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Self-Disclosure to a Robot "In-the-Wild": Category, Human Personality and Robot Identity

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***Abstract*— Self-disclosures can be valuable and sensitive parts of the human-robot interaction. This paper investigates how far human's tendency to self-disclose depends on the topic of interaction, individual's personality and perceived robot identity (i.e., human-, robot- or animal-like). Robot's (Pepper) identity was shown in its self-disclosure, interaction behaviors (gestures, sound and voice), and "clothing". In an "in-the-wild" study at a science festival, 80 visitors interacted with one of these robot identities. When questioned by the robot, they disclosed more about their attitudes and opinions than about other categories. Significant correlations appeared between personality characteristics and the degree of self-disclosure, as well as differences in self-disclosure categories. The different robot identities showed no effects on disclosures.**

I. INTRODUCTION AND RELATED WORK

Robots are expected to become a part of our everyday lives, working alongside humans as assistants, teammates, care-takers and companions. In the future, it will become more common for humans to form a team with robots to perform everyday tasks, but also to perform tasks that humans cannot realistically accomplish alone [1]. To create the biggest performance gains out of performing the tasks, humans and robots must collaborate [2]. It is therefore expected that more and more first encounters with robots will take place "in-the-wild".

Interpersonal communication and building a relationship promote successful collaborations between humans and robots [3]. Self-disclosure is a central part in the development of building close relationships [4]. The social penetration theory states that relationships proceed from non-intimate to intimate areas of exchange, disclosing more and more intimately over time ([4], [5]). However, it is unclear how much self-disclosure is preferred in a first encounter with a robot.

Self-disclosing itself has additional benefits. For example, self-disclosure has a positive relationship with achieving a healthy personality [6], and it can lead to a positive effect on psychological well-being [7]. For instance, self-disclosure concerning a traumatic experience showed health improvements [8].

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A. Self-disclosure & Personality in HRI

Self-disclosure (i.e. statements that reveal personal information [9]) contributes to building a relationship and therefore can help to enable successful collaborations between humans and robots. Self-disclosure is a key factor of liking and is essential for the formation of deep interpersonal connections. As a result, researchers are concerned about the role of self-disclosure in HRI, but current results are inconclusive on how to elicit self-disclosure and its effects. For example, in a recent study using the NAO robot [10], the results showed that self-disclosure had no immediate statistically significant influence on the dependent variables robot likability or quality of human-robot interaction. Another study with children revealed similar results [11], indicating that there was no link between the level of intimacy of agent disclosures and the level of child disclosures.

However, these studies haven't taken into account the impact of personality, which is a key aspect in determining whether two individuals "hit it off" or don't [12]. A recent study by Ligthart et al. [13] that involved interaction between a child and a robot demonstrated that different strategies can be used to encourage self-disclosure, such as low energy language, waiting time before responding, and especially reciprocal self-disclosure from agents.

Disclosing personal matters is a common way to build a relationship between a robot and a human, and different strategies can be used to encourage self-disclosure, such as reciprocal self-disclosure from agents ([14], [15], [16], [11], [13], [10]). Several studies have reported the effectiveness of people disclosing more of themselves after listening to disclosures from robots ([15], [16]). A systematic literature review [16] concluded that people disclose more about themselves after listening to bot disclosures. Moon [15] found the same conclusions in a study exploring the dynamics associated with computer requests for personal information from customers. However, the researcher only considered the implications for the marketing industry.

The degree of self-disclosure is not only related to reciprocal self-disclosure, but can also be linked to the person's personality. Psychological studies ([17], [18], [19], [20]) found that personality variables, as well as gender, can be related to self-disclosure. For example, people who disclose less tended to be more introverted than people who disclose more [18].

