The Coding Prometheus is Blind – Socio-Technological Imaginaries on GitHub

Der codierende Prometheus ist blind – sozio-technologische Imaginationen auf GitHub

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Abstract (English)

While cultural sciences are increasingly concerned with the effects of algorithmic systems on society, the production of algorithms remains an opaque field. Yet this process happens freely and accessibly on Open Source (OS) platforms such as GitHub. This paper examines the future imaginations of developers on GitHub, as relayed in qualitative interviews. Although GitHub sees itself as a diverse space, only two strong „socio-technological imaginaries" (Jasanoff 2016) may be identified: The 'greater good' and the 'Manichean good vs. bad' imaginary. The imagined futures are populated by ever better technology. This techno-optimism is combined with a hierarchical order on GitHub, from which individual developers emerge as 'Benevolent Dictators for Life'. They control and protect algorithmic developments, in case of doubt even against the 'bad'. The result is an image of the future that continues the development of technology in a non-disruptive way.

Keywords: socio-technological imaginaries, GitHub-culture, trajectorism, future

Abstract (Deutsch)

Während sich Kulturwissenschaften zunehmend mit den Auswirkungen von algorithmischen Systemen auf Gesellschaften beschäftigen, bleibt die Produktion von Algorithmen ein kaum beachtetes Feld. Dennoch ist dieser Prozess auf Open-Source Plattformen (OS) wie GitHub frei zugänglich. In diesem Beitrag befasse ich mich mit den Zukunftsvorstellungen der Entwickler*Innen auf GitHub, wie sie mir in qualitativen Interviews erzählt wurden. Obwohl sich GitHub als ein vielfältiger Raum versteht, lassen sich nur zwei starke "sozio-technologische Imaginationen" (Jasanoff 2016) identifizieren: Die des 'greater good' und die 'manichäische good vs bad' Imagination. Die imaginäre Zukunft ist geprägt von immer besserer Technologie. Dieser Technikoptimismus verknüpft sich mit einer hierarchischen Ordnung auf GitHub, aus der einzelne Entwickler*innen als "Benevolent Dictators for Life" hervorgehen. Sie kontrollieren und schützen die algorithmischen Entwicklungen, im Zweifelsfall auch vor dem 'Bösen'. In Folge zeigt sich ein Bild der Zukunft, das die Entwicklung der Technologie auf nicht-disruptive Weise fortsetzt.

Schlagwörter: Zukunftsbilder, Technologie, GitHub-Kultur, Trajectorism

1. Introduction

1.1 Algorithmic Present and Future

Life in modern-day society is constantly recorded, shaped and (fine-) tuned by algorithms, be it via a GPS-guided tour towards an unknown destination, during your daily run in a park with a fitness watch, or while searching for a new washing machine online. Assigned with distinct "algorithmic identities" (Cheney-Lippold 2011), most of us live our daily lives deeply rooted in and orientated alongside a digitally encoded environment, relying on and at the same time "co-producing" (Jasanoff 2010:13ff) the "Verdoppelung" (duplication[1]) (Nassehi 2019:108) of the world in the digital realm.

And while the above-mentioned activities appear to be "humdrum banalities", as the Sociologist Neyland (2019:3) phrases it, algorithms also play roles in not at all mundane scenarios: They have helped to contain the current Covid-19 pandemic (Zoabi et al. 2021, Waltz 2021), they move, create and destroy incredible amounts of wealth each second on Wall Street (Chan 2017; Hansen 2015) and they automatically guide drones to targets in faraway countries, transforming military conflicts into "algorithmic wars" (Amoore 2009).

The algorithm itself takes a central position in these dramatic acts, entangled in performances which blur the lines between human and non-human action, as well as between human and technological agency (Förster 2019:176, Rauer 2017:189). The situation is blurred to such an extent that the tech-philosopher Alexander Galloway observed almost 10 years ago that "power today resides in networks, computers, algorithms, information and data" (Galloway 2013:92).

Daniel Neyland renews this analysis in his 2019 work The Everyday Life of an Algorithm, adding that "[t]he everyday [is] somewhat sidelined by an algorithmic drama. Here, the focus is on algorithmic power, the agency held by algorithms in making decisions over our futures, decisions over which we have no control" (Neyland 2019:3).

Humans, according to Neyland's gloomy stance, seem to be deprived of control over the future. The timeworn but eminent Heideggerian hypothesis of framing and simultaneous "Entbergung" (revealing) of reality in and through the "Gestell" (frame) of technology (Heidegger 2019 [1954]) appears enforced and established through powerful algorithmic decision-making processes and Artificial Intelligence (AI). Every future that may emerge seems already technologically (en)framed.

In reflection of these technological developments, social and cultural sciences have directed their gaze to the new phenomenon, which sometimes appears as digitalization (Koch 2017:10), other times is looked at through the perspective of cybernetics (Nassehi 2019:82) or viewed through the holistic prism of digital or "algorithmic culture" (Seyfert / Roberge 2017).

While a lot of research is devoted to understanding the effects of algorithms and AI systems on the social world and human interactions (Elkins 2019, Sudmann 2019, Seyfert / Roberge 2017, Guzman / Lewis 2020), the production process and thus the emergence of algorithmic systems appears largely unobserved and represents an opaque field. The technology and its fabrication remain "somewhat of a modern myth" (Barocas et al. 2013:1) and "[…] not a black box that can be simply opened" (Seaver 2017:7).

