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Lionel P. Robert Jr.
Associate Professor
School of Information
Robotics Institute
University of Michigan
Ann Arbor, MI 48109-1285
USA

Rasha Alahmad
School of Information
University of Michigan
Ann Arbor, MI 48109-1285
USA

Connor Esterwood
School of Information
University of Michigan
Ann Arbor, MI 48109-1285
USA

Sangmi Kim
School of Information
University of Michigan
Ann Arbor, MI 48109-1285
USA

Sangseok You
Assistant Professor
HEC Paris
1 Rue de la Liberation
Jouy-en-Josas, France

Qiaoning Zhang
School of Information
University of Michigan
Ann Arbor, MI 48109-1285
USA

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Lionel P. Robert Jr.[1], Rasha Alahmad[2], Connor Esterwood[3], Sangmi Kim[4], Sangseok You[5] and Qiaoning Zhang[6]

[1]*School of Information, Robotics Institute, University of Michigan, MI, USA; lprobert@umich.edu*
[2]*School of Information, University of Michigan, MI, USA; rashama@umich.edu*
[3]*School of Information, University of Michigan, MI, USA; cte@umich.edu*
[4]*School of Information, University of Michigan, MI, USA; sangmik@umich.edu*
[5]*HEC Paris, Jouy-en-Josas, France; you@hec.fr*
[6]*School of Information, University of Michigan, MI, USA; qiaoning@umich.edu*

ABSTRACT

Personality has been identified as a vital factor in understanding the quality of human–robot interactions. Despite this the research in this area remains fragmented and lacks a coherent framework. This makes it difficult to understand what we know and identify what we do not. As a result, our knowledge of personality in human–robot interactions has not kept pace with the deployment of robots in organizations or in our broader society. To address this shortcoming, this paper reviews 83 articles and 84 separate studies to assess the current state of human–robot personality research. This review: (1) highlights major thematic research areas,

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(2) identifies gaps in the literature, (3) derives and presents major conclusions from the literature and (4) offers guidance for future research.

1

Introduction

Robots – technologies that can sense, reason and respond to their environments through embodied actions – are being used in new domains to both replace and complement humans (You and Robert, 2018; You *et al.*, 2018). This means robots are interacting with an organization's employees and in some cases directly interacting with their customers. The need for robots to directly interact with humans has led many researchers to identify factors that promote human–robot interaction. Personality has been identified as a vital factor in understanding the nature and quality of human–robot interactions (Gockley and Matarić, 2006; Goetz and Kiesler, 2002; Robert, 2018; Syrdal *et al.*, 2007a). What is personality? Personality comprises someone's past behaviors, cognitions and emotions derived from both biological and social factors (Hall and Lindzey, 1957). Why would scholars turn to personality to understand human–robot interaction? To answer these questions, this volume turns to the organizational behavior and social psychology literature on personality. However, given the paper's focus on personality as it relates to human–robot interaction, the discussion will be brief.

Theories of personality assert that individual human traits can be used to predict human emotions, cognitions and behaviors

(Peeters *et al.*, 2006). "Personality traits" is a label to describe a specific set of characteristics that are believed to be the best predictors of an individual's behavior (Tasa *et al.*, 2011). Personality is now considered a core construct in understanding human behavior over and above many other factors (Li *et al.*, 2014). More important, personality explains the way people respond to others in social settings (Thoresen *et al.*, 2003). This is why personality influences the quality of interactions between individuals (Driskell *et al.*, 2006; Peeters *et al.*, 2006). The literature on personality is rich in theory and spans disciplines such as sociology, psychology, and political science as well as organizational behavior.

Although there are many types of personality traits, the Big Five are held in particularly high regard. The Big Five personality traits are the most widely used personality traits (Li *et al.*, 2014). The acronym OCEAN, representing openness to experience, conscientiousness, extraversion, agreeableness and neuroticism, is often used to represent the five personality traits. Openness to experience represents the degree to which someone is imaginative, curious, and broadminded (McCrae and Costa, 1997). Conscientiousness reflects the extent that someone is careful, deliberative and self-aware of their actions (Tasa *et al.*, 2011). Extraversion is the extent to which an individual is assertive, outgoing, talkative, and sociable (Rhee *et al.*, 2013). Introversion is the degree to which someone enjoys being alone and is the opposite of extraversion (Driskell *et al.*, 2006). Agreeableness reflects the extent to which someone is cooperative and friendly (Peeters *et al.*, 2006). Neuroticism can be viewed as the degree to which someone is easily angered, not well-adjusted, insecure, and lacks self-confidence (Driskell *et al.*, 2006). Neuroticism is often viewed as the opposite of emotional stability, which is the degree to which someone is calm, well-adjusted, secure, and self-confident (Peeters *et al.*, 2006). The Big Five are not only the most popular set of personality traits in social sciences, but, as we demonstrate here, they are also the most popular traits used in the study of human–robot interaction (Robert, 2018).

Despite the importance of personality in the HRI literature, the research remains fragmented and lacks a coherent framework. This makes it difficult to understand what we know and identify what we do not. As a result, our knowledge of personality in human–robot interactions

has not kept pace with the deployment of robots in organizations or in our broader society. As robots become increasingly vital to our society, there is a need to better comprehend factors such as personality that facilitate better human–robot interaction (HRI).

To address this shortcoming, this paper reviews the literature on personality and embodied physical action (EPA) robots. We focused on EPA robots because their physical embodiment invokes strong emotional reactions that can lead individuals to project personalities onto them (Robert, 2018; You and Robert, 2018). Therefore, issues related to personality are likely to be more central to human–robot interaction with regard to EPA robots. This paper investigates the current state of human–robot personality research, discusses the unique role of personality in human–robot research, and offers guidance for future research.

This review offers several contributions to the literature. First, it presents a conceptual integrated model of the literature on personality in human–robot literature. In doing so, this paper helps to organize the literature on personality in human–robot literature. Two, it highlights four thrust areas in the literature. These thrust areas include: (1) Human Personality and HRI, (2) Robot Personality and HRI, (3) Robot Personality and HRI, and (4) Factors Impacting Robot Personality. Three, it derives and presents major insights from the literature. Finally, it identifies gaps in the literature that need to be addressed.

The paper is organized as follows. Next, in Section 2, we present the relevant literature including the inclusion and exclusion criteria for articles. This includes a brief discussion of the publication venues, personality measures, and outcome measures in the literature. Then, in Section 3 we present and discuss Thrust Area 1: Human Personality and HRI. In Sections 4, 5, and 6, a similar discussion takes place for Thrust Area 2: Robot Personality and HRI, Thrust Area 3: Robot Personality and HRI, and Thrust Area 4: Factors Impacting Robot Personality, respectively. Section 7 follows with a discussion on the way forward, focusing on the opportunities for personality research in human–robot interaction.

In summary, robots are being used to both replace and complement humans across many settings. Personality has been identified as a vital factor in the promotion of human–robot interaction. Unfortunately,

the HRI personality literature lacks a coherent framework, making it difficult to comprehend how personality can facilitate better human–robot interaction (HRI). To address this problem, we review the current state of human–robot personality research in hopes of providing guidance for future research.

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