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The influence of conversational agents' role and behaviors on narrative experiences

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Conversational agents (CAs) in narrative experiences are defined by the role they endorse and the communication style they adopt when users interact with them. In computer games, users' perception of intelligence and believability ascription influence the positive evaluation of CAs. Yet, the impact of CAs' role and communication style on users' experience remains to be clarified. In this research, the effect of the role and communication style of CAs on users' evaluation is investigated in a crime-solving textual game. Different CAs were created whose roles in the narrative (witness or suspect) and communication style (aggressive or cooperative) were manipulated. A Wizard of Oz method was used to control communication style while users' experience was assessed regarding their interaction with each CA using scales of perceived intelligence and believability. They also had to indicate a culprit and rate the certainty of their judgments. The results show that both CAs' role and communication style have an influence on users' perception of intelligence and believability, with a higher effect of the role. However, only communication style had a significant influence for the choice of the culprit.

Additional Keywords and Phrases: Conversational agents, verbal interactions, human behaviors, human-machine interaction, believability

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1 INTRODUCTION

Conversational agents (CAs) in interactive experiences drive the narrative through their interactions with users. To create such agents, designers manipulate parameters that aim to influence users' perception, and thus their experience of the narrative. For instance, explicit roles of CAs in the narrative can be communicated, which enable users to adapt their conversational strategy toward the agent. Moreover, CAs' communication style plays a significant part of the interaction since it conveys the narrative through their content generation. In addition, studies on human-agent interactions have shown the importance of considering users' perception of intelligence and believability ascription to create more engaging agents [1, 2]. The aim of this study is to provide a better understanding of the effect of CAs' role and communication styles on users' experience. To study their effect, an experimental textual game was created in which users endorse the role of a detective investigating a case. To succeed, users had to interact with four distinct CAs whose role and communication styles were manipulated, then they had to name a culprit. To assess their effect, measures of perceived intelligence and believability attributions were gathered.

2 METHODS AND MATERIALS

2.1 Participants, general method, and procedure

Thirty-two French Ubisoft employees (19 men and 13 women, mean age = 29 years old, SD = 7.3) completed the experiment. The experiment focused on the effect of CAs' role and communication style on users' experience. To do so, a French computer textual game was created. In the game, participants endorse the role of a detective and discuss with distinct CAs to solve a criminal case. Participants' task was to name a culprit among four CAs. These CAs were defined by their identity, personality traits and knowledge about the crime. Prior to the discussion, participants were informed about the explicit role of each CA in the narrative. The linguistic cues and conversational strategy were manipulated in the CAs' answers to express either aggressive or cooperative communication. A Wizard of Oz (WoZ) method has been used to select the CAs' answers from a predefined list of sentences. The participants interacted with all four CAs, whose roles and communication styles were pseudo-randomized, in a way to allow each participant to experience all the experimental conditions. Each discussion lasted ten minutes. Users' experience was studied through the participants' rating of the items of perceived intelligence [1] and believability [2] scales at the end of each discussion. In addition, participants indicated their perception of warmth and cooperation/aggressivity.

