5. Reporting on Robots: In/Animacy Attributions in Media Discourse

5.1. Robotics and Medialization

As a growing technology field with potentially far-reaching societal repercussions, robot technology is covered extensively in the news media. This context of media discourse on robotics will be the third empirical stop on our tour along the life cycle of robots. Just as at the previous stops, we will examine how in/animacy is attributed to robots, as well as the conditions, functions, and consequences of the attributions for this particular context.

The previous chapter showed that attributing characteristics of living beings to robots is one way in which actors in academic and commercial robotics draw attention to their work and products, and highlight their functioning and applicability. Not only academic peers and potential customers are among the target audiences of these communication and marketing activities. Also the media play an important role in the dissemination of news of current developments in robotics to the lay public and to political and economic actors.

The relationship between scientists and the media is, however, more complex than a simple dissemination of research results from one to the other. Scientists' work is processed and (re)framed by the media, for example in the light of current political events. Not only do scientists face polarizing, sometimes sensationalizing, media coverage and controversy (e.g. Nelkin, 1995), also decisions of resource allocation, for example by science policy actors, are often based on the perceived societal relevance of certain topics. This results in a competitive financial advantage for scientists working on topics that are "hot" in the media (Kohring et al., 2013; Peters et al., 2014). Scientists have even been shown to adapt their methods and communication practices to make their work more media-friendly, for example by choosing a research methodology or publication strategy based on anticipated media reactions

(Franzen, Rödder, & Weingart, 2012; Heinemann, 2012; Kohring et al., 2013; Peters et al., 2014; cf. Shinn & Whitley, 1985).

This "science-media coupling" is not only an aspect of the saturation of more and more areas of life with scientific knowledge[1], but also of an increasing interconnection of science and other societal subsystems, such as politics, economy, or the mass media (Weingart, 2001, 2003, 2005). It sets the basis for a medialization of science and technology (Weingart, 1998), resulting, for example, in a quantitative increase of science coverage in the mass media (Schäfer, 2008; Weingart, 2003). Moreover, it brings about a societal and political climate in which scientists are under pressure to legitimize their work in order to secure both public approval and financial support. In this climate, researchers are expected to communicate results not only within their scientific community, but also to the broader public, resulting in a professionalization of science communication and media skills for scientists (Franzen et al., 2012). As the previous chapter showed, similar practices can be observed in robotics. Roboticists adapt their dissemination and communication practices in order to present their work as functional, relevant and, consequently, worthy of funding. The present chapter will explore how journalists pick this up and – in the context of the broader discussion of increasing automation and its consequences – present robots as animate or inanimate.

5.2. Approach

Cases and Method

Based on a detailed analysis of several hundred online news articles, published by German, British, and US media outlets in the recent past, this chapter will explore how robot technology is covered in the news media. For the main text corpus, four media sources covering a range of journalistic styles and nationalities were selected:

1. The Guardian (Guardian.com): A British daily newspaper considered to be marketed towards "left-liberal, progressive, intellectual metropolitans, …

1 German "Verwissenschaftlichung der Gesellschaft" and "Vergesellschaftlichung der Wissenschaft". Cf. "knowledgeable societies" (e.g. Weingart, 2001).

academics, persons engaged in the cultural sector and students" (Jungclaussen, 2013).
2. The New York Post (NYPost.com): A US American conservative tabloid daily newspaper.
3. WIRED (Wired.com): A US technology news website, split off in the 1990s from of the monthly magazine Wired, focusing on emerging technologies and their effect on culture, the economy, and politics.
4. Spiegel Online (Spiegel.de): The online branch of the German news magazine Der Spiegel and one of the most widely read German-language news websites.

The online archives of these four sources were systematically searched for articles that were published in 2016 and either explicitly referred to robot technology, or were illustrated with a picture of a robot. This included, but was not limited to, articles including the term "robot*"[2] in the title or categorized as belonging to the subject "robot*", "artificial intelligence", or "digitalization". Letters to the editor, videos, podcasts, product reviews, and cartoons, as well as reviews of films or books about fictional robots were excluded. The main corpus consisted of 270 articles, with the bulk being from Guardian.com (142 articles); 54 articles were from Wired.com, 52 from Nypost.com, and 22 from Spiegel.de. This corpus was supplemented with over 360 further relevant articles, published between 2011 and 2019 in other publication sources.

Just as in the previous chapter, this corpus of material was analyzed following a qualitative content-analytic approach (Mayring, 2010). Analytical categories were developed inductively and iteratively from the material, the central criterion again being instances of animacy attribution to robots in the wider sense (including attributions of physiology, sensory experience, cognitive processes, intentionality, sociality, personality, emotion), as well as hints to practices of staging robot agency and animacy (e.g. in the form of a purposeful backgrounding of remote controlling of robot activity). Once again, the goal of this process was not to measure or quantify the "amount" of in/animacy attribution, but rather to document the qualitative range of attribution practices, in order to then identify the context, strategic function and consequences of in/animacy attribution practices in each specific instance.

2 Robot* = All words starting with "robot", including "robots", "robotics", "robotic", "robotized" etc.

Chapter Structure

The present chapter will, first, explore the spectrum of perspectives on robot technology in current media discourse and reveal a discourse moving between a utopian and dystopian framing of robots, with science fiction narratives playing a central role (Section 5.3).

Second, the chapter will analyze the form and function of animacy attributions to robots in media discourse. It will show that, in this particular context, these attributions often take the form of references to a science-fiction inspired narrative. We will find that these attributions are mainly employed for three reasons: To attract attention, to make complex and difficult technologies tangible, and to comment on the ever-increasing presence and impact of autonomous technologies in everyday life (Section 5.4).

Third, the position and proportion of animacy attributions will be examined. Once again, we will find a constant switching between robots being represented as inanimate objects and quasi-animate beings. While the bulk of article content often does not focus on robots' apparent animacy, the most attention-drawing aspects of the coverage, such as headlines and illustrations, frequently contain references to robot animacy (Section 5.5).