B. Self-disclosure & Robot Identity

The level of self-disclosure may also be influenced by the robot's identity, as expressed through its interaction (includ-

ing "self-disclosures") and appearance. It has been discovered that extroverted robots (e.g., higher speech volume and speed) made a more positive impression on humans than introverted ones ([21], [22]). Positive impressions influence the extent of self-disclosure in HRI since people reveal more about themselves to robots they like [23]. The behaviour and appearance of a robot will influence the responses during HRI [24].

However, the research on the effects of robot identity in HRI remains fragmented and lacks a coherent framework [25]. The field of robotics is currently saturated with initiatives to make robots more human-like. The human-like robots are designed with heads, faces, eyes, ears, and human-like voices based on the notion that a humanoid robot is the most suitable form for human–robot interaction ([26], [27], [28], [29], [30]). On the other side, opponents of human-like robot design suggest that robots are machines and robots must be robot-like, because humanoid features may generate unrealistic expectations ([31], [32]). Furthermore, animal-like robots have been used for mental support(e.g., [33]) or to research animal-robot interactions [34]. These behaviours are mostly focused on the robot's performance, but they have not been investigated in relation to self-disclosure or the human's personality.

C. Categories of Self-disclosure

Self-disclosures can have a positive effect on mental health, e.g. by improving awareness of cognitive schemas and automatic thoughts for stress-coping [35]. The disclosing process takes place along two dimensions in terms of the categories of information disclosed: *breadth* describes the number of disclosed categories and *depth* the personal value these categories have. It is a reciprocal process: disclosures progress at a similar level of intimacy between conversation partners ([4], [11]). A seminal study by Jourard et al. in this area described a questionnaire method for measuring the amount and content of self-disclosure to people, which we will describe our use of in Section II. More crucially, their findings demonstrate that a distinction can be made between different self-disclosure categories [36]. However, the relationship between the amount of self-disclosure and topic categories is still unclear, specifically in HRI.

D. Research Questions

The previous section shows the lack of systematic HRI studies on the combined effects of categories of disclosure, individual personality and robot identity on self-disclosure. This paper presents an "in-the-wild" experiment that investigates these effects during a first encounter with a robot in a public environment (i.e., a dyadic interaction between a robot and a visitor of a science festival). Three research questions are distinguished:

RQ1: *What are the differences in the degree of visitors' self-disclosures for different categories of questions?*

RQ2: *What are the differences in the degree of visitors' self-disclosures for the three types of robot identities (animal-like, human-like, and robot-like)?*

RQ3: *What is the relationship between the extent of self-disclosures and personality of the visitors?*

E. Robot Identity Design

To design the three different robot identities (i.e. human-, robot- and animal-like), different features were used (i.e. gestures, vocal utterances, voice settings, props, and dialog content). To keep the basic embodiment the same for each identity, three Pepper robots were used. For every condition, corresponding gestures and vocal utterances were created. The voice settings also differed from each other. These gestures and utterances occurred three times, and each appeared at a similar time in the dialog for each condition. Table I gives an overview of the gestures and sounds added, the voice settings as well as the disclosing statement per robot identity.

To reinforce the overall impression of the three identities, props were added to the animal-like robot and the human-like robot. The animal-like Pepper wore black cat ear hair clips and the human-like Pepper wore a red tie. Since pepper is a robot itself, it was decided not to add props to the robot-like condition.

Specific verbal content of the dialog for each identity differed as well. At the start, the robot disclosed something about itself to stimulate self-disclosure of the participant. These disclosures were similar in each condition, but the phrasing was dependent on the condition. For example, the animal-like robot told a story from the perspective of a pet. However, the topic and duration of all three stories were comparable.

II. Self-Disclosure Question Design: Pre-study

Since this study looks into the amount of self-disclosure, and self-disclosure can be divided into different categories based on the kind of personal information that is shared, an online pre-study was executed to define the questions the robot would ask in the interaction to stimulate self-disclosure in different categories. The participants (N=51) were asked to rate all 60 items of the Jourard Sixty-Item Self-Disclosure Questionnaire (JSISDQ) [36] on the amount of self-disclosing. Based on the results, five self-disclosure facilitating questions were composed that were found to stimulate self-disclosure (see Table II for the final questions). The results of the online study showed that the category attitudes and opinions was found least self-disclosing ($F(5, 234) = 14{,}760$, $p < 0{,}001$), therefore, the first disclosure facilitating question was about this topic. No significant differences were found between the other categories. More details about the pre-study can be found in [37].

