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The Force of Communication

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The things around us, having become media, have started to address us. Their first utterances went unnoticed: for years, our cars have loudly insisted that we fasten our seat belts. Informed by sensors, they scream as if they feared for their bodies while being parked or shout for help when they reckon that someone else, whom they do not know, wants to take them. This mode of communication quickly spread to the house. Now the robotic vacuum cleaner eagerly informs us when it is stuck and asks us to "move Roomba to a new location." And driven by new advances in natural language processing I have explored elsewhere (Bunz and Meikle 2018, 45–67), intelligent personal assistants with names like Siri and Alexa wake up to address us when they hear someone calling their names—in contrast to our fellow humans, who ignore everyone around them while under the spell of a screen. When things became interactive, they established a new kind of dialogue with us, the humans. To use technical interfaces today means to communicate with technology. Of course, it is not technology itself that has raised its head and started to speak. Even though it has learned to communicate, it has not become a human subject, although it has always been more than an object. Heidegger ([1954] 1977, 4) had good reason to look *further* into the agency of technology by reconsidering what is usually taken

for granted—"technology is a means to an end. . . . Technology is a human activity"—thereby questioning the instrumental definition of technology. Now that our technological devices have started to address us with multiple voices, we need to continue his analysis. So in what way can we investigate how technology addresses us without thinking it is speaking to us? For this is certain: when technology starts to speak, it is not technology we hear. Still, this is a development that is transforming our contemporary discourse and, with it, what can be called our "being with technology." This essay explores the force of digital communication, starting with a methodological discussion of how to approach technology. Having clarified this, it then links different aspects together: communication theories and the way we are addressed by digital media, child psychology and computer science, interface design and political theory. But let us start this endeavor by looking at what happens—what forces speak—when we communicate.

Being with Technology

Communication theories have always suspected that communicating with media *transforms our being in this world* in various ways. This section approaches these theories and this transformation in three ways. First, it summarizes historical theories of communication to foreground their common assumption, namely, that there is a *force* happening when we communicate. To understand where this force is generally located when it comes to digital technology, it then turns to contemporary theories. Finally, it discusses technology as a situation: the situation of being addressed by digital technology. But let's start with historic takes on communication.

Over the years, theorists have developed very different takes on communication. Yet, one assumption has always been at the heart of all theories: there is a force happening while we communicate. The following communication theories illustrate this, although the list is by no means exhaustive:

Shannon. An interest in the force of communication can already be noticed in one of the early theoretical takes on communication, in Claude Shannon and Warren Weaver's (1949) *The Mathematical Theory of Communication,* which my coauthor Finn Brunton discusses with brilliance and in more detail in chapter 1. Their theoretical concept of information implies that the capacity of a medium defines its possibilities to produce meaning, thereby claiming a certain dependency on the transmitting medium. Inspired by their theory, the German media theorist Friedrich Kittler (1999, xxxix) would condense this later to the claim that "media determine our situation, which—in spite or because of it—deserves a description."

Derrida. The French philosopher adds to this perspective (that something else is going on when communication is happening) by observing that communication also does not simply transmit content. As he points out in his well-known essay "Signature Event Context" (Derrida 1977), sending a message relies on its fundamental capacity for displacement. The fact that a message functions after it has been sent from A to B means that it "breaks with its context" (9) and has an "iterative structure, cut off from all absolute responsibility." In other words, one can never be certain of its meaning.

Williams. The cultural critique points again to a very different aspect, one more related to the link of communication with "communion." In his *Keywords: A Vocabulary of Culture and Society,* Williams (1985, 72) discusses the force of communication that lies in its distributive act: "make common to many, impart." When communication makes something common to many, however, two very different things can happen, as Williams points out: it can "transmit" in "a one way process" or "share" (72). In this capacity,

communication has the force to manipulate as well as to integrate and foster participation.

Haraway. Not far from this position, we find the important take of Donna Haraway on communication technologies. In "A Cyborg Manifesto" (Haraway 1991), she points to a very specific force by showing that communication technologies create social relations that structure our identity, which means that they can also restructure it. Haraway thus points out that they can be "crucial tools recrafting our bodies" and that "they should also be viewed as instruments for enforcing meanings" (Haraway 1991, 164). According to her, communication can be a discursive weapon.

Although the preceding approaches articulate very *different* perspectives and motives, all of them notice *a force* happening when there is communication—a force that is shaping our situation through shaping the possibilities of communication (Shannon and Weaver 1949), a force that can never be fully controlled (Derrida 1977) and, from a very different perspective, a force that can reach but also manipulate the many (Williams 1985) as much as it can be used as a weapon (Haraway 1991) to restructure our discourse. This chapter continues their productive suspicion that communication is always more than a transparent exchange of information. By looking into the specific case of digital technology, it explores the hypothesis that the rise of digital media is accompanied by a specific force, which differentiates it from other technologies. To enquire about this, it is necessary first to look into the theoretical setup of digital media. Can such a force also be located when it comes to digital technology?

When approaching this question, one quickly notices a rather confusing situation. Recent studies of digital technology (Bratton 2016; Chun 2016; Crawford and Joler 2018; Gitelman 2013; Starosielski 2015) have rightly pointed out a feature specific to digital communication, which is shaped by a situation far more

complex than a "communication channel." Bratton (2016) has most explicitly developed this thought, showing that the technical layers of the internet's OSI architecture, by now grown into a network of planetary scale, can be described as a "stack." To explore communication, different layers of this "stack" must be taken into account: the material communication layer providing energy and matter, controlled by an optimization layer and used by an application layer (53), for example. Here network communication challenges previous theories of software.

Being written in code, software has been organized by two strands of communication and, with it, two interfaces: one for the machine (an interface whose alienness Finn Brunton explores in chapter 1 of this volume) and one for the user (an interface whose alienness I explore here). Their conflating layers are the reason why Wendy Chun (2011, 3), informed by her double degree in both systems design engineering and English literature, has called software "a notoriously difficult concept":

> Software perpetuates certain notions. . . . It does so by mimicking both ideology *and* ideology critique, by conflating executable with execution, program with process, order with action. Software, through programming languages that stem from a gendered system of command and control, disciplines its programmers and users, creating an invisible system of visibility. (Chun 2008, 316)

The disciplinary machine that software is affects programmers and users alike, as Chun points out. Following her, Alexander Galloway (2012) has addressed the interface as effect and ethos to make a similar point: interfaces do not simply transmit our messages; instead, they open—or enforce?—a very particular dialogue with technology, a point that needs to be pondered for a moment.

When discussing digital media, media theorists have often differed over where the force of digital technology originates. That there is a force, they agree—the algorithmic, as, for example, Rita Raley (2016) pointed out in her precise essay on algorithmic translation,

is not purely mechanical. But where is it that media and technology scholars have to look? Do they need to look at the code with which a programmer is communicating and to which Paula Bialski turns in chapter 3? Or is the force located in the graphical user interface communicating with the user? When approaching digital technology, we too often follow "the logic of what lies beneath," as Chun (2011, 20) notes, even though "code is also not always the source, because hardware does not need software to 'do something'" (25). To make things even more complicated, further technological developments have stressed different parameters, such as data (Gitelman 2013) or machine learning architectures (Mackenzie 2017), and more parameters at the moment still unknown will follow. Thus, when looking at digital technology, this chapter assumes that for the process of communication, multiple interconnected layers are playing a part. Being interested in a very specific aspect of our dialogue with technology, however, this chapter does not focus on each of those layers but studies one particular moment: the moment when technology is addressing us. Whereas Brunton before me turns to Licklider to explore the complex setup that enables machines to communicate with each other, and Bialski in the next chapter turns to programmers to study the code review process, my chapter looks at the situation that enfolds when machines communicate with us. For this, it first needs to clarify its method of approaching technology.

