Creating an anthropomorphism questionnaire – A multidimensional approach

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Abstract

Human-Computer and Human-Robotic Interaction have become part of our everyday life. We communicate and interact with virtual agents, smart assistants and intelligent robots on a day to day basis. Therefore, research on how we interact with and react to these technologies becomes more and more important. One of the main underlying processes in this interaction is the tendency to attribute human characteristics or behaviour to non-human entities, which is often referred to as anthropomorphism (Epley, 2007). This mechanism enables us to view technological entities as social actors whom we can interact with. To understand this process, different questionnaires were developed (e.g. Banks, 2019; Ho & MacDorman, 2017). While most of these questionnaires have been evaluated and validated, there is a lack of pivotal aspects in these instruments. First and foremost, these questionnaires mostly treat anthropomorphism as a one-dimensional construct focussing mainly on appearance (e.g. Li et al., 2010). Current research, however, suggests a multidimensional approach, including factors like perceived emotional capabilities and dehumanization (Stein et al., 2019). Another problem lies in the conceptual structure of these instruments. The selected items within these questionnaires are often ambiguous (Moore, 2012). In addition, the dichotomous arrangement of the items appears to be arbitrary and not necessarily conceptualized as natural opposites which can lead to reliability problems (Stein et al., 2019).

The following study aims to tackle these shortcomings. Instead of the usual pscholexical approach, we followed a different, more theoretical path. Based on the most common scientific definition of anthropomorphism from Epley and colleagues (2007) and an extensive review of previous researches, we formulated a multidimensional model of anthropomorphism. Besides appearance this model includes additional visual factors like movement and gestures as well as higher human abilities such as perceived higher cognitions (e. g. goal-oriented behaviour) and emotional capabilities (e. g. emotion recognition). This model also takes dehumanization processes into account, which occur in settings in which a person's perception of a non-human entity´s

humanness creates ontological ambiguity or a feeling of threat, ultimately resulting in the uncanny valley phenomenon.

In a next step, we extracted unambiguous items from existing questionnaires and reassigned them to the different factors of the proposed model. After enriching the underrepresented factors with newly created items, we conducted a traditional forward and backward translation (english – german). We then gathered data via an online experiment to evaluate and validate the english as well as the german version of the newly constructed questionnaire. We finally performed a confirmatory factor analysis (CFA) to see whether the theoretically postulated dimensions could actually be mapped with the used item structure.

Keywords: questionnaire, human-computer-interaction, anthropomorphism, human-robotic interaction, dehumanization, method

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