The effects of the task context on the perceived personality of a Nao robot

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ABSTRACT
A lot of research has been done on whether complementary personalities or similar personalities are preferred for robots and virtual agents, but much of it has had conflicting results. In this study there is sought to clarify if the preference for a robot is affected by the task that it is performing. German and Dutch students participated in a between subjects design experiment. In total the sample consisted of 32 students. The experiment uses a validated questionnaire for determining personality. Six videos show a robot performing a certain task while interacting with a human. The robot was manipulated so that it had recognizable introvert and extravert personalities. The participant then randomly saw one of these six movies and filled in a second validated questionnaire used to acquire results. The results show that how intelligent the robot is perceived by the participants is related to the task, but how enjoyable they considered the robot wasn’t related to the task that it was performing, but was instead related to the personality of the robot. How fun they considered the robot differed in one task, but the reason for this is unclear.

This shows that the task must be taken into account when you want to create a robot that is perceived intelligent, the robot has to be tailored to the task if it should be perceived as intelligent as possible.

Keywords
Cultural dimensions, Extraversion, Human Robot Interaction, Introversion, Robot Personality, Social Robotics.

1. INTRODUCTION
Robots continue to evolve and are becoming more advanced year by year. A few decades ago we only had big factory robots, now we have complex humanoid robots. Ray C. et al [14] found that people want robots to do more and more tasks, so the design of these robots, both their outer appearance and their personality, is becoming more important too. There are many aspects that have an effect on how people experience the interaction with these robots.

To name a few: the speech style used by the robot [10], the way a robot laughs [4] and the personality of the robot [11]. But also the personality of the person interacting with the robot [8] and his culture [6][18] have to be considered. For better social interaction with humans, social robots need a recognizable personality so they can be useful in social tasks.

1.1 Personality
Personality has been described in many ways. One commonly used method to describe personality is the "Big Five" dimensions of personality [5]. These five dimensions are:

- extraversion
- agreeableness
- conscientiousness
- openness
- neuroticism.

These personality traits can be determined for each individual, but not every factor is easily noticeable. Out of these five traits, extraversion is most easily noticeable and it has also been a very important factor in Human Robot Interaction (HRI) [2].

In this study the focus will be on the extraversion dimension and on its opposite, introversion. Previous studies are required to understand how to design a robot that can manifest a personality correctly. Ibister & Nass [8] studied how to show extraversion and introversion by manipulating verbal and non-verbal cues. One of the things they found is how to change the voice in order to make the robot perceived as more extravert, or more introvert. Lee et al [11] investigated what kind of personality would be best for a robot. One of their issues is which social attraction rule people apply to robots, do they prefer similar social attraction rules or complementary social attraction rules?

Previous studies are required to understand how to design a robot that can manifest a personality correctly. Ibister & Nass [8] studied how to show extraversion and introversion by manipulating verbal and non-verbal cues. One of the things they found is how to change the voice in order to make the robot perceived as more extravert, or more introvert. Lee et al [11] investigated what kind of personality would be best for a robot. One of their issues is which social attraction rule people apply to robots, do they prefer similar social attraction rules or complementary social attraction rules?

Similarity means that people are more attracted to others with the same personality, so an extravert person would prefer an extravert robot over an introvert robot. Complementary means that people are more attracted to robots with an opposite personality, so an extravert person would prefer an introvert robot if he prefers a complementary personality.

A lot of research has already been done on these social attraction rules between humans and robots, but none of them found conclusive evidence [12] [9] [3]. Research by Reeves & Nass [15] also showed that people prefer a character with a personality similar to their own. But research by Lee et al [11] instead found that people prefer a robot with a personality complementary to their own.

With so much research done and still no conclusive evidence found, which of these two social attraction rules applies is hard to say. So what if it's something else entirely? What if the preference for a robot depends on the task that it's performing?
2. PROBLEM STATEMENT AND RESEARCH QUESTION

For this study we make the assumption that the preference for the robot depends on the task that it is performing.

Hypothesis 1: The preference for the type of robot depends on the task that it is performing.

