



# REELER Working Paper Series

Responsible Ethical  
Learning with Robotics

## Social Drama

An experiment in the Corporate  
Research department of an industrial  
robot company

Nadine Bender  
KUKA Corporate research

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Corporate Research  
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By Nadine Bender



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## FOREWORD

Responsible Ethical Learning with Robotics – REELER – is an interdisciplinary H2020 project funded by the European Commission with 1,998,265 EUR from the 1<sup>st</sup> of January, 2017 – 31<sup>st</sup> of December, 2019. Its main objective is to develop the REELER Roadmap for responsible and ethical learning in robotics. The project involves four European partners from the fields of anthropology, learning, robotics, philosophy, and economics, who work closely together in a research-driven collaboration between SSH-RRI and Robotic-ICT communities. Together, they aim to raise awareness of the human potential in robotics development, with special attention to distributed responsibility, ethical and societal issues, collaborative learning, as well as economic and societal impacts. The REELER Roadmap aims at aligning roboticists’ visions of a future with robots with empirically-based knowledge of human needs and societal concerns, through a new proximity-based human-machine ethics that takes into account how individuals and communities connect with robot technologies. REELER’s comprehensive research methodology includes a design-anthropological approach to onsite studies of roboticists’ laboratories and daily work, as well as onsite ethnographic studies and impact studies of present and potential affected stakeholders. The project also includes quantitative research in geographical distribution of patents and an AMB (agent-based model) research approach. Furthermore, the project makes use of novel methodologies to give both robot-designers and affected stakeholders a space for mutual exchange about a robotic future, built around a number of REELER’s ethnographic case studies of robots being developed in Europe. These novel methods include experiments with mini-publics, role play, social drama, and also explorations of the established sociodrama approach with professional sociodramatists. REELER aims to include all relevant aspects of this research in the roadmap, which will present ethical guidelines for Human Proximity Levels (HPL) in design work, as well as prescriptions for policy makers and robot-designers for how to include the voices of new types of users and affected stakeholders. The project aims to present an agent-based simulation of the REELER research to be used by roboticists and policymakers. The working papers presented in this series present ongoing research results, literature reviews, and position papers.

For further information about REELER, please contact:

Project Coordinator Cathrine Hasse: [caha@edu.au.dk](mailto:caha@edu.au.dk), +45 2323 3631

Quality Manager Stine Trentemøller: [stinet@edu.au.dk](mailto:stinet@edu.au.dk), +45 9350 8555

The REELER consortium includes Aarhus University, Ab.Acus Srl, De Montfort University, & University of Hohenheim.



## SOCIAL DRAMA: AN EXPERIMENT IN THE CORPORATE RESEARCH DEPARTMENT OF AN INDUSTRIAL ROBOT COMPANY

One of the goals of the REELER project is to learn more about and – with the REELER Roadmap – in the end positively influence the robotic technology development. All this while aiming to raise awareness of the human potential developers have in robotics development. Whereas the REELER team consists mostly of social scientists and economists, the industry, where robots are developed is a field most often dominated by engineers of all technical disciplines.

This paper aims to show how social scientists can work together with engineers in a very technology driven industrial company, with the aim to develop technologies which are not only ethically and socially correct but can actually offer something more for society. One method on the way to reach this humble goal is the Social Drama method, which will be explained in this paper.