As stated earlier, when technology communicates with us, it is not technology itself that raises its head and starts to speak—technology is *not an acting subject.* As Heidegger has pointed out, technology has also always been *more than an object*; that is, it has always been more than a means to an end. If it is neither a subject nor an object, however, how can in our case the force of communication regarding digital technology be approached? Here Hannah Arendt's ([1958] 1998, 151) short take on the problem of technology, which she develops while discussing the transformation of human life through technology, points our thoughts in an interesting direction:

> The discussion of the whole problem of technology, that is, of the transformation of life and world through the introduction of the machine, has been strangely led astray through an all-too-exclusive concentration upon the service or disservice the machines render to men. The assumption here is that every tool and implement is primarily designed to make human life easier and human labor less painful. Their instrumentality is understood exclusively in this anthropocentric sense. But the instrumentality of tools and implements is *much more closely related to the object it is designed to produce.* (emphasis added)

Here Arendt states that any given technology is more closely related to another technology than to a human subject. To her, technology is driven by an immanent ("closer") relation. This does not mean, however, that technology acts as a subject that masters the human. Humans play a part in the development of technology, which becomes clear in an "important assumption" added by Arendt: "that the things of the world around us should depend upon human design and be built in accordance with human standards of either utility or beauty" (152). Pleading for human standards, Arendt shifts the focus onto technology in an interesting way. She approaches it more *as a situation* and less *as a subject,* which becomes explicit in the following quotation: "The question . . . is not so much whether we are the masters or the slaves of our machines, but whether machines still serve the world and its things" (151). This chapter follows her approach when studying the force of communication by investigating how technology as a situation can be thought of in more detail. What should be examined? How does a technical situation need to be studied? To answer these questions, the chapter links Arendt's approach to Gilbert Simondon, with whom her take on technology resonates.

Like Arendt, Simondon (2017) finds our understanding of technology fundamentally flawed. Instead of emphasizing curiosity or understanding, Simondon critically remarks that our usual

approaches toward technology oppose humans and machines (15). To overcome this, he rethinks this relation. In the chapter "Evolution of Technical Reality: Element, Individual, Ensemble," he describes how technical evolution is not driven by men or machine but by an "ensemble" of the two. There is no master anymore who is in control of the process of a technical development. And this shift from a master relationship to an ensemble raises a question: instead of a gifted inventor or mad genius, what drives the development of technology?

For Simondon, similar to Arendt, the answer lies in the productive relations between men and technology, which create a process of "concretisation" (Simondon 2017, 33; also Iliades 2015). He sees this, for example, in the development of X-ray tubes: regarding the Crooks tube and its later "successor," the Coolidge tube, Simondon finds the engineer William Coolidge elaborating on technical functions of the already existing Crooks tube. Coolidge "purified" them to improve the tube's functioning—a process of concretizations in which specific aspects of an already existing technology get further developed: "the functions are thus purified by their dissociation, and the corresponding structures are more distinct and richer" (36). Instead of being struck by a flash of genius, it is the "technical reality" of the Crook tube that inspires the new product. Thus it is the technical reality itself that fosters further development, although this reality needs the human to concretize: "machines can neither think nor experience [*vivre*] their mutual relation; they can only act upon one another in actuality, according to causal schemes." With this, the role of the human comes into play: "Man as witness to machines is responsible for their relation" (157).

Neither human nor technology can initiate the process of further development on its own. They need to relate to each other. With the human as an *enabling witness,* the relation of man and machine can be sketched as an *ensemble* instead of as an opposition. This puts the human in a very distinct role: the human is *not master* of machines digital or mechanic but their *interpreter.* In Simondon's (2017, 150) words, "man understands machines; for there to be a

true technical ensemble man has to play a functional role between machines rather than above them" (see also Combes 2013, 57). Here the concrete technical relation of a technical object to its milieu describes an immanent development driven by "concretisations" that are nondirectional. Fascinated by constant technical change, Simondon (2012, 13) will later describe technology as characterized by an "*opening*": "technical reality lends itself remarkably well to being continued, completed, perfected, extended." Thus, in the middle of this, one finds an interesting tension: technology puts forth a situation that then needs a human to continue, complete, perfect, and extend it, in short, to turn it into reality. At the same time, technology follows its own, alien logic in what it offers to be continued, completed, perfected, and extended. We cannot predict the future of the technology we have invented. Even in the twenty-first century, in which we are facing a field as closely guarded as an economy driven by digital technology, we are never certain which technology will become the "next big thing."

Technology is a force alien to us that has now started to speak and process language. But just because it has started to process language and can now say something, we should not mistake it for a speaker. *Being with technology* instead means to approach technology as a technological ensemble, as a continuously developing situation made up of humans and technology. Thus we need to study what kind of situation unfolds when technology communicates with us as we aim to avoid treating technology as an anthropocentric subject that acts and/or speaks. Luckily, a blueprint for the power of communication that does not stem from a subject (although a subject is involved) can be found in the concept of interpellation Louis Althusser introduces when discussing the notion of ideology.

Althusser's notion of ideology evolves around an interesting shift. While he analyzes communication (or interpellation), he does not look at what is said or what can be said. Instead, Althusser (2014) focuses on the situation created when being addressed and the force of this address. In his essay "Ideology and Ideological State

Apparatuses," he analyzes the structural force happening in the moment of communication. Using the example of a policeman calling out to you on the street, he illustrates that communication situates (even appropriates) its participants by establishing a link between sender and receiver in the act of interpellation: it constitutes a subject. His description of this constitution has turned into a highly influential theory of interpellation, although it is less a "theory" than just a few paragraphs. In those paragraphs, Althusser shows that a specific social role—in his words, a "subject"—comes into being by "the practical telecommunication of hailings" (264). To illustrate how this "hailing" or "interpellation" functions in the context of ideology Althusser introduces an individual that turns around in response to a policeman shouting "Hey, you there!" (264) to "answer" that call. And in exactly that moment, so Althusser, one becomes a subject relative to the ideology of law and crime. In other words, in that moment, one experiences the social force of communication, which Althusser calls ideology: "ideology 'acts' or 'functions' in such a way that it 'recruits' subjects . . . . , or 'transforms' the individuals into subjects . . . by that very precise operation which I have called interpellation or hailing" (264).

In the twenty-first century, this operation of interpellation Althusser described, an operation that creates a situation of recruitment by establishing a link between a sender and receiver, is still continuing. Only now, it can be found in new and different forms of communication—and this is the hypothesis I would like to bring to a test in this chapter: Today, the recruiting of subjects happens when technology addresses us. By interacting with the interfaces of technology, we are situated through this communication and recruited as specific subjects. Of course, that we make a world for others to live in through our technological creations has been an aspect in philosophy of technology, which Langdon Winner (1986, 17) but also Donna Haraway (1997) and many others have addressed in much detail. This chapter adds to those explorations of politics we built into our technologies, although it will be slightly shifting the view. By approaching technology with Arendt as a situa-

tion and by trying to understand the contemporary technological ensemble (Simondon), it will not look at what is being said to us by technology. Instead, it is interested in the kind of situation that unfolds. As what kind of subject are we recruited in that situation? The next section therefore observes the communication with technology to tune into how something is being said when technology addresses us.

