A Kantian Right to Fediverse Access,

or: for a digital enlightenment on the social web

by Jan Bingemann

Abstract

In his paper "Palladium of the People – A Kantian Right to Internet Access", Christopher Buckman argues for internet access as a universal right. He bases his argumentation on the potential of social media, which has clearly proven itself to be a wrong assumption. This paper builds on his argumentation, but uses the concept of the Fediverse – a decentralized alternative to closed social media platforms – instead of traditional social media to argue for universal internet access, by this completing his argument and additionally, leading to a Kantian right to Fediverse access and three follow-up questions: What are reasonable ways to achieve universal Fediverse Access? How can we act morally in the Fediverse? How can the Fediverse itself become and stay moral – and implicitly through this: how could the Fediverse contribute to a moral world?

The first two of these questions will be tried to find first answers for based on three hypotheses. Firstly, that fantasy novels with magic systems can be seen as teaching resources of digital skills and could therefore be seen as new learning resources for digital skills, which requires to expand the term "digital thinking" and leads to the conclusion that in our digitalized society, one cannot not learn to think digitally. This will introduce new and moral, but also potentially immoral ways of digital thinking like astrology to the area of computer science didactics. Therefore, an important question of computer science didactics becomes in which form digital skills can be taught such that they adhere to moral ideals (with reference to Kant and Habermas). To observe the subject matter more closely, digital thinking is then described based on Wittgenstein as a language game: in daily life, people develop digital "daily"-languages ("Alltagssprachen") around interactions with the digital, which language games are learned automatically through the participation in our digitalized society. The question of C.S. didactics then becomes how these "Alltagssprachen" can be bridged to an advanced understanding of the digital that enables to become a mature digital agent, instead of succumbing to digital language games that are Heideggerian or quasi-magical. Secondly, related to acting moral in the Fediverse, the realization of the interplay of objectivity and subjectivity in the digital is introduced as the condition for the development of a morality in the digital, which works similar to that in the analogue universe as described by Kant. Thirdly, it is stated that the shift towards the Fediverse marks a paradigm shift inside the social web that also needs to be understood on an individual level and that this only enables people to see the potential in the Fediverse and make the Kantian realization that leads to a digital moral. Therefore, there is the need for a new understanding of the social web that puts the ideal of the Fediverse in the centre instead of the service/digital ecosystem one is currently using (here called the "Copernican revolution of the social web"). In other words: the text makes a case for a Kantian right to Fediverse access and then argues for an enlightenment on the social web as a condition for people to be able to claim that right.

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1. Introduction

Most arguments for the Fediverse are either utilitarian, economical or Marxist [17]. In the following, a Kantian argument for the Fediverse is described based on the paper “Palladium of the People – A Kantian Right to Internet Access” by Buckman.

The paper by Buckman makes the case for universal internet access by arguing that it enables a public discussion sphere to develop through social media, which can also (and in fact more fittingly) be argued for with the Fediverse instead of traditional social media. Therefore, I will start my argument by adding the concept of the Fediverse to Buckman’s argumentation, introducing it as a replacement for traditional social media that could actually meet the requirements that traditional social media could not. This will complete Buckman’s argumentation and lead to a universal right to Fediverse access, from which subsequent moral questions will arise: how can people gain the ability to claim their right to Fediverse access if they want to? How can people act morally in the Fediverse? How can the Fediverse maintain its moral character? And: In what ways might the Fediverse contribute to a more moral world?

To try to find answers to the first two of these questions, the text introduces three hypotheses: First, that magic systems in fantasy novels teach digital skills (or have the potential to do so), which could enable more people Fediverse access. For this, also the didactical understanding of what is considered digital thinking will need to be expanded, the reason for which can be summarized in the observation: in a digitalized society, one cannot *not* learn to think digitally. What this means is that there exist language games (after Wittgenstein), that have developed around interactions with the digital in daily life. Included in this new definition of digital thinking are also certain practices of astrology and esotericism. Therefore, there will need to be starkly differentiated in what we should consider moral digital thinking in the sense of Kant and which we consider not to, only the first of which should be acquired by and taught to people to gain Fediverse access. It is then argued based on Wittgenstein that the main purpose of computer science didactics should be to build a bridge from these digital “alltagssprache” to advanced digital language games and to actively push against people resorting to quasi-magical, Heideggerian digital language games instead. The second hypothesis states that the potential of the Fediverse induces the same relation between objectivity and subjectivity as the universe, therefore making one realise one’s morals in the digital. And thirdly, there exists what I call “the Copernican revolution of the social web” as an individual’s process, and it is a condition for making this realisation of objectivity and subjectivity and through this to become moral digital beings.