This was the initial point of my inquiry, which was fueled by the question: Where and by whom are algorithms actually produced?

Moreover, what technological and algorithmic future is about to emerge from this 'black box'? To find answers to my questions, I decided to conduct qualitative interviews with code developers. Yet, where to find them?

1.2 All Codes Lead to GitHub

The remarkable thing is that the main actor in this "algorithmic drama" (Nyland 2019:3), the code or algorithm itself, hardly seems tangible. Although it is ubiquitously embedded in the technological devices that are surround us (Rahwan et al. 2019), their source is often not immediately apparent. Loosely following Geigers and Ribes (2011) proposed method of trace ethnography, which is intended to be applicable in vast digital environments, I chose two random codes (the source code of Facebook and Signal, to be more specific) and traced them to their source – comparable to the saying 'all roads lead to Rome', because in a similar way all codes lead to GitHub.

It may seem paradoxical that a code-production process, which seems to be far from secret at all, flanks the clandestine appearing process of algorithmic decision-making. This takes place openly, in the full view of the public on Open Source Software (OSS) platforms such as GitHub. GitHub is the digital "Piazza" (Conti 2012:234) to which the code-traces lead me. This connection is unsurprising to tech-insiders, as GitHub is the "largest code host in the OSS world" (Vasilescu et al. 2014:401). Further, it is said to be the new "Maschinenraum" (engine room) of "algorithm factories" (Daum 2020:52). In this algorithmic factory, new and old codes are (re-) written, algorithms are developed and published – thousands a day, by people from all over the world (Octovers 2021).

However, GitHub not only provides tools for distributed version control and source code management, but it "encourages software developers to perform collaborative software development by offering […] services with social features (i.e. user profiles, comments, and broadcasting activity traces)" (Wu et al. 2017:1).

While these features are optional and not used by all users of GitHub, the platform offers an incentive to build online communities beyond the pure coding process. The gathered "Geeks" (Kelty 2008: 33) or "Hackers" (Levy 2001) on GitHub, who may only be interested in the open-sourced development of codes, co-exist with one-time users and computer engineers, who just want to connect with each other and use GitHub as a career-website, comparable perhaps to LinkedIn.

This experimental and recursive public, a term coined by Christopher Kelty (2008:8), is in its functionality comparable to a giant laboratory. I employ this analogy in order to build the connection to a quote from Francois Jacob, who described laboratories as "machine[s] for the production of the future" (Jacob [1987:9], cited in Rheinberger 1993:240). I argue that whatever algorithmic future there will be, it probably will be coded, 'forked' (i.e. making a copy of a project to experiment with and change the code, without affecting the original) and ultimately produced on GitHub.

For the empirical study in this paper, I chose to listen to the future stories of the developers on GitHub.

Under point 3 and 4 I will present my methodological approach and the results of eight narrative interviews, which were taken between January and August 2021. In my analysis of the collected interview

data, I looked at the future narratives and imaginations of the developers on GitHub, while questioning: what futures are desired? How are they articulated and enacted during the interviews? Is there a 'GitHub culture', and if yes, how much influence does it have on the coding process or imaginary futures? As I interviewed People from China, Vietnam, Germany and the UK, also a specific (inter)cultural question arose: Is there something like a collectively imagined future? Or can we see a variety of diverse future imaginations instead?

In the next chapter (2), I will clarify what I understand under the concept of the 'imaginary', linking this to 'the future', and reflecting upon this relationship via anthropological thought. Before we discuss the empirical analysis (4), I will explain my methodological thoughts about undertaking ethnography in the digital realm (3).

2. The Future and the Imaginary in Anthropological Thought

2.1 The Future

Future, imaginary, culture – three words linked by the sheer impossibility of satisfactory definition. Therefore, the reader may forgive the following tenuous attempt at theoretical clarification, starting with Bertrand de Jouvenel, according to Helmer (1983:19) one of the first scientists "who may rightly be called futurists". In his much-cited work *L'Art de la Conjecture* from 1964, he outlines two core elements of the future: it represents a space of freedom as well as of uncertainty (de Jouvenel 1967:19). Only towards the future people may act, but at the same time, the future realm remains withdrawn from positive knowledge. De Jouvenel (1967:62) utilizes this fundamental "principle of uncertainty" to reject the claim of a science of

the future. Instead, by introducing the concept of "futuribles" – the compound of future and possible – he refers to a spectrum of possible futures that can only be understood as "instantaneous probable successions of the present state" (de Jouvenel, cited in Seefried 2015:84).

While de Jouvenel's importance for the discipline of futurology is valued especially in the field of policy-making and economics due to his normative approach and methodologically sound models of planning (Arndt 1969, Helmer 1983, Seefried 2015), other aspects of his theoretical considerations are more relevant for the present argumentation. Namely, the significance of the "Gegenwartsbild" (image of the present), the processual development of futures emanating from it, and the central role of the "I" as "creator of the future" (de Jouvenel 1967:44).

Although this understanding of the future may seem trivial from today's perspective (Mandich 2020), de Jouvenel's work illustrates a development that, if one follows Reinhart Koselleck's (1979) argument, began in the "Sattelzeit" (roughly between 1750 and 1850) and marks the transition from a traditional society to "modernity" (Andersson 2018, Koselleck 1979).

