Tell Me Your Story, Robot.

Introducing an Android as Fiction Character Leads to Higher Perceived Usefulness and Adoption Intention

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Abstract—In a field experiment with N = 75 participants, the android telecommunication robot Telenoid was introduced in three different ways: participants either read a short story presenting the Telenoid as character, a non-narrative information leaflet about it, or they received no preliminary introduction at all before interacting with the robot. Perceived usefulness and behavioral intentions to adopt the robot were significantly higher in the story condition than in both other conditions. In line with the Technology Acceptance Model, reported usefulness additionally served as a mediator between treatment and adoption intention. This study is the first to apply findings from Narrative Persuasion to HRI and can prompt further discussion about stories as means to increase user acceptance of new robotic agents.

Index Terms—Human-robot interaction, social robotics, android, introduction, story, narrative, technology acceptance, experiment.

I. INTRODUCTION

As the relevance of service robots in our social environments is growing rapidly, the exploration of factors influencing the user acceptance of new robotic agents is also becoming more important. In addition to characteristics of the robot itself (e.g., visual appearance, movements, adaptability) and individual differences of human interaction partners (e.g., age, needs, attitudes) [2], contextual information about the robot, such as how it is initially presented to its potential users, may determine people's reactions too. The present experiment focuses on how to best introduce a robot by comparing effects of either narrative or non-narrative types of textual introductions on readers' perception of usefulness and intention to use the robot themselves.

Previous research has shown that the perceived usefulness of a new robotic service is one of the main facilitators to successful adoption [3]. In line with the original Technology Acceptance Model (TAM) by Davis [4] as well as expanded versions of it, e.g. the Unified Theory of Acceptance and Use of Technology (UTAUT) [11], empirical investigations in this field are mostly based on the assumption that a higher perceived level of usefulness, defined as the degree to which a person believes that using the presented system would enhance his or her performance [4], induces a stronger behavioral intention to adopt the particular technology in real life.

Studies from Media Psychology furthermore show that a narrative, basically defined as a communicated representation of a series of events, can serve as effective means to influence people's attitudes and behavioral intentions [5, 6, 9]. A story's persuasive impact may even increase over time [1]. The power of narratives has been attributed to the activation of attention, imagery, engagement, and identification processes when readers are being transported into the world of the story [5, 7]. A reduction of cognitive-elaborative processes such as counter-arguing is reported to come along with this immersive state [7].

To date, no study has yet explored storytelling approaches within the field of Technology Acceptance and HRI. Addressing this research gap in a field experiment, we hypothesized usefulness ratings and adoption intentions after interacting with a robot to be highest when the robot initially was introduced as a character in a short story, lower when introduced through a non-narrative information leaflet, and lowest when participants received no pre-information at all.

II. METHOD

75 visitors (42 female) of the Austrian Ars Electronica Center took part in the experiment, ranging in age from 17 to 68 years ($M = 31.12$, $SD = 11.52$). None had ever before been in contact with the involved robot Telenoid, a puppet-sized, tele-operated communication android that was developed by Osaka University and ATR Hiroshi Ishiguro Lab in 2009. At the museum's entrance hall, participants were randomly assigned to one of three conditions: either they were handed out a narrative short story about the robot, a non-narrative information leaflet about it, or they received no introduction at all. After silently reading their texts or being assigned to the control group, participants were taken to an exhibition hall where Telenoid was installed. Participants sat down on a sofa and held the talking robot on their lap. The Telenoid was operated by a museum employee, blind to the experimental conditions and trained to ask each test person a series of pre-defined questions (e.g., "What type of transport did you use to come here?").

After five minutes of interaction, participants completed a questionnaire on their interaction experience and perception of the robot. To measure *usefulness of the robot*, we used six items on 7-point scales (e.g., Telenoid "makes everyday life easier;" "has use for society;" "is practical") that formed a reliable index

(α = .86). To assess *intended adoption of the robot*, participants responded to five items on 7-point scales how likely they would acquire and use the Telenoid in their homes (e.g., I can well imagine "to purchase a Telenoid for my household;" "to use such a technology for myself;" α = .90).