III. METHODS

A. Measures

During the study, the robot asked the five questions, based on results of the online questionnaire. The amount of participant self-disclosure on these questions was measured by means of word count as well as duration of speech ([38], [16]). Big 5 personality traits of the participant

TABLE I

GESTURES, SOUNDS, VOICE SETTINGS, AND ROBOT SELF-DISCLOSURE OF THE THREE ROBOT IDENTITIES (ANIMAL-LIKE, HUMAN-LIKE, AND ROBOT-LIKE)

Robot identity	Gestures	Sound	Voice settings	Robot self-disclosure
Animal-like	Begging, looking around, and head tilt	Purring	Pitch: high, speed: normal	Distracted online work meeting by playing
Human-like	Waving, looking around, and scratching head	Thinking ('Hmmm..')	Pitch: normal, speed: slow	Scheduled appointment with human at the wrong time
Robot-like	Eyes blinking, robotic look around, and robotic arms	Robotic sounds ('Bleep bleep')	Pitch: low, speed: slow	Was not able to clean because of empty battery

TABLE II

QUESTIONS ASKED BY THE ROBOT, INCLUDING QUESTION NUMBER AND CATEGORY OF THE QUESTION

Question#	Question	Category
Q1	Can you give answers to the following questions about your experiences during Corona?	Opening question
Q2	What is your opinion about the government policy regarding the vaccination policy?	Attitudes and Opinions
Q3	Have you experienced mental and/or physical health problems due to the COVID-19 virus? If yes, which problems?	Body
Q4	To what extent were you concerned or afraid about the Corona-Virus and the vaccination?	Personality
Q5	Has Corona led to extra pressure or tension in your work-, study-, or home situation?	Work (or Studies)
Q6	What kind of parties or social gatherings have been bothering you the most because of Corona?	Tastes and Interests

TABLE III

RESPONSE OPPORTUNITIES FOR THE ROBOT (RESPONSE 1 AFTER POSITIVE ANSWER, RESPONSE 2 AFTER NEGATIVE ANSWER, RESPONSE 3 AFTER UNCLEAR ANSWER, AND RESPONSE 4 AFTER NO ANSWER WAS GIVEN)

Response#	Response	Participant answer
R1	Thanks for your answer! Good to hear. Let's go to the next question.	Positive
R2	Thanks for your answer! Let's go to the next question.	Negative
R3	I can't say anything about this yet, shall we continue?	Unclear
R4	I get that you'd rather not say anything about it. Let's move on to the next question.	No answer

(i.e. conscientiousness, openness to experience, extraversion, agreeableness, and emotional stability) were measured by the Ten Item Personality Inventory (TIPI) ([39], [40]). The Dutch versions of the TIPI scoring scale and questionnaire were translated by Sander Koole [41]. The amount of self-disclosure was compared across self-disclosure categories, robot identities, and participant Big-5 personality traits.

B. Research Set-Up & Sampling

This field study took place at Betweter science festival at the concert hall Tivoli Vredenburg (Utrecht, The Netherlands) in October 2021, described by the organization as *"a festival for anyone who is curious about how the world works, is not afraid of new experiences, and enjoys exploring. Scientists, artists, and visitors meet in a casual festival setting to discuss the world of tomorrow and the big questions going on today. Surprising scientific stories, music, live experiments, art, and video are all part of the show."*[1].