2.2 Materials

The scenario of the game is about a police investigation. Participants play a detective and must interact with the CAs to solve the crime case. Participants were first introduced to the scenario and the explicit roles of CAs and their identity before their interactions with any of them (e.g., 'Witness: Enzo, 32 years old, a tormented bartender who loads up the drinks to disinhibit the customers.'). The CAs' roles in the scenario are closely tied to their context (i.e., a witness or a suspect). For instance, in a crime-solving game, witnesses can be expected to act as cooperative agents who assist participants in solving the crime through their communication, while suspects can be expected to be more hostile and convey their motivation in the game (i.e., indicating whether they are guilty or not). CAs' communication styles were manipulated to convey aggressive or cooperative intentions. To do so, hostility and agreeableness markers based on communication theory [4, 7, 8, 9] have been implemented in the content communication to affect participants' evaluation of aggressivity and cooperation. On the one hand, CAs in their aggressive form had less verbosity, used personal attacks, and had negative content polarization. Moreover, they aggressed rather than answered participants' enquiries (e.g., 'Do you even know what you are talking about?'). On the other hand, CAs in their cooperative form had more verbosity and answered pedagogically to the detective's questions. CAs with a cooperative communication style requested confirmation for the relevance of their answers (e.g., 'I hope my answers will help you solve this affair.'). and used consilience markers (e.g., 'sir' or 'detective'). To control the form of CAs' communication style, a Wizard of Oz (WoZ) method was used. Precisely, the WoZ used a working sheet for each identity composed of the detective's potential questions and the content's communication for aggressive and cooperative answers. The potential questions asked by participants were listed based on the intention associated and involved specific situations such as 'Initial contact', 'Backstory information' and 'Accusation'. If participants asked follow-up questions about a specific topic, the WoZ either rephrased their answer in the cooperative form condition or made the answer more aggressive (i.e., the Wizard of Oz answers the question and adds impatience markers such as 'as I already said', 'Your questions are annoying').

3 RESULTS

In the experiment, participants rated their experience with four CAs' and named a culprit. The roles, communication styles, and order of presentation were pseudo-randomized between participants. A three-way ANOVA was conducted on participants' ratings of the items of perceived intelligence, believability scales and the two additional questions about agents' perceived aggressivity and warmth. As the scales involve multiple items, only the significant ones will be reported here. The factor role had a significant effect on the item 'Visual impact' of the believability scale (i.e., '< X >'s discourse draws my attention'). Participants were significantly more attentive to CAs' communication when they were introduced as witnesses rather than suspects ($F(1, 124) = 5.147, p = 0.025$). In addition, a simple effect analysis of the factor role on the different levels of the factor communication style showed that participants rated their attention as significantly lower when suspects were cooperative rather than aggressive ($p = 0.016$). The communication style factor had a significant effect on participants' rating of warmth ($F(1, 124) = 34.086, p < 0.001$) and aggressivity ($F(1, 124) = 258.903, p < 0.001$). There were significant effects of the interaction between role and order factors on participants' ratings. Precisely, the first and the last encountered CAs were evaluated significantly differently. The analysis indicated that witnesses were perceived to draw attention more ($F(1, 28) = 4.773, p = 0.037$) and possess more personality than suspects ($F(1, 28) = 10.817, p = 0.003$). Suspects were perceived as more competent ($F(1, 28) = 9.789, p = 0.004$), knowledgeable ($F(1, 28) = 18.640, p < 0.001$), intelligent ($F(1, 28) = 14.497, p < 0.001$), sensible ($F(1, 28) = 7.846, p = 0.009$) and responsible ($F(1, 28) = 4.443, p = 0.045$). There was no effect of the interaction between order and communication style on participants' ratings. A contingency table was conducted to analyze the distribution of participants' indication of the culprit between the four conditions. A chi-squared test indicated no significant difference between witnesses and suspects ($\chi^2 = 0.439, p = 0.508$) but a significant effect of the communication style ($\chi^2 = 4.176, p = 0.029$). In addition, a linear regression was conducted on participants' certainty scores to outline predictors of participants' choice of the culprit. The regression showed that the aggressivity score was the only significant predictor of participants' certainty ($r = 0.553, p = 0.009$).

4 DISCUSSION

The results of this experiment provide insights into users' experience of interacting with CAs in a detective game. Participants' attention was rated higher when they encountered suspects CAs while the communication style affected the perception of aggressivity and warmth. Evaluation of perceived intelligence and believability of the first encountered CA was significantly affected by the factor role. Nonetheless, the designation of the culprit was predicted by the perceived aggressivity of the CA regardless of its role in the narrative. In the following, the results of these two factors are discussed separately.

