Chapter 62
Can Cognitive Biases in Robots Make More 'Likeable' Human–Robot Interactions Than the Robots Without Such Biases:
Case Studies Using Five Biases on Humanoid Robot

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ABSTRACT

The research presented in the paper aims to develop long-term companionship between cognitively imperfect robots and humans. In order to develop cognitively imperfect robot, the research suggests to implement various cognitive biases in a robot's interactive behaviours. In the authors' understanding, such cognitively biased behaviours in robot will help the participants to relate with it easily. In the current paper, they show comparative results of the experiments using five biased and one non-biased algorithms in a 3D printed humanoid robot MARC. The results from the experiments show that the participants initially liked the robot with biased and imperfect behaviours than the same robots without any mistakes and biases.

INTRODUCTION

The study presented in this paper seeks to better understand human-robot interaction and with selected 'cognitive biases' to provide a more human-preferred interaction. Existing robot interactions are mainly based on a set of well-ordered and structured rules, which can repeat regardless of the person or social

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situation. This can lead to interactions which might make it difficult for humans to empathize with the robot after a number of interactions. The research presented in this paper tests five cognitive biases, such as, misattribution, empathy gap, Dunning-Kruger effects, self-serving and humors effects on a life-size humanoid robot, see Figure 1, and compare the results with non-biased interactions to find out participant's preferences to the interactions.

According to Breazeal (2001), a social robot should be socially intelligent and should have sufficient social knowledge. To develop social intelligence in social robots, researchers study various methods to allow a robot to adapt to human-like behaviour based social roles. Some of these more popular methods suggest developing human-like attributes in robots, such as, trait based personality attributes, gesture and emotions expressions, anthropomorphism. Dautenhahn (2009) investigated the identifying links between human personality and attributed robot personality where the team investigated human and robot personality traits as part of a human-robot interaction trial. Lee (2006) showed that developing cognitive personality and trait attributes in robots can make it more acceptable to humans, also expressing emotions and mood changing in interactions can help to make the attachment bond stronger between user and the robot. Meerbeek et al (2009) designed interactive personality process in robots which was based on Duffy's anthropomorphism idea. Duffy (2003) suggested that anthropomorphic or lifelike features should be carefully designed and should be aimed at making the interaction with the robot more intuitive, pleasant and easy. Reeves and Nass (1996) argued that users usually show biased driven certain personality traits to machines (PC & others). Later in 2008, Walters et al investigated people's perceptions based on robot appearances and associated attention-seeking features in video-based Human Robot Interaction trials. In the recent years, Moshkina et al (2011) in Samsung Research Lab has developed a cognitive model which includes traits based personality, attitudes, mood and emotions in robot (TAME) to get humanlike responses.

The above studies discuss various approaches to making a robot more human-like so that it would be easy for people to interact with the robots. However, researchers argue that it is challenging for a robotic system to become relevant and highly individualized to the special needs of each user in the particular beneficiary population (Tapus A, 2007). However, to develop the robot more personal and make their responses much humanlike we propose to develop humanlike different cognitive biases in robots. As such, we investigate this different and unique approach, which is by applying selected cognitive bias to provide a more humanlike interaction. Scientists suggested that cognitive biases have reasonable amount of influence in human's characteristics and behaviours (A Wilke, 2012). Haselton (2005) suggested that people behaves uniquely which is largely influenced by individual's thinking, genetics, social norms, culture and needs. Kahneman (1972) suggested that human thinking is affected by a variety range of biases which influence humans in making various decisions and judgements which sometime can be fallible (making mistakes, forgetfulness, misunderstanding, arrogance, over excitement, idiotic behaviours and others). Such behaviours are common in people and we observe and experience such behaviours in daily life. In our understanding, the differences in cognitive thinking which are influenced by various biases affect to make the individual's interactions unique, natural and humanlike. But in developing humanlike robots, we sometimes ignore such facts and make the robot without such humanlike behaviours. These cognitive biased behaviours (e.g. forgetfulness, making mistakes etc.) have not been tested in robots and long-term human-robot interactions yet. In our research, we develop few of the cognitive biases in the humanoid robot MARC and find out the effects of biases in human-robot interactions.

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