by making bots essentially detectable, as it happened in the case of the game   Tibia.
  One possible outcome could be that super-intelligent bots – behaving like a human – may make existing monitoring techniques based on detecting repetition quite obsolete. Further, if the bots behave like humans, camouflage techniques – such as rootkit technologies (Hoglund & McGraw, 2007) – could no longer be required for bots.

- Shrinking VWs. In studies conducted by the author, it has been possible to observe players complaining about the effects of bots, such as unbalancing the economy due to increased illegal productivity, or the transformation of MMOGs to a mere accumulation process (see De Paoli, 2012; De Paoli & Kerr, 2012). Something that these processes trigger is a sense of annihilation of the game. High level characters created by the means of bots have done everything inside the VWs – done all the quests, killed all types of monsters, reached all the maximum levels – and no real challenge remains for them inside the game. The games have nothing more to offer to cheaters because bots have annihilated them (De Paoli, 2012). Only one thing remains: the exercise of the will of power over other players. Perhaps this might be an initial sign of subjugation of players to bots.

- Another option to consider takes inspiration from a Reddit post from the true gaming subforum by a user called Crynth (2015). Crynth argues that MMOGs could at some point become single player games, because all the other players will be simulated: other players could be sort of super-intelligent bots, acting and behaving like credible humans and, despite this, players will still be loving their games and playing with and among

bots. MMOGs, in this view, will become VWs populated only by super-intelligent software interacting with a single human player. Perhaps this could be one of the effects of the *Race Against the Machine* in MMOGs: the replacement of the entire human player base by super-intelligent bots.

4. Can We Ensure That the Bot Singularity Either Does Not happen or, If It Does, It is Benign and will Benefit MMOGs and Their Players?

- There is some agreement that MMOGs are rather repetitive, leading to grinding play that resembles industrial labor and Taylorism (e.g. Rettberg, Corneliussen, & Rettberg, 2008). This is also one of the main reasons for the existence of bots: repetitive actions are easy to automate and automation can bring relief from grinding play. While it would be unjust to think that grinding play is not rewarding for players (Consalvo et al., 2010) other authors argue that this "is surely not everybody's idea of fun" (Taylor, de Castell, Jenson, & Humphrey, 2011, p. 50). While it is not too late, we should probably argue for MMOGs that are less repetitive in the game play. This may undermine the existing crops of bots while they still are very much more developed as simple automations than as complex AIs.

- Stop worrying and start playing with the bots. At present bots are mere cheating automations with some level of human-like appearances. But could we arrive at a point where they will be considered legitimate players and be allowed to compete with humans? This is a rather legitimate question as in other areas we seem much more confident of the importance of competing with play-software, of which Chess is probably the most prominent example (Campbell, Hoane, & Hsu, 2002; Bloomfield & Vurdubakis, 2008), and before in this paper the case of FPSs has been mentioned as another example. Perhaps, very much like we care for the idea of robots as our companions (Turkle, 2012), we could start considering bots in MMOGs as companion players.

- What about "merging" with bots? One of the predictions around the Technological Singularity is the human hybridisation with AIs. Without considering here the idea of a hybrid brain, we may wonder if a hybrid player is on the horizon. For instance during research conducted by the author on the game Tibia (CipSoft, 1997), it has been possible to observe what was at the time called a warbot (see http://www.blackdtools.net/showthread.php?555-Warbot-main-functions): an illegal bot used in wars among opposing guilds. Via a warbot, the guild master was able to coordinate the avatars of the other guild members. For example, via the warbot, the master could decide which opposing avatar to attack next, and this would then direct all the other guild-players avatars against the selected opponent. This was an assemblage mixing humans with bots, which goes beyond the mere automation of avatar levelling. In essence, human play actions were coordinated on a rather large scale, with bot functions. Perhaps similar hybrid arrangements could be used for positive improvements in games?