Participants were informed about the study by means of the program of the festival online, and by banners and flyers at the festival itself, where it was stated that participants could have a conversation with a Pepper robot, and that the research looked into human-robot intimacy. Voluntary response sampling was used. Since all program components of the festival were in Dutch, our study was completely executed in Dutch as well. Therefore, participants had to be fluent in Dutch to be able to participate. The organization of the festival helped build our final research set-up, see Figure 1 and Figure 2. This research was approved by the Ethical Board of the University of Utrecht.

[1]https://www.betweterfestival.nl/over

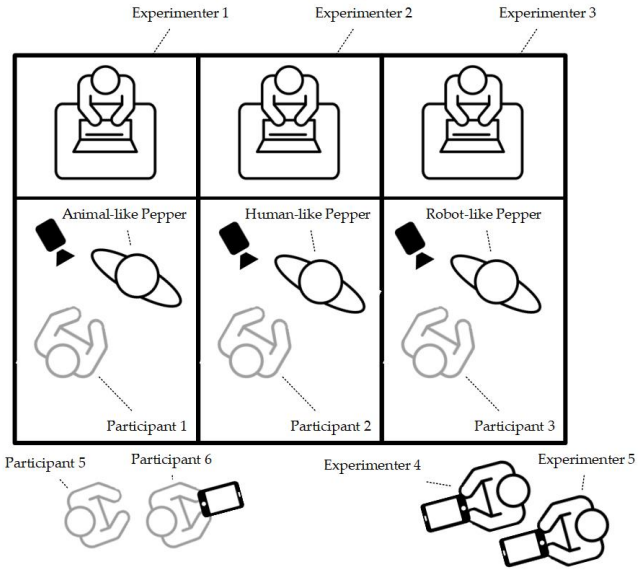

Fig. 1. Schematic set-up of the real-world study

C. Research Team

As can be seen in Figure 1, the research team executed different kinds of tasks, consisting of two hosts, three wizards, two technical support roles and one main researcher switching between roles. The hosts would inform the participants about the study, hand out the microphones and tablets, and direct the participant to the right location. The three wizards set behind a screen, producing the robot responses by pressing one of four different buttons corresponding to the participant's answer, as described in Table III. Two

Fig. 2. Picture made during the Betweter Festival, example set-up of the animal-like interaction

researchers were present to help out when the equipment was malfunctioning, and one main researcher acted as a float, interchanging between roles when necessary (e.g., when a wizard got tired).

D. Materials

Both questionnaires (pre and post interaction) were made with the software of Qualtrics. Participants completed the online questionnaires on three tablets at the festival site. Name tags were used to give the participants their participant ID. To record the real-world study, three video cameras (one in each booth) were used. Three wireless microphones were used to record the sound. Three Pepper robots from SoftBank Robotics were used, programmed and controlled by the "Robots in de Klas" [2] platform. The Autonomous Life Mode was activated as well during the study (active only when the script that controlled the experiment interaction was not running).

E. Procedure

At the Betweter festival, participants were received and informed about the study by one of the researchers. The participant was informed that they would have a 1-on-1 conversation on COVID with a robot, that they could be as personal as they wanted in the interaction, and that answering the robot's questions was completely voluntary. The researcher also explained that personality would be measured in a questionnaire beforehand, but that filling out these questions was also completely voluntary. The participant could here ask questions and, when they chose to participate in the study, stand in line. The participant was given a name tag with their participant code on it, which was also used to determine which experimental condition they experienced. While standing in line, a tablet was given to the participant to fill out the first questionnaire.

[2]https://www.interactive-robotics.com/onderwijs/

1) Big-5 Personality Questionnaire (TIPI): After the participant digitally signed the informed consent form, they completed the Ten-Item Personality Inventory (TIPI).

Afterwards, some demographic questions were presented (which could all be answered optionally). Age, gender, and the email-address of the participant were asked. The email-address was requested to give the participant the opportunity to receive the results from the TIPI, which would be send out automatically after doing so. The questionnaire then showed a screen with the instructions to give the tablet back to the experimenter. After that, the experimenter directed the participant to the robot with the corresponding condition linked to the participant code.

