Preface

The idea that we humans would one day share the Earth with a rival intelligence is as old as science fiction. That day is speeding towards us. Our rivals (or will they be our companions?) will not come from another galaxy, but out of our own strivings and imaginings. The bots are coming; chatbots, robots, gamebots.

Some of the early arrivers already build our cars, and soon may drive them for us. They reside in our mobile phones and try to answer our questions, and might one day arrange our diaries and help refill our fridges. We play games with them for fun. Ray Kurzweil [1] claims that we are merging with them and that we will together become a new, enhanced species.

Will we welcome them, when they come? Will bots have human friends? Will we grant them rights?

Future human-bot relations may depend on whether or not we see them as being like ourselves. And that is what the chapters of this book are about—what does it take for a bot to be *believable*—by which we mean, to seem like one of us? Can humanness be simulated? Can it be faked?

In the first chapter of this book, Weiss and Tscheligi present a series of case studies on humanoid robots, investigating the role of sociality in human-bot relations. In the following chapters, Bailey and her co-authors describe their psychosocial behaviour model and its implementation for computer game bots, showing how they can create bots that interact with a player in engaging ways. In *Actor Bots*, Arinbjarnar and Kudenko also consider computer game bots, viewing them as virtual actors in a virtual theatre, using belief networks to enable bots to behave believably within the game narrative. Morie et al. also focus on bots interacting with humans in virtual worlds which they call *embodied conversational agents*.

The next few chapters are about bots that masquerade as human players, in a competition for computer game bots which is modelled on the famous Turing Test. In 1950, Alan Turing [2] proposed a test in which a computer program converses with a reasonable person, and tries to convince that person that they are, in fact, conversing with a woman. Turing's assertion was that if a computer could play this game as well as a man could, then this would be evidence that the computer was intelligent. This test has been an enduring challenge and a controversy for

generations of computer scientists and philosophers. Since 1990, the test has been realised as an annual competition for chatbots—the Loebner Prize [3]. Taking inspiration from the Turing Test and the Loebner Prize, this book's editor organises and runs the annual BotPrize competition, a Turing Test for computer game bots [4]. In the BotPrize competition, humans play a computer game with an assortment of human and bot opponents, and try to tell which are human and which are not.

Entrants to the BotPrize have refined existing methods and developed new ones to try to win the prize. In Chap. 5, Schrum, Karpov and Miikkulainen describe the workings of their bot UT^2, which is based on *neuroevolution*, a powerful machine learning method combining the principles of Darwinian evolution with artificial brain models (neural networks). The next chapter by Karpov, Schrum and Miikkulainen explains how their bot imitates human players to solve complex navigation problems in the game. In A *Machine Consciousness Approach to the Design of Human-like Bots*, Arrabales et al. introduce their CERA-CRANIUM cognitive architecture, inspired by cognitive theories of consciousness. CERA-CRANIUM was at the heart of the bot they used to win the award for the most human-like bot at the 2010 BotPrize competition. The following chapter by Arrabales, Ledezma and Sanchis uses their *ConsScale* framework to measure and analyse the cognitive levels of a number of state-of-the-art computer game bots.

The BotPrize chapters are about bots that play a First-Person Shooter—a genre in which "interaction" between players (human or bot) takes the form of virtual combat. The final few chapters look at bots in games with different interaction modes. Jacek Mańdziuk and Przemysław Szałaj consider Realtime Strategy games, and propose a distinct personality system to operate alongside traditional reasoning and tactics. Togelius et al. in their chapter, take a step back to ask how best to judge how believable a bot is. For example, is the judgement better made by an external observer or by an active participant interacting with the bot? This question is examined using a Turing Test based on bots for Super Mario Bros., a well-loved and venerable platform game. Kemmerling et al. tackle Diplomacy, a game in which planning and negotiation are key skills. Finally, Muñoz, Gutierrez and Sanchis apply imitation learning to create a human-like bot for a car racing game.

We hope the stories in this book will start the reader thinking … Must robots and other bots be like us to be accepted as a part of our cultures and lives? Or would it be better if they were obviously and unmistakably different from us? If we want them to be like us, is it enough that they are believable—that they seem like us—or must they really *be* like us in their inner hearts, possessing consciousness, emotions, intellect, craving social interaction and meaning? What kinds of technologies would it take to implement these things in a computer program, and how could we tell whether we had implemented the real thing, or merely a facsimile of it? This book does not provide the answers—but perhaps it is a place to start.

Perth, Western Australia, March 2012 Philip Hingston

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