5. To conclude

Is a Technological Singularity near also for bots in MMOGs? The question remains essentially open and rather speculative, however, this paper has illustrated, via existing research and other evidence from MMOGs, that some relevant changes are taking place in the area of bots. Players are often competing with bots for resources with the latter being able to achieve a result in a much faster and efficient way. Likewise, game companies need to invest in technical countermeasures which

serve both for supporting the legitimate player community but also to break the ties between bot producers and their customers. Possible advances in bot technologies however may increase the competition with bots-machines that players and companies experience and render some of the existing countermeasures obsolete and inefficient. Clearly there is a *Race Against the Machine* which has influence on the gaming companies and the whole MMOGs player community. In conclusion, very much like speculations around AI are speculations about the future relations of mankind with technologies, we can agree that speculations around MMOGs bots are speculations about the future of players and their games.

References

Andersen, E. (2014). Ubiquity symposium: The technological singularity: opening statement: will computers out-compete us all?. *Ubiquity*, (October, 2014), 1-8.

Arrabales, R., Ledezma, A., & Sanchis, A. (2009). Towards conscious-like behavior in computer game characters. In *Computational Intelligence and Games, 2009. CIG 2009. IEEE Symposium on* (pp. 217-224). IEEE.

Arrables R. (2014). *Botprize 2014 competition*. Retrieved from http://www.conscious-robots.com/en/conscious-machines/machine-consciousness-projects/botprize-2014-competition.html.html

Bäck, T. (2001). Introduction to the special issue: Self-adaptation. *IEEE Transactions on Evolutionary Computation, 9(2),* pp. 3–4.

Baraniuk, C. (2014). You've got personality… for a bot. *New Scientist, 223*(2988), 22.

Bloomfield, B. P. & Vurdubakis, T. (2008). IBM's chess players: On AI and its supplements. *The Information Society, 24(2),* 69-82.

Bostrom, N. (2014). *Superintelligence: Paths, dangers, strategies*. Oxford: Oxford University Press.

Brynjolfsson, E., & McAfee, A. (2011). *Race against the machine. How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy*. Digital Frontier Press.

Campbell, M., Hoane, A. J., & Hsu, F. H. (2002). Deep blue. *Artificial intelligence*, 134(1), 57-83.

Castronova, E. (2005). *Synthetic worlds: the business and culture of online games*. Chicago: University of Chicago Press.

CipSoft. (1997). *Tibia* [Video Game]. Regensburg: CipSoft. Retrieved from http://www.tibia.com/

Chen, K. T., Jiang, J. W., Huang, P., Chu, H. H., Lei, C. L., & Chen, W. C. (2009). Identifying MMORPG bots: A traffic analysis approach. *EURASIP Journal on Advances in Signal Processing*, *2009*, 22 pages. DOI=10.1155/2009/797159

Consalvo, M., Alley, T. D., Dutton, N., Falk, M., Fisher, H., Harper, T., & Yulish, A. (2010). Where's my montage? The performance of hard work and its reward in film, television, and MMOGs. *Games and Culture, 5(4),* 381-402.

Crynth (2015, Feb. 24). *Simulated players are better than real ones. Why I believe the MMOs of the future will be single player games*. Retrieved from https://www.reddit.com/r/truegaming/comments/2x0qge/simulated_players_are_better_than_real_ones_why_i/

De Paoli, S. (2012). Bots and the speed of levelling: productivity and the player perception of MMORPGs (October 18, 2012). *Available at SSRN*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2607408

De Paoli, S. (2013). Automatic-play and player deskilling in MMORPGs. *Game Studies*, *13(1)*. Retrieved from http://gamestudies.org/1301/articles/depaoli_automatic_play

De Paoli, S. (2016). The rise of the robots in virtual worlds: A comparison and a framework for investigating bots in Social Networks Sites and MMOGs. *Handbook on 3D3C Platforms*. Y. Sivan (Ed.) (to be published by Springer) DOI=10.1007/978-3-319-22041-3.

