# Dr. Demis Hassabis
# CEO of DeepMind Technologies



Sir Demis Hassabis is a British computer scientist, artificial intelligence researcher, and entrepreneur.

Demis is the co-founder and CEO of Google DeepMind. DeepMind, one of the world's leading AI research companies, was founded in London in 2010 and acquired by Google in 2014 in its largest European acquisition. Demis has continued to run the company as part of the Alphabet group with over 2000 research scientists and engineers.

DeepMind has produced numerous landmark AI breakthroughs in many challenging AI domains from Atari games to StarCraft II, and has published over 2000 research papers - including more than two dozen in *Nature* and *Science*.

In 2016 DeepMind famously developed *AlphaGo*, which learnt to play the complex game of Go through self-play to become the first program to beat the world champion. In 2020 this was followed up with *AlphaFold2* which solved the 50-year grand challenge of protein structure prediction by accurately predicting the 3D shape of proteins, critical for disease understanding and drug discovery. AlphaFold was used to produce the structure predictions for over 200 million proteins - nearly every protein known to science - which DeepMind made freely available through

the AlphaFold Protein Structure Database hosted by the European Bioinformatics Institute. *AlphaFold2* was recognised as the Breakthrough of the Year 2021 by *Science,* and the Method of the Year 2021 by Nature. Demis was instrumental in the research direction and leadership of all these projects.

Demis started his long career in AI in the games industry. A chess and programming child prodigy, aged 17 Demis co-designed and programmed the classic multi-million selling construction and management AI simulation game *Theme Park*. After graduating from Cambridge University with a Double First in Computer Science, he founded the pioneering games company Elixir Studios, producing several award-winning games for global publishers with cutting-edge AI at their core. He then returned to academia to do a PhD in Cognitive Neuroscience at University College London (UCL) investigating the mechanisms underpinning memory and imagination, followed by postdocs at MIT and Harvard, seeking inspiration from the brain for new algorithmic AI ideas, before starting DeepMind.

Demis has won many prestigious international awards for his research work including the Breakthrough Prize in Life Sciences, the Canada Gairdner Award, and the Lasker Award. Demis has been awarded Honorary Doctorates from Cambridge, Oxford, UCL, and Imperial. His work has been cited over 150,000 times and has featured in Science's top 10 Breakthroughs of the Year on four separate occasions. He is a Fellow of the Royal Society, and the Royal Academy of Engineering. He has been awarded honorary degrees by Cambridge, UCL, and Imperial. In 2017 Demis featured in the Time 100 list of most influential people, and in 2024 he was awarded a knighthood for services to Artificial Intelligence.

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h-index of 83 and over 130,000 citations as of Dec 2023 – a complete list of publications can be viewed on Google Scholar. Top 40 publications listed below, with #24 and #30 in the top 10 most cited papers of the past 5 years in any field (cited over 17,000 and 27,000 times respectively).

1. J Jumper, D Hassabis. Protein structure predictions to atomic accuracy with AlphaFold. *Nature Methods* (2022)
2. J Kirkpatrick, B McMorrow, DHP Turban, et al. Pushing the frontiers of density functionals by solving the fractional electron problem. *Science* (2021)
3. A Davies, P Veličković, L Buesing, et al. Advancing mathematics by guiding human intuition with AI. *Nature* (2021)
4. J Jumper, R Evans, A Pritzel, …, D Hassabis. Applying and improving AlphaFold at CASP14. *Proteins: Structure, Function, and Bioinformatics* (2021)
5. R Evans, M O'Neill, A Pritzel, …, D Hassabis. Protein complex prediction with AlphaFold-Multimer. *Biorxiv* (2021)
6. J Jumper, R Evans, A Pritzel, …, D Hassabis. Highly accurate protein structure prediction with AlphaFold. *Nature* 596, 583–589 (2021)

7. K Tunyasuvunakool, J Adler, Z Wu, … D Hassabis. Highly accurate protein structure prediction for the human proteome. *Nature* 596, 590–596 (2021)

8. J Schrittwieser, I Antonoglou, T Hubert, et al. Mastering atari, go, chess and shogi by planning with a learned model. *Nature* (2020)

9. AW Senior, R Evans, J Jumper, …, D Hassabis. Improved protein structure prediction using potentials from deep learning. *Nature* (2020)

10. W Dabney, Z Kurth-Nelson, N Uchida, et al. A distributional code for value in dopamine-based reinforcement learning. *Nature* (2020)

11. O Vinyals*, I Babuschkin*, WM Czarnecki, et al. "Grandmaster level in StarCraft II using multi-agent reinforcement learning". *Nature.* 575, 350–354 (2019)

12. N Tomašev, X Glorot, JW Rae, et al "A clinically applicable approach to continuous prediction of future acute kidney injury". *Nature*, 572, 116-119 (2019)

13. M Jaderberg, WM Czarnecki, I Dunning, et al. "Human-level performance in 3D multiplayer games with population-based reinforcement learning". *Science*, 364, 859-865 (2019)

14. M Botvinick, S Ritter, JX Wang, Z Kurth-Nelson, C Blundell, D Hassabis. "Reinforcement Learning, Fast and Slow". *Trends in cognitive sciences.* 23:408-422. (2019)

