

Investigating Social Presence among Human and Robot News Anchors

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Abstract – Robots increasingly appear in various roles in news broadcasting. To better understand this phenomenon, the present research examined the nature of the news anchor (human vs. robot) and social presence in radio listening experiences. Primary findings indicate that the robot news anchor has stronger effects on listening experiences than the human news anchor. Also, social presence is found to link the relationship between the nature of the news anchor and radio listening experiences.

Keywords - social presence; robot news anchor; robotic voice

I. INTRODUCTION

Recent advancements in technology have blended the boundaries between humans and machines. One of the notable phenomena is the use of robots in news broadcasting. Radio and news stations across the world have adapted to using robots or Artificial Intelligence (AI) to present news [1]. In particular, Xinhau News Agency, a Chinese news station, debuted its first robot news anchor. This robot news anchor has the ability to work 24 hours a day and can communicate in both English and Chinese [2]. By working around the clock, the news anchor can save the news station human resources and ensure tasks are completed efficiently and effectively.

Robots are often designed with various levels of humanness in their voice. While the power of a human voice over a machine voice has been corroborated in previous work [3], the relationship between a human voice and a machine voice in the context of human-robot interaction (HRI) might be more complicated.

According to the Computers are Social Actors (CASA) paradigm [4], humans tend to apply interpersonal communication rules when communicating with machines (e.g., computers, robots). The paradigm implies that humans would treat machines as if they were real people. Based on the paradigm, a great deal of research has been conducted within HRI [5, 6]. However, given their increased representation, the role of robots as a news anchor requires further investigation.

In the understanding of HRI, social presence is an important factor to examine. Social presence is defined as “a psychological state in which virtual (para-authentic or artificial) social actors are experienced as actual actors in either

sensory or non-sensory ways” [7, p. 44]. That is, when interacting with robots, people may perceive them as actual social beings and feel a sense of togetherness although they know they are interacting with nonhuman beings.

Social presence plays a potent role in HRI, particularly as a mediator. More specifically, social presence has been found to function as a “bridge” that leads to favorable HRI experiences [8]. Based on both theoretical and empirical research, the present study raises the following research questions.

RQ1: Is there a direct effect of the nature of the news anchor (human vs. robot) on radio listening experiences?

RQ2: To what extent does social presence matter compared to the nature of the news anchor (human vs. robot) in radio listening experiences?

RQ3: How does social presence mediate the relationship between the nature of the news anchor and radio listening experiences?

II. METHODOLOGY

A. Participants

A total of 146 undergraduate students at a large public university in the United States participated in an online experiment. The average age was 20.21 years ($SD = 2.06$) with more females ($n = 92$, 63%) than males ($n = 54$, 37%). The sample consisted of Caucasian ($n = 75$, 51.4%), Hispanic/Latino ($n = 42$, 28.8%), and other ethnic groups ($n = 29$, 19.9%). All of the participants were randomly assigned to one of the two conditions: a human news anchor condition ($n = 74$) or a robot news anchor condition ($n = 72$).

B. Materials and Procedures

A 70-second radio weather report about tornado warnings and preparation was created for this experiment. In the human condition, the news story was recorded by a female anchor. In the robot condition, it was recorded by a female robotic voice through a computer program. All other features were the same in both conditions. This radio segment was inserted to a webpage where participants can listen to the segment over their computer.

Following the IRB approval, interested individuals completed the consent form and participated in the study. At the beginning, participants were told that they would listen to a radio segment recorded by a human radio news anchor or a robot radio news anchor. After listening to the segment, participants completed questions regarding their experiences.

C. Measures

The present study focused on three radio listening experiences: enjoyment, information seeking intention, and behavioral intention. *Enjoyment* ($\alpha = .94$) was measured with five items [9] (e.g., “enjoyable,” “fun”). *Information seeking intention* ($\alpha = .92$) assessed participants’ interest in obtaining further information about the topic they listened to. It was measured with five items (e.g., “How many tornadoes occur in my local area each year,” “Information I can share with family members”). *Behavioral intention* ($\alpha = .92$) assessed intention to take an action. It was measured with five items (e.g., “Download a tornado warning app for my phone,” “Follow the National Weather service”). *Social presence* ($\alpha = .95$) was measured with four items [8] (e.g., “I felt like the news anchor was with me,” “...the news anchor was interacting with me in the same space”). Responses were obtained on a 7-point Likert-type scale (e.g., 1=Strongly Disagree, 7=Strongly Agree).

III. RESULTS

Analyses were conducted using PROCESS (model 4) [10]. This method uses a bootstrapping approach and produces both direct and indirect effects of an independent variable, as well as a regression result. The procedure was based on 5000 bootstrap samples, and the results were interpreted based on 95% Confidence Interval (CI). Before conducting the analyses, the nature of the news anchor was dummy coded (0=robot, 1=human).

Regarding RQ1, the results did not find any significant direct effect on enjoyment (Direct effect = .30; $SE = 0.19$; $CI = [-0.07, 0.67]$, $p = .12$). However, a robot news anchor had significantly stronger effects than a human news anchor on both information seeking intention (Direct effect = -.54; $SE = 0.24$; $CI = [-1.01, -0.07]$, $p = .025$) and behavioral intention (Direct effect = -.66; $SE = 0.26$; $CI = [-1.17, -0.14]$, $p = .01$).

As to RQ2, the relative strength, while controlling for other variables, was examined in the regression result from the PROCESS output. Regarding enjoyment, the nature of the news anchor ($B = .30$, $t = 1.580$, $p = .12$) was not a significant predictor, while social presence ($B = .57$, $t = 9.99$, $p < .001$) was a significant predictor. As to information seeking intention, both the nature of the news anchor ($B = -.54$, $t = -2.27$, $p = .025$) and social presence ($B = .31$, $t = 4.33$, $p < .001$) were significant predictors. Regarding behavioral intention, both the nature of the news anchor ($B = -.66$, $t = -2.52$, $p = .01$) and social presence ($B = .46$, $t = 5.85$, $p < .001$) were significant.

Regarding RQ3, Results found significant indirect effects on all three variables. For enjoyment, the effect score was 0.65 (Boot $SE = 0.16$; $CI = [0.34, 0.97]$). For information seeking intention, the effect score was 0.35 (Boot $SE = 0.10$; $CI =$

[0.17, 0.58]). For behavioral intention, the effect score was 0.52 (Boot $SE = 0.15$; $CI = [0.26, 0.84]$). That is, social presence links the relationship between the nature of the news anchor and radio listening experiences.

IV. CONCLUSION

The purpose of this study was to examine people’s responses toward a human news anchor vs. a robot news anchor and to explore the role of social presence in radio listening experiences. Overall, the study revealed meaningful findings. First, a robot news anchor had a stronger effect than a human news anchor on information seeking intention and behavioral intention. This finding implies that, if news programs hope to educate people and encourage behavioral changes rather than to entertain, the programs could potentially use robots to present news. Second, the study found a crucial role of social presence in HRI. Specifically, the effect of social presence was significant on enjoyment while the nature of the news anchor was not. This finding implies that robot industries, as well as media industries, should find a way to foster social presence if they hope to facilitate media enjoyment. Third, the nature of the news anchor has an indirect effect on radio listening experiences through social presence. This implies that social presence is a crucial factor to consider in developing favorable HRI. In sum, the present study suggests optimistic use of a robot news anchor in the media and the importance of social presence in HRI.

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