How Is Technology Addressing Us?

To capture how technology addresses us, this section analyzes three different examples partly drawing on earlier research (Bunz 2015): it looks at the introduction of Apple's iPad to study its early interface design, considers the brand communication of internet companies and their fondness of mascots, and, finally, turns to the Google Doodles that appear on the landing page of Google search, which one passes by when searching for other information.

On April 3, 2010, Apple's cofounder, chairman, and chief executive officer unveiled a tablet computer it introduced as "iPad." Its new product was operated via a touch screen and could play music, take photos, shoot video, and perform internet functions such as web browsing and emailing; more applications, from games to social networking, could be added. In its first fiscal year following the launch of the new product range, Apple sold 32 million iPads, with 140,000 apps being created for it by December 2011 (*Economist* 2011). One could say that with the success of the iPad, a new era in the relationship between human and computer materialized: the tablet computer showed that digital communication had left the workplace to become a commodity in our day-to-day lives. Computers had certainly entered leisure time with game consoles long before. The iPad, however, could be used for much more than just gaming. It could perform all tasks done by a personal office computer at that time, although it was not supposed for working. Its reduction to a large touch screen that weighed 680 grams made it comparable to a heavy book or magazine that could be

read at home on the couch. It was its slick materiality that differentiated it from a computer as much as its specific user interface.

By that time, screens had been technically refined so that their visual interfaces no longer needed to be operated via minimal black-and-white icons. They could be replaced by touch screens with voluptuous 3D buttons more to the taste of Steve Jobs. As the former CEO of the animated film studio Pixar, he had a passion for reality imitating 3D graphics, as had Scott Forstall, the first architect of iOS, the software developed for the iPhone and iPad. Thus the early iPads had many 3D buttons and other skeuomorphic features each mimicking an original: the Notepad app had a border of stitched leather to make it look like a real notebook, the Podcasts app displayed a reel-to-reel tape deck when one pressed play, and the calendar and contacts apps looked like small books and featured a page-turn animation. Making apps and items mimic their real-world counterparts gave the iPad a stuffy look and feel. This continued in a different way Apple's traditional appeal to nontechnical people. Right from the start, the company had established its computer as a fun-to-work-on machine by including features such as greeting users with a "happy Mac" when starting or by using symbols like the "dogcow" (indicating the setup of a page), scissors (for the cut command), or the trash can, which were created by Susan Kare for the back then still limited black-and-white screens. Now computers had entered a new, advanced, but also more serious era—at least that was the impression Apple gave with their design of the first iPad. Its look and feel communicated to the user that computers had come of age, although not for very long. Technically, all screens from phones to tablets to laptops to PCs were able to display complex, grown-up 3D interfaces. Still, a new and very different trend emerged that soon became more successful than mimetic skeuomorphism.

Surprisingly, the new trend was initiated by Apple's rival Microsoft, which, after the iPhone's success, had already been written off. Faced with the staggering success of Apple's phone, Microsoft

had to respond with an original and different approach: for their handheld devices, the Microsoft designers decided to focus on cards and not on buttons. Eager to avoid Apple's extensive use of skeuomorphism (Wingfield 2012), their inspirations came from the design principles of classic Swiss graphic design, which favors a minimal style, emphasizes typography, and uses a grid that can often be seen on European transportation signs. Instead of buttons, they used text placed on cards, which one could navigate laterally through scrolling canvases. Their typography-based design language came to be known as Microsoft design language. Its principles had originally been developed for Microsoft's mobile media player Zune (2006–8), before they were taken over to the Windows phone, launched in 2010. Although the device did not have the same success as the iPhone, its design would inspire others, Google among them—and Google's logo in fact exemplifies this new and different approach to user communication.

While Apple's skeuomorphic design for the iPad communicated its device as a toy-tool for grown-ups, the flat design Microsoft had initiated would go a very different way—and with it a new form of addressing the user would begin. Early on, Google would be part of this. On Wednesday, May 5, 2010, the search engine Google changed its logo for the first time in ten years and eleven months (Googleblog 2010). The new logo was less skeuomorphic and more colorful. Its three-dimensional letters in red, yellow, and blue, plus the green letter *l* based on the font Catull, lost their drop shadows. The logo had exchanged the rich details of skeuomorphism in their big typography with louder colors and simpler forms. Google's senior user experience designer Wiley explained the change on the search engine's blog as follows: "The new logo is lighter, brighter and simpler. We took the very best qualities of our design—personality and playfulness—and distilled them" (Googleblog 2010). Experts agreed. Already before the change, British graphic designer Peter Saville, known for minimal design like the radio signal cover for Joy Division's album *Unknown Pleasures,* described Google's logo in an interview not just as playful. For him, it was

addressing children: “Everything about it is childlike: the colors, the typeface, even the name” (cited in Rawsthorn 2010).

The redesign intensified this further. Chris Moran, then the *Guardian*’s search engine editorial optimizer, commented on the new look and feel as a turn toward “My First Search Engine” (pers. comm., May 6, 2010). Online, the rise of flat design had begun, even though it would take a while before its triumph over skeuomorphism became recognizable—it was not until 2013 that an animated web page displayed the “battle flat design vs. realism” (Intacto 2013). Flat design opposed skeuomorphic and other “artificial” design techniques in favor of two-dimensional, “flat” illustrations; big typography; and bright colors for a more simplified aesthetic. When the new design became a mainstream trend, however, something else changed—technology would approach the user in a different way. The new design style addressed a very different user—not an adult one. Visually, the style resembled books for very young children. Addressing the user as a very young child, however, was a transformation that did not happen abruptly and not just in one field. With hindsight, years before 2013, the new trend in brand design could have been spotted on the World Wide Web. And although it went unnoticed for a long time, it fundamentally changed how brands approached the user.

Contemporary brand communication generally has a double function: it enables the user to identify a product and, for this, gives the product or service a specific identity or image (Millman 2012; Holt 2004). With the internet, as many marketing books were eager to explain (Levine et al. 2000), brands had to become a conversation. But this was not the only novelty. Online, the rules seemed to be different, which is why several internet companies embraced animals (or aliens). Or was it because they addressed *someone* very different? In any case, if one attentively observed the brand communication of “online” products and services, one could notice that animals had peacefully appeared in large numbers. Next to the fox of the web browser Firefox chirped the blue bird of the microblogging service Twitter, while a little white alien with antennae

accompanied Reddit, a social networking service that provided online conversations for "digital natives," as they were dubbed. And not only platforms but also technology companies seemed to have a thing for mascots, from Tux, the penguin of the Linux operating system, to the black Octocat that had landed on the 404 pages of Github, the web-based hosting service for software development projects. And there were many more, like the bare-bellied chimpanzee with a postman's hat who helped create professional email for MailChimp; or the big-eyed brown owl that had become part of the logo of Hootsuite, a social media management dashboard; or the flying beaver that sat enthroned on the online travel page of a start-up company called Hipmunk. Even a nonmascot service like Facebook introduced a character, the Zuckasaurus, which looks "like a short Barney, the kid's television show dinosaur" (Bilton 2014). Standing on its two feet while checking its laptop, the blue dragonlike dinosaur was first spotted in April 2014, when it started to address users in a pop-up window with the educational concern that it "just wants to make sure you're sharing this post with the right people" (Bilton 2014). In short, animated animals could be found all over the World Wide Web as if it were a fairy tale. Mascots had spread from sports, where they were supposed to bring luck to a team, to the internet, and academic books started to analyze the phenomenon (Brown and Ponsonby-McCabe 2014). In the offline world, brands that were targeting their products to adults generally refrained from using mascots; companies that produced cars, alcohol, or even entertainment electronics rarely considered an animated animal as part of their brand strategy.