15. D Silver, T Hubert, J Schrittwieser, …, D Hassabis. "A general reinforcement learning algorithm that masters chess, shogi, and Go through self-play", *Science*, 362:1140-1144 (2018)

16. R Koster, MJ Chadwick, Y Chen, et al. "Big-loop recurrence within the hippocampal system supports integration of information across episodes" *Neuron* 99 (6), 1342-1354 (2018)

17. J De Fauw, JR Ledsam, B Romera-Paredes, et al. "Clinically applicable deep learning for diagnosis and referral in retinal disease", *Nature Medicine* 24 (9), 1342 (2018)

18. A Eslami, DJ Rezende, F Besse, …, D Hassabis "Neural scene representation and rendering", *Science* 360 (6394), 1204-1210 (2018)

19. JX Wang, Z Kurth-Nelson, D Kumaran, et al. "Prefrontal cortex as a meta-reinforcement learning system" *Nature Neuroscience* 21 (6), 860-868 (2018)

20. A Banino*, C Barry*, B Uria*, et al. "Vector-based navigation using grid-like representations in artificial agents" *Nature* 557 (7705), 429-433 (2018)

21. D Silver *, J Schrittwieser *, K Simonyan*, …, D Hassabis "Mastering the Game of Go without Human Knowledge". *Nature,* 550, 354-359 (2017)

22. D Hassabis, D Kumaran, C Summerfield, M Botvinick "Neuroscience-Inspired Artificial Intelligence". *Neuron.* 95(2):245-58. (2017)

23. J Kirkpatrick, R Pascanu, N Rabinowitz, et al. "Overcoming Catastrophic Forgetting in Neural Networks". *Proc Nat Acad Sci.* 114(13):3521-26. (2017)

24. D Silver*, A Huang*, CJ Maddison, …, D Hassabis "Mastering the Game of Go with Deep Neural Networks and Tree Search". *Nature.* 529(7587):484-89. (2016)

25. A Graves*, G Wayne*, M Reynolds, …, D Hassabis "Hybrid Computing Using a Neural Network with Dynamic External Memory". *Nature.* 538(7626):471-76. (2016)

26. D Kumaran, D Hassabis, JL McClelland "What Learning Systems do Intelligent Agents Need? Complementary Learning Systems Theory Updated". *Trends in cognitive sciences.*

20(7):512-34. (2016)

27. D Kumaran, A Banino, C Blundell, D Hassabis, P Dayan "Computations Underlying Social Hierarchy Learning: Distinct Neural Mechanisms for Updating and Representing Self-Relevant Information" *Neuron.* 92(5):1135-47. (2016)

28. MJ Chadwick, RS Anjum, D Kumaran, DL Schacter, HJ Spiers, D Hassabis "Semantic Representations in the Temporal Pole Predict False Memories". *Proc Natl Acad Sci.* 113(36):10180-85. (2016)

29. J Balaguer, H Spiers, D Hassabis, C Summerfield "Neural Mechanisms of Hierarchical Planning in a Virtual Subway Network". *Neuron.* 90(4):893-903. (2016)

30. V Mnih*, K Kavukcuoglu*, D Silver*, … , D Hassabis "Human-Level Control through Deep Reinforcement Learning". *Nature.* 518(7540):529-33. (2015)

31. D Hassabis*, N Spreng*, A Rusu, C Robbins, R Mar, D Schacter "Imagine All the People: How the Brain Creates and Uses Personality Models to Predict Behaviour". *Cerebral Cortex.* 24(8):1979-87. (2013)

32. D Schacter, D Addis, D Hassabis, V Martin, N Spreng, K Szpunar "The Future of Memory: Remembering, Imagining, and the Brain". *Neuron.* 76(4):677-694. (2012)

33. MJ Chadwick*, D Hassabis*, N Weiskopf, EA Maguire. "Decoding individual episodic memory traces in the human hippocampus". *Current Biology.* 20(6):544-7. (2010)

34. D Kumaran, JJ Summerfield, D Hassabis, EA Maguire. "Tracking the emergence of conceptual knowledge during human decision making". *Neuron.* 63(6):889-901. (2009)

35. D Hassabis, EA Maguire. "The construction system of the brain" *Phil. Trans. of the Royal Society B.* 364(1521):1263-71. (2009)

36. D Hassabis, C Chu, G Rees, N Weiskopf, PD Molyneux, EA Maguire. "Decoding neuronal ensembles in the human hippocampus". *Current Biology.* 19(7):546-54. (2009)

37. D Mobbs, P Petrovic, JL Marchant, D Hassabis, N Weiskopf, B Seymour, RJ Dolan, CD Frith. "When fear is near: threat imminence elicits prefrontal-periaqueductal gray shifts in humans". *Science.* 317(5841):1079-83. (2007)

38. D Hassabis, EA Maguire. "Deconstructing episodic memory with construction" *Trends in Cognitive Sciences.* 11(7):299-306. (2007)

39. D Hassabis, D Kumaran, EA Maguire. "Using imagination to understand the neural basis of episodic memory". *Journal of Neuroscience.* 27(52):14365-74. (2007)

40. D Hassabis, D Kumaran, SD Vann, EA Maguire. "Patients with hippocampal amnesia cannot imagine new experiences". *Proc Natl Acad Sci.* 104(5):1726-31. (2007)

* equal contribution