Finally, the chapter will discuss the critical discourse directed by the robotics and AI community towards these practices and towards the ubiquity of dystopian science fiction references (Section 5.6).

5.3. Hope, Horror, and Science Fiction

Recent news media coverage of robot technology covers a broad stylistic and narrative spectrum. It ranges from enthusiastic reactions to robots as part of a luxurious utopian society, to balanced discussions of the potentials and risks of robot technology, to proclamations of a dystopia ruled by malicious robot overlords. In this, robots are presented to the audience with different meanings, in a range of different frames.

The concept of framing, introduced by Erving Goffman (1974), entails the idea that the way we process information presented to us is crucially influenced by the way this information is organized and structured. Both on the level of whole media outlets and on the level of individual articles, different frames for robot technology are created by focusing on specific events and by highlighting or playing down certain aspects (Happer & Philo, 2013).

It is not uncommon for robot technology to be framed very differently in different articles, sometimes even within the same publication medium (Schäfer, 2011). On the one hand, we encounter reports on specific robots or robot technologies in a science-oriented mode (cf. Bucchi & Mazzolini, 2003). Mainly found on dedicated technology news portals and in the science or technology sections of news periodicals, this kind of report is often authored by science or technology journalists and focuses more on technological features and potential applications than on social relevance. For the specific topic of robotics, these articles often focus on interesting and exciting new robot applications – frequently garnished with a title inviting the reader to "meet" a specific robot: "Meet Flippy, a Burger-Grilling Robot" (Kolodny, 2017), "Meet the Giant Robot that Builds Boeing's Wings" (Stewart, 2016). The articles in this cluster cover a wide range of appreciation and judgement towards robot technology: While many introduce the robot technology in question in a relatively neutral and descriptive manner, some reproduce the manufacturer's enthusiastic marketing copy, and some voice doubts about the technology's functionality or relevance.

On the other hand, we find articles discussing not specific robots and scientific findings, but rather robotics and automation technology in general – with a typical focus on societal consequences like technological unemployment. They often are written in a problem-oriented mode (cf. Bucchi & Mazzolini, 2003) and can be found in any section of a publication, from economics to culture and society. Here, the discourse on robotics is dominated by a rather critical, often even dystopian framing of the consequences of increasing "robotization".

This style of news reporting on robot technology is not a new development. Already in 1932, for example, the Portsmouth Times reported that a robotics engineer had been "Shot by the Monster of His Own Creation" (1932). In 1964, the German news magazine Der Spiegel featured on the cover of an issue on "Automation in Germany" a multi-armed humanoid robot at an assembly line, kicking away a human worker (Der Spiegel, 1964). In 1978, Der Spiegel again ran its lead story on "The Computer-Revolution" with a cover showing a humanoid robot shoving away a human worker (Der Spiegel, 1978a). The lead article itself compared industrial robot to giant insects, and described them as "mute colleagues" and "iron subworkers" (Der Spiegel, 1978b). Already back then, the function of these gaudy references to robots as animate beings was not only to attract readers, but also to make automation technology more tan-

gible – similar to what we will find for today's media discourse (cf. Section 5.5).

The currently observable range of different frames, the mix of excited cheer and impending doom, can be observed for other emerging and controversial technologies as well: "Amid scientific and social uncertainties, a variety of commentators fill the unavoidably speculative space with claims about 'promise' or 'peril'" (Hilgartner & Lewenstein, 2014, p. 2). A study analyzing the media discourse on synthetic biology observed a "mixture of fascination and repulsion", with media coverage "presenting pictures from a possible 'knight in shining armour' … to a 'Frankenstein's creation'" (Gschmeidler & Seiringer, 2012, p. 170). A similar "rhetoric of hope and fear" was present in the 1980s debate on research on human embryos (Mulkay, 1993). And also the public discourse on biotechnology since the 1990s has been controversial, with "green biotechnology" and nano-biotechnology discussed with ambivalence or criticism, while at the same time highlighting the benefits of medical applications in so-called "red biotechnology" (Acatech, 2012).

Robotics is affected by medialization just as many other emerging technologies (cf. Weingart 2001). One aspect standing out in the media discourse on robotics is the extreme prevalence of references to fictional narratives – specifically to science fiction. Journalists draw liberally – if not always responsibly, as we will see in Section 5.6 – from the readily available cultural reservoir of prototypical robot characters and narratives of human-robot interaction (cf. Chapter 1, Section 1.3). Here, science fiction references take the role of a convenient and effective tool, making robot technology tangible and interesting to a non-expert audience – the vast majority of which is likely to be exposed to robots almost exclusively through popular fictional narratives. Even when someone is not intimately familiar with specific robotic characters from movies, TV shows, or novels, they will usually at least be able to picture what a (fictional) robot usually looks like, and probably also know some typical plot lines. Journalists direct attention to their coverage of robotics by referencing these inherently emotionally charged, exciting, and engaging narratives.

Moreover, science fiction is a rich pool of shared cultural knowledge that journalists employ to make complex robots, and other more abstract autonomous technologies, tangible to their readers:

> "Science fiction provides an array of conceptual frameworks for engaging with scientific or technological issues. It speaks directly to people's concerns, fears, anxieties and desires, encouraging them to work through the possi-

> ble implications of different scenarios while, at the same time, promising to keep them entertained in the process. What might otherwise be regarded as a dauntingly complex issue, evidently requiring careful attention over time, can be creatively explored in a manner which makes sense to people in relation to their personal circumstances." (Petersen, Anderson, & Allan, 2005, p. 338)

Autonomous mobile platforms or very human-like androids may not yet be commonplace in contexts where laypeople can encounter them, but they can be explicitly compared to their fictional counterparts – such as a security robot to RoboCop (e.g. Woolf, 2016), Boston Dynamic's Atlas robot to the Terminator and to the Star Wars droid C-3PO (e.g. Belfiore, 2014), or robots participating in the 2015 DARPA[3] Robotics Challenge to another Star Wars droid, R2-D2 (e.g. McMahon, 2015): "Terminator & co lend themselves to making the topic of AI recognizable at a glance, and to filling it with emotions"[4] (Hermann, 2019a). Figure 8 shows some examples of the Terminator used as an illustration for various technological topics (also see Section 5.4).