The (Western) understanding of time as well as of the temporal horizon, according to the condensed thesis, increasingly relied on "imagination, anticipation, and longing" (Beckert 2018) as relevant as ordering elements to the extent that old patterns of reference, such as religion, tradition, and consolidated social roles (i.e. the patrimony of the past), lost significance as a form of guidance into the future (Beckert 2018, Andersson 2018, Mandich 2020).

Arjun Appadurai (2013:298) takes an anthropological standpoint on this temporal disposition in his

work *The Future as Cultural Fact,* highlighting how "the world of the habitus has been steadily eroded by the pressures" to counter an uncertain and conflictual future through improvisation.

In identifying 'trajectorism' as the meta-trap of the West, he formulates a decidedly postcolonial critique. Trajectorism is the belief that time has a telos, a beginning and an ending, an unfailing trajectory from point A to B – time is "a cumulative journey […] from now to then" (Appadurai 2013:223). This 'trap' stands in opposition or at least in contrast to other meta-narratives, like the Buddhist belief in reincarnation, or myths of eternal return. In trajectorism, the future is either perceived as chaotic as well as uncertain and, therefore, to be formed and colonized, or else the future is already known, such as in the Christian Apocalypse. In both narratives, however, the future is located somewhere upon a linear timeline. Following Appadurai (2013:225) further, a distinct "European cosmopolitanism"[2] also takes on an important part within this narrative. Combined with the belief in progress and prosperity it builds the ideological foundations of imperialism and globalized capitalism.

In summary, the horizon of this (newly) open(ed) future became the guiding disposition for societies that entered modernity, whereas imaginaries can be seen as one of the building blocks on which modern individuals could structure their actions, "[…] trying to understand the present by borrowing from a cautiously imagined emergent future" (Marcus 1995:4).

Besides its asserted importance for modern societies, according to Bryant and Knight (2019:3), "the future has been a literal dead-end for the discipline [of anthropology]". In the publication *The Anthropolo-*

gy of the Future, they express their hope that "the concept of 'orientations' […] including the act of imagining the future" could help to "gain an ethnographic hold on the relationship between the future and action" (Bryant / Knight 2019:16). Accordingly, the imaginary in its future orientation could serve as a programmatic method and theoretical lens in anthropological research about 'the future'. The term 'imaginary' itself is not, however, new in anthropological discourse. The next chapter will further elucidate the linkage between future, imaginary and 'culture'.

2.2 The Imaginary and Culture

Although Appadurai (2013:285) criticizes the underrepresentation of the term imaginary in the cultural sciences, the concept had of course already entered the scholarly discourse prominently via Benedict Anderson's book *Imagined Communities* in 1983. His account of the formation of nationalism and nations highlighted the importance of collectively shared imaginaries for the cohesion and maintenance of communities, "not as illusions but as realities" (Bieger et al. 2013:xv). Charles Taylor's Modern Social Imaginaries builds on Anderson's work and further elaborates the role of imaginaries in the emergence of modern social orders (Bieger et al. 2013; Taylor 2007). Such imaginaries have evolved historically and are both learned and incorporated by members of a society, leading to a stable moral and social order (Kelty 2008:40; Willim 2017:58). Reading the characterizations of the imaginary oriented especially towards Taylor and Anderson, the provenance of the concept to culture appears conspicuous. Willim (2017:59) points out that, at a time when culture as a concept seems to be falling into disrepute, the term

imaginary could indeed perhaps "replace" it. By using the concept of the imaginary, the researcher may simply avoid these controversies when writing about culture. Instead of culture, the concept of imaginaries may explain what holds communities and groups together and guides people's actions (Bieger et al. 2013:xvi; Willim 2017:60).

While this perspective seems attractive, I would argue with Appadurai (2013:179) that the imaginary may be seen as just one more "dimension of culture" and, in fact, should be integrated (or in his words: "brought back") into anthropological thought and cultural sciences. Understood this way, imaginaries are then at the same time products of certain cultural environments, as they are constitutive parts in the day-to-day reconfiguration and construction of culture.

While Anderson's, Taylor's and Appadurai's concepts of the imaginary reach into both the past and the future, in this article I wish to consider the imaginary primarily in its ability to gain an "ethnographical hold" (Bryant / Knight 2019:16) on technological futures. To this end, I will additionally draw on the "socio-technological imaginary" and on ethnographic works that have looked at narratives in the field of technological development.

2.3 The Socio-Technological Imaginary

Pfotenhauer and Jasanoff (2017:787) define the role of imaginaries in providing:

"a thread of continuity and stability by extending existing frames of reference from the past into the future, thus mitigating the unknown through what is known and taming the disruptive quality of [technological] innovation through what is imaginable and permissible in a given social, political, and historical context".

According to the two scholars, the socio-technological imaginary is not only a visionary blueprint of the future, but links past developments with current possible states of technological futures. They are building on George E. Marcus' work *Technoscientific Imaginaries* from 1995. Here, imaginaries are understood as structures of contingency in technoscientific innovation and embedded in social and cultural contexts (Marcus 1995). This means that imaginaries not only contain sketches of future developments, but also are rooted in and oriented to the past.

However, literature from the field of Science and Technology Studies (STS) further suggests that technology has a certain attraction for futuristic imaginaries and acts as a tabula rasa, ready to be inscribed with future images and vivid utopian or dystopian stories (Wehling 2015:59). While traditional media and technology, such as the book and the letterpress, seem to be deeply connected to the past, digital technology, and especially "[t]he computer is bound more closely to the future of our society […]" (Combi 1992:43).