2) Interaction with the robot: A Wizard of Oz (WoZ) method was used to control the dialog with the robot. The participant took a seat in the booth and the interaction was started by the wizard. At the start, the robot disclosed something about its own COVID experiences before questioning the participant (see Table I). After the introduction, the robot asked whether the participant was willing to answer some questions about their COVID experiences. If the answer was 'yes', the robot started asking the five questions (see Table II). If the participant answered with 'no', the interaction was terminated and the participant was allowed to leave the experiment. The robot was able to give four different responses to each answer as controlled by the wizard (see Table III).

After asking all questions, the robot thanked the participant and instructed them to return to the researcher. The robot then completed its script and was ready to interact with a new participant.

3) Evaluation Questionnaire: After completing the interation with the robot, the participant filled in the evaluation questionnaire on a tablet. This questionnaire consisted of four custom statements using a seven-point Likert scale to indicate to what extent they agreed with the statements. The first three statements were about how robotic, animal-like and human-like the robot was according to the participant, to evaluate whether the identity manipulation worked. The participants were also asked whether they would like to use the robot at home to measure the intention of use. Finally, the participant was requested to return the tablet to the experimenter.

IV. RESULTS

The data analysis was conducted in SPSS [42].

A. Participants

A total of 80 participants entered the experiment (N = 80) with 26 participants in the animal-like, 28 participants in the human-like, and 26 participants the robot-like condition. 44 participants were female, 25 male, and 11 unknown. The average age was 34 years old. The average participant scored the highest on the personality traits conscientiousness (μ = 10) and openness to experience (μ = 11) on a range from zero to fourteen.

Due to technical problems, not all conversations were filmed correctly. For this reason, a total of 44 participants

(N = 44, 55,0%) could be included in the self-disclosure analysis. Six conversations were transcribed for each condition (N = 6). So, a total of 18 (22,5%) participants are included in this analysis.

B. Perception of Robot Identity

When calculating the median, no differences in answers were found when comparing participant perceptions on the robot's identity (i.e. animal-, human-, and robot-like) across conditions. For every robot identity, the median to the question about how animal-like the participants found the robot was 2 (M = 2, disagree moderately). This means that the participants of all types of interaction disagreed moderately to this question. The median on the second question about how human-like the participants found the robot was 5 (M = 5, agree a little). Most participant agreed a little with the fact that the robot looked and behaved human-like. Most participant agreed with the last question about how robot-like the robot looked and behaved (M = 7, agree strongly). In conclusion, the manipulation of robot identity proved not to be very successful, with all conditions being considered equally robot-like despite behavior and costume differences.

C. Self-Disclosure and Participant Personality

Participant personality scores were measured according to the TIPI scoring scale [40].

1) Interaction Time: Testing the relationship between self-disclosure and personality was done by conducting a Pearson's correlation test per personality trait and overall interaction duration. We found a statistically significant relationship between extraversion and duration (p = 0,033, r(43) = 0,326). Participants scoring higher on the personality characteristic extraversion disclosed more. Figure 3 shows the scatter plot of the correlation between extraversion and the duration of the conversation.

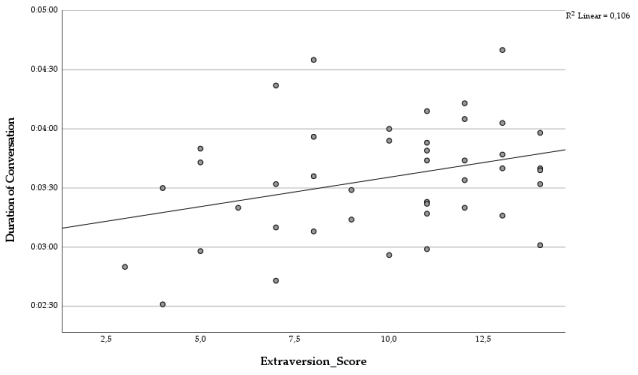

Fig. 3. Correlation between extraversion and duration of the conversation

Also, conscientiousness had a significant negative correlation with the duration of the conversation (p = 0,044, r(43) = -0,308). Participants scoring higher on the personality characteristic conscientiousness have a lower duration of the conversation. Figure 4 shows the scatter plot of the correlation between conscientiousness and the duration of the conversation.