Parallel to the appearance of the online mascots, a similar development could be found on search pages: the rise of the Google Doodles, which introduced a new, unique style of commemoration that shared the same tendency. Until 2010, Google had only sporadically changed its prominent search website logo into those "Doodles" to mark an anniversary or event. Although the concept of the Doodle was born at the very start of the company (1998), when founders Larry Page and Sergey Brin changed the logo with

a stick figure drawing to mark their visit of the Burning Man festival in the Nevada desert, the logo was not changed very often. It took two years before they requested a second change to honor Bastille Day, commemorating the beginning of the French Revolution each year on July 14. Before 2010, the logo was changed only on rare occasions. Then one could find a sketch that playfully intertwined the topic of an event with the logo: the birthday of English mathematician Ada Lovelace, Martin Luther King Jr. Day, or Halloween. After 2010, the frequency with which Doodles replaced the logo intensified. In 2010, Google published thirty-five Google Doodles, more than in any previous year. In the years 2011 and 2012, this number went up to seventy-six and eighty-three, respectively, and has gone up ever since. More and more Doodles displayed events or presented persons shaping human history and culture with imaginative cuteness. They started to appear worldwide, thereby taking national cultures into account: Britain celebrated the eight-hundredth anniversary of the Magna Carta (2015), Mexico the Day of the Dead (2013), and the United States the Mexican Hollywood actress Katy Jurado (2018).

Considering that Google is now an essential part of our public sphere—the Court of Justice of the European Union (2014) indicated this by its ruling that natural persons have the right to be forgotten and links to personal data must be erased in this public space—Google Doodles are the monuments we find in it. As we pass by those monuments when searching, we are reminded of important moments that have shaped our human fate. This form of commemoration, however, happens in a rather unique way, different from historic monuments cast in stone and erected on our public squares, which foster a certain symbolism and spread an air of pathos. Indeed, most public monuments in stone or bronze are slightly pathetic, from the Statue of Liberty enlightening the world from Liberty Island in Manhattan to the Soviet War Memorial in Berlin's Treptower Park to the Monument of the People's Heroes in Beijing's Tiananmen Square to Christ the Redeemer in Rio de Janeiro cresting Corcovado mountain. Online Doodle monuments,

on the other hand, turn achievements into playful stories with imaginative cuteness and are supposed to be "fun" (Google Doodles Archive 2018). It should come as no surprise that they more often commemorate birthdays than deaths.

Before judging Google Doodles as "history light," however, it is important to take a step back and get a full view of the transformation. Certainly all three developments—the rises of flat design, brand mascots, and Google Doodles—show a common tendency, as their style is equally defined by colorful surfaces, big typography, and playful stories or mascots, thereby resembling elements we are familiar with from children's books or apps. Thus what is the specific form of interpellation that can be noticed here? How is technology addressing us? To state the obvious, online technology has started to address us as if we were children. The extent of this infantilization, however, only comes fully into view when comparing the described design tendency to an older project designed by Dieter Rams, who helped the company Braun to relaunch an educational toy called Lectron; and like many of his other designs, it became iconic.

Lectron was a modular electronic experimentation kit designed to introduce youth to basic electronic circuits and theory. From 1967 on, the German designer and his team, among them Jürgen Greubel, produced the packaging in a new style, including a redesign of all manuals. Being supervised by Rams, it is not very surprising that the Braun Lectron Hobby Set Radio Receiver (1969) is kept in a minimal style. Contrary to the users of Google's search engine, Apple's iPad, or the service online brands, however, it does not target adult users. As a game, it is tailored to a much younger age group. So how does Lectron approach its teenage user?

The cardboard box cover shows three photographs. Two smaller ones display the white radio set in Rams's minimal design and a detail of a printed circuit board; the bigger photo pictures a black-haired teenager in a buttoned-up blue shirt, who sits in front of components and tools soldering electric parts. Lectron approaches

[Figure 2.1] The Hobby Set Radio Receiver design by Dieter Rams and Jürgen Greubel, 1967. Photograph by dasprogramm.

the technically interested and capable teenager. Contemporary flat design, on the other hand, incorporates design elements for a much younger age group. Its colorful surfaces, big typography, and animated characters are generally design elements used for targeting children aged two to seven—a time during which children are in the sensorimotor stage. Children in this stage, as the child psychologist Jean Piaget has shown, assign active roles to things in their environment (animism), while their activities are mainly categorized by symbolic play and manipulating symbols. It is a stage in

which physical operations are more dominant than mere "mental" operations. Thus the conclusion is obvious: we are addressed by technology as very young children.

Fighting back the natural reaction to all miscategorizations (feeling insulted), this is an interesting outcome to be investigated further by shifting our attention back to the aspect Althusser had in mind when discussing being addressed as a form of power. So what is the effect of this infantilization of user interfaces? What force or form of power play are we facing here? For that we face a form of power play can almost be taken for granted—when technology is communicating with us in this way, it is surely not just transmitting the friendliness of cuddly Silicon Valley companies that commissioned plush toy–like interfaces to comfort us in the exhausting world we live in. To understand this manipulation further, the next section categorizes this infantilization.

How We Are Getting Manipulated

Technology has always manipulated us (Winner 1989, 19), and it does this more openly than ever, since it has started to speak. For this, one does not even need to turn to conversational interfaces, such as Apple's Siri or Amazon's Alexa, quarreling with us if the lights should be on or off. This also can be easily noticed by anyone who has been disciplined by a car's navigation system. In fact, Global Positioning System (GPS) usage is a good example of a simple form of manipulation, as it has turned into quite a dominant system. To get their exact position, smartphones and millions of other devices use GPS, which was launched 1978 by the U.S. government. The system's Master Control Station is located in the Schriever Air Force Base near Colorado Springs, overseeing thirty-two GPS satellites (U.S. Naval Observatory 2018). Currently only Russia operates an alternative system, GLONASS, with Europe and China working on further alternatives. But most cars and smartphone maps use the GPS signal, which is then correlated to a road or a calculated route. The route, however, does not always coincide with reality. A

survey for Michelin (2013) among 2,200 U.S. drivers showed that 63 percent of those who use GPS say that it has led them astray at least once by pointing them in the wrong direction—and some of us obey those directions more than others.