Even though ethnographic research on technological future is meagre (Bryant / Knight 2019:2), some authors have attempted to examine technological developments through the prism of socio-technological imaginaries. The sociologist Joan H. Fujimura (2013:84) for example has looked at how "[…] imaginaries, meanings and understandings of the East and the West, of culture and nature, of science and society" have influenced the practices of scientists involved in genomics research. Her study revealed a special form of techno-orientalism in the discourse on genomics.

In the field of computer sciences, two ethnographic works from the early 1990s stand out in particular: Mariella Combi (1992) focuses on "AI imaginaries", accessible via narratives floating in the field of AI developers. She describes how stories and guiding narratives shape and specify which problems are

tackled in the first place and what the technical solutions look like that are sought and found. Both the technical and the social are co-produced by the "human-machine relation" and Combi (1992:7) introduces the "techno-scientific AI lens" through which future developments seem predefined.

A similar approach can be found in Diana Forsythe's work *Engineering Knowledge: The Construction of Knowledge in Artificial Intelligence* from 1993. In this ethnographic study of knowledge acquisition and production within the scientific AI community, Forsythe investigates the shared practices and attributions of meaning within different AI laboratories. Her key finding was the existence of a unifying "engineering ethos", which combined different beliefs about the social, a deeply rooted trial and error solution-seeking spirit and the belief in technology as objective and universal (Forsythe 1993).

Drawing on the mentioned works, I further sympathize with Nick Land (1998:82), when I understand the imaginary here as an "abstract motor of the actual". Therefore, the technological "future which arrives is already infected, populated" (Land 1998:82). This "contamination"', and I am borrowing this term form Anna Tsing (2018), may already be perceptible in the present "stories about the future, by the people creating it" (Constantine, cited in Fischer 2013:275) – in the present case: the developers on GitHub coding and creating those futures.

In the next chapter, the methodological approach will be explained which allowed for the collection of those future-stories from GitHub users, which are populated by two principal imaginaries: The greater good as well as the Manichean good vs. bad imaginary.

3. Methodology: Digital Ethnography and Narrative Interviews

To be able to explore GitHub in its capacity as an infrastructural component of the internet, I methodologically oriented myself towards the approaches of virtual or digital (Hine 2007, 2015) and multi-sited ethnography (Murthy 2008, Turner 2019:34).

Christine Hine's (2007, 2015) work is a significant contribution to the methodological configuration of ethnographic methods in the digital realm. She highlights the importance of an ethnography that turns its gaze onto online spaces by looking in detail at the distinctive cultures that may emerge, with their "own sets of norms and values, with common understandings of humor, reciprocity" and a sense of their "own identity as a social formation distinct from others" (Hine 2015:34).

To reach the specific online community of developers on GitHub, I "traced" (Geiger / Ribes 2011) people and their codes across multiple contexts – which in my case consistently turned out to be digital. I found the eight interviewees via the GitHub internal search function and the "Trending Developer" (Github 2021a) list. Since GitHub only allows contact via direct contribution or comment on the codes and repositories itself, I contacted the interviewees mainly via LinkedIn or email, if the contact information was given on the personal GitHub profiles.

Therefore, in my research one could speak of a "blended ethnography" (Janowitz 2010) approach, meaning the mixture of traditional methods (the ethnographic interview) with aspects of Hine's (2015) "online ethnography" (my participation on GitHub, the use of GitHub's internal search functions and lists, the study of my interviewees GitHub projects, and also the use of digital means of communication throughout the research).

This said, the classic ethnographic interview (Heyl 2001) was and remains a fundamental tool in the ethnographic method box, also in the digital field (Hine 2015:109), and is the main source of the presented data here. It offers crucial and direct access to peoples' narratives and the constructions informing them: be it values, religious views, assu-

med cultural affiliations or imaginations (Cortazzi 2001).

I structured the narrative interviews along a guideline. The interviews were recorded with the consent of the interviewees and later transcribed. The analysis of the interview material was based on the qualitative content analysis proposed by Mayring (2010). In order to make them untraceable for third parties, I anonymized all of the names and hid identifiable information about the GitHub projects they are working on. Here is a very short introductory list of the interview partners, which is based on how they described and introduced themselves:

Alex from Northern England, working for a Chinese AI company.
Dotan, learned coding all by himself in India and "got into a military program in Israel for developers".
Jian, working from Germany and the "only Chinese maintainer" of a big GitHub repository.
Martin, doing his PhD in a research project on GitHub – a "typical geek".
Natalia speaks a lot about OS at conferences. She "can recognize pretty well when [she sees] an issue created by a fellow Eastern European".
Phan, Vietnamese OS developer and "Vice President of Engineering" in his own company.
Tracy uses GitHub at work for a Danish company and with her friends "to share cool stuff".
Georg, born in Lübeck, describes coding on GitHub as a form of relaxation.

In the following section, I will present the empirical results of the interviews. I try to focus on the 'stories about the future' told by the eight developers. By identifying two main imaginaries, I will also outline a tentative version of the particular 'culture' of the online community on GitHub.

