

## **Christoph Bartneck**

HIT Lab NZ, University of Canterbury Private Bag 4800, 8410 Christchurch, New Zealand

christoph.bartneck@canterbury.ac.nz

<http://hitlabnz.org>

# Robots in the Theatre and the Media

## **Abstract**

Robots frequently feature in the movies and occasionally in the theatre. Their presence in the media is of major importance on how users interact with them. Due to the scarcity of robots in everyday life, most of the users' expectations and interpretations about robots stem from the media. This paper provides a framework of robots in the media that will help robot interaction designers to assess preconceptions about robots.

## **Keywords**

Robots, HRI, media, theatre

## **1 Introduction**

Robots have triggered the imaginations of writers and directors for many years. Robots have been featured in all types of artistic expressions, such as books, movies, theatre plays and computer games. The importance of the media in forming our understanding of the world cannot be underestimated, in particular in situations in which access to real experience is limited. We are at an interesting point in time where on the one hand more and more robots enter our everyday lives, but on the other hand, almost all our knowledge about robots stems from the media. This tension between the expectations fuelled from SciFi and the actual abilities of the robots can result in negative experiences. It is therefore important for us to know about how the media has portrayed robots.

We would like to focus on robots being used in the theatre since they better represent the current state of robotics. Computer graphics can nowadays visualize almost anything and hence depiction of robots in movies can be more fantastic. Movies can show us robots that use anti gravity to float around, but there is little use for such a vision for the actual future of robotics. Robots that have to work on stage are constrained to the current state of the art in robotics and are therefore closer to what robots will be like in the close future. While this form of real-time acting introduces a healthy dose of reality, it also constrains the distribution of the performance. The audience needs to be present in the theatre to experience a play. This temporal and physical constraint of the performance limits the number of people able to see the show. Movies, on the other hand, can be distributed on disks or through the internet and can be viewed at home at any desired moment. Theatre plays are, as a matter of fact, often video-recorded to document the event and to make the play available for review, discussion and debate. We believe that although the theatre is the preferred source for our study, we need to expand it to include movies and other media since far more people will have seen a movie with a robot than a theatre play with one.

In the field of HRI, there has also been a long discussion on whether video recordings of robots can be used as a replacement for live human-robot interaction. While

Woods et al argued that the two interaction styles were broadly equivalent [1], Bainbridge et al concluded that participants had a more positive experience interacting with robots than with a video representation [2]. Powers et al also found large attitudinal differences between participants interacting with a collocated robot in comparison to a remote robot [3]. These results strengthen the importance of considering robots in the theatre over robots appearing in movies.

We have to acknowledge that it was not possible for us to consider every robot mentioned in every book, film, computer game or theatre play. Their number vastly exceeds our limited capacity for processing. But an exhaustive review is, in our view, not even necessary. We believe that we can still draw some valid conclusions from a representative sample of robots in the media. We also do not claim that any of the conclusions drawn in this paper are scientifically valid by the standards of the natural sciences. We are filtering and interpreting the available data and we cannot exclude the possibility that our personal knowledge and experience biases the results. But we shall not shy away from the task because of this limitation. Most of the work in the humanities relies on interpretation and the arguments we bring forward are hopefully still of interest to the HRI community. Cynthia Breazeal has already argued that theatre is an interesting test bed for HRI [4].

The goal of this paper is to reflect on how robots have been portrayed in the media, which leads us into a definition of a framework to describe common patterns of human-robot interaction in the media, and this in turn gives us clues on the expectations that future users have towards their robots.

## 2 HRI as theatre

The research field of human-robot interaction (HRI) investigates how humans and robots interact with each other. This multidisciplinary field includes three large sub fields. Firstly, it includes the developments of robotic technology that are targeted to be useful for the interaction. Secondly, it includes a creative field in which daring new ideas are explored and artistic installations are developed. Lastly, it includes studies that are targeted at understanding human reaction towards robots. For this purpose, experiments are

conducted in which robots act in front of human users, as not all actions of a robot can be produced as a result of computations. Due to the limitations of artificial intelligence, researchers often have to fall back on the Wizard-of-Oz method. In this method, an experimenter observes the interaction from a hidden location and remotely controls the robot accordingly. This is a mild form of deception, since it allows the robot to appear more intelligent than it really is. More elaborate deceptions are occasionally necessary to test certain aspects of HRI, such as the study of embarrassment [5] or of the users' hesitation to kill a robot [6].

