

Dr Sarah Morley and Dr David Lawrence – Written evidence (AIC0036)

Call for Evidence- Artificial Intelligence

Dr. Sarah Morley and Dr. David R. Lawrence

Importance of Regulating AI

1. There is an existing and urgent need for the Government to develop new policies and regulations that address the emergence of new types of artificial Intelligence (AI). AI will have different levels or degrees of consciousness; the Government will need to create legal definitions for this consciousness in order to distinguish between the different legal responsibilities that will inevitably arise for the AI itself and for those who develop and operate AI.
2. The regulation of AI is paramount when considering the increasing use of these technologies in our daily lives and their increasing consciousness. A survey of the 100 most cited academics writing on AI suggests an expectation that machines will be developed "that can carry out most human professions at least as well as a typical human,"¹ with 90 percent confidence, by 2070, and with 50 percent confidence by 2050. While it must be stressed that this is merely educated speculation, the prototypes and experimental robots extant today are more than impressive. The componentry and systems exist (though for now they are yet to be united in one machine) to emulate proprioception, tactility,² visual processing and object recognition, walking and running³—even on rough terrain and at high speeds⁴—and many more elements of human biology, even the high-speed recognition, analysis, and reaction needed to play table tennis.⁵ Robots have long been a feature of the workforce; for example, in the automotive manufacturing industry, but are now in a position to start taking more subtle, customer-facing jobs. ASIMO, Honda's famous walking robot, has acted as a receptionist,⁶ and has acted intelligently in concert with other ASIMOs as a team of office assistants.⁷ Many industries live in fear of the encroachment of automation,⁸ and

¹ Müller VC, Bostrom N. Future progress in artificial intelligence: A survey of expert opinion. In: Müller VC, ed. *Fundamental Issues of Artificial Intelligence*. Cham, Springer; 2016:553–71.

² Syntouch- Biotac. *syntouchllc.com*. 2016. Available at: <http://www.syntouchllc.com/Products/BioTac/>. Accessed July 14, 2016.

³ ASIMO – The Honda Worldwide ASIMO Site. *World.honda.com*. 2016. Available at: <http://world.honda.com/ASIMO/>. Accessed July 14, 2016.

⁴ Raibert M, Blankespoor K, Nelson G, Playter R. BigDog, the Rough-Terrain Quaduped Robot. *Boston Dynamics*. 2008. Available at: http://www.bostondynamics.com/img/BigDog_IFAC_Apr-8-2008.pdf. Accessed July 14, 2016.

⁵ Raibert M, Blankespoor K, Nelson G, Playter R. BigDog, the Rough-Terrain Quaduped Robot. *Boston Dynamics*. 2008. Available at: http://www.bostondynamics.com/img/BigDog_IFAC_Apr-8-2008.pdf. Accessed July 14, 2016.

⁶ Humanoid robot gets job as receptionist,. *New Scientist*. 2005. Available at: <https://www.newscientist.com/article/dn8456-humanoid-robot-gets-job-as-receptionist/>. Accessed July 14, 2016.

⁷ The World's Most Advanced Humanoid Robot. *Asimo by Honda*. 2016. Available at: http://asimo.honda.com/news/honda-develops-intelligence-technologies-enabling-multiple-asimo-robots-to-work-together-in-coordination/newsarticle_0073/. Accessed February 16, 2017.

⁸ Why robots are coming for US service jobs. *Financial Times*. 2016. Available at:

robots are even expected to move into the “educated professions” such as law and medicine.⁹ Robotics and artificially intelligent systems are not a future issue, rather, they are very much an integral and essential aspect of modern society; and they will continue to become ever more so as development continues across the world.

3. When we consider the potential stakes; smart systems that could upend our society, or the birth of AGI that could think and reason like a human, with wants and needs and perhaps moral rights of its own, there is probably good reason to want to ‘get in front’ of these challenges; but it does not necessarily follow that we *should* do so, or do so unilaterally. To try to control or limit the development of robotics and AI may prevent responsible and conscientious parties from doing so, but it will not stop others. With the potential impacts so significant, it seems that the sensible approach would be to ensure that freedom to act rests in the hands of those most able (or those likely to be so) to do so appropriately and with consideration for consequences. Guidelines and regulations that attempt to control technologies after the fact are rarely great successes, and with one as ephemeral as an AI (of any type) it will be all the more difficult. Furthermore, with regard to AI the balancing act of scientific freedom and the preservation of the status quo is a futile endeavour- AI will, no doubt, be the greatest technological challenge to our society, and has already fundamentally altered how we live.

