# The Good, The Bad, The Weird: Audience Evaluation of a "Real" Robot in Relation to Science Fiction and Mass Media

Ulrike Bruckenberger, Astrid Weiss, Nicole Mirnig,
Ewald Strasser, Susanne Stadler, and Manfred Tscheligi

ICT&S Center, University of Salzburg, Austria
`firstname.lastname@sbg.ac.at`

**Abstract.** When researchers develop robots based on a user-centered design approach, two important questions might emerge: How does the representation of robots in science fiction and the mass media impact the general attitude naïve users have towards robots and how will it impact the attitude towards the specifically developed robot? Previous research has shown that many expectations of naïve users towards real robots are influenced by media representations. Using three empirical studies (focus group, situated interviews, online survey) as a case in point, this paper offers a reflection on the interrelation of media representations and the robot IURO[1] (Interactive Urban Robot). We argue that when it comes to the evaluation of a robot, "good" and "bad" media representations impact the attitude of the participants in a different way. Our results indicate that the previous experience of fictional robots through the media leads to "weird", double-minded feelings towards real robots. To compensate this, we suggest using the impact of the mass media to actively shape people's attitude towards real robots.

**Keywords:** fictional robots, perception of robots.

## 1 Introduction

Meeting service robots in everyday life, still only happens in rare occasions in the Western world, e.g. at science and trade fairs. More often, people come in touch with robots as intelligent, pre-programmed machines in an industrial context or with robotic vacuum cleaners and lawn mowers in a domestic context. People hardly get in touch with anthropomorphized service robots, besides in the mass media and science fiction. Nevertheless, empirical studies showed that people without real life experience with real robots have expectations towards them [1, 7]. Where do these expectations come from? Expectations towards and opinions about robots, especially anthropomorphic ones, are presumably generated through something else than practical experiences with such systems - most likely through the media [1]. For example through science fiction movies, which promote stereotypical "good" and "bad" concepts of human-robot interaction, such as robots as super-heroes that save

---

[1] `www.iuro-project.eu`

the planet or as evil intelligence that enslaves mankind. These stories leave strong pictures in people's mind. Therefore, it is likely to presume that they affect the participants of user studies with service robots too [2], in a "good", "bad", or "weird" way. Subsequently, the following important question emerges, when we are developing a new service robot based on a user-centered design approach: How does the representation in science fiction and the mass media impact the general attitude naïve users have towards robots and how will it impact the attitude towards the specifically developed robot? Using a focus group, situated interviews, and an online survey as a case in point, this paper offers a reflection on the interrelation of media representations and the IURO robot. Thus, in this paper, we firstly outline related work on the topic "media representations and robots". After laying out each of the three studies in detail, we conclude with an overall discussion focused on the question: "How can we take into account the audience evaluation of "good" and "bad" media representations of robots for the user-centered design of novel service robots?" Our purpose is to provide some insights on how researchers can take advantage of positive media biases and limit negative ones.

## 2     Related Work

Several researchers described in previous studies that the reception of movies about fictional robots influences the attitude of people towards real robots [1, 2, 3, 4]. The attitude of people towards robots fundamentally depends on their assumptions about robots [7]. As most people never interacted with real robots, their expectations about robot capabilities must come from other sources, e.g. from science fiction movies [1]. The interaction between humans and robots - as presented in many of these movies - utilizes people's emotions about the unknown; therefore it is likely that people keep those stories in mind, which might have an influence on the outcome of empirical studies [2]. For example the fear of participants to loose control over highly developed robots is most likely based on the influence of science fiction movies, which promoted this scenario in various ways [6]. Science fiction movies have often been inspired by real science and in turn inspired scientists to keep up with the presented fictional inventions [3]. Furthermore, those movies shape the idea of human-robot relationships that might occur in the future and therefore support the conception of how future societies including robots might look like [4]. Personal contact with real robots has a positive influence on the attitude of people, e.g. in the context of field studies with service robots [5] or in a private context with a robot pet (e.g. AIBO) [8].

On the basis of the outcomes of these previous studies, we tried to gain deeper insights into the way the representation of robots in the media influences people's attitude towards real robots. Knowing the pictures that are in the mind of our participants might enable Human-Robot Interaction (HRI) to actively shape people's opinion about real robots in a positive way.