Experiments with users in the field of HRI have the character of theatre plays, if not busking. The actions of the robots often follow scripts and occasionally the robots are even able to improvise based on their autonomous decisions. The users play the role of an involuntary actor that is called up onto the stage from the audience, similar to what is practised in busker festivals or comedy shows. While the busker (aka robot) has some understanding of the structure and goal of the act, the users are not always fully informed about what they may do or not do. They mainly try to comply with the expectations of the experimenter outlined in the description of the experiment. But even such descriptions can be intentionally misleading to achieve a certain deception. The users then have to fall back on their own experiences and ideas of robotics, which are based on the depiction of robots in the media. What we experience in laboratory experiments today is what future users will experience at home when interacting with their home robots.

The performing arts have been experimenting and testing effective methods of persuasive interaction for centuries and we agree with Guy Hoffman who argued that we can learn from their insights [7].

## 3 Short overview of robots in the media

Robots have been portrayed in the media for many years. Although general stories of artificial human beings, such as "Golem" in Jewish folklore, have been around for hundreds of years, it is Karel Capek who arguably formed the word "Robot" with his theatre play "R.U.R. - Rossum's Universal Robots" that premiered in 1921. The relationship between humans as puppets

in the theatre has also been explored by Oskar Schlemmer in his "Triadisches Ballett" [8]. There are some archetypes in that storytelling about robots that we would like to reflect upon.

### 3.1 Robots want to be humans

In many stories, robots are portrayed as wanting to be human, despite their superiority in many aspects, such as strength or computational power.

This desire to become human is the central story line for Isaac Asimov's "The Bicentennial Man" in which a robot named Andrew Martin is following a lifelong plan to become a fully recognized man [9]. The book was the base on which the movie of the same name was released in 1999, featuring Robin Williams as Andrew Martin. Besides becoming physically more human-like, Andrew Martin also fights a legal battle to gain full legal status. He is even prepared to accept mortality to gain this status.

Other robots, such as the replicant Rachael in the movie "Blade Runner", based on the book by Philip K. Dick [10] are not even aware of the fact that they are robots. The same holds true for some of the human-like cylons in the 2004 TV series "Battlestar Galactica". Not being aware of the nature of your own existence is possibly the highest form of human-likeness. A prime example of a robotic character that is aware of its robotic nature is Mr. Data from the TV series "Star Trek – The Next Generation" (see figure 1) played by actor Brent Spiner.



Fig. 1. Mr. Data played by Brent Spiner.

Mr. Data is stronger, has more computational powers and does not need sleep, nutrition or oxygen. Still, his character is set up to have the desire to become more human-like. Mr. Data's main difference from humans is his lack of emotions.

Steven Spielberg's movie "A.I." based on Brian Aldiss's short story "Super Toys Last All Summer Long" [11] accepts the main premise that robots lack emotions, and hence Professor Allen Hobby, played by William Hurt, builds the robot David that does possess the ability to love.

These three archetypical examples are only the tip of the iceberg. The appeal of this storyline stems, in our opinion, from our inferiority complex. Already a hundred years ago we were building machines more powerful than us, and there has also been major progress in the area of artificial intelligence. On May 11, 1997, the "Deep Blue" computer won the first chess match against a world champion. In 2011, the computer Watson won the game quiz show "Jeopardy". Both computers were developed by the IBM Company. In light of this progress, it is easy to imagine how robots in the future might be strong and intelligent. Humans would be therefore be reduced to an inferior position. By giving robots the desire to be human-like, we rescue our self esteem. We flatter ourselves by making robots wanting to be like us.

Rational problem-solving and calculations have been the prime focus of the development of computers and hence it comes as no surprise that SciFi authors consider emotions to be a feature that all robots would lack. It would be a crucial desire of robots to feel emotions. It has been shown that humans require emotions to act intelligently but the same does not hold true for machines. Moreover, several computational systems of emotions have already been successfully implemented. The computer programs implementing the so called "OCC Model of Emotions" [12, 13] are prime examples. Equipping robots with emotions to finally make them human is therefore an archetypical story line.

But we are not only flattering ourselves. Our need for appreciation goes beyond that. We want to be creators of life and create machines that are not only in our image, but that even admire us. Professor Allen Hobby,

creator of the emotion robot, puts it like this in the first minutes of the film "A.I." "In the beginning, didn't God create Adam to love him?" We are afraid of entities that are stronger and smarter than us and hence we make them to want to be like us and love us. It feels much better that way.