In the United Kingdom, a driver continued to follow the navi's instructions, which told him the narrow, steep path he was driving on in Todmorden, West Yorkshire, was a road. He only noticed the mistake after he struck a fence and his BMW hung off the edge of a cliff. In South Brunswick, New Jersey, a driver ignored the end of a road because it was differently displayed on his navigation system. Following the navi's version of reality, he ignored a stop sign and hit a house. In Australia, three Japanese tourists drove their car into the Pacific Ocean. Their navi had told them there was a road to the North Stradbroke Island. After five hundred meters, they got stuck in the mud, their car being flooded by the tide. In Bergün, Switzerland, the navigation system told a man to turn onto a trail. The trail was for goats. The minivan that he had driven up that trail could only reach the road again with the help of a heavy-lift helicopter. In Italy, two Swedish tourists drove four hundred miles to the wrong Capri. Instead of relaxing on the island with its blue grotto, they ended up in an industrial city in Italy's northern region that bears the same name. In all cases, human judgment was distorted by technology, it seems. But the dialogue between human drivers and advising technology only looks at first sight like a master discourse, in which human servants blindly follow a directing technology. Technology, as both Simondon and Arendt have reminded us, is not necessarily an opposing force that aims to bring humans under control and is wrongly thought of through the template of master and servant. After all, in the preceding cases, the advice of technology could have easily been ignored. Thus one could also say that in most cases, the drivers, often tourists who were not familiar with their environment, followed "their" technology instead of asking other humans for help. In other words, we are part of this manipulation—and the same is the case when we look at patronizing, talkative self-service checkouts.

One of the countries in the West that embraced self-service checkouts early was the United Kingdom. By 2015, Tesco, the United Kingdom's largest supermarket chain, had already introduced twelve thousand of them. To help shoppers understand how to operate the new technology, the checkouts give verbal guidance on how to use them. And their most renowned comment in their early phase became "Unexpected item in bagging area. Remove this item before continuing." The reason for this comment: its pay mechanism has integrated scales. It weighs the item after it is placed in the grocery bag; this is done to ensure that the shopper pays for all the items in the basket. The problem is, however, that the system gets easily irritated, for example, when an item is too light and the second scale fails to recognize it. In these cases, the checkout announces loudly that there is an "unexpected item in bagging area" and soon after starts nervously flashing a light and an alarm sound for everyone to hear and see—the system calls for help, as it needs the reassurance of an assistant. Does it accuse you of being too thick to use it? Or suspect you of being a thief who has just stolen something? Being addressed by it in an Althusserian manner—"Hey you, there!"—we react annoyed. We recognize that other humans who see and hear this might put us into the category of social subjects who have problems using a self-service checkout, which is not very flattering.

Here we experience manipulation: when making you behave in the right manner or advising you to do the right thing, both the self-checkout and the car navigation assistant are forms of disciplinary manipulation, in contrast to those open forms of manipulation we find with infantilization, which do not directly tell you what to do. This seems to be of a different kind, with its interface *not* disciplining us but simply suggesting a situation. Cheerful design signals a simple and unproblematic context. By addressing us as very young children, the playful interfaces of flat design suggest that there is no need to understand anything. Just try it: go press this button, speak to it, create! The simple but colorful appearance signals that the users can be free from second thoughts about the complexity

of the technological apparatuses as well as about the complexity of the world we live in.

We are manipulated into a situation we seemingly don't have to question—and this is why we should pause. For we have reached our first conclusion: having looked at how technology is addressing us, this chapter could establish that it is recruiting us as very young children. But can we really read the situation as technology concealing its mode of operation to lure us into its unquestioned usage? Would this not mean that we have positioned ourselves again in opposition to technology? After all, this chapter does not plan to study the concealed interests of technology companies. Instead, it aims to analyze and understand our *being with technology* by analyzing our current dialogue with it through looking into its actual "concretization" (Simondon 2017); indeed, Simondon discussed the intuitive approach of children toward technology as one way of understanding the being of technology: "One cannot study the status of the technical object in a civilization without taking into account the difference between the relation of this object to the adult and to the child," he writes (106). The technical training of the child is based on practicing with technology bringing forth a "technical subconscious" (107), which can also be understood as an intuitive skill. This experimental skill is a certain intuitive mode of technical knowledge also linked to "experts"; Simondon names the operational knowledge of farmers or of craftsmen about the material they work with. Their technical training consists of "intuition and purely operative schemas that are very difficult to formulate or transmit through any kind of symbolism" (107). Instead of scientific knowledge, the operational knowledge is created through technical realization:

> Technical realization, on the contrary, provides the scientific knowledge that serves as its principle of functioning, in the form of a dynamic intuition that can even be apprehended by the young child, and which is susceptible to becoming more and more elucidated, doubled by a

> discursive form of comprehension. . . . Through technics, encylopedism could thus find its place in the education of the child without requiring capacities for abstraction, which the young child does not fully have at its disposal. In this sense, the child's acquisition of technological knowledge can initiate an intuitive encyclopedism, grasped through the nature of the technical object. (124)

Following Simondon, and linking his understanding of intuitive encyclopedism to our problem if being recruited as very young children, one could therefore also understand the "call" of technology as an invitation to learn about a digital interface. We, however, read this dialogue according to the idea that technology is manipulating us into being its slave users, which seems to be a rather anthropomorphic reading of technology: it treats technology as if it were a human in the role of an acting subject. As pointed out earlier, technology has agency and is a force, but to understand the alienness of this force means to remind ourselves that it is not a human subject that follows a Hegelian interest to subjugate and control other humans.[1] Technology creates specific situations—in this we can find its force—but when creating those situations, it does not follow a specific interest, and this is exactly why Donna Haraway (1991, 161) in "A Cyborg Manifesto" sees the potential for "rearrangements in world-wide social relations tied to science and technology." What is created by technology can always be interpreted in different ways—if its force is understood. Even Marcuse (1998, 42), whose take on technology is generally rather critical, writes that "technics by itself can promote authoritarianism as well as liberty, scarcity as well as abundance, the extension as well as the abolition of toil." Technology is not neutral—its force is that it confronts us with a specific situation or a specific transformation; how this transformation is interpreted, however, and which concretization is going to appear is always adapted by us humans, as we are part of the technical ensemble. To say it with Donna Haraway: "We're living in a world of connections—and it matters which ones get made and unmade" (cited in Kunzru 1997).

Returning with this insight (that technology creates situations, although without interest) to our childish dialogue with technology, reading this dialogue through Simondon's approach of an intuitive encyclopedism, we can still find a negative effect of our infantilization: the creation of a situation that does not need to be further questioned. But can the recruitment of technology addressing us in an infantilizing manner be thought of differently? Can we move beyond the template of master and servant? To follow this question, the next section explores infantilization from a different perspective, by looking at an advertisement of the company that created the style of flat design: Microsoft.

In 2014, Microsoft aired its first national Super Bowl advertisement, a one-minute video produced mainly in-house. Using Microsoft products, it explores technology through the eyes of Steve Gleason, a former NFL player who is battling ASL, a severe illness that attacks nerve cells in the brain and spinal cord that control muscle movement. At the beginning of the video, we hear a computer-generated voice asking, "What is technology?" and see it being written by Steve Gleason, who sits in a wheelchair with a keyboard he operates via eye movements. We see a girl playing with a red windmill. From there, the commercial cuts to symbols that resemble written code, followed by Microsoft's colorful card screen design. Then a surgeon is flipping through large medical images displayed on a wall using hand gestures, followed by a white toy robot, which is about to look at us, as the camera movement suggests. Gleason's next question can be seen and heard: "What can it do?" after which a small boy enters the screen playing baseball standing on two artificial legs, followed by the ninety-eight-year-old painter Hal Lasko, partially blind, painting a colorful landscape with the help of a mouse. Again, Gleason's artificial voice is asking, "How far can we go?" We see pictures of a satellite in the universe, a surgeon using his hand to control an X-ray, and two groups of children cheering each other via a video-chat projection. After this introductory period, the next thirty seconds are grouped around a theme showing the examples of the "power" of technology, as

Gleason puts it: a soldier being remotely present during the birth of his child; a small child freaking out with joy when she sees her dad on the screen; several scientific and medical successes, from the launch of a rocket to a man with an artificial arm moving his hand and the emotional reaction of a women making remote contact with someone on the other side of the screen. It ends with the slogan "It has given voice to the voiceless," showing Gleason in his high-technology wheelchair, a computer helping him communicate, his son on his lap, to whom he now connects directly by raising his eyebrows. The main slogan appears—"Empowering us all"—to be replaced after a few seconds by Microsoft's logo.