# 3    The Three Studies

The goal of our research was to gain a deeper understanding of how "good" and "bad" representations of robots in science fiction and the mass media impact the evaluation of a real robot by naïve users. The platform we used for our studies was the IURO robot. The goal of the IURO project is to develop a robot that is capable of navigating in densely populated human environments using only information obtained from encountered pedestrians. The robot can serve for fetch and carry tasks in unknown environments (for details on the scenarios see [9]). We started our investigations on the impact of media representations with a qualitative approach by means of a video-based focus group, followed by situated interviews with people who had interacted (or at least observed someone else interacting) with the IURO robot in a field study. Finally, we conducted a video-based online survey to support our qualitative findings with quantitative data and gain additional insights how the IURO robot is affected. The main research question in all three studies was: "How can we take into account the audience evaluation of "good" and "bad" media representations of robots for the user-centered design of novel service robots?"

## 3.1    Focus Group – Understanding the General Impact

**Study Setup.** The focus group was conducted with five participants (2 females, 3 males) in August 2012. The average age of the group was 28.4 years (SD = 8.85) ranging from 23 to 44 years. In the beginning, the participants were asked to fill in a questionnaire about their general attitude towards robots and their previous knowledge about fictional robots. Thereafter, the participants were shown four short sequences out of popular robot movies and a short video about the IURO robot interacting with a human. We have chosen movie scenes in which robots are depicted either "good" or "bad", in terms of behavior. The good ones included T-800 (Terminator 2 – Judgment Day) and Wall-E (Wall-E) whereas David (A.I. – Artificial Intelligence) and Ratchet (Robots) counted as bad robots. The sequence about the IURO robot shows it asking a human for the way and interpreting the answer. It uses arm gestures and a pointing device on its head to accompany its utterances. Furthermore, the participants were asked to freely discuss their opinion about real and fictional robots following 13 guiding questions. In the end, the participants were asked to fill in a second questionnaire about their attitude towards the IURO robot.

**Results.** Except for one, all participants stated that they know robots from science fiction movies. One participant mentioned real life experience with robots in the context of an automobile factory but media coverage about real robots was not mentioned at all. Only two participants thought that the previous experience with fictional robots did influence their attitude towards real robots in any way. The results of the group discussion about robots in general showed that the participants have expectations towards real robots. These expectations cannot be based on reality, although the participants felt that they do so. In their ratings of the robots all of the participants followed the pre-assumed categories of "good" and "bad". The IURO robot was rated

rather negative. In comparison to the fictional robots, it could not meet the high expectations of the participants in terms of speech and interaction capabilities. Nevertheless, all of the participants stated that they would wish to see the IURO robot "in person" to interact with it. Altogether, the participants of the focus group were very double-minded in their attitude towards robots in general. On the one hand, robots were called "iron idiots" and, on the other hand, they were expected to be capable of skills and abilities like humans and even more. During the discussion four major topics emerged: design, personality, skills & behavior, and prospects & risks.

In terms of *design,* the participants clearly preferred robots that look machine-like. The functionality of robots was more important than their appearance. *"If it has a function then it should fulfill it the best way possible and I do not think that human-like appearance is feasible for all aims."* It was especially mentioned that robots, which are indistinguishable from humans, might cause problems due to a transfer of emotions towards them. *"I think the more a robot looks like a human, the higher is the risk to fall in love with it"*.

In terms of *personality,* all of the participants agreed that robots could not possess an independent personality. They stated that emotions in general are a dangerous thing to have for a machine. *"There has to be a difference between humans and robots. Emotions are that difference in my opinion"*. Still, some of the participants were sure that they could develop feelings towards a robot.

Regarding *skills & behavior,* the scope of tasks robots might execute for humans in the future ranges from helping in the household to driving a car, to being a sports partner. *"We could use robots in all classical sports disciplines"*. A skill an autonomous robot should never be capable of was *"to program itself"*. One essential expectation was: *"There should always be a possibility to turn a robot off"*. Furthermore, it was very important for the participants that a robot is able to act politely. *"It should be more polite and say 'please' and 'thank you'"*.