The conclusions drawn from the three hypotheses give the term "Fediverse Access" additionally to its technical and societal dimension, a moral dimension and a dimension of theoretical understanding, both of which need to be reached in addition to the technical and societal skills it requires to be able to use it. Based on the drawn conclusion, people would be able to become their own moral agents in the digital. Potentially, this could give people the freedom to become their own digital gatekeepers and lead to a new level of digital agency and maturity; eventually leading to the development of democratic structures on the web itself, which is indicated in the considerations about the third question in the last section and by this making a first attempt at solving the problem of judicial and moral accountability on the Fediverse.

Generally speaking, looking at the bigger picture of symbolic machines and their centuries-old-relationship with humanity, we find ourselves in an interesting time. Regarding the digital and social media more specifically, Habermas wrote in his book about the digital that with the invention of letterpress printing, everybody was potentially able to read a book, but people still

needed to learn how to read. Now with the digital, potentially everybody is able to become an author, but we are still learning how to write. I would even go further: the invention of letterpress printing enabled everybody to learn about symbolic machines and how to use them; the digital potentially allows everybody to create their own symbolic machines through operative writing; *and* become an author, *and* the combination of the two.

2. Description of Concepts

Before the main part, I will describe various terms that will be used in the arguments. The first three sections will define the term of the Fediverse, describe and compare its practical implementations and define associated concepts of it like the social web. This is followed by a brief comparison of various philosophical definitions of the "digital", which will be referred to later in the text when expanding the concept of digital thinking.

2.1. The Fediverse

The Fediverse is first of all an abstract concept of how social networking on the web should ideally look like. For its advocators, this ideal is that of an open network of interconnected, dezentralized social network servers that work based on a standardized, shared protocol.

In contrast to the closed digital ecosystems of the social media that emerged in the so-called "web2", the underlying protocol is to be designed in a way that it enables developers to build on top of the network new apps and services. For this to work, the protocol abstracts the functionality of social networks into its most basic functionalities: posting content (regardless of its type), reacting to comments by others and subscribing to people. The openness of this concepts should enable developers to build dezentralized clones of established social media applications like Microblogging (Twitter/X), Image/Video-Posting (Instagram, TikTok, YouTube) or Link Aggregators (Reddit); but also variations or mixings of these archetypes as well as completely new concepts of social networking.

Secondly, users should be able to allow users to migrate from one server to the other with their account, including their data and their followers. It's argued that this would give users more control over their digital social spaces and put pressure on server owners to improve their user's experience. The hope is that over time, users would gain more digital agency and social networking services overall would gradually improve.

2.2. Practical implementations: The ActivityPub-, Nostr- and AT-based Fediverse

The idea is currently realized most prominently by the ActivityPub protocol, which is implemented for example by Mastodon and (soon) Threads; other competitors include the AT-protocol by Bluesky and the Nostr-protocol. ActivityPub can be seen as the most popular among the candidates, because it builds on protocols that have been developed for over two decades and it has been promised to be adapted by Meta's Threads. It's the ecosystem that is usually referred to when people speak about "the Fediverse" and claimed this term for itself early on.

ActivityPub is defined as general as possible, enabling not only decentralized clones of existing platforms like Twitter/X (realized by Mastodon) or Instagram (realized by Pixelfed) to be developed on top of it, but also the interoperability between different types of social networking services. This allows for example to view image posts from Pixelfed from one's Mastodon account, just as it enables blog posts of federating WordPress-accounts to be viewed on Mastodon, both of which were commonly thought of as distinct types of apps that exist fully separate from one another.

Other protocols like Bluesky's AT-Protocol, which is not as open to open-source development as ActivityPub, also try to realize the Fediverse with an open protocol, while usually not referring to themselves as the Fediverse but in the case of Bluesky, as "The Atmosphere". Between the ActivityPub-based Fediverse and the Atmosphere also exists a bridge that forwards posts between the networks, which raises the question whether the combined networks can be seen as the currently most closest implementation of "the Fediverse"; however, after complains by the ActivityPub-based Fediverse-community, the service has been switched to opt-out by default, again making the ecosystems more separate.

In the following, the term Fediverse will refer first of all to the ideal; when talking about practical implementations, they will be referred to attached to the protocols that realize them; that is, as the AT-, Nostr- or ActivityPub-based Fediverse respectively.