If humanoid robots are to be used more in the future then it's important that people enjoy interacting with them. So it's important to find out if the preference for a robot depends on the task that it's performing. Barrick & Mount state that extraversion is a valid predictor for occupations that include social interaction [2]. Their research shows that people prefer different personalities for different professions. This means that some professions are more extravert, for example salesmen and managers. Others are more introvert, like teachers and accountants. There are also some professions that don't have any correlation to extraversion, these will be considered ambivalent professions. An example of such an ambivalent profession is a pharmacist.

The exact effects of the task on the perceived personality of the robot are currently unknown. The effects of the robot on the perception of the task are also unknown. This study will focus on that and mainly look at introversion and extraversion, but several other traits of the robot will also be looked at, like perceived intelligence, fun and enjoyability.

Several main questions can be asked, the first is a question about the effect of the task on the way the robot is perceived when it comes to extraversion and introversion, since the exact effects, if there are any, aren't known.

Q1: Does the task strengthen the personality perception of the robot?

This can be broken down into four sub questions, two check for strengthening while two others ask if the opposite happens when the personality of the robot is opposite to the task:

Q1.1: When an introvert robot does an introvert, extravert and ambivalent task, is it perceived the most introvert when doing the introvert task?

Q1.2: When an introvert robot does an introvert, extravert and ambivalent task, is it perceived the least introvert when doing the extravert task?

Q1.3: When an extravert robot does an introvert, extravert and ambivalent task, is it perceived the most extravert when doing the extravert task?

Q1.4: When an extravert robot does an introvert, extravert and ambivalent task, is it perceived the least extravert when doing the introvert task?

The second main question will ask the same thing as the first one, but instead of looking at the effect of the task on the robot, it will look at the effect that the robot has on the way the task is perceived. It could be that they way the task is perceived changes depending on the personality of the robot.

Q2: Does the robot strengthen the perception of the task?

This can also be broken down into several smaller questions, just as was done with Q1. Two questions about the strengthening effect and two that ask if the opposite occurs when the personality of the robot doesn't match the task.

Q2.1: When an extravert task is performed by both an extravert and introvert robot, is the task perceived the most extravert with the extravert robot?

Q2.2: When an introvert task is done by both an extravert and introvert robot, is the task perceived the most introvert with the introvert robot?

Q2.3: When an ambivalent task is done by both an extravert and introvert robot, is the task perceived the most extravert with the extravert robot?

Q2.4: When an ambivalent task is done by both an extravert and introvert robot, is the task perceived the least extravert with the introvert robot?

The way the robot is perceived could also change in other ways depending on the task. For example how intelligent, fun and enjoyable a robot is perceived could depend on the way the robot and task are perceived. If both are introvert then maybe the robot is perceived to be more intelligent, compared to an introvert robot doing a task that's extravert of nature. The question that follows from that is:

Q3: Does consistency between the personality of the robot and the task improve the way the robot is perceived?

This can be broken down into several sub questions, one for intelligence, one for enjoyable and one for fun:

Q3.1: When the personality of the robot matches the task, is the robot perceived the most intelligent?

Q3.2: When the personality of the robot matches the task, is the robot perceived the most enjoyable?

Q3.3: When the personality of the robot matches the task, is the robot perceived the most fun?

3. METHOD

For the experiment several video's were made using a Nao robot [17]. The Nao robot performed one of three tasks while interacting with one person. It also had two different personalities, one introvert and one extravert personality. Therefore the overall design is a 2x3 study with the robot's personality (introversion vs ambiversion) and the task's nature (introversion vs ambiversion vs extraversion) as independent variables.

The Nao's pitch of voice and body movement was manipulated so it would be perceived as introvert or extravert, see 3.2 Manipulation for the details on this.

3.1 The tasks

Barrick & Mount's research shows that some tasks are more extravert than others [2]. From this, introvert, extravert and ambivalent tasks can be derived. From the groups of professions that they looked at, only one group has a negative correlation with extraversion, the professionals. From this group the teacher profession was chosen. Two groups have the highest positive correlation with extraversion, the managers and salesmen. From these two the manager profession was used for the extravert task.
One group has no correlation to extraversion, the semi skilled/skilled group. From this group the profession pharmacist was used.