Regarding *prospects & risks*: In terms of prospects, all of the participants could imagine that robots assist them in everyday life in the future. Robots as a part of our society in the future were seen as given by all of our participants. The possibility of robots that help old and handicapped people was especially discussed. On the one hand, the participants expected robots to be companions with sophisticated skills and abilities. "*It should be a companion that listens and understands"*. On the other hand, one major concern was a possible emotional dependency between humans and robots. *"The imagination that my grandmother develops some kind of feeling towards an iron thing because I do not have time for her is terrible."* In terms of risks, nearly all of the participants were sure that it is impossible that highly developed robots might turn against mankind someday. In addition, the participants stated that they thought about autonomous robots rather positively. Furthermore, it was elaborated that the deployment of robots might lead to a reduction of jobs for humans.

**Reflection.** The participants are straightforward in their opinion that robots will be part of our everyday life in the future. As neither experience with real robots in an everyday life context nor media coverage about real robots were mentioned, we assume that science fiction movies paved the way for this perception and the human-robot relationships that might occur, as Weiss et al. [4] also stated. Although the participants believed that their previous knowledge about fictional robots did not

affect their attitude towards real robots, their fears are clearly based on the "good" and "bad" robot representations shown in science fiction movies. The participants desire the skills and abilities fictional robots represent and they expect them from real robots too. Concerning social skills like behavior and emotions, they do not want real robots to be similar to fictional robots. Basically, the possibility of robots being capable of emotions like humans causes anxiety. Robots that look like humans arouse a strong feeling of fear of being replaced in terms of personal relationships. The IURO robot could not meet the expectations of the participants in terms of skills and abilities in comparison with the fictional robots. Nevertheless, all of the participants were interested in it and had the wish to interact with it. This shows the "weird", double-minded component in the attitude of the participants towards real robots. On the one hand, real robots do not meet the participants' expectations but, on the other hand, people are very interested and want to get in touch with this technology.

### 3.2    Situated Interviews

**Study Setup.** We executed situated interviews with 15 passers-by (5 females, 10 males) that interacted or watched an interaction with the IURO robot during a field trial in October 2012. The participants were aged between 21 and 73 years (M=45.5, SD=19.94). We compiled guidelines for the situated interviews on the basis of the four main topics identified in the focus group. Furthermore, we added the topic "safety aspects" because of the mentioned need that there has to be a possibility to turn a robot off anytime.



**Fig. 1.** The IURO robot in interaction with a pedestrian during a field study

**Results.** In terms of *design,* the participants rated the IURO robot basically very well except its size (too large) and its missing hands. *"All in all it appears really felicitous"*. In general, the participants expect robots to look anthropomorphic, but want to be able to distinguish them from humans at first sight. Nearly all of our participants stated that they do not like to watch science fiction movies. However, nearly all of them mentioned the robots "R2D2" and "C3PO" from the science fiction movie "Star Wars".

In terms of *personality,* the participants were undecided if the IURO robot is capable of having one. But due to its design and the ability to display facial expressions it appeared *"rootedly friendly"*. The participants presumed that robots in general would become more and more anthropomorphic. This assumption is based on

the belief that robots need to be human-like in part to execute the given tasks. Concerning fictional robots, the most favored character trait was "intelligence".

Regarding *skills & behavior,* all of the participants could imagine that the IURO robot is able to support them in the future. Robots in general should be able to help in the household and can be imagined to assist old and handicapped people. *"My grandfather is blind, I think that a robot could support him".* When talking about the nearer future, the participants were not quite sure if it is possible that real robots can be built as perfect as the fictional robots we know from movies nowadays.

Regarding *prospects & risks,* the participants were sure that the IURO robot could assist them, if it had arms with grippers. They liked the idea of being supported by a robot. *"I think it is cute and robots are great".* Robots should be applied in areas where humans could be injured, would be too cost-intensive, and could be challenged too little. All of the participants agreed that the fictional storyline about highly developed robots that turn against mankind is impossible because humans will be superior to robots for all time. *"Humans cannot be replaced".*

In terms of *safety aspects,* none of our participants had any concerns when meeting the IURO robot on the street. *"Safety? No, I do not have any concerns about that".* Talking about robots in general, the participants had either no safety concerns or they saw possibility to increase the personal safety in terms of being accompanied. None of the participants expected robots to be that highly developed to accompany people in the near future. When it comes to fictional robots the participants did not mention any safety concerns because they are fictional and therefore not able to injure a human in any way.