2.3. Closed Digital Ecosystems and the Social Web

The two most fundamental features of Fediverse-like digital ecosystems are decentrality and openness, which puts them in contrast to the closed ecosystems of Apple, Google, Meta, Microsoft, etc.; however, it should be noted that in the following, the Fediverse is already assumed as just another digital ecosystem that is in principle similar to that of Microsoft or Apple, but open and decentralized.

To include this in the overall picture, another term, the social web is introduced here, which includes all ecosystems in the digital, counting in the ones by Apple, Google and Meta. While those parts of the social web are referred to with the term "closed social web", the parts that try to implement the Fediverse with an open, shared protocol are referred to as the "open social web".

2.4. Ontologies of "the digital"

Parts of this work will be dedicated to coming closer to a new definition of what we consider "the digital", which expands the common definitions by the scientific community and will build on the works of Sybille Krämer, who described "interacting with the digital" as a combination of epistemological skills and the interacting with symbolic machines [11] and the later Wittgenstein, as well as some observations from daily life.

Attempts to define the digital have been made before, for example through computer science didactics with the term "digital thinking", which is currently the most common approach to regard the skills associated with digital artefacts and the interaction with them as a certain way of thinking, in the tradition of linguistics and philosophical idealism. Apart from this, other approaches have been attempted, for example to define the digital through its objects [6], which is similar to the philosophical tradition of rationalists like Thomas Hobbes and often builds on engineering concepts.

The debate which of these two approaches is the right one has already gone on for a few years and produced various new concepts, e.g. CS unplugged, in which teaching concepts are trying to be taught only with physical artefacts and overall, a shift can be observed towards a less purely constructivistic view on the digital in the last years. While the development is now only at its beginning, the current computer science didactics approach of the broader community has,

with the introduction of the term digital thinking and its related concepts, already left the path towards an ever-advanced understanding of rational machines combined with basic media skills and by now also includes teachings of critical thinking and the combination of them in the interaction with symbolic machines, which has become even more pressing with the increasing use of AI agents. Now with the introduction of AI agents, attempts from both traditions often fall short regarding AI agents like ChatGPT, however, the thinking-approach does seem to manage to handle it better. While both focus on the behaviour of the digital artefacts they observe, in the case of ChatGPT, its observation of behaviour is in fact an observation of the language game with it. Given the potential of AI agents in the future, the language game could then just as well be the focus in the first place, which is why one of the reasons why the thinking-approach has gained more traction in the last couple of years.

This is why in the following, the term of “the digital” is expanded based on the tradition of the former with a stronger focus on its linguistic aspects based on Wittgenstein, which makes it easy to describe interactions with AI agents, since the focus is on the language that is used to interact with them anyways and would make one able to further advanced AI agents in the next couple of years. Digital skills, or as a broader term “digital thinking”, will therefore in the following be skills associated with interacting with “the digital” in this way. Different approaches like [6] can of course used complementary to this.

3. General Argumentation: from a Kantian Right to Fediverse Access to the three moral Fediverse Questions

The following section shows an overview of the argument that will be laid out in the further course of the text, starting with a case for a Kantian right to Fediverse Access. Every question that results from this builds on the question before that, assuming that it has already been answered, which leads to three central questions related to a universal right to Fediverse access, two of which will be tried to be answered based on three hypotheses; and for the third one, possible answers will be discussed.

First, it begins with an argument for the basic hypothesis of this text: an argument for a Kantian right to Fediverse access. From then on, it is assumed to exist.

Now, if it does exist, the question arises how to achieve it with reasonable means. Of course, this can only happen, first of all, through the teaching of digital skills, e.g. skills of digital thinking as described by computer science didactic research, the propagation of iteracy/digital bildung as defined by David M. Berry, and possibly, as explained later, through the application of formal language systems found in daily life in general and fantasy/science fiction novels, cooking recipes and marble runs more specifically. This is also the first hypothesis of this text, while it will need to be elaborated on, in which form these language systems can be used to adhere to the moral conditions raised by the next questions.

If it is assumed that these digital skills are being acquired through reasonable means, there also comes the need for an ethic on how to use them. This would mark a paradigm shift in C.S. didactics since until now because of the complicatedness of the subject matter, most effort was directed toward teaching the skills rather than how to use them in a moral way. Conditions on this ethic are here defined as follows in reference to the teachings of Kant: it should adhere to the ideals of the enlightenment as defined by Kant and more specifically after Habermas, in the sense that digital skills should not be used in a zweck-rational way.