For the validity of the experiment, it was crucial to manipulate the stimulus texts in a structured way, meaning that they should differ only in terms of their narrative form and apart from this allow for comparability. Both texts were one page long and communicated pre-defined aspects of Telenoid's appearance (e.g., puppet-sized, human-like looks), functionality (e.g., transmits an operator's voice and mimics in real-time), and purpose (e.g., helps the elderly to stay in contact with family members). Whereas the non-narrative text was an adaption of the Telenoid leaflet given to ordinary museum visitors, the narrative was presented in form of a science fiction story with Telenoid supporting a talk between two persons on earth.

III. RESULTS

Main effects of the experimental manipulation were tested with an omnibus ANOVA, mediation was tested through a Bootstrap analysis of indirect effects [10]. Groupwise comparisons were Bonferroni-corrected.

As assumed, participants who preliminary read the short story ascribed higher *usefulness* to the robot after interacting with it ($M = 5.24$, $SD = 0.98$) than individuals who read the non-narrative introduction leaflet ($M = 4.50$, $SD = 1.23$) or no text at all ($M = 3.92$, $SD = 1.18$), $F(2,69) = 8.03$, $p = .001$, $\eta_p^2 = .19$. The different introduction types also had a significant influence on participants' *intended adoption of the robot*. Individuals in the story condition showed greater willingness to acquire and use the robot themselves ($M = 3.95$, $SD = 1.55$) than individuals in the leaflet condition ($M = 2.74$, $SD = 1.53$) or the no-text condition ($M = 2.94$, $SD = 1.37$), $F(2, 69) = 4.44$, $p = .015$, $\eta_p^2 = .11$. Other variables not reported here include human-likeness and eeriness [see 8], all resulting in a similar pattern.

Furthermore, the effect of the story manipulation on the behavioral adoption intentions was fully mediated by the reported usefulness perceptions (Fig.1). A bootstrap analysis demonstrated that the 95% confidence interval for the indirect effect using 5,000 samples did not include zero (lower limit = 0.0728, upper limit = 1.4799).
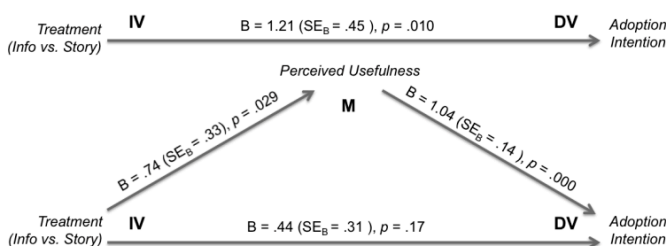

Fig. 1. Perceived usefulness mediated the effect between the experimental treatment (information leaflet = 0, story = 1) and the wish to adopt the robot.

IV. DISCUSSION

In line with the Technology Acceptance Model [4, 11], the present experiment shows that introducing an android robot through a narrative text can induce higher perceived usefulness of the robot and in turn lead to stronger adoption intentions. A non-narrative introduction text had no such effect. This research is the first to explore a narrative communication approach for the purpose of introducing a new robotic agent to its potential users. Our findings suggest that, aside from characteristics of the robot itself and individual traits of the users, presentation and information contexts, too, may impact persons' reactions towards a robot.

Limitations of this study, which need to be overcome in future work, include the lack of objective measures for the dependent variables and the lack of exploration concerning underlying processes and long-term effects. Moreover, as only one specific type of robot was used in the present field experiment, analyses could be repeated with several other robotic agents to allow for more generalizable results.

However, we believe that our findings make an interesting starting point for further discussion and in-depth evaluation of narrative communication strategies in HRI, imparting a high level of relevance for applied contexts.

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