Role of the Government

4. There is an urgent need for the Government to produce policies and regulations that address the emergence of AI and the involvement of corporations in their creation and operation. Moreover, as AI will have different levels of consciousness the Government will need to consider how this should affect its regulation. For example the Government will need to form legal definitions for this consciousness in order to distinguish between the different legal responsibilities that will inevitably arise for the AI itself and for those who develop and operate AI.
5. The Government should therefore play a particular role in determining:
 - I. Legal definitions to determine the different consciousness and moral status of AI
 - II. The legal status of AI: Should AI be granted legal personhood?
 - III. The responsibility to AI: Who is responsible for the creation, lifespan and ultimate fate of AI. If the answer is the company who produced the AI, to what extent should they be liable?

Points two and three are likely to have different implications depending on the consciousness-derived moral status of the AI in question (hence they should be subsidiary to point one). These points are expanded upon in the following sections.

<http://www.ft.com/cms/s/0/cb4c93c4-0566-11e6-a70d-4e39ac32c284.html#axzz4DNsK7QYF>. Accessed July 14, 2016.

⁹ Meltzer T. Robot doctors, online lawyers and automated architects: the future of the professions?. *The Guardian*. 2014. Available at: <https://www.theguardian.com/technology/2014/jun/15/robot-doctors-online-lawyers-automated-architects-future-professions-jobs-technology>. Accessed July 14, 2016.

i. Consciousness and moral status of AI

6. As robotics have advanced, so too has the development of AI, in concert with the abovementioned and as a field in its own right. There are a number of subfields, each immensely complex, working toward elements of human-level intelligence. For example, a true, conscious AI would need to be able to perceive and understand information;¹⁰ to learn;¹¹ to process language;¹² to plan ahead and anticipate (and thus visualize itself in time);¹³ to possess “knowledge representation”¹⁴ or the ability to retain, parse, and apply the astronomically high number of discrete facts that we take for granted, and be able to use this information to reason; to possess subjectivity; and many, many more elements. A number of projects exist attempting to develop and integrate one or more of these elements into “artificial brains,” using modeled or biological neural networks and other technologies; including Cyc,¹⁵ an ongoing 32 year attempt to collect and incorporate a vast database of “common-sense” knowledge in a practical ontology, to enable reasoning. There is also the Google Brain,¹⁶ a “deep learning” project focused on giving the AI access to Google’s vast troves of data and allowing it to begin to parse things for itself; for example, the Brain, when given access to *Youtube.com*, learned unprompted to recognize human faces, and showed a partiality to videos of cats.¹⁷ A third project, the well-known Blue Brain, has successfully modelled 37,000,000 synapses of a rat’s sensory cortex¹⁸ in an attempt to understand the “circuitry.”
7. It is imperative that the Government defines when an AI is both conscious and unconscious. This is because the different statuses of AI should have implications for the regulations that follow such as legal responsibility. For example, if the AI is deemed to be conscious regulations should reflect on whether the appropriate mechanisms for shutting down or “killing” the technology should be different from that of unconscious AI.
8. The present authors are currently undertaking research to consider these future technological developments and suggest practical legal definitions for the status of both

¹⁰ Russell S, Norvig P. *Artificial Intelligence A Modern Approach*. 2nd ed. New Jersey: Prentice Hall; 2003. at 537–81, 863–98.

¹¹ Langley P. The changing science of machine learning. *Machine Learning* 2011;82(3):275–9.

¹² Cambria E, White B. Jumping NLP curves: A review of natural language processing research. *IEEE Computational Intelligence Magazine* 2014;9(2):48–57.

¹³ *Op cit.* 10 at 375–459.

¹⁴ *Op cit.* 10 at 320–63.

¹⁵ Knowledge modeling and machine reasoning environment capable of addressing the most challenging problems in industry, government, and academia. *Cycorp: Home of Smarter Solutions*. 2016. Available at: <http://www.cyc.com/>. Accessed July 14, 2016;

The word: Common sense. *New Scientist*. 2006. Available at:

<https://www.newscientist.com/article/mg19025471.700-the-word-common-sense/>. Accessed July 14, 2016. I thank John Harris for informing me of this fascinating endeavor.

¹⁶ Hernandez D. The Man Behind the Google Brain: Andrew Ng and the Quest for the New AI. *WIRED*. 2013. Available at: <http://www.wired.com/2013/05/neuro-artificial-intelligence/>. Accessed July 14, 2016.

¹⁷ Google’s Artificial Brain Learns to Find Cat Videos. *WIRED*. 2012. Available at: <http://www.wired.com/2012/06/google-x-neural-network>. Accessed July 14, 2016.