Furthermore, based on Wittgenstein, the main purpose of computer science didactics should be to show people a path from their digital “alltagssprache” to advanced digital language games and additional to that, also actively pushing against the adoption of Heideggerian, quasi-magical digital language games. How this bridge can be achieved will be formally shown at the example of magic systems and then based on this more broadly with marble runs and cooking recipes.

This argumentation is represented in principle by Figure 1 and 2, all of which digital languages and their differences will be introduced in the further course of this paper. On the right side, there are the daily digital languages that developed around digital artefacts and form their own digital ontologies, like cooking recipes, TODO-lists and horoscopes. They are divided into two groups based on the world view that they imply for the ontology of the physical world: constructivistic and quasi-magical. On the left side, the advanced digital languages are depicted, which have been covered to a high degree by the sciences. The classic role of computer science didactics was here to build bridges from one side to the other, or at least introduce people to advanced digital languages, and the classic approach by computer science didactics to do that was to assume the constructivistic language as a starting point and then introduce pupils immediately to the advanced languages of engineering and/or logic, while often building on metaphors found in digital language of daily life. I don’t want to change anything about this role, however, with the introduction of ChatGPT, the teaching approach does not work anymore, and it always had its blind spots in the first place, as the digital skills

learned from quasi-magical digital languages were never attributed for although they always contained potential as well as danger themselves: the current solution of just ignoring them, which made it easy to ignore and separate the community as well as pupils from these irrational forms of digital thinking worked rather well, but was rather make-shift, left the subject-matter largely unstudied and found its ending with the recent introduction of advanced AI agents that makes the need for observing them and finding a handle on them even more pressing. Therefore, there needs to happen a broadening of the horizon by the digital didactics, even as this leads to discover new potentials but also risks and danger in the course of this.

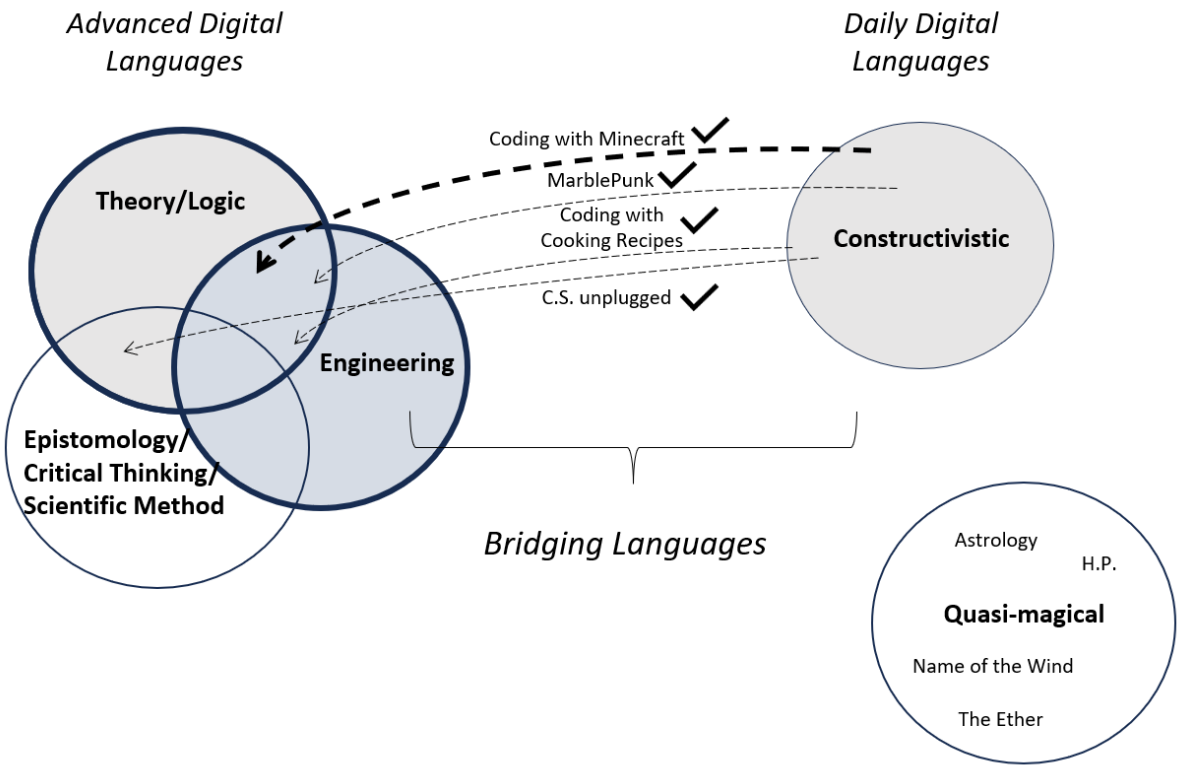


Figure 1: Digital languages that C.S. didactics considers its subject matter before ChatGPT