This affinity for science fiction-inspired references is not necessarily unique to the media discourse on robotics. In an analysis of media reactions to biotechnology, Alan Petersen and colleagues (2005, p. 1) observed that "news media coverage of biotechnology issues offers a rich source of fictional portrayals, with stories drawing strongly on popular imagery and metaphors in descriptions of the powers and dangers of biotechnology" – one popular example being the story of Frankenstein's monster (Shelley, 1918).

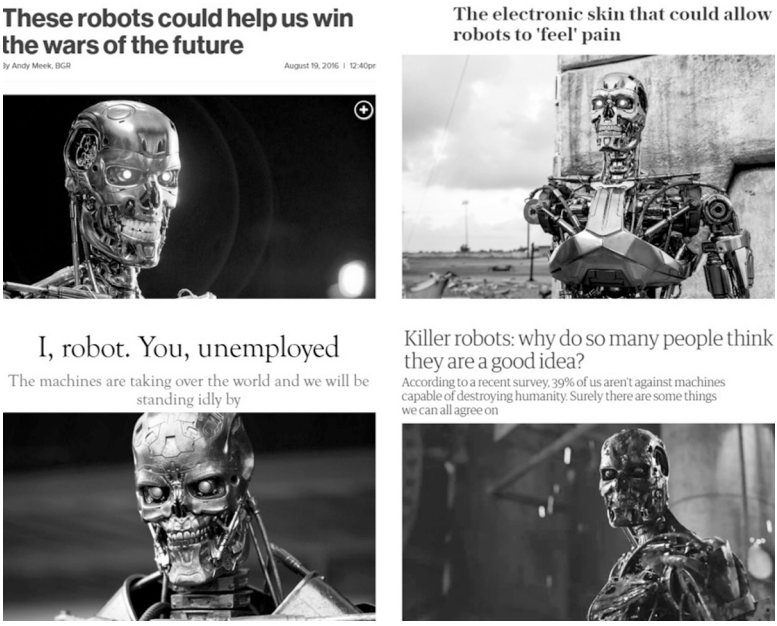
Most popular science fiction narratives depict robots with life-like characteristics, such as natural language interaction, goal-directed intentional behavior, and a humanoid body (cf. Hermann, 2019b; cf. Chapter 1, Section 1.3). Critics have pointed out that it can therefore be difficult for the audience to separate fact from fiction when science fiction references are used as an explanatory handhold: "If someone speaks about the terminator robot, it invokes a set of expectations in the listener about how a robot might look, act, or what its tasks or capabilities are" (J. Carpenter, 2016, p. 23). References to fictional robots also "may act as a positive or negative influencer, depending on how it is used as a rhetorical device" (ibid., p. 22), carrying with them an inherent judgement of the robot's righteousness. Whether a humanoid robot

3 Defense Advanced Research Projects Agency (USA).

4 Translated from German by the author.

is compared to the friendly C-3PO from Star Wars or the killer cyborg Terminator makes a crucial difference for the mental model a reader develops of the robot. A robot technology thus can be framed as promising or perilous, simply by choosing one or the other well-known science fiction character or story as a reference point.

Figure 8: The Terminator, used as an illustration for articles on autonomous warfare technology (top left, 2016, and bottom right, 2019), a pressure-sensitive "skin" technology (top right, 2019), and technological unemployment (bottom left, 2016).



Sources: https://nypost.com/2016/08/19/these-robots-could-help-us-win-the-wars-of-the-future (top left) | https://www.telegraph.co.uk/technology/2019/09/02/electronic-skin-could-allow-robots-feel-pain (top right) | https://www.spectator.co.uk/2016/01/i-robot-you-unemployed (bottom left) | https://www.theguardian.com/commentisfree/2019/sep/19/killer-robots-why-do-so-many-people-think-they-are-a-good-idea (bottom right). Screenshots taken on 2019-12-06.

5.4. From Human-Shaped Software to the Robot Apocalypse: Practices of Animacy Attribution

References to robot animacy are often placed in prominent and attention grabbing positions within the context of an article. Drawing readers' attention and interest is, however, only the most obvious function of animacy attributions in media discourse. Journalists covering complex technological topics like digital transformation and automation face the challenge of making these topics tangible for their lay audience. Some technologies might already play an active role in their audience's life, such as algorithmically controlled social media feeds or search engine results. Other technologies might not even be present in the audience's immediate environment, such as industrial robotics, or have no direct impact on their lives yet because they are just about to enter the consumer market, such as service robots. Therefore, references to well-known and often dramatic science fiction narratives not only serve as attention-grabbers. The shared cultural knowledge of popular narratives makes robots and related emerging technologies tangible for a non-expert audience. Similarly, the frequent use of pictures of humanoid robots, both fictional and real, is a way of making robot technology imaginable. The same goes for references to robots having traditionally human tasks, roles, emotions, or even physiology. Moreover, depicting robots as having goals and intentions can be a way of commenting on the seemingly inevitable approach of autonomous technologies into all areas of life. In the following sections, we will explore in depth these functions and specific forms of animacy attributions.

The Human(oid) Bias: Making Robots Tangible and Imaginable

When exploring the media discourse on robotics, one encounters an even looser definition of what a robot is than within the robotics community (cf. Chapter 1, Section 1.5). The term "robot" seems to be used as a one-for-all for a variety of technologies, including basic statistics software, machine learning, and artificial intelligence (AI) – to name only a few buzzwords. Sometimes, robots stand in for technologies that have nothing to do with robotics whatsoever. The term "robot" has been used for journalistic software (Kelly, 2016; Rogers, 2016), a legal advice chat bot (Naughton, 2017), a virtual government clerk (Davies, 2016), image recognition software (New York Post, 2016; Schmundt, 2019), lie-detection software (Klausner, 2016), bookkeeping software (Monga, 2015), investment software (L. Lin, 2016), music software (Biggs,

2016), and many more. A similar phenomenon has been described for the media discourse on genetic technology and research: Francis Collins, head of the Human Genome Project, observed that people tend to "lump anything with 'gen' as the human genome project—gene therapy, GM foods, cloning—it's all the same thing" (cited in Lewis, 2000).