### Background

As a female social scientist in a very men-dominated industry I started working at KUKA's Corporate Research (CR) department in 2015. Beforehand I've been working for 2.5 years in KUKA's innovation department. There we were disproportionately many more women and also most of us had a non-technical background, either in Social Sciences or in Economics. During this time as a scientific researcher, I started to focus more on topics like the future of work and how megatrends impacted the robotics world. All this in an environment, where everyone understood why such questions are important to answer. So, starting my new position in CR, I felt a lot like the four Jamaican Runners participating at the bobsleigh Olympics in the movie "Cool Runnings". Back then we were about 36 people, 30 of which were male and 33 were engineers of some kind. I was welcomed very friendly and connected easily to my colleagues; on a professional level however, none of them were sure what it was that I was doing and why exactly it was important for KUKA and also their work. Over the course of two years I slowly started to reach more and more of them with the explanations to why there is more to robotics and AI than just the pure technology. In 2016 I started giving trainings at the KUKA Academy on Ethical Legal and Socioeconomic Issues for all employees. Additionally, since in CR we are all very specialised in our topics, we have to give two expert talks a year to brief our colleagues on our current work and expertise. For my first expert talk, all of five people came. Two years later, 22 colleagues were interested in my expert talk on the Social Drama experiment I did in our department in connection to the REELER project. To give you a frame of reference – having about ten attendees is already pretty good. By now we have several funded research projects, with their own ELSI working packages. So to say, the first step was to get ELSI working packages, where I would be allowed to write short (mostly theoretical) studies and evaluations of the developed technology and the application scenarios. Then, this year for the first time we applied to two different calls with proposals, where actual integrated technology development is foreseen and the involvement of me as a social scientist is more than just a theoretical analysis and some ethical approval of already decided technologies.

But back to the year 2017, the openness for non-technical topics in our department was -putting it kindly- still improvable, but all of my colleagues at least knew roughly what I was doing. In June I was invited as a Robotic Expert to the first REELER Robotic Expert Panel in Copenhagen. Beforehand I was

told that we would get to use a method called Social Drama, not knowing much more I was very excited for this workshop.

### Methodology

Social Drama is a new method and still under development but takes its inspiration from Sociodrama (Jacob Moreno 1932). Sociodrama helps groups work in engaged creative and spontaneous explorations of wider cultural and philosophical issues and themes. The idea behind Social Drama is to explore an issue from multiple perspectives without the constraint of reality to enable a new level of understanding of each other and the questions being examined. To this end, REELER invited a selection of roboticists and social scientists from different backgrounds. Each roboticist chose a robot they work with and the social scientists were asked to select a theme or concept that lies within their expertise. I for example chose our mobile human-robot collaboration robot called KMR iiwa and paired up with two social scientists who were “Learning” and “Innovative Systems”. Next, we were given 40 minutes to get acquainted by presenting more details about the robot and the concepts and come up with a short sketch (five minutes maximum), integrating the two concepts and the robot, so that a fruitful discussion would evolve afterwards. Once we had presented our sketch, we stayed on stage and discussed our scenario with the other participants. Here the remarkable point was, that for this dialogue we stayed in our chosen roles as robot or concepts and argued from their perspective. But not only the actors stayed in their roles, but also all other participants asked their questions most of the time from their chosen concept’s perspective. In the end, each role of the sketch was asked who in their opinion was carrying the ethical responsibility in a highly distributed technology like a robot.

After this workshop I was very intrigued, I have never seen such a method before and it worked surprisingly well. However my assumption was, that this was the case only because almost all participants had a social scientist background of some kind. Even the other, truly technical, roboticists were at least very open to such experiments. I carried this very positive experience and the sparked interest back home with me to KUKA. The seed was planted and after some nights - strangely such ideas always come overnight – I knew I wanted to test the Social Drama method on my, totally technology focused colleagues. Not one of them has the least bit of social scientist background and they are by nature very sceptical about “humbug” like that. So after receiving the OK of my superior for conducting a little experiment with my colleagues, I prepared a short teaser presentation which I held at our next team meeting. There I shortly explained what Social Drama was and that I would need nine volunteers for the KUKA Social Drama workshop, whose results I already announced to be the content of my next expert talk. In the end, I found the nine volunteers relatively easily, and with seven men and two female colleagues the group represented our department very well.