4. Imaginary futures on GitHub: The Greater Good Community

"So, imagine, I am sure you know that, but almost every software product we have nowadays cannot exist without Open Source. Even a washing machine is running on some version of Linux and those are Open Source for sure. And your Email, Gmail, Google, whatever you use, they have some Open Source components, like most of them are OS components. Open Source literally changed the world for the better" (Phan).

I start my analysis of the empirical data with a quote from the developer Phan. Phan, a middle-aged man of Vietnamese background and currently living in Germany, emphasizes the central importance of Open Source Software (OSS) for the technological present. It is found everywhere as an elementary component, even in washing machines (remember, you wanted to buy one in the first sentence of this article). Based on this information he remarks that OS has genuinely improved the world. Additionally, Phan later noted that GitHub "will be here to stay in 10 to 20 years" and therefore will continue "to contribute to the greater good of the world" (Phan).

I often encountered this expression of 'the good' or even 'greater good' in the conversations I had with the GitHub experts. Alex, one of my interview partners from the UK, used a similar wording, convinced that the "[…] right kind of AI is an AI that really does good for the people" (Alex). Moreover, Jian, an experienced developer and self-proclaimed "believer" in OS, told me that the "only way that people can really contribute to the software and for the good" seems to be via OS platforms.

While the 'greater good' was often named in the conversations, its meaning was not really specified and remained insubstantial. I tried to get behind this opaqueness by directly asking about the specific outlines and contents of this good. The answers varied from simply

mentioning the "usefulness" (Natalia) of technological products, to addressing greater visions like solving "health issues" (Dotan), and to simply referring to a (supposed) collective knowledge by stating: "I think people know, what good AI is…and what bad [sic] AI can be" (Alex).

Based on these fractured outlines, I identified two slightly different but co-dependent socio-technological imaginaries: The first is the 'greater good' imaginary, while the second more mythologically-laden imaginary which also encapsulates the first may be preliminary called the 'Manichean good vs bad' imaginary. It will lead us to a third meta-narrative of the 'coding Prometheus', which may be at the core of the GitHub culture and informs the emergent futures that I traced and detected in the densely populated narratives of my interviewees.

4.1 The Greater Good Imaginary

As already implied, the first imaginary centers upon a quite simple narration of extrapolation of the current state into the future – with just somewhat "better" technology (Natalia, Dotan, Tracy). Natalia envisions a future in which GitHub allows the OS community "to collaborate over products, making them better, way faster […]", while Dotan prognoses that technology will "[s]implify day-to-day [sic] for humans and help to […] understand the world in a better way." Tracy also holds a very optimistic view of the future, in which technology will "save a lot of time" – without being more specific, how and where this time will be saved.

When I looked more closely at the GitHub projects of my informants, their statements resonated with the purposes of the repositories and codes: Alex contributes to an OS framework – i.e. a collection of code – that deals with the topic of neural search for multiple modalities. With the new framework, it is possible to give a voice input, for example a snippet of a song, and search

for pictures, images, more songs or videos by using neural networks. In short, Internet searches will become faster and more convenient. Another developer maintained a framework for building user interfaces (like apps or websites). Again, software that existed, but acts in an improved manner now. A third algorithm supports smoother access to an old programming language, establishing a more user-friendly interface.

The interviewees involved in those GitHub projects were interested in further improvements of the existing codes and algorithms. The narrative line they were sketching in the interview started directly from innovative technology from the past (like search engines or apps) to a future that is inhabited by almost the same technology, only faster, cleaner and overall simpler.

This quite materialistic imaginary of a good future, which was articulated in the interviews, showed itself to be dominated by a technological imperative and driven by an inherent techno-optimistic idea of innovation. We can see an old 'Western' trajectory shining through here: The ideal of further progression by innovating, by making things better, faster, easier. Appadurai (2013) sees this belief as part of the meta-trap called trajectorism and as a core element of a Eurocentric view of modernism. The sociologist Götz Bachmann (2020:10), who researches on developers in Silicon Valley, sees this faith in progress as condensed in the visions of "black boxes of present technological paradigms", expressed in narratives of "ready-made futures", while Forsythe (1993) described similar beliefs being part of an "engineering ethos" in the 1990s.

The good in these shiny and all-ready futures is deeply linked to the code, the software product and technology in general.

Perhaps noticing the scepticism in my eyes, while hearing this frictionless vision of the technological future, Tracy came forward in the interview with the following statement:

"Yeah, so yeah, I know like lately many people are talking about AI in the future and robots and how they can control the word. (Laughing) But in my opinion like yeah, I think that the AI and technology will I have a lot [sic] with our daily lives. They can replace a lot of manually tasks that are human and […] in my opinion that's good. And we don't have to worry about that in the future, like 10 and 20 next years [sic]. I don't think that we have any problem with the technology".

Besides her vision of automation and the replacement of manual tasks, which Marx indeed already predicted (Butollo / Nuss 2019) and researchers on future work discuss as existing between fear and euphoria (Forlano / Halpern 2015), the image of the good technology is emphasized again. The dystopian notion of robots taking control of humanity was addressed by Tracy but dismissed again in the same instant.

According to this narration, technology is not the problem, but the solution – if there is a problem then it lies in the misconception of technology by amateurs or uninformed people. Jian confirmed this narrative by highlighting his own expertise and adding that it "really is super dangerous, when people talk about AI who have no clue"; the people who know "that it is not magic" (Phan) will be able to control the technology, as well as find solutions to future problems.