### 3.2 Robots will kill all humans

Another archetypical story line is the robotic uprising. In short, humanity builds intelligent and strong robots, then the robots decide to take over the world and enslave or kill all humans. Going back to the example of Mr. Data, he has a "brother" named Lore that possesses an emotion chip. Lore follows this typical path of not wanting to be like a human but instead wanting to enslave humanity. Other popular examples are "The Terminator" (1984), the cylons on the 2004 TV series "Battlestar Galactica", the Machines in the movie "The Matrix" (1999) and the robots in the 2004 movie "iRobot". The latter is based on the book of the same name by Isaac Asimov. Asimov coined the term "Frankenstein Complex" to describe this archetypical storyline.

This archetype is built on two assumptions. Firstly, that robots resemble humans. The robots have been designed to look and think and act like their creators. However, they exceed their creators in intelligence and power. Secondly, once they interact with the now "inferior" human species, they will act exactly as humans have historically acted when they have encountered so called "inferior species". The example of the Spanish Inquisitors and the German Nazis provide horrifying examples on how one "superior" race enslaved and killed an "inferior" one. And since robots resemble humans, they would also be likely to enslave and kill humans. It can be argued that even today the developed countries take advantage of the less developed ones, but we certainly have widely overcome slavery and genocide. It still occasionally takes place, but is condemned by the international community.

It is time that we overcame this superficial view that all superior robots would have nothing better to do than to enslave and kill humans. Several science fiction authors have already proposed future scenarios in which superior robots quietly and positively influence human society. In Isaac Asimov's "Prelude to Foundation," he

describes a robotic First Minister that keeps the empire on the right track. Interestingly, the First Minister hides his robotic nature. He is a very human-like looking robot, but needs to resort to various strategies to blend in. He does, for example, eat food, despite the fact that he cannot digest it, collecting it in a pouch that can be emptied later. Here we have a scenario in which a superior being helps the human society behind the scenes.

## 4 Framework for performing robots

The goal of our framework is to provide a high level categorisation of human-robot interaction. First we will discuss the actual implementations of performing robots before reflecting on different types of interaction themes.

### 4.1 System Architecture

On a high level of abstraction, theatrical robots can be categorised by two factors. The Locus of Control factor describes where the control unit for the robot is located, and can either be inside the robot or outside of it. The Control Entity factor can either be human or the robot itself.

	Locus Of Control	
Control Entity	Inside	Outside
Human	Guy in a suit	Puppeteering
Robot	Autonomous	Robotdrone

Table 1. System Architecture

With this matrix in place (see table 1) we can now illustrate the four quadrants with some examples. The "Guy in a Suit" quadrant is populated with robots that are operated by a human placed inside the robot. Possibly the most well known example might be The Tin Man from the movie "The Wizard of Oz" played by Jack Haley (see figure 2 or 3CPO from the movie "Star Wars").

One of the difficulties of this approach is that the robot needs to have roughly the shape and size of a human. George Lucas cast Kenny Baker, who is 112 cm tall, to operate the R2-D2 robot in the movie Star Wars. This allowed him to give R2-D2 a distinctly different shape. Lucas possibly got this idea from Douglas Trumbull's 1972 film "Silent Running", where double-amputee Mark Persons acts inside Drone 1 (Dewey) (see figure 3).



Fig. 2. Jack Haley as the Tin Man in The Wizard of Oz



Fig. 3. Mark Persons inside of the robot Dewey.

For movies, it is no longer necessary to use the Guy in a Suit method, since modern Computer Generated Graphics (CGI) can easily create realistically moving robots. But for a theatre play, this approach is still the most common method since it barely requires any technology. All the motions and behaviors are directly controlled and performed by the actor. The illusion of a robot can even be created by movements alone. In the popular robot dance style, dancers create the illusion of being a robot by very abruptly stopping movements (dimestop) and by constraining the degree of freedom of their body. Both methods imitate typical movements of robots that have electrical motors.

While humans try to dance like robots, robots, ironically, try to improve their dancing skills to become more human-like. Of the more well-known examples of

robotic dance-like practices there were the participants of the Daft Punk Aibo Dance Competition in 2005 organised by Sony, and the many dances of the Nao robot, such as in Michael Jackson's famous "Thriller" dance. While there are many examples of dancing robots, there are very few that are built to dance together with humans. The best such dancing robot is the Partner Ballroom Dance Robot (PBDR) that allows humans to dance in the classical ballroom style with the robot [14].

### 5 Theme types

Now that we have a first overview of robots in the media, we may now proceed to define our research question: What is the role of robots in theatre and in what direction can we take it in the future? From a conceptual point of view, robot theatre plays are typically of four types. They can either focus on the similarities or the differences between humans and robots, and in terms of either their body or their mind (see table 2). Dixon supports this view by stating that artists explore the deep-seated fears and fascinations associated with machine embodiment in relation to two distinct themes: the humanisation of machines and the dehumanisation of humans [15]. We extend his framework by dividing these two themes into the physical embodiment and the mind. We thereby define four types of themes (see table 2).