To some extent, it is simply a strategy to attract an audience:

> "The word robot generates a lot of … fascination and sometimes fear. … You can use it to get people's attention. … It's much sexier to call something a robot than to call something a dishwasher." (Darling, cited in Simon, 2017a)

Using the "emotionally resonant" (cf. Lim, 2017a, 2017b) term "robot" not only serves to attract attention, increase readership, and drive up click counts. Robots can also be a metaphor for a range of new technologies that are still unfamiliar to a non-expert audience and cannot yet evoke an established conceptual model (LaFrance, 2016). In this context, robots serve as a stand-in until the technology in question becomes more familiar. We will examine the idea of robots being part of the future and thus representing new and exotic technologies in more depth further below.

Non-experts may simply lack the knowledge necessary to tell apart different robotic and non-robotic technologies. This is supported by a US study reporting that study participants did not distinguish between their fear of robots and fear of artificial intelligence (Liang & Lee, 2017). The authors suggest that this distinction is simply not relevant to the general population. In a similar vein, Stephen Cave and colleagues report one of their study participants defining artificial intelligence as "scary robots" (2019, p. 3; cf. Dihal, 2019).

Paradoxically, this very loose use of the term "robot" is intrinsically tied to a very specific physical form of robot, namely robots designed to imitate the human form – humanoids. This is observable in both the choice of illustrations in the context of news articles and the way robots are framed in article texts. When it comes to pictures accompanying news articles, "humanoids are … hogging all the attention" (Thórisson, 2007). Both, articles on automation in general and articles on non-humanoid robots, are frequently illustrated with pictures of humanoid robots. In 2016 alone, Guardian.com published 52 articles on robotics and the future of work, almost half of them of them illustrated with a picture of a humanoid robot. Not a single one of these articles was about humanoid robots.

The most popular choice are images of existing humanoid robots, such as Softbank's Nao[5] and Pepper[6], or parts of humanoid robots, like hands or heads. The Pepper robot, marketed for service contexts like retail or hospitality, is one of the first humanoid robots on the commercial market. This makes it a popular choice of illustration for articles on robot technology – even when the technology in question has not even the slightest resemblance to Pepper. Following media coverage for a while, one could get the impression that Pepper is a nanotechnologically powered artificial intelligence, killing jobs by working simultaneously as a lawyer, investment advisor, hotel receptionist, and surgeon (see Figure 9).

Another popular illustration choice are artistic renderings of humanoid robots from stock image databases. These illustrations are often science fiction-inspired, featuring extremely human-like androids. Popular are also pictures of fictional humanoid robots or cyborgs from successful movie franchises, such as the Terminator, Robocop, or C-3PO.

Just like science fiction references, illustrations of humanoid robots not only serve as an attention catcher for text articles, they also provide a mental model for non-experts to think about complex digital technologies and issues of automation in general (cf. Thórisson, 2007). Their use in the news media is so ubiquitous that they have evolved into something like metaphorical visualizations. Andreas Lösch (2006) observed a similar phenomenon for the case of nanoparticles, which are frequently illustrated with pictures of microsubmarines.

Pictures of humanoid robots do not only reinforce the widespread assumption that the humanoid form is the default form of a robot (cf. T. Nomura et al., 2005), they also implicitly frame a technology as possessing other human characteristics – such as animacy:

> "Robots with humanoid features make it a lot easier for people to perceive them as intelligent: Head, eyes, arms, legs — these imply 'living being' whereas a rectangle chunk of metal on belts implies 'vacuum cleaner'." (Thórisson, 2007)

A similar "humanoid bias" in media discourse is present in neighboring technology topics, such as artificial intelligence, machine learning, or big data (Geitgey, 2018; Montani, 2017; Pentzold, Brantner, & Fölsche, 2018; Winfield,

5 https://www.softbankrobotics.com/emea/en/nao (accessed on 2019-12-21).
6 https://www.softbankrobotics.com/emea/en/pepper (accessed on 2019-12-21).

Figure 9: Pictures of Pepper robots used as illustrations in articles on medical robots (top left, "Would You Undergo Surgery Performed by a Robot?", 2017), AI and nanotechnology (top right, 2015), software (bottom left, 2016), and chatbots (bottom right, "When Robots Present the News", 2016).

Sources: https://www.industry-of-things.de/wuerden-sie-sich-von-einem-roboter-operieren-lassen-a-600562 (top left) | https://www.theguardian.com/technology/2015/feb/18/artificial-intelligence-nanotechnology-risks-human-civilisation (top right) | https://www.handelsblatt.com/unternehmen/beruf-und-buero/buero-special/kuenstliche-intelligenz-die-robo-anwaelte-kommen/13601888.html (bottom left) | https://www.faz.net/aktuell/feuilleton/medien/medien-chatbots-roboter-die-nachrichten-ansagen-14363427.html (bottom right). Screenshots taken on 2019-12-06.

2017). Here, next to the same popular pictures of humanoid robots, we can find a variety of "awful stock photos" (Geitgey, 2018) showing "AI tropes" like wires connected to a brain, or a "human face coalescing … from the atomic parts of the AI" (Winfield, 2017) – similarly fostering the impression that artificial intelligence has human characteristics.

Pictures of humanoids are the most visible and obvious way in which animacy is attributed to robots in the context of media discourse. The humanoid bias goes beyond ascribing just humanoid embodiment to robots, however, and extends into to other forms anthropomorphism. While only few articles state outright that a certain robot "is basically a human" (Reed, 2016), robots and neighboring technologies are frequently framed as having human-like features even beyond their physical shape.