As, again, I was a bit surprised by the 'cleanliness' of those narratives, I tried to bring some 'dirt' or friction into the conversations, mentioning already existing dangers and "digital dilemmas" (Franklin 2014), such as privacy issues or the impact on climate change due to the energy consumption of server farms. I constructed this interview situation to inflict a different perspective, to motivate new answers and narrations (Spradley 2011:90).

Often, the reaction sounded like this: "[H]onestly, I not often… I have the thinking [sic] and concerns about this topic. So I don't have any opinion on that. […] Not really about the politics and other stuff" (Tracy). Correspondingly, Dotan stated that he has "[n]o opinion on that, sorry", too, while Jian simply ignored my question about dangerous futures.

Apparently, most interviewees did not want or could not talk about any possible bad or 'political' futures. This non-imagining indicates an important shift in the modern GitHub programmers' set of beliefs: Where the traditional hackers and geeks of the early free-software movement in the 1990s were mostly imagining the internet as a radically free and anarchic space, "today's developers hardly even notice 'Open Source' as a concept anymore" (Eghbal 2020:28). This new "GitHub generation", according to Eghbal (2020:30), is apolitical and mainly interested in two things: convenience and success.

Until now, the imaginary of the greater good shows itself as "contaminated" (Tsing 2018) and infused with (neo-) liberal beliefs of progress and the grand 'Western' narrative of modernism. This imaginary future is not disruptive, but a logical development towards the good, fueled by technology and innovation. The catalyst of this development is the combined and collaborative power of programmers and developers. Current, emerging or already unfolding catastrophes like climate change, wars and global injustice in wealth distribution did not appear in the future imaginations, they told me.

4.2 Dangerous Futures

Two expert names of the short profile list did not really appear until now: Georg and Martin. The reason lies in their slightly different views on future and technology.

Georg, who also believes in some kind of greater ethical purpose that shall guide his own work, preceded my critical intervention and inspired them for my later interviews by giving his definition of a good code: "It tries to tackle a real problem. Like data privacy or the climate change [or] the racial bias problem, it has to take all the social factors in account [sic]".

He made sure that I understood his aversion to "libertarians" and the capitalistic system. His vision of the future relied on the old 'free internet' narration and his main concern was security and privacy. Being "not optimistic" about future development, he saw the biggest threat in companies gaining more control over personal data. His narration indeed became even darker, when he talked of transfer of responsibility for the 'correct' use of technology to the users and humanity in general. Technology, he stated, "is neutral". Nevertheless, the use of it determines whether we will live in a "democracy" or if we "[…] enter an absolute dystopia at a certain time" (Georg). A dystopia of omnipresent control through a powerful state, "a bit like in 1984" and people being "only interested in convenience" lay out the pathway to this "digital dictatorship" (Georg).

Martin, also describing himself as a "pessimistic visionary", shares Georg's concerns about data privacy and the misuse of code. He likes the idea of the "original vision of the internet", which was "indeed very decentral" (Martin). He added that, unfortunately, the future would probably see a complete centralization through large companies. This is why he works on a software that tries to decentralize power again by following a "local first" approach. His GitHub repository already has "certain ethical norms embedded in the way the software is designed at quite a fundamental level". Martin wants people to have "control over their own data", and that the servers' functions are reduced again to simple transfer and synchronization, without saving data themselves – the classic cloud-solution would disappear. It is interesting that his own code library with the embedded local first approach is openly accessible on GitHub, a platform that runs on big centralized server constellations, owned by Microsoft. Still, the embedded local first approach – and therefore embedded imaginary of a decentralized internet – gives an example of how a digital

future, which re-writes and disturbs the current development could resemble. Alex also sympathizes with the idea of thinking about ethics at an "early stage of development". Nevertheless, he was the only interviewee who was generally skeptical about the OS concept:

"There is this concept called an info-hazard. [T]he idea of an info-hazard is that some information […] is dangerous. It is dangerous information. And it's not the right thing to have as default "all information is open", everyone can access this information. […] [I]f you come up with a way of building some really powerful nuclear weapon which you can build back in your backyard by buying stuff from amazon, its better if you don't make that Open Source".

The concept of "information hazard" (Bostrom 2011) is a conspicuous one and may find its proper analysis in a further article. For now, the significant finding is that 'gloomy' or even dystopian futures do float around in the discursive field of GitHub. Those imaginaries often entail the threat of a "centralization of power" and the following loss of freedom, to either companies and states or even non-human actors such as a "powerful Super AI" (Alex).

While Alex warns not to make every information openly accessible, Martin defends the OS ideology and compares himself to a car manufacturer who builds a car, which is then used by terrorists: "And the car manufacturer can't do anything about it. And in the same way, as a software manufacturer, I can't do anything either. […] This is a problem that is completely out of the control of the manufacturer and therefore not really worth further consideration".
Openness or freedom are the key elements in this narrative, and they stand hierarchically above security concerns or possible bad uses of technology. The free and unhindered flow of technological innovation drives human progress towards the future and that is why Martin "would rather have no restrictions at all on how people can use the software".
Christopher Kelty (2005:187) identi-

fied this "commitment to openness" as central for the recursive public of the geek community he observed in his ethnography, comparing it to J.S. Mill's vision of a "liberal polity in which all ideas are allowed to circulate because it strengthens and highlights the best ones". Technology is characterized as neutral, if there is 'bad', it lies in the people's actions.