**Reflection.** It could be revealed that all participants knew fictional robots, also the participants who do not like to watch science fiction movies. In contrast, no one mentioned to have seen real robots in the media or in an everyday life context before. This shows how ubiquitous the representations of fictional robots are in our society. Again, the participants had "weird", double-minded feelings towards real robots in terms of skills and abilities. The IURO robot could not meet their expectations but all of them were very interested in it and wanted to interact with it. Furthermore, the personal contact with the real robot revealed that the expectations of the participants are not fixed yet. It seems like the participants are willing to accept that robotic technology nowadays is not as perfect as it is shown in science fiction movies. We assume that people understand that it takes time to develop this technology. The missing safety concerns towards real robots and the refusal of the possibility that highly developed robots could turn against mankind someday, might be based on the fact that the participants of this study exclusively referred to "good" robot characters.

## 3.3     Online Survey

**Study Setup.** We conducted the online survey to support our qualitative data from the two previous studies with quantitative data. The online survey was conducted in January 2013 with 58 participants (36 females, 22 males), aged between 18 and 47 years (M = 27.7/SD = 6.82). We have sent out the request to participate over various mailing lists, mainly to students from the University of Salzburg. The participants were shown a video recorded at the field trial (see Figure 1) about the IURO robot in interaction with a

pedestrian. Afterwards, they were asked about their previous knowledge about fictional robots, their previous knowledge about real robots from the media, their general attitude towards robots, and their attitude towards the IURO robot.

**Results.** The overall majority of the participants (91.4 %) knew robots from science fiction movies and clearly more than half (60.3 %) of the participants declared that the previous knowledge of fictional robots shaped their opinion about robots in general (science fiction movies: 50 %, cartoon series: 8.6 %, books: 1,7 %). More than half (60.3 %) of the participants knew real robots from media coverage, but only one fourth (24.1 %) of them declared that previous knowledge of real robots from the media shaped their opinion about robots in general (documentations: 22.4 %, newspaper articles: 1.7 %). One fifth (20.7 %) of the participants knew real robots from work, but not all of them (15.5 %) stated that previous experience with real robots shaped their opinion about robots in general (personal experience with real robots: 8.6 %, toy robots: 6.9 %).

We divided the answers to the question "What shaped your opinion about robots the most?" into three different groups: group 1 - fictional robots from the media; group 2 - real robots from the media; group 3 - experience with real robots. Participants from group 1 had only experience with fictional robots through science fiction movies, cartoons, and books. Participants from group 2 had in addition experience with real robots through watching documentations on TV and reading newspaper articles about the actual state of the art in robotics. Participants from group 3 had, in contrast to the other groups, interacted with real robots before, either with robot toys or with real robots in a factory context. These three groups were compared (by one-way ANOVA) regarding their answers to the question "Which kind of feelings do you link with fictional robots?" (positive, neutral, negative). The groups differed only by tendency ($F(2,55)=2.87$, $p=.065$) but the Post-Hoc test (LSD) revealed a significant difference ($p=.039$) between group 1 (M=2.40, SD=0.60) and group 3 (M=2.00, SD=0.00). A look at the means of these groups showed that the participants from group 1 link more positive feelings to fictional robots than the participants from group 3. All of the participants from group 3 have chosen the same option: "neutral feelings". Group 2 (M=2.14, SD=0.36) did not significantly differ from group 1 and group 3. This result points towards the fact that participants who knew real robots have a more distant view towards fictional robots because they can reach back in mind towards a real model of a robot.

From the answers on the question "Which characteristics should a robot possess in your opinion?", we calculated a "positive attitude score" (kindness, reliability) and subtracted a "negative attitude score" (aggressiveness, carelessness). A one-way ANOVA showed a significant ($F(2,55)=3.50$, $p=.037$) difference between the three user groups. The Post-Hoc LSD test further showed a significant difference ($p=.013$) between group 1 (M=1.49, SD=.78) and group 2 (M=.86, SD=.66). These results show that group 1 applies more positive characteristics to real robots than group 2. Group 3 (M=1.11, SD=0.93) did not significantly differ from groups 1 and 2. This outcome shows that participants who consider fictional robots as their model for robots in general, apply more positive characteristics to real robots than participants who consider real robots as their model for robots in general.