Indirectly, the choice of specific topics covered in the media sets the basis for this practice. Sarah Kriz and colleagues (2010) found that, while the recent boom in social robotics was covered extensively in the media, advancements in robots' cognitive capabilities were systematically given less attention. Some technology news sites even set the whole focus of their robotics sections on social aspects of robotics. Robots are frequently framed as being about to take over not only specific tasks traditionally performed by humans, but complete jobs or even roles. Examples range from specifically social roles ("Zora, the Robot Caregiver", Satariano, Peltier, & Kostyukov, 2018; "transforms into a cute robot companion", Gibbs, 2016a), to service tasks ("turns into an adorable mini robot butler", ibid.; "newest crew member of Costa Cruise Line", Reese, 2016) and white collar jobs ("the new bookeeper is a robot", Monga, 2015; "the robo-lawyers are coming", Postinett, 2016), to law enforcement ("humanoid robots invade our lives as … first responders", Belfiore, 2014) and even management ("why a robot could be the best boss you've ever had", Chamorro-Premuzic, 2016). Especially on technology news portals and articles in the science-oriented mode, readers are frequently invited to "meet" a robot or read that humans "welcome" a new robot: "Meet Luigi the PoopBot. He's Here to Scrape Your Sewers" (Grey Ellis, 2016) "Meet Zora, the Robot Caregiver" (Satariano et al., 2018), "[A baseball manager] is Welcoming Robot Umpires" (Phillips, 2019), "People will welcome the new [robot] 'master chef' to their kitchen" (Joshi, 2018). These phrases not only attribute personhood to a robot, they also frame it as being able to interactive socially. Moreover, it depicts robots as individuals – even though they usually are not even unique one-off artifacts, but in fact off-the-shelf robot models produced by the hundreds and thousands. Frequently, these depictions do not explicitly refer to human characteristics but more generally to characteristics of living beings. We find references to robots with not only a humanoid form, but with biological bodies and physiological processes – for example, when a sensor technology for the detection of heat or pressure is called an "electronic skin that could allow robots to 'feel' pain" (Boland, 2019).

Emotions are often attributed to robot technology as well. A demonstration video by Boston Dynamics (2016), showcasing their Atlas robot being repeatedly pushed in order to demonstrate its balance and stability, caused considerable media reactions attributing suffering to the stumbling, "abused" robot, even describing the actions shown in the video as "bullying" or "torture", and predicting the robot's future revenge (e.g. Hern, 2016; Koerber, 2016; Novak, 2016; Stockton, 2016).

When describing so-called "intelligent" technologies, field experts themselves frequently employ terms loaded with meaning from a human perspective, such as "experience", "learning", "recognizing", or "thinking". Not surprisingly, the news media pick up these terms and relay them to their non-expert audience – which is not able to assess subtleties like the difference between machine intelligence and human intelligence. Headlines like "Facebook is Training Robots to Think" (Paris, 2019) or "Robotic Vacuum Remembers Your Home's Layout" (Verger, 2018) thus insinuate that robots have human-like cognitive processes.

Voices from within the robotics and AI community have been criticizing the liberal and sometimes incautious use of these "suitcase words" (Minsky, 2006, p. 11). Robotics professor Rodney Brooks (2017b) noted that "the use of these words suggests that there is much more there than is there" and expressed worries that "people will over generalize and think that machines are on the very door step of human-like capabilities in these aspects of being intelligent". Section 5.6 will dive deeper into this critical discourse.

Be it physical shape, physiological or cognitive processes, professional and social roles, or even personhood and individuality – in media coverage of robot technology we can observe references and comparisons to human characteristics on all levels. Through science fiction references or comparisons to real humans, robots and other autonomous technology is made tangible, imaginable, and exciting for the non-expert audience. However, not only the characteristics of specific technologies are at the center of the discourse. The consequences of their deployment, too, are discussed in a way that inherently frames robot technology as quasi-animate.

The Inevitable Robot Apocalypse: Commenting on a Technologized Society

When exploring media discourse and looking specifically for pictures or mentions of robot technology, the majority of articles one encounters does not

focus on specific technologies. Instead, we find a steady stream of articles on automation and its consequences that not only make constant references to robot technology but also embed it in a very specific narrative: That of robots actively and intentionally approaching to steal human jobs. This narrative – in its extremes packed with references to "robot overlords" and even the end of humanity – is not only "a convenient, faintly ominous, and click-generating shorthand for referring to the phenomenon of automation in the workplace" (Merchant, 2019). It is also a way to express the perceived inevitability of ever-increasing automation, and the apparent helplessness of the average person in the face of more and more traditionally human tasks being automated. This process goes beyond the automation of simple physical tasks and increasingly includes "soft" skills like social interaction, caretaking, or creativity. In the context of media discourse, the perceived inevitability of advancing autonomous technology is – once again – met with references to a curiously specific science fiction-inspired narrative. Not only is the active involvement of human agents pushed to the background. Robots – here understood as a stand-in for automation in general – are framed to be coming from a predetermined future. These robots want to steal human jobs, and a takeover of robot overlords appears to be practically inevitable (e.g. Corbyn, 2015).

Presumably, most journalists and readers are well aware that it is not robots who decide to purchase and install themselves in factories and personally fire the employees whose tasks they take over. As Astra Taylor (2018) suggests, a brutally honest headline would be: "Capitalists are making targeted investments in robots designed to weaken and replace human workers so they can get even richer". Obviously this is not very catchy. Therefore, typical headlines instead refer to an active, physical approach of robots – such as: "Robots are Leaving the Factory Floor and Heading for Your Desk – and Your Job" (Corbyn, 2015). Robots are almost routinely framed as acting on their own initiative, while human agents – such as manufacturers or customers – are effectively backgrounded (Leeuwen, 2008, p. 29). An analysis of the representation of military robots in the mass media and in Department of Defense press releases similarly observed that, while there usually "is some reference to the social actor elsewhere in the text, … their role in the represented action has been de-emphasized" (Roderick, 2010, p. 238).