So the Nao robot had 3 different tasks to perform, in one movie it was performing the introvert task as a teacher giving a private class to a student. In another movie it performed the extravert task as the CEO of a company, holding a meeting with one of its managers. In the third movie it performed the ambivalent task, acting as a nurse in an apothecary, giving advice and selling medicine. Each task would be done once by an extravert Nao and once by an Introvert Nao.

3.2 Manipulation
Verbal and non-verbal cues were used to manipulate the personality of the Nao robot. For verbal cues, the pitch of the voice, speed of speech and loudness were changed. Extraverts speak faster, with louder and a higher tone of voice than introverts [13].

Nonverbal cues are also important for the perception of extraversion/introversion [1][7][16]. Extraverts tend to have larger and more frequent body movement and they also more readily approach people than introverts do [8].

Several non-verbal cues were manipulated, the extravert robot would make wider movements, move faster and sometimes even walk a bit towards the camera.

To manipulate these non-verbal and verbal cues, the Choreograph program from Aldebaran robotics was used.

The same person was featured in each movie, since using a different person in each movie could have an effect on the results. In order to make sure that the size of the robot, which is a lot smaller than it's human counterpart, didn't have an effect on the results, the robot was manipulated during the movie editing so that it looked just as big as its counterpart.

3.3 Participants
A complete between subjects design was used with a sample group that consisted of Dutch and German students. With the aim to get at least 15 participants for each video. This survey started with the Wiggins personality test [19], using the eight introvert and eight extravert personality adjective items in a random order. The participants were also asked about their gender, age and the kind of study they were following or had finished.

Participants were then randomly given one of the movies to watch, after which the survey gave them several more questions, discussed next.

3.4 Measures
As mentioned earlier, extravertedness/introvertedness of the participant was measured using 16 personality adjective items from the Wiggins personality test, the eight from the Extravert list and the eight from the Introvert list, the last list being reversely coded. These 16 are: Silent, shy, introverted, bashful, inward, unrevealing, unsparkling, undemonstrative, outgoing, extraverted, vivacious, jovial, enthusiastic, cheerful, perky and unshy. A 9-point scale was used for these questions, from describes very well to describes very poorly, this is exactly the same as how it was done in previous research [8]. Describes very well is equal to a 1, while describes very poorly is equal to a 9. So for example on extraversion, the lower the score on the eight extravert adjectives, the more extravert the participant is.

Extravertedness/introvertedness of the task was measured using the following question: "For each word below, please indicate how well it describes the task in the movie. Note that you are evaluating the task, NOT the not the robot and not the interaction with the human!" The exact same 16 personality adjective items were used here, again using a 9-point scale.

The extravertedness/introvertedness of the Nao robot was also measured using these 16 personality adjective items from the Wiggins personality test, also with a 9-point scale and the following question at the beginning of the list: "For each word below, please indicate how well it describes the robot in the movie. Note that you are evaluating the robot, NOT the task or the interaction with the human!"

To measure the intelligence of the Nao an index with the following 2 adjective items was used: intelligent and clever. Fun was an index of four personality adjectives used to characterize the robot: enjoyable, exciting, fun and satisfying. According to previous research this index was very reliable (Cronbach's α=0.90) [8].

How enjoying people considered the robot to be was measured using an index of three adjective items: enjoyable, fun and entertaining. According to previous research this index was very reliable, (Cronbach's α= 0.88) [11].

4. RESULTS
4.1 Participants
A total of 115 people started the survey, but out of these 115 only 42 finished it, the possible reasons for this will be discussed later. Out of these 42 several people filled in the survey for 2 extra movies that were part of the survey for another study and so their results aren't used here. This leaves 32 people who filled in the survey for this study.

Table 1 shows how these people were distributed according to age, their education, their gender and their nationality.

