

tony prescott



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As AI continues to break new milestones, The Psychology of AI answers key questions about what it really means to be human and how AI will impact our lives in every way, now and into the future.

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THE PSYCHOLOGY OF ARTIFICIAL INTELLIGENCE

TONY PRESCOTT

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For my parents, John and Diana



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INTRODUCTION

Artificial Intelligence, or AI for short, is “the science and engineering of making intelligent machines, especially intelligent computer programs”.¹ This is according to John McCarthy, one of the founders of the field, who adds that AI is “related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable”.²

This book is about artificial intelligence and its relationship to the science of understanding human intelligence—psychology. This is a complex, multiway relationship. First, as McCarthy suggests, because psychology and AI have similar subject matters, both are concerned with intelligence. Psychology studies intelligence in its natural form, as seen in humans and animals. AI is concerned with the possibility of creating synthetic (human-made) intelligence in artefacts, particularly computers, but also artefacts that might more closely resemble animals, such as robots.

As we will explore, some psychologists, also known as cognitive scientists, use AI methods to create and test theories of human intelligence. Researchers in AI also look to borrow ideas from psychology and neuroscience—the scientific understanding of brains and nervous systems—to create new forms of AI. Although AI is not limited to copying natural intelligence, when it follows a different path, we sometimes call that *alien AI*. Due to this two-way sharing of ideas and

insights, AI and psychology have been intertwined since the earliest days of computers. Indeed, the idea of thinking machines is almost as old as Psychology itself, beginning with the early Greek thinkers.

There are further ways in which psychology is relevant to AI. One is that, as AIs come into the world, people will interact with them, and they will change society and how we live. Understanding how AI will impact humans and how people will relate to AIs, including physical ones such as robots, has led to new fields of research known as *human-machine interaction* and *user experience*.

Psychological methods are also being used to understand how people see AI, for example, our attitudes towards AI and our thoughts and fears about how AI might impact us in the future. Of course, AI is already here, so some of these impacts are already happening, but people are also thinking and are concerned about the longer term. For example, could AI become *superintelligent*, and if so, what would happen next? This idea, sometimes called the *AI singularity*, is hotly debated, both as to whether it might happen and whether the outcome (for humanity) would be good or bad, or even very, very bad, to the point where humans are replaced by AIs as imagined in some science fiction movies.

All of these aspects of the psychology–AI relationship will be explored in this short book.

Chapter 2 will look at the nature of intelligence so that we have a clear idea of what it could mean to create intelligent artefacts. We will look at different aspects of intelligence in people and consider whether intelligence is one thing or many.

Chapter 3 will look at the similarities and differences between brains and computers. After all, AI is predicated on the idea that computers are like brains in important ways, allowing both to be intelligent. We will explore the extent to which this is the case.

Chapter 4 will look at some of the building blocks of intelligent systems, both natural and artificial, from different kinds of reasoning and control, through processes such as search and optimisation. We will ask whether humans think differently from machines

and explore unsolved challenges, including the role of emotions in decision-making.

Chapter 5 investigates brain-inspired AIs called *neural networks* that are designed to be especially good at learning. We will explore how the latest *deep neural networks* are being developed to address some of the most challenging problems in AI, including the especially human capacity of language.

Chapter 6 considers *artificial general intelligence* (AGI), a form of AI that is as flexible and general-purpose as human intelligence. We will look at the current limitations of AI, compared to human intelligence, and whether AIs could better understand the world if provided with robotic bodies. We will also discuss how the development of the current class of predictive AIs is leading to new theories of human intelligence.

Finally, in Chapter 7, we will look at how people can live alongside AI, including our attitudes towards AI and our possible relationships with it. This chapter will also consider some of the ethical and societal risks, such as bias and error in AI algorithms, and the consequences for our long-term future as AIs surpass human intelligence in important ways.

A consideration throughout will be the question of how closely AIs can resemble humans. If they can think like we do, does this mean they could have some form of self-awareness? If so, where does that leave us? Are we the biological equivalent of very complex robots? We will pose these questions rather than provide a full answer here. However, this does illustrate that the relationship between psychology and AI gets close to the heart of what we are as thinking beings and points to the possibility of a deeper understanding of what it means to be human.

NOTES

- 1 Quote retrieved from <http://jmc.stanford.edu/artificial-intelligence/what-is-ai/index.html>.
- 2 Ibid.

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