In order to have the same status quo with regard to prior knowledge, the participants did not get any more information before the workshop, so they were just as unknowingly as we were before the start of the REELER Copenhagen workshop. In the beginning of our CR experiment workshop I then introduced them to the method in more detail and also provided them with a list of exemplary themes and concepts:





Figure 1: Original slide of the CR experiment presentation

These concepts were similar to the ones presented and chosen at the REELER workshop. Next, I asked the whole group to split up into three groups, with each group consisting of one robot and two concepts. The participants choosing a concept were asked to choose one that they can relate to. Some had already sympathised with a concept and others already knew they “wanted to be a robot” so the allocation into the three groups was easy. All three robots had a “KUKA” connection. The first, MAID, was the result of a former funded research project, the second, the KMR iiwa is an existing product, and the third, the REFILLS Scara is the demonstrator in a current H2020 research project.

Scenario	Robot	Concept 1	Concept 2
1	Interactive MAID	Scepticism	Autonomy in daily life
2	KMR iiwa	Communication	Ethics
3	REFILLS Scara	Safety	Future Employment

Figure 2: Overview of the robots with their concepts

### The Experiment

During their half an hour of rehearsal time, the three groups came up with their plays. In the first scenario, **the interactive MAID** robot is in the home of a grandma, who is hungry and decides what she wants to eat. The robot tells her the fridge is empty and suggests accompanying her to the next store. On their way to the store, both meet the grandson, who hasn’t been around for quite some time. Grandma asks MAID to explain to him that they will go grocery shopping to cook a certain meal. The grandson is very sceptical about the robot and disagrees about the meal and suggests a different one to MAID, next MAID tells the grandma to explain herself what food she likes. This triggers a conversation between grandma and grandson. Soon after he has left, the grandma falls down and asks MAID for help to get up, MAID only answers with an error code and asks to contact her producer.

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*Scepticism* came up in the form of the grandson, who at first only communicates with his grandmother via the robot, because he assumes that her grandma has now lost her autonomy to the robot. This is, until *autonomy in daily life* comes in, when the robot tells grandmother to explain her food choices herself. Thanks to the robot, the grandmother also won more autonomy in daily life, because she can choose her meal and go to the grocery store with the robot, not needing to wait for anyone else (e.g. her grandson). This on the other hand was also an argument for scepticism, because it could be assumed that the granddaughter also knows this and now comes by even less. The last part of the play, when the grandma falls, and the robot can't help her also integrates both concepts. In theory, the autonomy of elderlies increases, because the technology promises more safety in such cases; on the other hand scepticism prevails, because in this case, the technology fails when it is needed. There is also the paradox that the grandma wins autonomy because she can stay at home longer with less other help, while she grows more dependent on the technology.

The second play with the **KMR iiwa** took place in an industrial co-working setting together with the concepts *communication* and *ethics*. In the beginning the robot is already at work, saying "I am doing my work" in an endless repeat, while the human worker just starts his shift – still a bit tired. The worker is soon annoyed and stressed by the robot because he's working so fast and needs no rest. When the screws are empty, the worker sends the robot to get more, but, when the robot drives into a dead end, he needs the help of another worker, who turns out to be a programmer. Once the robot comes back with the new screws, he replaces the worker because "he is too slow".

The worker embodied ethics, putting questions out there like if, a robot should be programmed to take breaks too? Thus, making the human feeling better, less inadequate. In the interaction between the worker and the robot it also becomes obvious, that a robot has not ethical or moral behaviour, it cannot adhere to forms of communication, which would facilitate the collaboration on a social level. The second worker, the programmer, embodied the concept communication and showed how the communication between the worker and the robot was very one-sided. The programmer gives the commands, which the robot enacts. The worker himself was not included in this communication. However, it might have helped, if he had been able to switch off the robot during his breaks/at night. The robot itself has also communicated in the play, but only with actions like pushing the worker away, working faster than the worker does – all this are "messages" to the worker. This scenario produced two further questions: How should communication in human-robot-interaction look like? And how can ethical aspects be included more deeply?