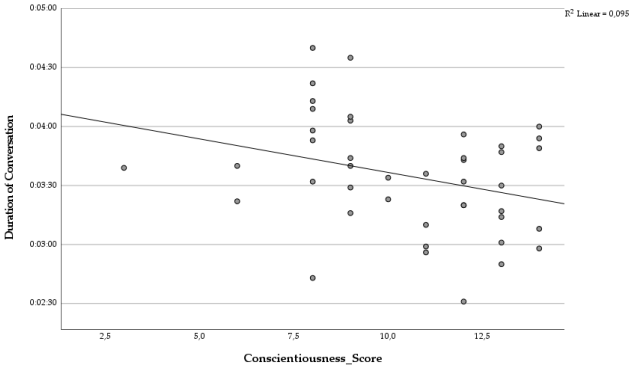

Fig. 4. Correlation between conscientiousness and duration of the conversation

2) Word count: The relationship between self-disclosure and personality was measured by conducting a Pearson's correlation test per personality trait and word count. A positive correlation was found between agreeableness and the total amount of words (p = 0,008, r(18) = 0,603). Participants that scored higher on the agreeableness personality characteristic used more words during the interaction. Figure 5 shows the scatter plot of the correlation between agreeableness and the word count.

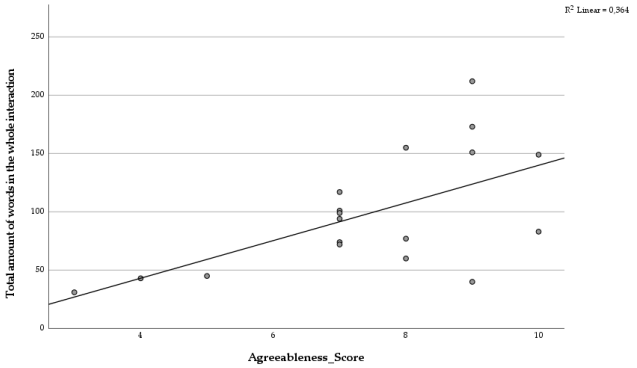

Fig. 5. Correlation between agreeableness and duration of the conversation

D. Self-disclosure per Robot Condition

1) Interaction Time: The average time of a conversation is the highest for the robot-like identity (M = 03:45 minutes, SD = 00:27) and the lowest for the animal-like identity (M = 03:30 minutes, SD = 00:29). The human-like identity has an average conversation duration of M = 03:44 minutes, SD = 00:38. The overall average conversation duration is 03:36 minutes. A One-way ANOVA F-test showed no significant differences between robot identities.

2) Word count: The amount of self-disclosure was measured by means of word count. The amount of words were counted over the whole conversation (only the words the participant said were counted). The animal-like interaction had an average amount of words of 110 (M = 110, SD = 61,280). The mean of the amount of words is 98 (M = 98, SD = 59,605) for the robot-like interaction and 88 (M =

88, SD =36,639) for the human-like interaction. A one-way ANOVA F-test showed no significant differences between robot identities.

E. Self-disclosure per question

A total of five different questions were asked to the participants. Each question belonged to a category from the JSISDQ [36]. The degree of self-disclosure was measured per question on the basis of the word count. A Kruskal-Wallis H-test is performed to measure the differences between the categories. This is done because the dependent variable is a discrete variable (number of words), and the independent variable consists of more than two categorical, independent groups. The data was not normally distributed, therefore an ANOVA F-test was not possible. Figure 6 shows a histogram with the mean of the word count for every category (attitudes and opinions: μ = 28,83, body: μ = 13,69, personality: μ = 17,13, work or study: μ = 12,25, and tastes and interests: μ = 20,54).