When robots are described as coming for human jobs, there is already a certain attribution of intentionality as the driving force: "Yes, the Machines are Getting Smarter, and They're Coming for More and More Jobs" (Tufekci, 2015). This intentionality is frequently framed as something dangerous, the

idea being that once we let robots out of our control they will follow their own – often malicious – agenda. Individual reports and articles usually only use one or two specific references. Taken together, these references assemble into a curiously stable narrative that sounds as if plucked directly from a science fiction novel. A science fiction novel with a decades-old and very specific niche narrative in which robots' agency and intentionality are directed against humanity. A narrative that reportedly already felt outdated to science fiction legend Isaac Asimov himself in the 1950s (Nof, 1985, p. xi). This narrative of robots rebelling against their human masters is a common trope in science fiction literature of the twentieth and twenty-first century (cf. Chapter 1, Section 1.3). It mirrors the historically troubled and competitive relationship between workers and machines, as well as the perceived threat to human agency over the means of production (Meinecke & Voss, 2018). This narrative can be traced back to the Czech play "R.U.R." (Čapek, 1920) and has been retold and modified many times, from short stories by Isaac Asimov to television series like "Battlestar Galactica" (Moore, 2004) and movies like "Ex Machina" (Garland, 2014). Inspired by this, autonomous technology is described in the news media as, for example, being "on a mission" (Alba, 2016), "eager" to do something (Glaser, 2016), "willing to kill" (Sample, 2016), needing to be "tamed" (Stone, 2015), being allowed to "have free reign of the house" (Gibbs, 2016b), "stealing" jobs (Vardi, 2016), "infiltrating … assembly line[s]" (Paur, 2013) or "escap[ing] the factory floor and star[ting] conquering big cities" (Simon, 2017a). It is no accident that the plot line of the Terminator movie franchise – in which machines take over control of the world – is one of the most referenced stories.

The narrative of robots' negative power over humanity moves between stories of a more or less unfriendly competition on the labor market and predictions of outright genocide. Next to many articles framing robots as only interested in our jobs there is a huge section of the discourse discussing robots as a threat to human identity (cf. Złotowski, Yogeeswaran, & Bartneck, 2017), featuring very explicit descriptions of an apocalyptic future in which robots will destroy humanity. References range from a robot vacuum "trying to eat its owner's head" (McHugh, 2015), to smart robots "casting out workers from factories and offices" (Hagelüken, 2016), to "AI, robotics, and autonomous vehicles all unit[ing] in a winner-takes-all battle against humanity itself" (Bishop, 2014). The basic plot of robots wanting to take our jobs is followed by the idea that robots will "go rogue" at some point (e.g. Ambasna-Jones, 2016), breaking loose from human control, even plotting revenge against the humans who treated them badly. This specific narrative was particularly popular in the cov-

erage of the "tortured" Atlas robot: "Engineers have been filmed beating, pushing and torturing a humanoid robot in video that could one day be seen as the beginning of the war between man and machine" (Griffin, 2016), "When robots inevitably take over the world, remember this video" (Koerber, 2016). The narrative continues with robots actively trying to take control over the world in a "rise", "march", "uprising", "rebellion", or "revolution", in which they are expected to resort to outright, systematic violence. For example, Amazon's warehouse robots are frequently referred to as an "army" (e.g. Chang, 2014; Thielman, 2016) and robots posing a potential competition for human workers are often framed as an "attack", "invasion", or "war" (e.g. Epstein, 2016). Finally, the narrative goes, robots will "take over" (e.g. Bostedt, 2016) and assume the role of overlords.[7]

In some variations, the narrative even escalates towards an apocalyptic end of humanity. In line with the idea that eventually all traditionally human jobs will be automated, this dystopian narrative frames the conflict with robots as something not only relevant for those whose jobs are threatened, but for all of humanity. Robots becoming more and more similar to humans triggers, on the one hand, discussions of human-machine distinction, of "what it means to be human" (Chatfield, 2016) and the "future of (hu)mankind" (Burton-Hill, 2016; McMahon, 2015). On the other hand, it causes robots to be perceived as a threat to our very humanness – be it as competitors in a "race" (Hagelüken, 2016; Thielman, 2015), opponents in "mankind's war with the robots" (Epstein, 2016), or as an outright existential threat of "the end of humanity" (Biggs, 2016; Robbins, 2016). This highly dramatic timeline is a conglomerate of tropes, but almost never referred to in its entirety. Instead, news articles usually refer to little snippets of the narrative, implying that readers already know the story very well. So well, that important aspects of the narrative are often used with the definite article, and occasionally even capitalized like proper nouns – such as "The Robot Revolution" (instead of "a robot revolution").

7 The trope of robotic overlords has become so common that a mocking counter-trope has appeared. It can be traced back to the quote "I, for one, welcome our new insect overlords" from the film adaptation (B. I. Gordon, 1977) of a H.G. Wells (1905) short story. "Its phrasal template 'I, for one, welcome our new X overlords' has been widely used to express mock submission towards an obsessively controlling individual for the sake of humor" (Know Your Meme, 2012). The variation "I, for one, welcome our new robot overlords" has become such a staple that it is frequently used for introductions of new robot technology.

At the same time, this specific narrative is presented not only as a predetermined future waiting for the present to catch up, but also as a physical location from which certain robots are coming from. Here, robots are typically described in a way that attributes a strong agency and even intentionality to them. They are approaching us from the future, their arrival apparently something we as humans do not have any control over, with all agency lying in the hands of the robots themselves: "2017 was the Year the Robots Really, Truly Arrived" (Simon, 2017b).