The first result to emerge from the experiment is the impact of the CAs' roles on users' ratings of perceived intelligence and believability regardless of the adopted communication style. As expected, explicit roles aim to activate stereotypes in the user's mind. Thus, in a police investigation, suspects and witnesses are known to have different types of interaction with the investigators. Usually, interacting with suspects involve highly challenging and argumentative conversations since they are expected to protect their alibi, while witnesses provide important information effortlessly for the investigation to move forward. In the experiment, roles were explicitly communicated prior to the interactions and enabled participants to predict the conversation and thus,

their conversational strategy toward the CA (i.e., the topic of the detective's enquiries). The strategy adopted by the participants could have affected their evaluation of encountered CAs, in particular the first interaction. Through the rating of the item 'Visual impact' of the believability scale (c.f., the replacement of 'behavior' by 'discourse', participants rated their attention drawn by the discourse of the CA), participants rated their attention to be higher when they were interacting with witnesses. They were more attentive to witnesses' discourse as they could have expected them to provide resourceful information to name the culprit. Then, participants rated the suspects' perceived intelligence as significantly higher than witnesses. When participants conversed with suspects, they were more inclined to suspicion and accusative enquiries, while conversations with witnesses were more informative. These different strategies reflect participants' motivation behind their interaction, as suspects are implicitly more inclined to be named as the culprit. Participants might have perceived the suspects to be more intelligent as they answered to accusation and suspicion, while the strategy towards witnesses involved informative enquiries, which implies less argumentative answers. Therefore, the different CAs' answers between suspects and witnesses were induced by users' expectations and their applied strategy to achieve their goal (i.e., naming the culprit).

The second result of the experiment is the importance of the CA's communication style to users' perception of aggressivity and warmth regardless of their role. The CAs with an aggressive style of communication were perceived as more aggressive and colder compared to cooperative ones. Although there was no significant effect of communication style on participants' perception of intelligence and believability, the communication style did impact the item 'Personality' of the believability scale regarding the suspects. In the experiment, the personality of cooperative suspects was rated as significantly lower than the other conditions. Participants were prone to accusing and arguing with suspects, but the cooperative suspects exceeded their expectations by diffusing tensions and responding calmly to their accusatory enquiries. This finding aligns with Magerko's perspective [6] on defining believability as a measure of artificial agents, which are evaluated by observers based on their expectations. According to Loyall [5], the dimension of personality in the believability ascription is not merely an evaluation of their behavior, but rather a reflection of users' recognition of an agent's uniqueness and a powerful motivator of users' engagement. Thus, suspects with unexpected communication styles are ranked lower on the ascription of a personality, potentially hindering their effectiveness as engaging characters in a narrative experience. Furthermore, the use of aggressive communication style was the only predictor of participants' identification of the culprit, emphasizing the greater impact of communication style over initial expectations. Aggressive CAs were identified significantly more often as the culprit, which relies on an implicit association between aggressivity and guiltiness [3].

The results of this research demonstrate that the roles and communication styles of CAs have a significant impact on users' perception of intelligence and believability. Suspects were perceived as more intelligent than witnesses, however, this result can be attributed to users' different conversational strategies during their interaction. Suspects with unexpected communication styles (e.g., being friendly) were rated to possess lower levels of personality, leading to a potential decrease in users' engagement in the narrative experience. Aggressive communication style was a significant predictor of being named as the culprit, regardless of the role. These findings collectively suggest that considering users' expectations and perception through a proper correspondence between the CAs' role and their communication style in a game (here a detective game) can enhance user engagement and make a more compelling narrative experience.

5 CONCLUSION

The experiment's findings emphasize the importance of users' perception in narrative experiences. By manipulating the roles and communication styles of different CAs, valuable insights were gained regarding their impact on users' perception of intelligence and believability attribution. Those information are crucial for creating engaging CAs that convey accurately the narrative through their conversation with users. The results also outline the importance of the communication style regardless of the role, in attributing a culprit in a detective game. However, the role plays a significant part in their interaction as it shapes users' expectations and thus, their attitude toward the CA. Overall, these findings have broad implications for the design of CAs in various narrative contexts, emphasizing the need to carefully consider users' expectations and perception. All types of agents could benefit from considering users' expectations of their nonverbal behaviors to enhance their experience and engagement, especially when combined with appropriate roles and communication styles.

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