<table>
<thead>
<tr>
<th>Table 1. Participants</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>65,6%</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>34,4%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>29</td>
<td>90,6%</td>
</tr>
<tr>
<td>older 25</td>
<td>3</td>
<td>9,4%</td>
</tr>
<tr>
<td>Type of education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Study</td>
<td>16</td>
<td>50,0%</td>
</tr>
<tr>
<td>Social Science Study</td>
<td>15</td>
<td>46,9%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>3,1%</td>
</tr>
<tr>
<td>Personality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introvert</td>
<td>9</td>
<td>28,1%</td>
</tr>
<tr>
<td>Extravert</td>
<td>23</td>
<td>71,9%</td>
</tr>
</tbody>
</table>

For nationality the Other was a Mexican, while for Study the other was a participant who was studying to become a teacher for Biology, which is a bit of both categories. Instead of assigning that to another category it was kept as Other. Several
other participants who had filled in Other were moved to their appropriate categories, one participant had for example filled in Psychology as Other, while that belongs to the Social Science Study group.

4.2 Scale reliability
The personality test consisted of two lists of eight personality adjective items each, from the Wiggin's personality test [19]. For the exact personality adjective items used please see the Method section.
The Introvert index was very reliable (Cronbach's α=0.90), the Extravert index was also reliable (Cronbach's α=0.78). Combined as one index of 16 items, with the Introvert scores reversed, it was also found to be very reliable for measuring extraversion and introversion (Cronbach's α=0.91).
When these same questions were used to measure how extravert/introvert people considered the robot, the Introvert index was also very reliable (Cronbach's α=0.86), as was the Extravert index (Cronbach's α=0.89). Combined as one index it was again reliable (Cronbach's α=0.85).
When these same questions were used to measure how extravert/introvert people considered the task to be, the Introvert index was also very reliable (Cronbach's α=0.87), Extravert index was also reliable (Cronbach's α=0.81). Combined as one index it was also reliable (Cronbach's α=0.79).
The index used to measure how intelligent people considered the robot to be was also found to be very reliable (Cronbach's α=0.91). The index used to measure how fun people considered the robot to be was also found to be very reliable (Cronbach's α=0.89).
Finally the index used to measure how enjoyable people considered the robot to be was also found to be very reliable (Cronbach's α=0.88).
So all the measures were found to be reliable, with some being very reliable.

4.3 Movies
The distribution of the movies is pretty equal, each was watched at least five times, while two were watched six times.
Movie 1: The CEO task movie with the extravert robot.
Movie 2: The CEO task movie with the introvert robot.
Movie 3: The Pharmacist task movie with the extravert robot.
Movie 4: The Pharmacist task movie with the introvert robot.
Movie 5: The Teacher task movie with the extravert robot.
Movie 6: The Teacher task movie with the introvert robot.
Movies 3 and 6 were watched six times, the other four were all watched five times.

4.4 Perception of the Robot
Following next are some figures and tables that show how introvert and extravert people perceived the robot to be, but first an explanation of the scale that was used. A 1 in this graph is equal to the "Describes very well" option from the 9-point scale, while a 9 is equal to the "Describes very poorly" option. So for the graph, the lower it is on for example extraversion, the more extravert the task was perceived to be. All the following graphs and tables will use the scale in this way unless mentioned otherwise.
First the graph for the video's with the extravert robot. Instead of using the 16 adjective item index for the personality questions as one index, it has been split into two indices of eight questions each, the index that measures introversion and the index that measures extraversion.

Figure 1 shows how extravert the robots were perceived to be in each of the three tasks. Figure 2 shows the same but then for introversion. Table 2 also contains all of this data, using the Mean values. As can be seen the most introvert robot was the Introvert robot during the Ambivalent task, the Pharmacist. The most extravert robot was the Extravert robot during the Ambivalent task. But the difference in measured introversion and extraversion for the Extravert robot is negligible between tasks in both figures, so that robot was perceived to be almost just as extravert or introvert during each task. The introvert robot on the other hand does show a noticeable difference when introversion is measured.

One of the research questions was if the task strengthened the personality perception of the robot. For the extravert robot this isn't the case since there's no noticeable difference between the tasks. So the task seems to have had little to no effect on how the extravert robot was perceived.
There was a non-significant interaction effect between the task and the robot's personality, on the perception of extraversion of the robot, F(3,34) =0.709, p = 0.554.
The task does seem to have an effect on the way the participants perceived the introvert robot, during the Pharmacist task it was perceived to be a lot more introvert and a lot less extravert than during the other tasks.
There was a significant interaction effect between the task and the robot's personality, on the perception of introversion of the robot, F(3,34) =3,703, p = 0.021.
But the robot wasn't the most introvert during the teacher task, so the introvert task did not strengthen the personality perception of the robot and the extravert task did not weaken it.
So to answer the first question, the task does not strengthen the personality perception of the robot if both are of the same type.