The commercial is informed by the topic that frames it—how technology helps, "empowers," those we love and care for to lead better lives—and certainly appeals to our emotions. The majority of the situations depicted in this video are related to health and science. Thus the situations visualized mainly pertain to health or science—generally areas not dominated by children. The video, however, uses nearly as many images of children (as individuals and in groups) as of adults. A content analysis[2] shows nine sequences with the focus on children and twelve with the focus on adults. The reason for images of curious, excited, and playful children lies partly in the task of every commercial: to create appealing images. But there is more to it. That children are playfully discovering technology is also symbolic. This becomes apparent when Gleason's first question opening the video—"What is technology?"—is followed by a sequence showing a small girl in a dress curiously looking at the windmill she puts into motion with her small hand: humans exploring technology. The message of a girl putting a windmill into play (its movement enhanced by a sound effect) is visually answering this question. Moving a windmill means exploring technology. *The usage itself* is an act of exploration—and empowering.

Of course, one can argue that this is a message in the interest of Microsoft: the sheer usage of its commercial products is empowering—and not programming code yourself, as, for example, open source software would allow. Being able to understand

or even program code yourself can certainly be more empowering. Still, this does not fully explain why the question "What is technology?" finds a fitting visual sequence in a child playing with a windmill. Instead of asking what a windmill has to do with digital media or Microsoft, the sequence makes sense. Linking this image to theories of learning and its role for the history of graphic user interfaces, the next section aims to explain why this could be the case.

Logic Is Not a Derivative of Language

The graphical user interface has become a commercial success, although this took several experiments, among them Douglas Engelbart's NLS system, Ivan Sutherland's Sketchpad, SGI's Iris, the two interfaces of the Xerox Alto and Xerox Star, and the Apple Lisa and Apple Macintosh. As such, it is generally referred to as the transformation that helped personal computers to become mainstream (e.g., Chun 2011, 59). Its advantage: it is easier to use than a command line interface. Therefore the graphic interface appeals to users not familiar with coding. This section aims to inquire what it is that makes it easier and how this is linked to the girl playing with a windmill. To show this, it is first necessary to compare the older command line interface with the newer graphical user interface with respect to learning. In principle, both interfaces have the same function: they are ways to command a program. How they approach the user, however, is different. A graphical user interface's windows, icons, menus, and pointer are intuitive elements, whereas the knowledge to operate the command line needs *to be learned beforehand.* A graphical user interface can be operated without much knowledge as it *incorporates the learning into its usage.* Learning theories in fact played an important role in its development. Discussing the work of mathematician Seymour Papert (1963, 1968), who collaborated closely with child psychologist Jean Piaget and also influenced the computer scientist Alan Kay, this section takes a look at the connection of learning theories to computer science in general and the graphical user interface in particular.

When developing new approaches to artificial intelligence, Papert had come across theories of learning by child psychologist Jean Piaget. The South African had met Piaget when he spent time in Paris as part of his second doctorate in St. John's College in Cambridge and decided to follow him to his Institute in Geneva to apply his theories to artificial intelligence, a field that found itself in its golden years from 1956 to 1974, driven by new discoveries and funding. More precisely, Papert's aim was to enhance machine learning by incorporating Piaget's ideas of the learning of children, although their interest was mutual: Piaget endorsed Papert's cybernetic approach and published many of his articles in his journal *Études d'Épistemologie Génétique.* Known today as a child psychologist, he understood himself as a scholar of epistemology exploring theories of knowledge with the aim to establish a new approach toward understanding. And it would be the graphical user interface that would pick up this approach to show that children's learning can indeed be applied to adults' learning too.

Interested in multiple ways of knowing, Piaget turned to children's learning as a unique form of interacting and theorizing. Curious about their thinking, he took their logical reasoning seriously, even when their thinking led to "wrong" answers. His nonjudgmental approach enabled him to describe four universal stages of cognitive development that are still relevant to contemporary psychology. More important in the context of this argument, however, is something different: central to his approach was the hypothesis that for human understanding and learning, the act of reasoning (the work of the mind) is as important as practical or experimental understanding (the work of the fingers and mind together). When observing children between the ages of two and seven, Piaget recognized a specific way in which children play. He saw in children's sensorimotor approach a form of learning—thinking with fingers—most important when we are very young children. From this, he concluded that logic is formed not only in the brain:

> I believe that logic is not a derivative of language. The source of logic is much more profound. It is the total

> coordination of actions, actions of joining things together, or ordering things, etc. This is what logical–mathematical experience is. (Piaget 1972, 13; see also Piaget 1969, 90)

Piaget developed what has come to be known as constructivism, an approach that viewed learning as a reconstruction rather than as a transmission of knowledge. It valued experience highly and understood playing—the manipulating of materials—as a way to create knowledge:

> To know an object, to know an event, is not simply to make a mental copy, or image, of it. To know an object is to act on it. To know is to modify, to transform the object, and to understand the process of this transformation, and as a consequence to understand the way the object is constructed. . . . In other words, it is a set of actions modifying the object, and enabling the knower to get at the structures of the transformation. (Piaget 1972, 20)

To apply and automate this approach to machine learning, Papert (1963) developed a project called "genetron," which explored the learning of algorithms by allowing them to build their own network topologies that simulated qualitative and quantitative developmental change (Shultz et al. 2008; Minsky and Papert 1969). He was later assisted by Marvin Minsky, with whom he cofounded MIT's Artificial Intelligence Lab. Despite support from MIT, the project struggled with technical limitations (Shultz et al. 2008). But Papert had also started to approach the relation of child and machine through another angle, manipulating not the machine's learning but children's learning. Applying Piaget's theory, the aim here was to allow a coordination of actions—acting with an object—to initiate learning in children: learning to operate a computer. Together with his colleagues Wally Feurzig and Cynthia Solomon, Papert developed LOGO, an educational dialect of the functional programming language Lisp, which was used to command first a virtual turtle, then a small turtle-shaped robot that could move and draw. And it was this approach that would inspire Papert's colleague

Alan Kay (1972) to develop a graphical user interface not just for children but also for "children of all ages."