In the third group the play was staged in a logistic scenario, where a human worker is shelving goods in a super market, until he is provided with a robot **REFILLS Scara** to help him. The worker is now visibly relieved and mentions the physical relief, because now he only has to put the products into the shelves and not hold the heavy boxes while doing so. The worker's union at first protested against the robot, but when they learned about the tactile skin of the robot, which recognizes contact and prevents accidents, they accept its usage. However after some time, the robot drops a box on the worker's feet. The worker is not seriously injured, and the robot defends itself, that it is still more reliable than a human worker. Being not only more reliable, but also able to do the shelving as well, he then soon starts doing all of the worker's tasks. The worker is very worried about what he can do now, but the trade union shows him a new task: The worker is now advising customers and explaining to a female customer how the robot works, so that she is no longer afraid.

The two concepts *future employment* and *safety* were embodied in several roles in this play. Future employment raised several questions: Who decides which work is so repetitive/tedious/boring/dangerous that a worker does not want to do it? What does future work look like: Who determines the pace of the work and the breaks? It was also noted that in the beginning only one aspect of the

worker's task was replaced by a robot, in the end, the worker got a totally different task and the robot did the worker's old job. Also safety proved to have different perspectives. Of course there is the technical safety, that the robot does not malfunction and hurt people. But the social safety was also an important discussion point in this play: The worker was afraid of being replaced, and worried about what happens with his family. In contrast to the second industrial scenario, in this play the robot communicated directly with the human worker, which increased the feeling of transparency and hence also the personal safety feeling.

### Findings

Comparing both Social Drama experiments with the REELER group and the CR, the most obvious difference is, that in the REELER workshop, the concepts were played by social scientists, who choose their own favourite concept from a familiar field. In the CR experiment, the participants were all engineers and choose concepts with which they could identify most. Therefore it can be said that the educational background and ability to fully grasp what stands behind the chosen concepts will also influence the play and the discussions afterwards. This must not be seen as a negative point, but it should be noted, that it will influence the acting and discussion. One example became apparent in the discussions about **safety**, in the REELER experiment it was not even a topic, whereas in the CR plays it came up several times and was also discussed in depth. Thereby it was found that there are different kinds of safety aspects. Interestingly scepticism as a concept was used only in the CR experiments, where you would assume that as robotic engineers they would not be sceptical towards new technologies at all. Apparently, the engineers were very able to slip into different roles and characters and imagine how "normal people" would react. In their plays, scepticism showed mostly in the beginning when people had not yet had real contact to a robot.

Comparing the **ethical concepts** and perspectives in the two workshops, it stands out that in both cases one scenario was about an ambient-assisted-living robot in the home of an elderly woman with the goal to increase her autonomy, which then defaulted. Also both scenarios made aware of the risk for human-human interactions, which might suffer under the increase usage of robots in the elderly care. In the CR experiment the discussion brought the suggested solution of implementing a "ethical-by-design" approach, which raises awareness among users and family members.

First, besides the question of how ethics can express itself in robotics, the question arises as to whether and why this is - or should be - accepted. So a programmer could let the robot keep working, because it would not need a pause anyway. However, this affects the workers who work together with the robot: This way they are indirectly told that they are less efficient and slower. The fear of being replaced increases. At the same time, a robot has no ethical or moral behaviour (or only as far as it has been programmed). Accordingly, the robot cannot react to such fears of the workers or adapt his behaviour in order to make the cooperation more comfortable for the human workers.

Additionally the CR Social Dramas brought up a new differentiation between internalised ethics of a person and the (external) ethical responsibility. In the first case, the question is if the person in the respective scenario acts ethically correct, whereas the question of ethical responsibility was aimed at for example the producer of the robot. Here it was admonished that physical safety and current norms and standards don't include societal aspects and issues. Therefore it was discussed whether the current "top-down" method is the right one or if ethical responsibility should be embedded differently.