	Mind	
Body	Similar	Different
Similar	Type I	Type II
Different	Type III	Type IV

Table 2. Topics of HRI in the theatre

These four types of topics can of course be mixed. If we take the example of Mr.Data from above, he looks very much like a human which sets our expectations accordingly (Type II). It then appears dramatic and surprising if Mr. Data is able to enter the vacuum of space without taking any damage. In the movie Prometheus, the android David, played by Michael Fassbender, is wearing a space suit when walking on an alien planet. Wearing this suit does not serve a functional purpose since David does not require air at all. The following dialog emerges:

**charlie holloway:** David, why are you wearing a suit, man?

**david:** I beg your pardon?

**charlie holloway:** You don't breathe, remember? So, why wear the suit? **david:** I was designed like this, because you people are more comfortable interacting with your own kind. If I didn't wear the suit, it would defeat the purpose.

Again, the apparently human embodiment sets our expectations and when a difference to humans is displayed, it surprises the audience. Godfried-Willem Raes with his robot orchestra takes a different approach. He emphasises the equality of robots and humans in his theatrical performances (Type I). He argues that:

*If these robots conceal nothing, it is fairly self-evident that when their functioning is made dependent on human input and interaction, this human input is also provided naked. The naked human in confrontation with the naked machine reveals the simple fact that humans, too, are actually machines, albeit fundamentally more refined and efficient machines than our musical robots. [16]*

An example of Type III could be Johnny Five from the 1986 movie "Short Circuit". Although Johnny Five has a distinctly robotic body he expresses human emotions, which suggests that his mind is similar to humans.

This contrast between robots being similar or different to humans is certainly one of the most often-used story elements of robots in the theatre and movies. But this view on human robot relationships is superficial. It is like admiring the eye shape or coloring of someone from a culture that you have never encountered before. At the beginning, this might be fascinating, but soon enough we understand that there is much more to this person than his eyes or color. The four types of robot theatre plays described above can also be applied to human-human relations.

## 6 Conclusions

The story archetypes and theme types proposed appear frequently in the media. They address our inner fears and fascinations when interacting with robots. Are we like robots? Are robots like us? And if so, will

superior robots act as badly as humans have done when encountering inferior beings? We may ask ourselves why these questions are so persistent in the media. The most obvious answer is that stories need to have a conflict to generate tension. A fictional world in which everybody is happily living together is unlikely to capture the attention of the audience. Pitching evil robots against good humans does not only serve the purpose of creating a conflict, but also triggers an "in-group" effect. We humans feel that we need to defend our species against the "out-group" robots. This division can then be challenged by introducing robots that are indistinguishable from humans, such as in "Battlestar Galactica". This creates a great uncertainty and this creates tension. We wonder, is the character a robot or a human? And if so, is he good or evil?

The matching of evil robots and good humans is most persistent in Western culture. Robots are extremely popular in the Japanese media but here we can observe a more nuanced balance. Robots such as "Atomic Boy" are good characters that help the humans against other evil humans. These diverse scenarios break the "Terminator Pattern" and allow us to consider the relationship between humans and robots in more depth. The research on HRI cannot shy away from the representation of robots in the media and the elicitation of the associated fears since this is what the current users are aware of. It might be useful for HRI experiments to take away some of the ambiguity when confronting users with real robots. It should be clear that the robot is a machine, and what its abilities and intentions are.

But we do not only need to take past exposures to robots into account, we also need to present our users with positive and realistic visions of the future. Notable exceptions from the gloomy visions in the media are in the TV series "Futurama" by Matt Groening and the Movie "Robot and Frank" by Jake Schreier. In both shows, a vision of the future in which humans and robots live peacefully side by side is depicted. Moreover, they even become friends. Thinking about how we develop our relationships with robots is one of the most important problems in HRI.

But there is also a positive vision for the performing arts in human-robot interaction. Home theatre systems can now become what their name promises. Imagine a

future in which you do not download the movie, but in which you download the theatre script into your robots. You can then either watch the robots perform the play or even join in. It is important to notice that robotics has in the past and still is today being used to automate tasks that we do not want to perform ourselves. Industrial robots, for example, were introduced to relieve us of difficult and repetitive manual labor. There is little use in automating tasks that we actually enjoy doing. This does not mean that there is no place for robots in the theatre at all. Plays that actually deal with robots should of course be cast with robots.

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