De Paoli, S. & Kerr, A. (2009). "We will always be one step ahead of them": a case study on the economy of cheating in MMORPGs. *Journal of Virtual Worlds Research, 2(4)*. Retrieved from https://journals.tdl.org/jvwr/article/download/865/

De Paoli, S. & Kerr, A. (2010). The assemblage of cheating: how to study cheating as imbroglio in MMORPGs. *FibreCulture Journal, Issue 16*. Retrieved from http://sixteen.fibreculturejournal.org/the-assemblage-of-cheating-how-to-study-cheating-as-imbroglio-in-mmorpgs/

De Paoli, S. & Kerr, A. (2012). On crimes and punishments in virtual worlds: bots, the failure of punishment and players as moral entrepreneurs. *Ethics & Information Technology, 14(2),* 73-87.

Eden, A. H., Moor, J. H., Soraker, J. H., & Steinhart, E. (2013). *Singularity hypotheses: a scientific and philosophical assessment*. Berlin: Springer.

Floridi, L. (2015). Singularitarians, aItheists, and why the problem with artificial intelligence is H.A.L. (Humanity At Large), not HAL. *Philosophy and Computers, 14(2),* 8-11.

Gehl, R. W. (2013). The computerized socialbot Turing Test: new technologies of noopower. *Available at SSRN*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2280240

Hingston, P. (2010, August). A new design for a turing test for bots. In *Computational Intelligence and Games (CIG), 2010 IEEE Symposium on* (pp. 345-350). IEEE.

Hoglund, G. & McGraw, G. (2007). *Exploiting online games: cheating massively distributed systems*. Boston: Pearson.

Holmgård, C., Liapis, A., Togelius, J., & Yannakakis, G. N. (2014). Generative agents for player decision modeling in games. In *Foundations of Digital Games, 2014*. Retrieved from http://www.fdg2014.org/papers/fdg2014_poster_05.pdf

Jagex Games Studio. (2001). *Runescape* [Video Game]. Cambridge: Jagex Games Studio. Retrieved from http://www.runescape.com/

Jagex Games Studio. (2012a, Apr. 08). *Bot nuke day*. Retrieved from http://services.runescape.com/m=rswiki/en/Bot_Nuke_Day

Jagex Games Studio. (2012b, Jan. 27). *Jagex vs. IBot & Anti-Bot Update*. Retrieved from http://services.runescape.com/m=news/g=runescape/jagex-vs-ibot--anti-bot-update

Kerr, A., De Paoli, S., & Keatinge, M. (2014). Surveillant assemblages of governance in massively multiplayer online games: A comparative analysis. *Surveillance & Society, 12(3),* 320-336.

Kurzweil, R. (2005). *The singularity is near: When humans transcend biology*. New York: Penguin Group USA.

Laird, J. E. (2002). Research in human-level AI using computer games. *Communications of the ACM*, *45(1),* 32-35.

Pamlin, D. & Armstrong, S. (2015). The case for a new risk category. *Report from the Global Challenges Foundation*. Retrieved from http://globalchallenges.org/wp-content/uploads/12-Risks-with-infinite-impact-full-report-1.pdf

Mitterhofer, S., Platzer, C., Kruegel, C., & Kirda, E. (2009). Server-side bot detection in massive multiplayer online games. *IEEE Security and Privacy*, *7(3),* 29-36.

MMOViper. (2013). *MMO Viper home page*. Retrieved from http://www.mmoviper.com/

Randar (2013). *The bot FAQ*. Retrieved from http://www.randars.com/bots/botfaq.html

Rettberg, S., Corneliussen, H. G., & Rettberg, J. W. (2008). Corporate ideology in World of Warcraft. In H. G. Corneliussen & J. W. Rettberg (Eds.) *Digital Culture, Play, and Identity: A World of Warcraft Reader*, (pp. 19-38). Cambridge MA: MIT Press.

Samlis (2013, Dec. 07). *Bots - The elephant in the room*. Retrieved from http://eu.battle.net/wow/en/forum/topic/8882098709

Taylor, N., de Castell, S., Jenson, J., & Humphrey, M. (2011). Modeling play: re-casting expertise in MMOGs. In *Proceedings of the 2011 ACM SIGGRAPH Symposium on Video Games* (pp. 49-53). ACM.

Turing, A. M. (1950). Computing machinery and intelligence. *Mind, 59(236),* 433-460.

Turkle, S. (2012). *Alone together: Why we expect more from technology and less from each other*. New York: Basic Books.