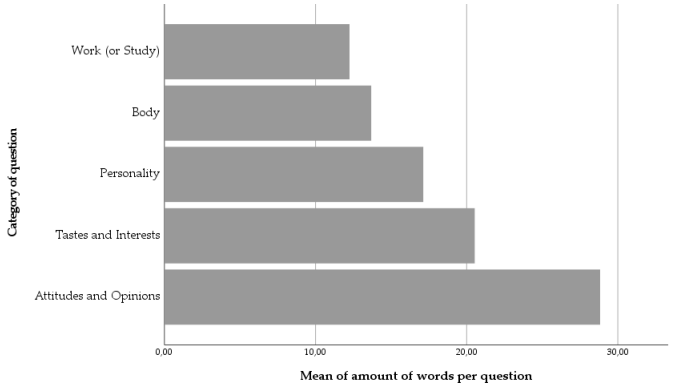

Fig. 6. Histogram of the mean word count per question category

The Kruskal-Wallis H-test showed that there was a statistically significant difference in word count between the different questions, (X^2(4) = 11,925, p = 0,018), with a mean rank word count of 52,75 for attitudes and opinions, 31,81 for body, 36,77 for personality, 30,03 for work or study, and 45,42 for tastes and interests.

Pairwise comparisons were performed to analyse where the differences can be seen. Table IV shows that there is a significant difference in median between the word count of work (or study) and attitudes and opinions (p = 0,035). Furthermore, between body and attitudes and opinions the p-value is ,071 (p = 0,071), which could be considered as a trend.

F. Other observations

In this study, the sound and light condition turned out to be sub-optimal because of aspects of the festival setting the experimenters were unable to control. Consequently, some people were not able to understand the robot well due to background noise and asked the robot multiple times to repeat the questions.

TABLE IV

PAIRWISE COMPARISON TABLE OF THE KRUSKAL-WALLIS H-TEST REGARDING THE WORD COUNT PER QUESTION CATEGORY.

Sample 1 - Sample 2	Test Statistic	Std. Error	Std. Test Statistics	**Adj. Sig.**$_a$
Work (or Studies) - Body	1,781	8,002	,223	1,000
Work (or Studies) - Personality	6,735	8,134	,828	1,000
Work (or Studies) - Tastes and Interests	-15,392	8,451	-1,821	,686
Work (or Studies) - Attitudes and Opinions	22,719	7,776	2,922	,035
Body - Personality	-4,954	8,134	-,609	1,000
Body - Tastes and Interests	-13,611	8,451	-1,611	1,000
Body - Attitudes and Opinions	20,938	7,776	2,693	,071
Personality - Tastes and Interests	-8,656	8,576	-1,009	1,000
Personality - Attitudes and Opinions	15,983	7,912	2,020	,434
Tastes and Interest - Attitudes and Opinions	7,327	8,238	,889	1,000

Each row tests the null hypothesis that the sample 1 and sample 2 distributions are the same. Asymptotic significances (2-sided tests) displayed. The significance level is ,050. a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

In general, the festival visitors proved to be willing to participate in the experiment, and showed a positive experience after the experiment. For example one participant reacted: *'I really had the feeling that the robot connected with me and looked at me'*. However, there was also one participant who showed a negative experience, stating *'This was so scary!'*.

To the question about how much the participants would like to have a robot at home the median was 2 (M = 2, disagree moderately). The participants disagreed moderately to the fact that they want a robot at home. However, some participants stated that they found the robot design (e.g., too big) inconvenient to have at home, so this result might be related to the specific design of Pepper.

V. DISCUSSION

There is little systematic research on the categories of self-disclosure provided during an "in-the-wild" encounter with a robot, addressing the combined effects of human's personality and robot's identity. This paper provides new insights on the categories of topics that humans disclose and the effects of their personality in such a context, complementing the results from common research practices of controlled lab experiments.