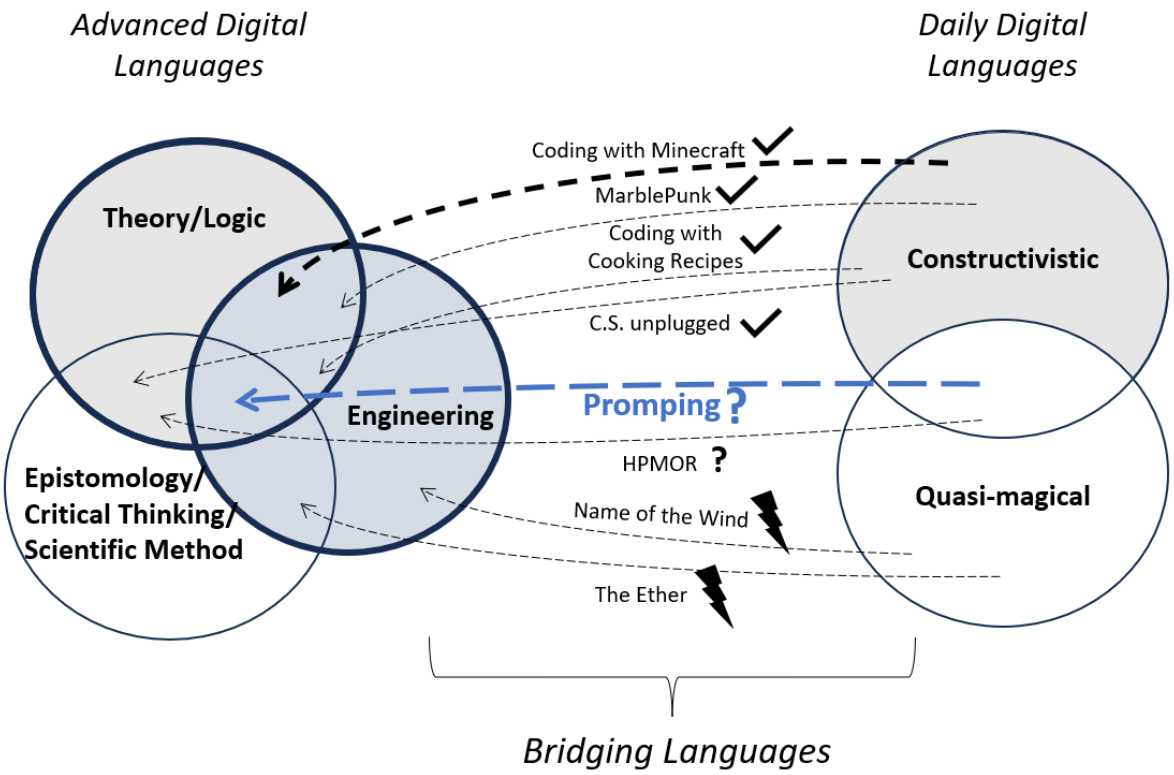


Figure 2: Digital languages that C.S. didactics considers its subject matter after ChatGPT

To master ChatGPT and other AI agents, new skills are needed, around which the digital daily language of prompting developed. This resulted in a shift in the landscape of digital languages that are important to the digital didactics and left them somewhat puzzled. They need a while to adjust to this new change, because in this new situation lies potential as well as danger. It is not as easy any more to differentiate oneself from irrational ways of digital thinking, because understanding AI agents and phenomena like prompting means to take a closer look at irrational ways of digital thinking as well and think about how to guide people towards enlightened ones, and with the introduction of the Fediverse also outside the context of schools.

With reference to the formal language systems for teaching the digital skills to acquire access to the Fediverse mentioned earlier, in this part of the text will also be elaborated on the potential consequences and moral limitations of this approach. For this, the term of “digital thinking” itself will need to be expanded to include these new teaching resources, and then to study them on their applicability in terms of moral. It will result in the conclusion that when developing these formal language systems, there should be a stark distinction made from object-oriented ontology [6] as it stands in the tradition of Heidegger and can be described as anti-Kantian in the sense that it fosters a zweck-rational view on the world (after Habermas).