We divided the answers from the question "Wherefrom do you know robots?" into two groups: group 1 ("media experience") knew fictional and real robots from the media only; group 2 ("real life experience") knew in addition to fictional and real robots seen in the media real robots from professional life. From the question "Which robot personalities do you prefer in movies?" we calculated the "positive personality score" (helpful & friendly) and subtracted the "negative personality score" (aggressive & frightening). This resulted in a score for "attitude towards fictional robots". On this data we conducted a t-test between the group "media experience" (M=1.46, SD=0.78) and the group "real life experience" (M=0.94, SD=0.97), which showed a significant difference (t (56)=2.17, p=.035). This result reveals that participants who had only experience with robots through the media prefer more positive fictional robot personalities than participants who had experience with real robots.

About half (55.2 %) of the participants wanted robots to look human-like while the other (44.8 %) participants wanted robots to look machine-like. More than half (56.9 %) of the participants thought that it is possible that we will have robots in the future that will be as perfect as those in movies (22.4 % disagreed, 20.7 % were undecided). Nearly half (46.6 %) of the participants believed that the IURO robot could help them in the future. More than half (58.6 %) of the participants did not think that it is possible that highly developed robots turn against mankind someday, whereas 41.4 % considered that possible. When thinking about meeting the IURO robot in public space, the overall majority of the participants (81 %) would not have any safety concerns.

Most of the participants connected neutral emotions to robots (65.5 % fictional robots, 74.1 % IURO robot, 46.6 % real robots in general). This is followed by positive emotions towards robots (31 % fictional robots, 19 % IURO robot, 41.4 % real robots in general). Only a few participants connected negative emotions to robots (3.4 % fictional robots, 6.9 % IURO robot, 6.9 % real robots in general).

**Reflection.** Science fiction movies are clearly the influence that shapes the attitude of the participants towards real robots the most. In contrast to the two previous studies, most of the participants of this study were aware of that, but the outcomes are the same. The influence of "good" and "bad" representations of fictional robots leads to "weird", double-minded feelings towards real robots. On the one hand, the movie scenario about highly developed robots that turn against mankind someday is considered possible but, on the other hand, nearly no one is afraid of real robots, instead a clear majority connects neutral emotions to them. The IURO robot could again not meet the expectations of the participants in terms of skills and abilities, although half of the participants can imagine that it will help them in the future. It seems like the expectations of the participants towards real robots are not fixed yet, as they do not expect robotics to provide as perfect robots as we know from movies nowadays in the near future. Previous experience with real robots through the media leads to a more distant view towards real robots and seems to decrease the belief that robots are more than highly elaborated technology. Furthermore, it appears to reduce the fear of robots in general because it decreases the influence of previous experience with fictional robots through the media. It is noticeable that only a little amount of the participants who knew real robots from media coverage considered them as their model for robots in general. This might be due to the fact that media coverage about

real robots is hard to find and therefore consumed only in a little amount whereas fictional representations of robots are ubiquitous.

# 4    Conclusion and Recommendations

We have presented findings from three different studies, which aimed at exploring how the representation of robots in science fiction and the mass media may affect the audience evaluation of real robots in general and the IURO robot in specific. At this point, the reader might ask: "How can we take into account the audience evaluation of "good" and "bad" media representations of robots for the user-centered design of novel service robots?" Thus, we recommend fellow researchers who develop service robots and follow a user-centered design approach to consider the following.

The findings of our three studies support the results from other studies [1, 2] in terms of the influence of previous experience with fictional robots through the media on the attitude of participants. Previous experience with fictional robots through the media not only increases expectations towards real robots, but it also seems to lead to the fact that all of the participants see a future society including robots as given. Science fiction established a picture of robots that will be a great advantage for our everyday life in the minds of the participants. So, on the one hand, science fiction made it harder for real robots to be accepted and, on the other hand, science fiction paved the way for a society including robots in the mind of the participants [4].