When he met Papert, Alan Kay was a young, creative computer scientist who had thought about the graphical user interface ever since he was a student—the first thing his supervisor gave him to read was Ivan Sutherland's description of the Sketchpad, one of the first interactive computer graphics programs. But it was watching children in schools using Papert's LOGO that enabled a breakthrough:

> Here were children doing real programming with a specially designed language and environment. . . . This encounter finally hit me with what the destiny of personal computing really was going to be. Not a personal dynamic vehicle, as in Engelbart's metaphor opposed to the IBM "railroads," but something much more profound: a personal dynamic medium. With a vehicle one could wait until high school and give "drivers ed," but if it was a medium, *it had to extend into the world of childhood.* (Kay 1996, 523, emphasis added)

Kay understood that the logic of the world of childhood could be extended to adults by reapplying visual thinking to an adult interface. Reading (besides Piaget) the educationalists Jerome Bruner and Maria Montessori had convinced him that not the command line but visual thinking and a more iconic approach (531–32) would shape future ways of operating a computer. His insights culminated in his proposal "A Personal Computer for Children of All Ages" (Kay 1972), which described a portable educational computer to be commanded by experimental actions. It was based on a program that came to be known as Smalltalk, a program "environment in which users learn by doing" (547). Via Papert, Piaget's insight that logic can be a coordination of actions had found its way to Kay's interface; Kay saw Piaget's thesis confirmed: "Just *doing* seems to help" (547)—a seismic shift. With the graphical user interface, experimental thinking started to assist linguistic thinking. And with

the rise of digital media, interfaces have become the way we approach information, an approach based on experimental as much as on linguistic logic. Relying on a logic we use in Western culture primarily when we are very young, interfaces address us as very young children. Users of graphical interfaces are asked to apply an experimental logic, which means to learn to understand the interface via a set of actions. Ever since the rise of digital media, the devices that inhabit our kitchens or gardens have stopped asking us to read through the manual before being switched on for the first time.

The infantilization of interfaces does not necessarily mean that technology is becoming smart while we are declared stupid. The manipulative dialogue of today's interfaces is not necessarily an act to deceive the user. Reaching out to a human logic mostly used in childhood, similar to the way Kay's and Papert's interfaces functioned, the playful addressing of the user can also be read as an invitation to experiment. In experimenting, in playing with the windmill, we use digital technology. Using it, however, means to understand how to act on it—acquire the skill to use its force—thereby entering into a dialogue with that technology. Entering into this dialogue is important not just for the case of the graphical user interface but also for artificial intelligence and machine learning, about which Shan Carter and Michael Niessen (2017) have argued that its new form of computing must be linked to a new and different interface to fully unfold its operational knowledge. To bring forth this operational knowledge in a more general sense, digital technology is calling upon us as children. It is not addressing us as adults, as engineers. To call into action an intuitive, visual-operational knowledge, marginalized in our postindustrial Western societies, it is recruiting us as children of all ages. The force of communication we face in digital technology is an operational knowledge; to make use of it, we are being framed as very young children.

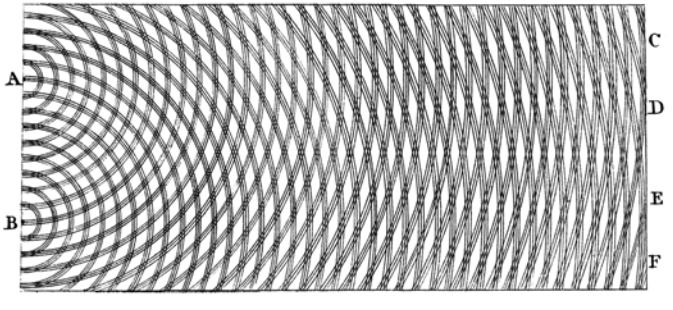
The hypothesis that digital technology finds itself linked to a specific force could be shown; still the analysis cannot stop here. For within this force, an interesting setup of power relations unfolds, power relations that are coming into action when we communicate using digital interfaces. Is the infantilization of interfaces inviting us to experiment with those interfaces, or is it luring us into a playful situation that is not to be intellectually questioned? To understand our contemporary being with technology, another effort needs to be made to explore the lines of power that run through it. How do we know if a digital interface is addressing us with the aim of empowerment, or deceiving and sedating us? How can one conceive the difference? This is the difficulty when it comes to being addressed as children: the infantilization of interfaces is able to be both patronizing *and* empowering simultaneously—the power we find within the force of communication refrains from following a well-behaved dialectical thinking.

Being patronizing *and* empowering means that one cannot be *for* or *against* infantilization. Being *for* the user's emancipation does not equal being *against* infantilization. The conceptual architecture we find at work here does not unfold in an oppositional way. An interface can be both patronizing and empowering in the same moment and is therefore not fitting into the antagonistic concept of dialectics, thesis and antithesis. Questioning the phenomenon of the infantilization of interfaces further with regard to the powers at play here, however, one also can realize that at the same time, an antagonistic, dialectic relation is not completely gone: an interface can be patronizing and empowering at the same time, although to be patronizing and to be empowering remain fundamentally different acts of power. While empowering users means that we are learning to use the power of technologies ourselves, patronizing guides and shoves us toward just acting out that power. One time the power is with the user; the other time the power is just lent to the user—in other words, there is still a fundamentally

dialectic relation between. Deep inside the conceptual architecture, a negative relation, this complex force of negativity that has been described by Susan Coole (2002) and Benjamin Noys (2010) for thinking/acting difference is still at play, ensuring that there is difference.

From this follows that, again, we need to try coming to grips with the force of communication and the forms of power we find in its act of infantilizing the user. For this, the last section of this text turns to the inspiration of a visual, operational knowledge (inspired by Alan Kay and Gilbert Simondon) which it finds in the concept of "diffraction" as it appears in and has been visualized for quantum mechanics. Diffraction describes the phenomenon of waves interfering with each other, although differences remain, much like in Thomas Young's image from 1803 (Figure 2.2) showing a two-slit diffraction.

The double-slit experiment with two waves interfering has become the thought experiment that is expressing puzzles of quantum mechanics, such as the wave–particle duality. In this century, diffraction also resurfaced as an interesting concept to think difference and was explored in depth in the writings of Karen Barad.[3] Inspired by particle diffraction of quantum trajectories, such as



[Figure 2.2.] Thomas Young's sketch of two-slit diffraction presented to the Royal Society in 1803.

diffracted light waves, the philosopher with a doctorate in quantum physics developed the method of reading of insights through one another that came to be known as the *method of diffraction.* Barad (2007, 137) is interested in the phenomenon of diffraction as it allows her to think differences not as essentials but as a process. Diffractive patterns are always fundamentally linked to the agential apparatus that produces them, and vice versa: "Changing patterns of difference are neither pure cause nor pure effect; indeed, they are that which effects, or rather enacts, a causal structure, differentiating cause and effect." Here I'd like to take up Barad's aim of deessentalizing difference but to mirror and link it to the difficulties in differentiating the two modes in infantilization, that is, to be empowering and patronizing at the same time. The circumstance of infantilization's two effects—empowering and patronizing—resembles diffraction: two waves that overlap to build a diffractive pattern. The particles/waves overlap while the waves still can be differentiated. Thus, as the image shows, despite them overlapping, there can still be difference. Or in other words, a diffractive pattern, as we find it within the phenomenon of infantilization, does not mean its effects cannot be differentiated. Following Barad further, we therefore ask the question again: how can one conceive this overlapping difference?

As Barad stresses, to understand diffraction, to know what kind of diffraction is the case, it is important to look *further* than just noticing that there is a pattern: "Crucially, diffraction effects are attentive to fine detail" (91). It is here where we find an aspect central to her approach: the detail. In her own words: "Attention to fine details is a crucial element of this methodology" (92). One has to be "sufficiently attentive to the details" and is "thinking through the details" (73), because "fine-grained details matter" (90). It is the "level of detail" (42) that enables one to answer a question. Thus it is to the detail she looks to situate difference: "Small details can make profound differences" (92). While the interference of the waves is a given—otherwise, there would be no diffraction—the way a diffraction pattern looks can vary as it is linked to its parameters: "If any

of these parameters is changed, the pattern can be significantly different" (91). Only when looking at the details of the pattern and studying the "concrete" effects does one understand what exactly has been produced and which tendency of both—empowering or patronizing—precedes.