¹⁸ Markram H, Muller E, Ramaswamy S, Reimann MW, Abdellah M, Sanchez CA, et al. Reconstruction and simulation of neocortical microcircuitry. *Cell* 2015;163(2):456–92.

conscious and unconscious AI, in service of later developing and providing proposals for appropriate regulation for the responsible development, operation, and disposal of the technologies. By way illustrating un-consciousness, we might consider that an intelligence of a type which surpasses our own raw cognitive processing power might warrant being called 'super', as it could, in a narrow sense, outperform us. But this type of AI is not likely to be conscious. This type of AI is the one which presently exists- albeit probably without yet qualifying as 'super'. We can see examples in many AI which we utilise as individuals every day- from simple algorithms used by streaming television services such as Netflix which recommend shows based on your viewing history;¹⁹ to stock market trading programs;²⁰ to the complex Bayesian systems which operate autopiloting in aircraft and autonomous cars.²¹ These are all 'expert systems'²² or 'applied' AI (sometimes known as 'weak' AI²³)- based on the combination of a knowledge base and an inference engine. In effect, the system is pre-programmed to recognise data and to respond in a certain manner- so for instance an autonomous car might detect a sudden obstacle ahead and another vehicle pulling alongside, infer the risk of collision, and would be able to choose to swerve the opposite way. These systems are not making decisions in the manner of a human, using reasoning and intuition to consider cause and effect, but are instead applying their own type of first-order logical rules,²⁴ which might at a very simple level be summed up as 'if X, then Y'.

9. If AI is shown to be legally conscious (having considered the legal definitions) does the AI have capacity to take on responsibilities? Because consciousness does not equal competence. The answer to this question will impact whether the AI should be given a legal personality and who is ultimately responsible for the AI. Current tests of capacity and competence from medical law can be used to test the AI on these matters. For example, *Gillick v West Norfolk & Wisbeck Area Health Authority [1986]* might be used to determine an AI's competence.

ii. Should AI be granted Legal Personality?

10. Recent proposals by committees of the European Parliament, the White House, and the House of Commons²⁵ have suggested, among other things, the institution of corporate personality for extant 'expert systems' and autonomous robots. These proposals may

¹⁹ Gomez-Uribe CA, Hunt N. The Netflix recommender system: Algorithms, business value, and innovation. *ACM Transactions on Management Information Systems (TMIS)*. 2016 6;4:13.

²⁰ Dymova L, Sevastjanov P, Kaczmarek K. A Forex trading expert system based on a new approach to the rule-base evidential reasoning. *Expert Systems with Applications*. 2016 Jun 1;51:1-3.

²¹ Zhu, W; Miao, J; Hu, J; and Qing, L. Vehicle detection in driving simulation using extreme learning machine. *Neurocomputing* 2014 128: 160–165.

²² Cuddy C. Expert systems: The technology of knowledge management and decision making for the 21st century. *Library Journal*. 2002 127;16:82.

²³ Searle, J.R. (1980) 'Minds, brains, and programs', *Behavioral and Brain Sciences* 1980 3: 3, pp. 417–57

²⁴ Forgy, C. Rete: A Fast Algorithm for the Many Pattern/Many Object Pattern Match Problem *Artificial Intelligence*. 19;1: 17–37.

²⁵ European Parliament Committee on Legal Affairs. (2016) *Draft Report With Recommendations To The Commission On Civil Law Rules On Robotics (2015/2103(INL))*. Brussels. House of Commons Science and Technology Committee. (2016) *Report on Robotics and Artificial Intelligence*. London, HC145 National Science and Technology Council Committee on Technology. (2016) *Preparing For The Future Of Artificial Intelligence*. Washington D.C.: Executive Office of the President

not constitute an appropriate regime as they fail to address the subsequent technological development of full conscious beings, or the comparable implications of synthetic genomic design.

11. In undertaking the enormous task of regulating AI, the Government should firstly consider whether AI should be eligible to be accorded legal personality. The decision to award legal status to AI will have many ramifications for legal responsibility and for issues such as legal liability. Additionally, the conscious status of AI will need to be considered when deciding on this point. If AI are not awarded legal personality then the Government will need to decide who takes legal responsibility for these technologies, be it the developers (companies) or the owners. For example if a self-driving car crashes and causes injury to a third party, who will be responsible for paying the damages - the developers or the owner? It may be that the developer will be liable if there has been a fault with the AI machinery/programming but otherwise the owner should insure themselves against liability like any other car. In this instance the Government can amend current regulations to ensure owners of AI are insured against any losses they may suffer because of the AI. Criminal liability however may be more difficult to establish if the AI is not granted a legal personality.