The highly dramatic narrative chain of events is not only referenced over and over, it is persistently framed as not as a possibility, as a hypothetical, fictional future, but as a predetermined timeline of future robot technology development. This way, articles reporting on technologies of the present also appear to prepare the audience for a "known" future in which robots will take over: It is "only a matter of time" (Hamill, 2016), "the only question is when, not if, humanoid robots will work, play and war beside us" (Belfiore, 2014). The present simply appears as not having reached the start of this timeline yet. That it will start at some point is undoubted: "The day … draws inexorably closer" (ibid.). Even present technological developments are constantly compared to their "predicted" counterparts. Whenever a sufficient overlap is perceived it is interpreted as the future having "arrived" (Fetterman, 2016) or us "already living in the future" (Stone, 2015). Certain developments in robotics are even referred to as a sign that the anticipated disastrous ending – the Robot Apocalypse – is already in sight. Robot platforms measuring up to the expectations set by fiction are therefore popular illustrations for anything considered remotely robotic – such as the few commercially available humanoids (e.g. Pepper, Nao) and those staged as sufficiently impressive in demonstration videos (e.g. Atlas). If, however, a new robot technology does not live up to the predictions and expectations, this is not necessarily understood as indication for the predictions being wrong. Instead, it is described as a temporary delay – typically observable in comments that some expected robot capability is "not yet there". For example, in the 2015 DARPA robotics challenge, research teams competed by having their state of the art robots complete an obstacle course simulating the aftermath of a disaster like the Fukushima catastrophe. From a robot technology perspective, the – mostly humanoid – robots showed impressive abilities. Media reactions, however, were steeped in both apparent Schadenfreude and relief in the view of robots failing to complete seemingly simple tasks like opening a door (Guizzo & Ackerman, 2015). Even renowned robotics professor Rodney Brooks was com-

pelled to comment that "anyone who is worried about the robot apocalypse just needs to keep their doors closed" (cited in Keay, 2015). However, even in the face of the slapstick-like robot fails the discourse was steered towards the apparently inevitable Robot Takeover. Readers were asked to "laugh … while [they] can" (Tabarrok, 2015), "with whatever short-lived impunity [they] may still have" (O'Connor, 2015).

Even when the alluded-to future is not one explicitly predicted to end in the Robot Apocalypse, robot technology is almost always expected to evolve into something more human-like than today. Even the robotics news site Robohub, analyzing past and possible future trends in robots in an article titled "Envisioning the Future of Robotics", illustrated the predicted evolution of robots from less to more humanoid, referencing famous illustrations of apes "evolving" into humans (Mayoral Vilches, 2017). In this sense, attributions of animacy to robots are used to show how close to the future a specific technology is perceived to be.

5.5. Switching Perspectives: In/Animacy Attributions as Constructive Practice

The role of animacy attributions appears to be minor when they are quantified by the proportion of text they take up in individual articles. However, the typical positioning of animacy attributions within and around an article gives them substantial impact. In the context of specific news articles, "flashy" references to robot animacy are usually positioned strategically where they can attract attention or drive home a critical standpoint on automation. Typically, these references can be found in a headline, "punchline", or illustration. In this, they often stand in contrast or even contradiction to the tone and content of the rest of an article, which typically discusses robot technology in a more matter-of-fact manner. A headline like "Robots Instigate Revolution in the Workshop"[8] (Menzel, 2017) conjures images of humanoid robots mounting the barricades in a factory hall. The article below this headline, however, simply reports that "car manufacturers will increase the use of robots" and does not imply in any way that robots are deciding anything by themselves – least of all a revolution. Under the headline "Plant Biologists Welcome Their

8 Translated from German by the author.

Robot Overlords" – raising visions of similarly science-fiction inspired scenarios – we read that "old-school areas of plant biology are getting tech upgrades that herald more detailed, faster data collection" and no mentions of overlords (Ledford, 2017). And under the headline "New York State Creates Group to Study Rise of Robots" we do not find a report on scientists observing the approach of a robot army but learn that "New York state will convene a panel to study the impact of artificial intelligence, robotics and automation on the state and suggest areas of potential regulation" (Vielkind 2019). And vice versa: A concluding sentence like "The idea is that biohybrids could be very cheap to produce, and they would just biodegrade once they outlive their usefulness" is followed by a snarky "Or, you know, they could start multiplying and take over the world" (C. Smith, 2016).

Articles discussing an emerging robot technology expected to "inevitably" (cf. Section 5.4) play an important role in the future often use a combination of the negation of animacy and the word "yet". A sentence or headline might explain that robots do not have certain advanced abilities, which could make them appear animate. Crucially, however, the sentence ends with "yet" – implying that it is only a matter of time until those abilities emerge: "Robots aren't stealing our jobs, yet" (O. Smith, 2015).

In the in the vast majority of cases we find animacy attributions not in the text itself but in the image(s) placed next to the text. Especially pictures of humanoid robots – both real and fictional ones – are ubiquitous (cf. Section 5.4) and often create an almost absurd contrast to the written article. For example, an article which explicitly tries to distance itself from science-fiction tropes by stating "We are not talking about the artificial intelligence robots of Hollywood dreamers … In the real world this is much more mundane and more immediate", is accompanied by a picture of a fictional humanoid robot from the movie "Robot & Frank" (Schreier, 2012), captioned "Could fiction soon become reality?" (Ambasna-Jones, 2015). An article on autonomous weapons, referred to as "killer robots" in the headline, is illustrated with a picture of small humanoid Nao robots playing soccer (Dreifus, 2019). An article on image recognition software is placed next to a big picture of the humanoid Pepper (Schmundt, 2019).

While interacting with such an article readers are submitted to a constant switching of perspectives on robot technology: From a headline alluding to robots having intentionality ("Want to steal your job"), to a dry report on the management of a company announcing to automate certain production tasks, to a punchline referencing robot overlords, to an illustration featuring a cute

humanoid robot, captioned with a neutral reference to the article text. Over the course of the reading process the technology in question changes frames, from "animate" to "inanimate" and back, several times. While tone and focus vary with the type of article and publication, this switching is observable across the whole sample of analyzed articles, independent of the style.

We encountered this constant change of perspective already at our earlier stops along the life cycle of robots, in our explorations of research and development practices, of demonstrations, science communication, and marketing. Just as in these other contexts, also in media discourse the switching of attributions of in/animacy to robots has context-specific constructive functions. In media coverage of both, specific robotic technologies and technological progress in general, pictures of futuristic humanoid robots and references to dramatic dystopian narratives appear to do an excellent job at attracting readers' attention. Not only that, comparisons to well-known fictional narratives can make a difficult to grasp technology tangible and imaginable. Moreover, references to well-known tropes like the Robot Apocalypse can serve as a comment on the seemingly inevitable saturation of society with autonomous technologies.