It seems not to be of importance if fictional robots are represented as "good" or "bad", because both representations lead to the same outcome: Robots behave like humans and are therefore considered as being doubtful, in any case. Either they might replace humans in personal relationships or they might enslave mankind. Both fears can be seen in the attitude of the participants towards real robots, although not everyone is aware of the fact that they are based in science fiction and not in reality. People's opinions are indifferent when it comes to physical appearance, human-like and machine-like appearances are nearly preferred in the same way. The development of human-like appearance is only favored until some point, if robots look alike humans then again pre-existing fears based on fictional representations of robots are aroused.

When the previous experience with fictional robots through the media clashes with the experience of interacting or watching an interaction with a real robot then the "weird", double-minded feelings of the participants become obvious. Nearly no one is afraid of real robots, in general the participants connect neutral emotions to them and believe that this technology will support them in the future. Based on this fact, we assume that the negative attitude and the fear some participants have towards real robots can be decreased through information about real robots through the media and the possibility to interact with real robots. Interesting media coverage about real robots is hard to find but fictional representations of robots are present in the media for every age cohort, e.g. cartoon series for children and action movies for adults. Robotics has to cope with science fiction and to reach the same perfection in real technology will be a long way (and is utopian in some cases). But despite the high expectations people have in mind because of their previous experience with fictional robots through the media they are very interested in real robots and their expectations seem to be not fixed yet: they are willing to give robotics time to develop.

We strongly suggest using the impact of the mass media to present the robotic technology we own today. The media coverage concerning this topic should focus on the benefits that service robots could provide to our society in the near future. Media coverage about real robots might lead to a discussion about technical limitations robotics has to face today. This may eventually arouse new fears among people with no personal experience with robots which, however, can be seen as a chance to generate realistic expectations towards real robots in the public and raise the interest of researchers from other disciplines to be part of the solution. HRI research should take the chance to shape the expectations of people towards service robots in a way that the actual state of the art in robotics can cope with. Robotics must not fear the challenge with science fiction, but it has to leave the labs and must go out and present itself to the broad public [5].

# References

1. Kriz, S., Ferro, T.D., Damera, P., Porter, J.R.: Fictional robots as a data source in HRI research: Exploring the link between science fiction and interactional expectations. In: 2010 IEEE RO-MAN, pp. 458–463 (2010)
2. Bartneck, C.: From Fiction to Science – A cultural reflection of social robots. In: Proceedings of the CHI 2004 Workshop on Shaping Human-Robot Interaction, Vienna (2004)
3. Lorencik, D., Tarhanicova, M., Sincak, P.: Influence of Sci-Fi films on artificial intelligence and vice-versa. In: 2013 IEEE Applied Machine Intelligence and Informatics (SAMI), pp. 27–31 (2013)
4. Weiss, A., Igelsböck, J., Wurhofer, D., Tscheligi, M.: Looking forward to a "Robotic Society"? Notions of Future Human-Robot Relationships. International Journal of Social Robotics 3, 111–123 (2011)
5. Mirnig, N., Strasser, E., Weiss, A., Tscheligi, M.: Studies in Public Places as a Means to Positively Influence People's Attitude towards Robots. In: Ge, S.S., Khatib, O., Cabibihan, J.-J., Simmons, R., Williams, M.-A. (eds.) ICSR 2012. LNCS (LNAI), vol. 7621, pp. 209–218. Springer, Heidelberg (2012)
6. Ray, C., Mondada, F., Siegwart, R.: What do people expect from robots? In: IROS 2008, pp. 3816–3821 (2008)
7. Nomura, T., Kanda, T., Suzuki, T., Kato, K.: Prediction of Human Behavior in Human-Robot Interaction Using Psychological Scales for Anxiety and Negative Attitudes Toward Robots. IEEE Transactions on Robotics 24(2), 442–451 (2008)
8. Bartneck, C., Suzuki, T., Kanda, T., Nomura, T.: The influence of people's culture and prior experiences with Aibo on their attitude towards robots, pp. 217–230. Springer Verlag London Limited (2006)
9. Złotowski, J., Weiss, A., Tscheligi, M.: Interaction Scenarios for HRI in Public Space. In: Mutlu, B., Bartneck, C., Ham, J., Evers, V., Kanda, T. (eds.) ICSR 2011. LNCS, vol. 7072, pp. 1–10. Springer, Heidelberg (2011)