iii. Legal Responsibility and Company Law

12. It seems likely that AI will be the product of public corporations and in particular multinational corporations. The main source of regulation for these corporations derives from company law. Company law here is to be understood to incorporate not only company law in the traditional sense (Companies Act 2006) but also other regulatory mechanisms that control the behaviour of companies such as criminal sanctions, civil remedies, governance codes etc.
13. Currently, there are no company regulations which specifically address the development and operation of AI. This includes the ethical and safe advancement and destruction of AI. For instance, as the law stands Directors are not required to consider whether AI should have a right to life, to liberty, or to self-ownership; nor to the impacts its existence and operations may have. There is no requirement for any such project to be disposed of in a responsible manner, taking into consideration that closure may involve the “killing” of the AI, or what the effects of an incomplete cessation of activity may be. Furthermore, if AI is determined to be conscious but not competent should companies be legally responsible for the AI until they can be proven to possess legal capacity?
14. How heavily corporations should be involved in deciding on these, often sensitive, matters will need to be considered by the Government. We would advise that companies should be regulated to some extent on these matters in order to protect society and the AI itself. We have already seen so-called ‘racist’ and ‘sexist’ AI resulting from bias implicit in coding by human agents, unintentional though it may have been.²⁶

²⁶ Caliskan A, Bryson JJ, Narayanan A. Semantics derived automatically from language corpora contain human-like biases. *Science*. 2017 Apr 14;356(6334):183-6.

15. If companies are left unregulated in this area there is a further risk that AI will be affected by the specific drivers of companies (profit), and in particular of public companies (shareholder primacy and short-term profit maximisation). Are the traditional drivers of companies appropriate for the development of any morally significant technological development? We would answer no.
16. This poses the question as to whether company law can, or should, be the primary means of regulating AI, and by extension their potential wide-ranging societal impacts. We would answer that there is certainly potential for AI to be regulated by current company law regulations. For example the Companies Act 2006 could impose specific duties on directors to develop, operate and dispose of AI in an ethical manner. The UK Corporate Governance Code could also be utilised to include specific guidance on these matters.

Conclusion

17. AI systems are pervasive, and are involved in almost everything that utilises digital automation. They are, in effect, so immersed in the fabric of our society that they *are* that society. It may well be that humanity could continue without applied AI, as we managed for many millennia, but it is certain that we could not operate in the same way as we do today. Nor could we enjoy the many benefits of these systems that we take for granted. Scientific progression in these fields, and its 'trickle down' into the smallest parts of our lives, has fundamentally altered the human experience. This has been a great benefit to those fortunate enough to enjoy it- and it is a great argument in favour of having the freedom to do so. However the influence of these systems, this irreversible interweaving of science and society, leaves us at a crossroads. Further integration of weak AI into our lives, or the pursuit of 'strong'²⁷ or 'general'²⁸ AI (that can go beyond problem solving into human-level cognition) through the free practice of science, is likely to cause more direct changes to who and what we are. Our place in the hierarchy of beings, even our relative position as the pinnacle of moral status could be forever altered.
18. As the stewards of scientific progress, we are beholden to all parties- both to existing persons, and to the beings we may create through AI research. The risks and fears surrounding AI are purely our problems to solve, or to prevent from arising through careful design and the implementation of appropriate regulation and policy to govern their development. This work is presently beginning- already bodies within nations likely to drive the research and technologies in question are exploring the challenges and proposing their own means of addressing them. Reports such as the White House National Science and Technology Council Committee on Technology's *Preparing For The Future Of Artificial Intelligence*, the UK House of Commons' Science and Technology Committee *Report on Robotics and Artificial Intelligence*, and the European Parliament's *Draft Report With Recommendations To The Commission On Civil Law Rules On Robotics* all emerged at the end of 2016, though it should be said that none of these documents

²⁷ Kurzweil, R. *The Singularity is Near* New York: Viking Press 2005

²⁸ Newell A, Simon HA. Computer science as empirical inquiry: Symbols and search. *Communications of the ACM*. 1976. 19;3:113-26.

are definite regulatory roadmaps. They do however aim to provide a basis for controlling the integration of AI and our lives- to bridge the gap between science and society in a controlled manner. Whether the suggestions will be effective is yet to be seen, but the fact these documents exist is a promising start. What we must ensure, though, is that we consider reality- whether advanced technological development is permitted or tightly controlled, there will always be the chance that it is developed in secret and beyond regulatory reach. We would therefore suggest that the Government does play a role in regulating fundamental issues to ensure that AI is developed and operated both safely and ethically, whilst still allowing innovation in science.

19. We propose that this role primarily consists in the first instance of approaching the three key points outlined in this document, i.e. to agree legal definitions and standards by which to measure the moral status of an AI, to thus determine whether a given AI is eligible for legal personhood, and to determine and enforce responsibility of creators towards any new AI person and in the production of new AI. These will provide a logical and well-founded basis for future legislation able to cope with the advent of developed, conscious intelligences.

30 August 2017