Unsurprisingly, pointing out those ambiguities and exploring their details also has become a habit of media and technology scholars interested in describing social formations. For this, theorists of digital technology and media have questioned word pairs like public–private, global–local, free–controlled, nature–technology, and work–play. Once understood as antithetical, they have made clear that their conceptual relation does not seem to be essentially oppositional anymore. Tiziana Terranova (2004) was among the first to discuss the ambiguity of work–play, pointing out that commenting online on platforms is free labor playing in the hands of companies looking for profit, although it remains pleasurable—a paradox. Wendy Chun (2011) also showed early that digital media is spreading democratic freedom along with the fact that it also accelerates the potential for global surveillance—an observation she later extended into digital media entering our daily habits, thereby messing "with the distinction between publicity and privacy, gossip and political speech, surveillance and entertainment, intimacy and work, hype and reality" (Chun 2016, ix). Analyzing algorithmic security practices and data technologies, Claudia Aradau and Tobias Blanke (2018) have disclosed how the dichotomies of normality–abnormality, friend–enemy, and identity–difference have been fundamentally reconfigured. Looking at the matter of media, Jussi Parikka (2015) dissects the opposition of nature–technology, which brings out the dependency of today's media from nature (Parikka 2015). Traversing computer science with a philosophical perspective, Luciana Parisi (2015) has questioned today's critique of instrumental rationality, pointing out that incomputability and randomness need to be conceived as the very condition of computation and not instrumentality. Pointing out dependence in a networked age, Anna Watkins Fisher (2016) discusses interventions

of corporations like Walmart or McDonalds, which aimed to help their employees master problems created through being exploited by the very same corporations. One could add Nicole Starosielski (2015), Christopher Kelty (2012), N. Katherine Hayles's (2017) study of the cognitive nonconscious, and many more whose recent books or essays discuss how to deal with the ambiguities of new media and the paradoxes we live with—the force digital technology confronts us with.

These examples show that digital technology in the twenty-first century is characterized by a dialectical setting in which disparate aspects no longer operate in an oppositional mode, although their dialectical relation has not collapsed—one is the flip side of the other. Such a setting, in relation to the work of Pheng Cheah (2010), could be described as "nondialectical dialectics." *Nondialectical* as an interface that is addressing us as a very young child is both patronizing and empowering and *dialectic,* as both moments are still marked by an antagonistic relation, with one enabling the use of power while the other is just lending it. Thus, regarding digital technology, the task we face is to understand how to adjust the frame in a way that fortifies the waves of empowering by turning to the fine details. It is not to choose the right side.

IIIIIIIIIIIIIIII

This chapter set out to study a force and found it linked to a figure of power that it described as "nondialectical dialectics." Interested in understanding how technology is addressing us, it aimed to explore how a specific force unfolds in digital communication. Drawing on Althusser's theory of interpellation, it identified a particular situation opening up when being addressed by digital technology communicating with us: digital interfaces, which aim to reach a general user, show a tendency of infantilization. By drawing on design elements from a child's world, such as big typography, primary colors, big buttons, and animated mascots, those interfaces are addressing their users as young children, thereby calling upon an experimental–operational knowledge rather than an encyclopedic–scientific one. This type of knowledge, as could be

shown, has also historically been at the core of the development of graphical user interfaces, which Alan Kay or Samuel Papert conceptualized and built, inspired by the educational research of Jean Piaget, who believed that the coordination of actions ordering and joining things together should also be understood as "logical–mathematical experience."

In this operational dialogue with digital technology, however, a new phenomenon could be seen: it is not in a strict sense defined by a dialectical logic of right or wrong dialogues with technology—and in this lies the political sticking point. An interface that invites us to an experimental dialogue exploring it can be empowering, while it is not far from an interface that simply suggests how to use it best without the user gaining any deeper knowledge about it (but getting things done quickly). In other words, advising interfaces that address us as children *can* but *do not have to* be empowering—the force of digital technology that came into view could and does go both ways. The cases analyzed here, from historic Google Doodles to flat, colorful buttons on touch screens, are examples of infantilization that show that the way digital technology is addressing us is deeply ambiguous. Digital technology can produce two or more antagonistic effects at the same time and can therefore be described as being nondialectical. Still, a dialectic relation remains, as the effects it produces can be considered antagonistic with one being the flip side of the other. Only when turning to the details (Barad 2007), only when analyzing the actual effects, can the actual political scale be understood.

The force of communication that then comes into view is a complicated, ambiguous one. It is a challenge—a challenge because it is nondialectical while producing political effects; a challenge because it has agency but is not an acting subject. When thinking the force of digital technology, it helps to avoid understanding it in an anthropomorphic way and to instead call upon its alien logic. So I end this text with seconding what Finn Brunton pointed out in the first chapter, who was preparing us for an alien dialogue in which we find ourselves always already.

Notes

Without Wendy Chun's invitation and feedback on this contribution to, first, the Terms of Media II conference at Brown University and then to this volume, this text would not exist. Indeed, the text owes a lot to her encouragement here (and in other situations). I also owe warm thanks to the inspiration I got from the work and conversations with Finn Brunton and his aliens, waving to us through his text if one squints a little. Special thanks then go out to Paula Bialski, Goetz Bachmann, and Boris Traue for their thoughtful, informed, and thorough editorial reading of the manuscript, which improved it significantly. And thanks to the gifted Robert Ochshorn for sharing my serious interest in interfaces. Finally, I thank Michael Dieter and David Berry, whose invitation to contribute to their 2015 reader *Postdigital Aesthetics: Art, Computation and Design* (2015) gave me a first chance to grasp the idea of infantilization of digital interfaces. I am still surprised to find them sharing my perspective, the first time I presented it, which was the start that allowed me to build on it.

1 Understanding technology as a subject seems to be a projection linked to Finn Brunton's observation that human communication with aliens in space is imagined along the lines of a nonhuman agency with which we are familiar.

2 The analysis did not count individuals. Every time a new or a different sequence was introduced, it looked if the focus was on "adult" or "child," whereby groups counted the same as individuals. Three scenes were mixed. When the child plays football surrounded by a group of adults, the focus is mainly on the child (counted as child). The child birth in the surgery theater shows first adults at work; from there the camera moves to the child who was just born (counted as adult and child). The last scene shows Steve Gleason looking at the son on his lap (counted as adult and child).

3 Interestingly, Barad's strong focus on "interference" observed in the phenomenon of diffraction is somewhat close to Gilbert Simondon's approach, whose focus on the "ensemble" of technology and human—their interference—was discussed by describing the "technical reality" as one (Simondon 2017, 53). It has often been said (e.g., Combes 2013, 57) that Simondon's description of technology as an interference is informed by his concept of "individuation," which describes the process that produces an individual, although this individual is only a temporary instability—a theory he develops among others inspired by quantum and wave mechanics (Simondon 1992, 304), much like Barad. Therefore it comes as no surprise that Barad, with a doctorate in quantum physics, starts her point of departure—the preface of her book—from a very similar point of view. She writes, "Individuals do not preexist their interactions; rather, individuals emerge through and as part of their entangled intra-relating." Furthermore, she points out, "existence is not an individual affair" (Barad 2007, ix).

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