At the same time, the majority of analyzed articles also attempts to give a reality-based perspective on the technologies in question, focusing on technical details and limitations. The constant switching of perspectives, between robot animacy and inanimacy, has a constructive quality. It is a reflection of the complexity of the topic, and of journalists' attempts at satisfying multiple demands: That of attracting an audience, that of informing the audience, and that of commenting on current societal developments.

However, it appears that attributions to robot animacy, the forms discussed above, have become such a staple in media discourse that their use has become somewhat opportunistic. References to science fiction and images of humanoid robots often are not selectively and constructively sprinkled among fact-based information, but appear to be routinely pasted on everything that remotely resembles a robot. This practice has been drawing criticism, as the next section will discuss in depth.

5.6. Critical Discourse: Animacy Attributions as Traffic Bait?

The common practice of overpowering depictions of robots as inanimate machines with Terminator pictures and references to the Robot Apocalypse does

not only generate favorable reactions. The treatment of fictional narratives as predictions of the future, painting a picture of an inevitable dystopian future of humanoid robot overlords, as well as the frequent use of misleading headlines and visualizations – a practice which is usually considered a journalistic faux-pas (Schenk, 2007, p. 122) – are facing criticism from both within the journalism community and the robotics and AI community.

With the mass media as a main source of information on scientific developments for the lay public and policy makers (Schenk, 2001; Summ & Volpers, 2016), the way robot technology is presented and framed in the media can have far reaching consequences – from "setting the agenda" (Lippmann, 1922; McCombs & Shaw, 1972) to critically shaping public opinion, legislation, and further technological progress (as Chapter 7 will discuss in more depth). For example, the New York Time's coverage of robotics promoted the extensive development and use of social robotics in the US (Russett, 2011) – not by directly praising certain robot technologies, but "by creating … opportunities" or "niches" which robotics "could usefully occupy" (Arthur, 2010, p. 174).

Interestingly, the media-critical discourse also takes place within the same publications that regularly employ the very practices facing criticism. The Guardian – which routinely features articles referencing robot animacy and illustrates most of its articles on AI with pictures of humanoid robots – also published articles titled "The Media are Unwittingly Selling Us an AI Fantasy" (Naughton, 2019) and "How the Media Gets AI Alarmingly Wrong" (Schwartz, 2018).

While academic publications on the issue are still rare, the bulk of critical reactions ranges from heated discussions on social media among AI ethicists and communication scientists to dedicated journalistic articles. They point out the "epidemic of AI misinformation" (Marcus, 2019b), the "fantasy-based" (Fernaeus et al., 2009, p. 280) "unhinged discourse" (Schwartz, 2018), and that "robots aren't going to kill you" (Buchanan, 2015). Some of the criticism is quite harsh: Journalists are accused of being "clueless", "willfully ignorant" (Sofge, 2015) and "opportunistic" (Schwartz, 2018) when it comes to robots and AI, "callously traffic-baiting" (Sofge, 2015), "spreading misconceptions" (A. Guzman, 2017), "misrepresenting research for the purpose of generating retweets and clicks" (Schwartz, 2018), and "amplifying industry's self-interested claims" (Naughton, 2019).

Especially the ubiquitous references to science fiction narratives face criticism. For example, Isabella Hermann (2019a) argues that they are not a suitable base for a societal discourse on AI; that, on the contrary, they distract

from the really relevant opportunities and challenges. Hermann (2019b) also points out that "robots in films … tell us little about technical progress or the pressing challenges of digitalization and artificial intelligence, but all the more about ourselves". Similarly, Lisa Meinecke and I (2018, p. 208) argued that considering science fiction as a kind of societal wish list for the future means disregarding that these narratives are not a neutral repository of ideas about technology or a road map to the future. Rather, they are a reflection of the values, hopes, and anxieties of the cultural context they originate from.

This criticism of the animistic treatment of robot technology is particularly directed at the media. However, as we saw in Chapters 3 and 4, also roboticists themselves face this criticism – be it in the context of robot design, human-robot-interaction design, or science communication and marketing. We will revisit this issue in the following final chapter.

5.7. Summary

References to robot animacy are ubiquitous in the news media: In discourses of promise or peril, of fascination or repulsion, and across all journalistic styles; in science-oriented and problem-oriented articles, in enthusiastic reports on a new robot technology, in pessimistic essays lamenting the imminence of a machine-controlled dystopia, and between dry descriptions of the newest sales figures of industrial robotics in the automotive industry. In all these contexts, robots and other autonomous technology are regularly framed and (re)presented as possessing human-shaped, even biological, bodies, as well as emotions, goals, and intentions.

Most instances of animacy attribution in media discourse can be observed in one of two contexts. Firstly, in the context of discussions of autonomous and autonomous-appearing technology – independently of whether this technology is really "robotic" in the technical sense. References to human-like characteristics are used to make complex and difficult to grasp technologies tangible and imaginable for a lay audience. In this context, animacy attributions range from comparisons with real and fictional humanoids to references to traditionally human tasks and even mentions of personhood and individuality. Secondly, we can observe animacy attributions in commentaries on the seemingly inevitable saturation of our environment with autonomous(-appearing) technologies. In this context, we find references to an apparently "predetermined" future – strongly inspired by specific science fiction narra-

tives in which malicious robots want to, or even succeed to, "take over" the world.

While most instances of animacy attribution take up little space, their typically opportunistic placement in headlines, punchlines, and pictures gives them considerable force, letting them overpower any otherwise fact-focused depictions of robot technology. The impression while reading such an article is that of a constant switching of perspectives, from robots as animate beings, to robots as inanimate machines, and back again. This switching reflects the multiple challenges of reporting on a complex emerging technology: attracting the audience's attention, informing on the technology, making it tangible and imaginable, and at the same time commenting on its societal consequences.

This predominant style of media reporting on robot technology and artificial intelligence is at the center of a lively critical discourse – both in the communication science and in the robotics and AI community. Critics are concerned that the framing of robot technology as quasi-animate constitutes a dangerous misrepresentation of the current state of the art of robot and AI technology.