As mentioned above, during the scenarios in the CR experiment, the concept **communication** was put into a spot light for all other plays too. A central aspect in the debate about communication in the CR

was how communication works in the human-robot-collaboration. In the social drama scenarios, communication was characterized by one-sidedness. The programmer gives commands, the robot executes. Depending on the case, the worker in the collaboration is not involved in the communication at all. Then communication passes the worker by and he has to turn to the programmer first. In other scenes, communication also played a central role. For example, the household and service robot that communicated with outsiders on behalf its user. However in the elderly care robot scenario, successful communication only succeeds up to the point where the robot runs an error code and cannot help the person who has fallen. If robots are used, for example, in supermarkets, the one-way communication that takes place between employee and/or programmer and robot can unsettle uninvolved parties, such as customers. Here the employee bridges the gap with his new job in customer service as information point about the robot. The fact that in CR communication played such an important role, might be, because many researchers are actively working on human-robot communication concepts from a technological point of view.

In the discussions involving the concept **future employment**, similar arguments were exchanged, in the CR discussion however, concrete solutions were also discussed: The participants asked for re-training measures offered either by the employer or more centrally organised by the government. Additionally they agreed that better training and improved communication before and during the implementation of robots in their new work fields is necessary. It was also shortly mentioned if a financial support for replaced workers might help. This however was not discussed in more depth.

### Discussion

The feedback of all participants of the CR experiment was very positive. They felt inspired and were able to gain new insights for their daily work. None of them thought their plays to be especially negative or critical. From my point of view, during this experiment they acted more from the perspective of their private self than as an employee of a robot company. Maybe this was because, they were asked to do something outside their comfort zone, what they had never done before and hence could not fall back to learned structures. As mentioned above, after the experiment, I summarized the results and presented them to the whole department in an expert talk. Interestingly in the discussion after my presentation, the feedback in the end was very different. Colleagues, who did not participate in the experiment, were startled and surprised of how negative the discussions during and after the three scenarios were.

The discussion also revolved around the question, why the experiment – in the eyes of the spectators – turned out so negatively. One explanation was, that with the task that was given to the colleagues and the concepts that were suggested, it was already suggested to come up with critical scenarios. This would mean that the experimental concept itself is suggestive. The outcomes of the REELER experiment would support this argument, there, the scenarios were also mostly critical. Maybe participants generally think it is expected from them to find possible problems of new technologies like robotics. Following this line of thought, it can also be added that only by focusing and imagining “worst case scenarios” one can develop ideas and solutions, before they become necessary. I would call all participants in the CR experiment true roboticists, who truly love their job and believe in the good that robotics can do. Also, before the discussion following my presentation, none of them had the feeling that they were “betraying” their profession or our company. Quite the opposite can be argued actually. The participants saw part of the responsibility with the robotic engineer, whereas it was implied that it is not the legal liability, but more the ethical responsibility. Of course, this kind of reflection can lead to the problematisation of individual aspects. However, since this is the reflection of the individual engineer, a solution to possible problems can already be found at this level. This can also be seen as identification with the company and its products

Expected Contribution

Summarizing my experience with both Social Dramas with the REELER and the CR groups, I find it noticeable that the method worked similarly with both a group of social scientists as well as a group of engineers. Yes, they focused on different concepts and emphasised different (ethical) values, and some of them were likely connected to their different educational upbringing and professions. But on a higher level, the similarities overweigh. Both groups were in the beginning mildly sceptical (maybe the engineers a tad more), but soon fully understood the task at hand. In both groups the method Social Drama led to experiences and debates that would otherwise never have happened. Therefore I find this method especially valuable when it is used to approach a new field or topic which might be controversial but needs to be evaluated from different perspectives. Especially the discussions after each short play proved to show even further insights. I could also imagine that this method proves valuable for the evaluation of new stakeholder groups and their issues with a new technology.