However, on the horizon of these imagined dangers surges yet another teleological narrative: a competitive battle between the good (or the best) and the bad.

4.3 The Manichean Good vs. Bad Imaginary

Despite the difference in their optimistic (greater good) or pessimistic (infohazard and 1984) perspectives, there is a concordance within the statements made by my informants which brings us to the second flickering imaginary that shined through the data:

"The fight between the good and the bad is always there. For the AI and machine learning it is a new battlefield, but the fight is not new. So, I am not too worried about all this advanced technologies that we are dealing with. Just because we do all lot of this stuff, we know how things work. […] [W]e understand a bit about this, we know it is a good thing! You can use it for the good and for the bad. And in this case when we use it for the good we can use that good to fight the bad" (Phan).

In almost all interviews, the developers at some point mentioned the existence and inevitability of "competition" (Natalia) or more dramatically "fight" (Jian). While Natalia and Dotan framed the competitive behavior in a classical liberal way, in the sense that good ideas and people naturally compete for the next innovation, market share and money, Martin phrased it a little more ontologically by saying "Competition always exists". Phan ultimately widened this narrative in declaring an omnipresent fight between the good and the bad.

This imaginary, which for this paper may be titled the 'Manichean good vs. bad', is informed by and co-dependent on the 'greater good' imaginary, which seems to, quite automatically, require the reverse image of the bad or the evil. In this binary narration, the developers as well as the OS community on GitHub is characterized as the 'good force' on the scale of this eternal struggle between dualistic powers. At the other end of this scale looms a diffuse and not very well-defined 'bad', whose main goal seems to be to deprive humanity of its freedom.

Remarkably, nobody seems to be afraid of the bad. Mainly, because they (i.e. the developers) "know how things work" (Phan) and so they can fight the bad with the good. Phan is resting in self-confidence, like Jian, who declares: "Developers are smart people. They find solutions. Always".

This is seen as the immanent strength of OS coding on GitHub: "Free and transparent, and decentralized. [T]hese are the key spirits that let me, let smart people really building [sic] something from the ground up" (Jian).

The developers are creators, a bit like an artist who is "drawing" a picture from "nowhere, from empty" (Jian). This self-image as masterful constructer has a long tradition in computer science and builds upon key figures, which are praised in the interviews repeatedly: For example Ken Thompson, who "[b]uilt the entire computer borders, everything, every digital devices that you have seen. Is starting from him. He's the Moses" (Jian). Next to "Moses" Thompson, Linus Torvalds, the creator of Linux, was mentioned (Martin), as well as the famous Tim Berners-Lee (Georg), known as the inventor of the world-wide-web.

Additionally, coding as a practice is described as a very individualistic and lonesome process (Jian, Martin, Phan). According to Georg this leads to a certain dynamic:

"because at the end of the day it's always very few who have the say, also necessarily,

because things are complex […] I think only the one who wrote [the code] really understands it completely.[…] Yes, that alone makes it actually necessary that he is also the one who has the say. I don't know if it makes it necessary, but it's relatively logical that he's the ultimate decision-maker" (Georg).

Emerging out of the coding praxis and the traditionally strong focus on individuals and their 'genius' is a strong hierarchical orientation. In the field, the person who has the last "ultimate" say about changes on the code and maintains the development with one's authority is called "Benevolent Dictator for Life" (BDFL) (Milinkovich 2015, Kelty 2008:212). This emic term was originally used by Eric Raymond (another important figure in the OS community) in an essay in 2000 and then adapted by Guido von Rossum, the author of the widespread programming language Python (Eghbal 2020:26).

Since then, the figure or position of the "BDFL" is a stable part of OS culture and seems to contradict the idea of collective and open participation to a certain extent. That is why Georg calls GitHub "pseudo-democratic". The hierarchical structure of the platform, in combination with the self-image of the developers as smart creators, "co-products" (Jasanoff 2010) a specific social order, where only the smartest or most assertive developers appear to prevail, because "you can easily fight each other about not agreeing on something, […] that is actually a part of the culture of programming software developers. GitHub becomes a very centralized community platform where only the people who agree with each other will contribute on the same project" (Jian). It is this centralizing dynamic and the competitive coding practice that seems to nurture the narrative of natural conflict and competition, eventually transforming and supporting the imaginary of the battle between the 'good' and the 'bad'. In this narrative, the developer takes on the role of an almost promethean creator, producing codes out of thin air and controlling or defending

the future development as BDFL. At the same time, this hierarchical GitHub environment fosters a certain homogeneity, despite the assumed inclusiveness and openness.

5. Discussion – The Coding Prometheus is Blind

The globally accessible and "diverse" (GitHub 2021b) Internet platform GitHub rests on the idea of open and collaborative work on codes. These can be downloaded, forked and re-programmed anywhere from anyone – this is the promise of Open Source. Algorithms, which freely travel the world, are therefore genuinely highlighted by companies "as engines of multiculturalism" (Elkins 2019). This global and diverse environment is presented and advertised as a catalyst for the future of technological development (GitHub 2021b).

A first glance at the biographies and socio-cultural backgrounds of my interviewees (cf. short introductory list) indeed supports the claim of GitHub being a diverse space and one could assume a wide range and variety of answers to my questions, resulting in an equally diverse kaleidoscope of future imaginaries.