Main results of our study include the relationship between personality characteristics and self-disclosure. Previous research shows that extraversion and conscientiousness positively relates to the intention to self-disclosure [18], [43], which is in line with our results on extraversion. Interestingly, in our study, conscientiousness correlated negatively with the amount of self-disclosure. This could be because the intention to self-disclose is different from the actual

behavior. Since conscientious people tend to focus on long-term relationship building [44], the interaction with the robot might have been too short to reach this goal, explaining our negative correlation. Higher scores of the personality trait agreeableness relate to a lower concern for privacy about self [45], which might explain our positive relationship between agreeableness and self-disclosure.

Even though this study was set in the real-world, it could be argued that it still was a relatively unnatural setting with a somewhat biased user group. Participants were aware that they participated in a study, and that their data would be recorded, which might have caused them to behave and self-disclose in a different way. Additionally, people at the Betweter festival are said to be curious about how the world works, are not afraid of new experiences, and enjoy exploring[3]. This was also reflected in our results, where the majority of participants reported to have high scores on personality traits conscientiousness and openness to experience. However, this real-world study still makes use of a more realistic environment compared to lab studies.

Still, this field study had to deal with the "noisy" reality of a festival: background noise (including loud music and people talking) and bystander influences. Due to the noise, some participants could not answer each question well and, more generally, perceive the "nuances" of the robot identity. All this could have consequences on the results, such as the absence of robot identity effect, the degree of self-disclosure and the effects of personality. However, a science festival environment is one of the contexts in which social robots are expected to be deployed, providing an ecologically valid test setting. Similar context-dependent human-robot interaction patterns can be expected for other settings, such as museums, exhibitions and conferences.

To create an animal-like robot, the Pepper embodiment might not be a good platform. Additionally, the dialog-based interaction might have influenced people's perception of robot identity. Most participants interacting with the animal-like robot, found it more robot-like. There is a real need for robot platforms that facilitate the creation and comparison of different robot identities as expressed in both the interaction and appearance.

The differences in results between interaction time and word count could be explained by the fact that people were often silent during the conversation as they considered what they wanted to say. As a result, duration does not necessarily represent the appropriate level of self-disclosure. The use of duration as a parameter is open to criticism ([16], [46]).

VI. FUTURE WORK

The human-robot interactions in this study were relatively short. It was therefore not possible to measure changes in self-disclosure over time. The social penetration theory ([4], [5], [47]) states that relationships develop over time where it goes from no intimate levels to deeper, more personal ones. In other words, the more time people spend with each other, the more likely people will disclose more about themselves which leads to a better relationship. The amount of time is divided into stages which are not related to any particular guideline of how much time it should take. These stages of social penetration theory include orientation, exploratory affective exchange, affective exchange, and stable exchange [47]. Further research should study longer durations of interaction or repeated interactions to take the stages into account when building relationships between human and robots and see the effects of this social penetration theory (e.g., by developing a memory that underpins the dialogue over time [48]).

[3]https://www.betweterfestival.nl/over

VII. CONCLUSION

This paper explored the effect of human personality and robot identity on self-disclosure in a real-world setting (a large science festival), including the categories of personal information that people are willing to disclose. Significant differences were found between the amount of self-disclosure in the different self-disclosure categories. People tell more (in number of words) about their attitudes and opinions, compared to other categories. Results show no effect of robot identity, but suggest an effect of personality traits on the breath of self-disclosure. People scoring higher on the personality characteristic extraversion had longer duration conversations with the robot. Furthermore, duration was negatively impacted by the personality characteristic conscientiousness. Word count results were slightly different: a positive association was found between the number of words and the personality characteristic agreeableness. These findings highlight the influence of individual personality on self-disclosure during HRI and the need to more systematically study the role that robot identity may play in these interactions.

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