The second hypothesis applies Kant’s relation between objectivity and subjectivity of the universe/self on the Fediverse. It assumes that by realizing the potential of the Fediverse, one comes in the position to develop one’s own morals in the digital.

And the third hypothesis is now that this can only be reached by an advanced understanding of the social web that separates the ideal of the Fediverse from the digital ecosystem one is currently using (Copernican revolution on the social web), because only this makes one able to realize its full potential.

Therefore, from a Kantian Right to Fediverse Access can be derived a call to both educate people regarding their digital skills to claim Fediverse Access as it is their right, as well as a moral on how to use them which in turn assumes an advanced understanding of the Fediverse, which also needs to be taught and propagated through reasonable means. Therefore, access to the Fediverse should be understood both in the technical sense to participate in the Fediverse and in the sense of an advanced understanding to also grasp its potential and by this, the moral implications of this. Overall, this text calls for the reasonable development of the Fediverse, a pushing for digital skills through established, reasonable and moral means (e.g. digital thinking and iteracy/digital bildung, and potentially also through certain kinds of fantasy novels), and the propagation of an advanced understanding of the Fediverse (Copernican Revolution of the social web) to understand its potential and moral implications; as well as the propagation of ideals of Kant, Habermas and the ideals of the enlightenment in the overall course of this.

To summarize, each of the following questions can be derived from the existence of a universal right to Fediverse Access that was argued for in the last section, as each question assumes the one before to be answered and then builds on top of that.

Question 1: What are reasonable ways to achieve universal Fediverse Access?

When there is a universal right to Fediverse access, it needs to be thought of how to achieve this with reasonable, moral means. Regardless of how this will look like, more than universal internet access will be needed for this, because open decentral social networks are not as easy to use (and furthermore, to understand and to commit oneself to) as closed social networks, which usually come with a high easy-of-use by design. The digital skills needed for this should not only be used to be able to sign up for a Fediverse server as this is still a relatively easy job and would only enable people to use Fediverse-services as if they were web2-services; but also to make use of its advanced features (like account migration) and even to be able to participate in the Fediverse to a reasonable degree and to realize its full potential for society. However, these digital skills should not be taught by any means, it also needs to be thought about how these applied methods would affect individuals, especially in their further moral development in the Fediverse.

Question 2: How can we act morally in the Fediverse?

Assuming that somehow, these digital skills are brought to people, with them comes the new responsibility of finding an ethic on how to use them morally.

Question 3: How can the Fediverse itself become and stay moral? (and implicitly: How could the Fediverse contribute to a moral world?)

The next question comes naturally with the expected growth of the Fediverse if the universal access to it would be propagated. First of all, internally, the question is how the Fediverse can stay moral against immoral actors that try to gain influence over it by joining it, but also against

bad moral actors that already joined, as well as the active interaction with external actors; or phrased more generally: how can the Fediverse become and also stay moral over time?

As the Fediverse becomes and stays moral, and in the course of this becomes a more powerful societal and political factor, the question will become implicitly relevant, how the Fediverse should act and use its power to contribute to a morally better world. However, this is already included in the last question, as it already includes the interaction with actors outside the Fediverse.

These questions will be answered in the following. There are three main hypothesis that I make in this work, regarding question 1 and 2, and that I will try to lay out in the following. The last question will not be tried to be answered here with a hypothesis and only provided first thoughts about at the end of this paper.

Overall, the text stands in line with applying the teachings of Kant and the age of enlightenment to the digital; but extends this practice to the Fediverse (and the social web in general) and thinks through the societal and philosophical consequences of this.

4. Is there a Kantian Right to Fediverse Access?

In this section, I will answer the central question on which the rest of the text will be based on: whether there is a Kantian right to accessing the Fediverse or not. Often, the argumentation for a universal access to the Fediverse follows utilitarian or Marxist logic, in the following will be made another, stronger case for the "big Fedi" standpoint, based on arguments by Immanuel Kant and a paper by Christopher Buckman, which will, in the further course of this text, lead to a broader vision on how the Fediverse could help us to become more moral digital beings based on one of the central ideas of Kantian thinking laid out in the next sections of this paper. But for that to be possible, first the case for a Kantian right to Fediverse access must be made, because everything that follows will be based on this.