The interview-data suggests that this forthright assumption seems not to be true. Rather, it could be concluded that GitHub attracts, fosters or even creates certain types of developer identities and that the strong unifying culture of OS guides the narratives and imaginaries in a certain direction. The competitive environment contributes to a process via which only developers with similar ideas and coding practices continue to work on a project, mostly guarded by one BDFL or small groups of developers. The feared "digital dictatorship" (Georg) finds its pallid micro-sociological expression in the hierarchical structure of many GitHub projects.

Centred on the narrative of the genius developer, who creates and controls technological development, two co-dependent imaginaries were found:

the linear greater good imaginary and the Manichean good vs bad imaginary. I drew both imaginaries back to trajectorism, which Appadurai (2013:224) describes as the "great narrative trap of the West". The belief in a linear and teleological trajectory of humanity merges smoothly with techno-optimism and a liberal worldview. The socio-technological imaginary, which emerges out of this, is populated with narratives of clean, fast and easy futures: "Ready-made" (Bachmann 2020) utopias focusing on the greater good brought about by technology. The belief in predictability and the controllability of futures frames the imaginaries and resembles the ideal of a cybernetic order of reactive control (Seefried 2015:10).

The constantly in the background flickering 'bad futures' or dangers were often not specified, but served to illuminate the importance of further technological development, specially to fight against the 'bad' as a narrative counterpart. This also may be integrated in the "ontological habit" of trajectorism, which includes the triumphant "journey from dark to light" (Appadurai 2013:223).

Only fractured and in a few rare cases could dystopian narrative threads be identified: the centralization of power in and through the internet, the loss of privacy and finally freedom due to all-powerful digital dictatorships. Those narratives highlighted the potential 'bad' lying in technological innovation itself, remembering another traditional storyline of technological "dominance" (Cave / Dihal 2019:76) or misuse of technology. Even the idea of "Singularity" (Bostrom 2014) was mentioned: a rampant Super-AI that independently acts as a threat to all humanity.

Mostly, those dystopias were immediately discharged, even ridiculed. Instead, the smartness of programmers was emphasized as the main reason to be optimistic about the future.

Therefore, the creator of the technological future was clearly identified, while the future narratives often lacked a sharper contour. Intentionally confronted with difficult scenarios such as digital warfare and the actual climate disaster, the interviewees pointed to their non-political attitude or lack of opinion on the topic.

Eventually, those somehow 'missing futures' may be characteristic of the "modern Prometheus" and his inability to "imagine as much as we could make and realize" (Palandt 1999:55). According to tech-philosopher Günther Anders, the discrepancy between what is technically possible and what is humanly realizable is unbridgeable; we are "simply no match for the Prometheus in us" (Anders, cited in Palandt 1999:55). Another discrepancy, as Sabine Palandt (1999:56) elaborates, is the inability to imagine coming times – the modern Prometheus is, so to speak, "Zukunftsblind" (future-blind) and locked in the struggle between 'good' and 'bad'.

The developer on GitHub, this coding Prometheus, indeed seems blind to many potential futures. Those are not only obscured by the Manichean imaginary of good vs. bad, but also by a globalized 'Western' trajectorism. Speaking with Amadasi and Holliday (2020), the hegemony of this strong "centre-culture", out of which the GitHub culture emerged, supports a strong narrative "block", which contains a mélange of beliefs in good technology, progressive modernity and liberal individualism. Inside this "technoculture" (Shaw 2008), other future imaginaries are hard to find or indeed to provoke.

Yet, there are surely other visions in existence and a deeper dive into the depths of GitHub could further explore such varied future-stories. My momentary findings are limited both by the small number of interviews, as well as by the position of the interviewed developers: all are established contributors, rewarded by an inherent trending algorithmic system, and located in projects that could be seen as traditional or mundane.

Yet, how may these "other experiences of time" (Sloterdijk, cited in Nassehi 2008:333) and "de-centralized" (Amadasi / Holliday 2020) futures look? What form may they take?

Martins' code library may be a frail indication in this regard. It could be read as a sign of a fragile techno-utopian future emerging, when out of the blocking force of a neo-liberal centre-culture the de-centred thread of a 'local first' imaginary emerges and finds it's embedding within actual code. Perhaps then empowering a human in the future, who is also sitting in front of a personal computer, searching for a new washing machine – but this time in complete ownership of his or her own data.

However, maybe this story still is too similar to the contemporary hegemonic future-imaginary. Then the last and little dismayed words may belong to Richard Barbrook (2007:9), who observed that "[t]he present is continually changing, but the imaginary future is always the same".

6. Bibliography

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Endnotes

1   All translations by the author, except where stated.

2   Appadurai (2013: 197) distinguishes between a Western and Eurocentric "European cosmopolitanism", historically linked to the ideals of European Enlightenment and composed of "cultivated knowledge of the world", privileges in education and free international travel, all in all leading to the "the luxury of expanding the boundaries of one's own self by expanding its experiences" (Ibid.:197). This version of cosmopolitanism is contrasted with a „cosmopolitanism from below" (Appadurai 2013: 198), which manifests itself in places of "cultural co-existence" (like Mumbai), where people inevitably come into "intercultural contact [by] rubbing shoulders with those who speak other languages, eat other foods, worship other gods, and wear clothes differently" (Ibid.: 198). These distinctions by Appadurai reflect only a small part of the broad academic discourse on the concept of cosmopolitanism. For further reading see Delanty (2012) or Hannerz (2004).