Table 2. Robot personality

<table>
<thead>
<tr>
<th>Robot_Inversion</th>
<th>Task</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introvert Robot</td>
<td>CEO</td>
<td>6.2071</td>
</tr>
<tr>
<td></td>
<td>Pharmacist</td>
<td>4.2940</td>
</tr>
<tr>
<td></td>
<td>Teacher</td>
<td>5.4375</td>
</tr>
<tr>
<td>Extravert Robot</td>
<td>CEO</td>
<td>5.7000</td>
</tr>
<tr>
<td></td>
<td>Pharmacist</td>
<td>6.1429</td>
</tr>
<tr>
<td></td>
<td>Teacher</td>
<td>5.6250</td>
</tr>
</tbody>
</table>

The third question concerned if consistency between the personality of the robot and the task improved the way the robot is perceived for intelligence, fun and enjoyment. So now we will take a look at how the robot was perceived for intelligence, fun and enjoyment.

As can be seen in figures 3, 4, 5 and in table 3, the extravert robot was always perceived to be the most fun and enjoyable, except in the Teacher task. For enjoyability the task doesn't seem to make much of a difference at all. For fun there's a difference between the first two tasks and the Teacher task for the extravert robot, that robot is seen as a lot less fun in the teacher task and was perceived in pretty much the same way on Fun as the introvert robot. Consistency doesn't seem to improve how fun or how enjoyable people considered the robot to be at all.

There was a non-significant interaction effect between the task and the robot's personality, on the fun of the robot, F(3,34) =0.690, p = 0.564.

There was a non-significant interaction effect between the task and the robot's personality, on the enjoyability of the robot, F(3,34) =0.221, p = 0.881.

So it could have been something else than the task that caused it.

With intelligence the introvert robot was the most intelligent CEO, but the extravert teacher was the most intelligent teacher. This is the exact opposite of what was expected since the Teacher task is the introvert task and the CEO is the extravert task [2].

There was a significant interaction effect between the task and the robot's personality, on the intelligence of the robot, F(3,34) =2.888, p = 0.050.

When looking at intelligence during the Teacher task again a big difference can be seen for the extravert robot. So while the robot is perceived a lot more intelligent, it's also perceived to be a lot less fun.

Just like with fun and enjoyable, consistency did not improve the way people perceived the robot. So the task has an effect on how intelligent people considered the robot to be, but it had no noticeable effect on how fun and enjoy-able people considered the robot to be. Consistency does not seem to improve the way the robot is perceived for intelligence, fun and enjoyability.
Table 3. Robot personality (continued)

<table>
<thead>
<tr>
<th>Robot</th>
<th>Introvert</th>
<th>CEO</th>
<th>Pharmacist</th>
<th>Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot_Intelligent</td>
<td>CEO</td>
<td>3,0000</td>
<td>4,3000</td>
<td>4,8333</td>
</tr>
<tr>
<td>Extravert</td>
<td>CEO</td>
<td>3,8000</td>
<td>3,9167</td>
<td>2,0000</td>
</tr>
<tr>
<td>Robot_Fun</td>
<td>Introvert</td>
<td>CEO</td>
<td>5,9667</td>
<td>6,2500</td>
</tr>
<tr>
<td>Extravert</td>
<td>CEO</td>
<td>4,6000</td>
<td>4,5833</td>
<td>6,2500</td>
</tr>
<tr>
<td>Robot_Enjoyable</td>
<td>Introvert</td>
<td>CEO</td>
<td>6,2667</td>
<td>6,4667</td>
</tr>
<tr>
<td>Extravert</td>
<td>CEO</td>
<td>4,5333</td>
<td>5,2778</td>
<td>5,4667</td>
</tr>
</tbody>
</table>

4.5 Perception of the task

Next are the effects the robot’s personality might have on the perception of the task. Figures 6 and 7 show how introvert and extravert people perceived the task to be. This time the y-axis has the two robot personalities instead of the task.