A similar attempt in favour of basic rights to internet infrastructure, has been made before. In his paper "Palladium of the People: A Kantian Right to Internet Access" [3], Christopher Buckman argues for a basic right to internet access. But while this makes the starting point of his argumentation the internet's protocol level, his argumentation quickly ascends to the internet's application-layer and more specifically: to the applications of social media. To justify its claim, he bases his argument on a supposed potential of social media. Because they supposedly enable people to access vital resources and facilitate informed democratic participation, he argues that they could serve as a bridge between morality and politics, aligning with Kant's vision of the public sphere. And because social media can be accessed over the internet for free and with neglectable effort, the text argues that access to high-speed internet should be considered a basic right.

However, while making a solid case for a universal access if social media would have the described beneficial potential for society, the text always merely assumes them to exist and never argues why this should be the case. This can for example be seen in the following paragraph: "Increased inclusivity, made possible by the recognition of a universal right to internet access, would allow social media to fulfil its potential as a Kantian bridge between the moral and political". He never explains why this should apply to traditional social media nor a version of them that could be developed in the future. And while he addresses criticisms of social media, highlighting concerns about polarization and misinformation, he does not examine them thoroughly. Despite the described challenges, the text suggests that social media's potential to unify and democratize discourse justifies a basic right to internet access. It provides examples such as the Black Lives Matter movement to illustrate how social media can drive political change and advocates for universal broadband access as a means to uphold individual autonomy, foster enlightenment, and safeguard against authoritarianism through social media.

However, since the paper's publication, 2017, based on multiple studies and lawsuits, it can be constated that at least the traditional social media platforms have clearly failed to meet these expectations that would be necessary to enable what Buckman described as the "palladium of the people". Overall, not only do current social media platforms not enable people to achieve "digitale Mündigkeit" but they actively prevent them from doing so [20].

This raises the question how social media could be developed further to meet the requirements, and in the following, I will argue why the Fediverse by leveraging protocols as the basis for a new form of social networking applications, could be the conceptual solution for this:

1. The fediverse is not owned by a monopoly and because of its openness can easily be extended.
2. It scales better due to different forms of social interactions and communities to coexist with the possibility to move away from each other more than in traditional social media.
3. It gives individuals the freedom to choose their provider.

While Buckman argues that a universal internet access would actually enable the public sphere that bridges morality and politics that Kant calls for, the Fediverse could be the more realistic thing to make that happen, and that will not necessarily lose this ability when it scales (at least in the technical sense; the moral aspect of this will be acknowledged in the further course of this paper, because as it has not been solved for traditional social media in the first place nor attributed by Buckman, it does not openly contract his line of argumentation).

Therefore, the inconsistencies in Buckman's argument could be overcome with the introduction of the Fediverse, allowing a public sphere to develop as Buckman describes it. It therefore completes Buckman's argumentation for a universal right to internet access and makes a universal access to the Fediverse a condition of this, which leads directly to a universal right to Fediverse access.

Therefore, if his term of social media is expanded to include the concept of the Fediverse and this does in fact meet the described requirements, Buckman's argumentation already contains everything to justify that a universal access to the Fediverse is in fact a Kantian right. However, what also follows from this, is, that universal internet access is not enough to realize universal access to the Fediverse, because signing up for the Fediverse is not as easy as signing up for web2 social media platforms (which almost requires no effort). Therefore, additionally, digital skills and advanced understandings of the Fediverse are needed, from which further moral questions will follow that will need to be answered to fully complete Buckman's argument. This will be done in the next section.

5. Question 1: What are reasonable ways to achieve universal Fediverse Access?

The first question stemming from a universal right to Fediverse access is how to achieve universal access to the Fediverse reasonable.

Of course, many ways have already been established by computer science education and didactics. Its findings enable people not only to get access to the Fediverse both in terms of digital skills and in the ability to find a sufficient understanding of it to realize its potential, but also to contribute to its further development. A more advanced theory of this that also includes ideas of critical thinking developed by David M. Berry [1] is called “computational enlightened” or “iteracy”, as well as the branch of C.S. didactics called “C.S. unplugged”, in which new ways of digital thinking are tried out exclusively with physical teaching resources.

However, there may be a different approach to achieve these things, which has until now been left untouched by computer science education and does not typically fall under the term “digital thinking” or “digital literacy” and that lies in the magic systems of fantasy novels like Harry Potter.

Hypothesis 1: The definition of “digital thinking” as it is used in C.S. didactics must be expanded, because magic-system fantasy novels teach people digital skills (and: as a participant in a digitalized society, one cannot not learn to think digitally / there exists a digital “alltagssprache”, which can be built on when learning digital skills).