Figure 6. Measured introversion of the tasks

The second research question was if the robot strengthens the perception of the task. Looking at figures 6 and 7, the first shows that the perception of introversion isn't affected by the robot at all. There is a very minor difference for the CEO task but the others are equal.

Figure 7. Measured extraversion of the tasks

For extraversion there is a difference only in the CEO task, there the task was perceived to be the most extravert when the introvert robot performed it. The perception of the other tasks again isn't affected much by the robot at all.

So the robot’s personality type doesn't seem to affect how the task is perceived for introversion and extraversion except in one case. But since that case is an inconsistent combination, an introvert robot doing an extravert task, the answer to the second research question is that consistency does not strengthen the perception of the task.

5. DISCUSSION

As could be seen, a lot of participants started the survey but never completed it. Some direct feedback revealed that several of them found the questions on the first page, especially the personality test, to be too personal.

There was also a group of participants who completed the first page but stopped at the movie. Eventually one participant filled in a comment on the movie page, saying that the movie didn't work. But no issues could be found with the movie, all the movies were working fine when they were tested, so that's a technical issue that could not be solved.

The combination of those two issues resulted in the amount of participants being a lot lower than desired, only a third of the aim.

The answer to the first research question is that consistency does not improve the way the robot is perceived for introversion and extraversion. The task had no effect on the perception of the extravert robot. It did have some effect on the perception of the introvert robot with the CEO robot being the least introvert robot, but the pharmacist was more introvert than the teacher.

The participants did rate the extravert robot better enjoyable than the introvert robot during each task. This is caused by the personality instead of the task, the participants considered the extravert robot to be more enjoyable every time.

For the second research question we looked at the effects of the robot on the perception of the task for introversion and extraversion. Only in the CEO task, when extraversion was
measured, was there a visible difference. During the other five combinations there was no difference at all between the two robots. This is most likely caused due to the very small sample size that was mentioned earlier.

For the third research question we looked at the effects of the task on the perception of the robot for intelligence, fun and enjoyability. For enjoyability the extravert robot was always rated better than the introvert one, but the task had no effect. For fun the extravert robot was rated better in the first two tasks, but during the teacher task it was rated quite similar to the introvert robot, it was suddenly seen as a lot less fun than during the other tasks. Fun wasn't found to be significant. Intelligence on the other hand was found to be significant and it differed greatly between tasks, but not in the way we had expected. The introvert CEO was perceived to be more intelligent than the extravert CEO and the extravert teacher was perceived to be more intelligent than the introvert teacher. The opposite was expected because the teacher is an introvert task and the CEO an extravert task [2]. But instead the introvert teacher and extravert CEO were rated worse on intelligence. A reason for these results could be that a CEO who moves more, faster and speaks in a louder voice, could be perceived as less intelligent. A calmer and more collected CEO could be perceived as more intelligent during a meeting than a CEO who moves around a lot. For a teacher, making more movements could result in people perceiving him as more intelligent, while a teacher who's mostly just standing there and talking in a low voice could be perceived as less intelligent. With the manipulation of the robot the extravert robot was made to move more often and to make faster movements, its voice was also louder. The introvert robot on the other hand moved less and slower, its voice was also less loud. For the extravert CEO robot this was most likely too much, while the introvert teacher robot didn't move enough.

In future research attention should be given to what kind of behaviour people really have in such professions.

The reason for the difference in the perception of fun for the extravert robot during the teacher task is unclear. Intelligence also stands out for that robot since it was seen to be a lot more intelligent too. Maybe there is some relation between perceived intelligence and perceived fun for an extravert robot, in future research attention could be given to this to see if such a relation exists.

So, going back to the hypothesis: Hypothesis 1: The preference for the type of robot depends on the task that it is performing. Only for intelligence does this seem to be the case since the task had an effect on how intelligent the participants considered the robot and a significant interaction effect was also found. The task had no effect on how enjoyable people considered the robot, but the personality of the robot, whether it was introvert or extravert, did affect that. For fun a difference was found between the teacher task and the other two for the extravert robot, but the interaction effect was non-significant. So if you want people to perceive your robot as intelligent as possible then the task has to be taken into account so that it acts in a way that makes people perceive it as more intelligent.

6. REFERENCES