The hypothesis is therefore that fantasy novels describe the interaction with the digital, and that magic systems are shared understandings of how interaction with the digital looks like. If this would be correct, these new ways of teaching and the form of digital thinking they result in, would need to be evaluated on whether they could be used as teaching resources; which will be done in the following section. For this, in the further course of the text, the term “digital thinking” will be expanded to include these context-specific language games that can be found in all parts of daily life and can be used to build a bridge to advanced digital language games.

5.1. Harry Potter and its relation to digital thinking

To prove the above stated hypothesis, research would be needed as well as language-theoretical argumentations (which will be done in the next section as well). Even though no studies have been made regarding this yet, already some observations can be made regarding this theory, for example by observing the popularity of Harry Potter and its unique relation to digital communities and digital thinking, which point towards indications for this hypothesis.

For one, the rise of Harry Potter fell together with the rise of the world wide web. Members of the Harry Potter fandoms build it early on with the help of the world wide web as a tool to connect themselves and grow for example through fan sites. The Harry Potter magic system resembles key actions of the digital: delete, create, modify and move objects, which are the fundamental actions of the digital: CRUD (Create, Read, Update, Delete) or ACID (Add, Change, Inquire, Delete) [2]; as well as problem-solving and rudimentary algorithmic thinking. It also implies a basic set of moral rules, which is similar to some teachings of Kant, for example the prohibition of the instrumentalization of people, as resembled by the prohibition of the use of the imperium-curse, or the instant killing (deletion) of people with the “Avada Kedavra”-curse.

5.2. Expansion of the definition of “digital thinking” based on daily observations about the relation between esotericism and the digital

Now placing these observations in a bigger historical and societal context, we can expand the initial hypothesis to generally expand the term of digital thinking to more societal activities beyond Harry Potter that fall in the area of esotericism.

For example, as seen with the observations of the last section, there seems to exist a long, subconscious societal fear of certain interactions with the digital. Both actions of deletion and literal instrumentalization have in their form as spells no immediate resemblance in daily life, but nevertheless show a long etymological and cultural history, because they make sense in the interaction with the digital; and with that, also in its historical sense. For example, the act of deletion exists in our society almost only in the relation with the digital (wiping a school board clean, burning a page in a book). The curse “Avada Kedavra” is based on an old Aramaic word, which means “Let the thing be destroyed”. The fear is here that a person’s soul is wiped away just like the inscribed letters scratched on a piece of stone or the earth. In the same sense, there are also many cultural sayings about people being possessed or controlled by other people through the use of magic, just as people are nowadays afraid of their data and identity being stolen by hackers, it can be frightening to bystanders how real-world matters are captured through mathematical symbols and formulas and are then “carried out” in a way that gives answers about the described phenomena, which can easily be mistaken for or extended to in the imagination for “being magically executed”.

Both of these fears that have a century-long tradition that is related to the societal punishment of certain kinds to interact with the digital can be seen in the form of the curses and their handling in the society of Harry Potter. Of course, in the literal sense these fears are irrational and often lead to false allegations against individuals (which puts them also in contrast to actual hacking) or have also often lead to the suppression of scientific discovery and freedom of expression; however, they can also in parts be seen as a negative reaction to the participation of a quasi-magical view of the digital and its interaction with it, which, for example in the case of alchemy often lead to the infliction of harm to uninvolved people. It was therefore negatively reacted to by society and also connotated negatively in the stories of the time, as can for example be seen in the depiction of magic in classic fairy tales, classic horror tales like Frankenstein and the Christian tradition in general, and it can also be seen today in the case of Harry Potter. Often, these reactions as well as the interaction with the digital in quasi-magical forms sees a rise when new forms of operative writing develop, as parts of society are irritated and frightened by the change; and cannot tell which one is which, which increases if the society is undereducated and unable to learn new digital skills.

If we take a look at what esotericism is defined at [31], the most influential definition is attributed to Antoine Favre [30]. He defined the following six intrinsic criteria, the first four being intrinsic to him:

1. "Correspondences": The thought that real and symbolic relationships exist among all things in the universe.

2. "Living Nature": Faivre suggested that esotericists view the natural universe as having its own life force, perceiving it as "complex, plural, hierarchical."
3. "Imagination and Mediations": According to Faivre, esotericists highly value the human imagination and mediations — such as rituals, symbolic images, mandalas, intermediary spirits, and mantras — as means to access different realms and levels of reality between the material world and the divine.
4. "Experience of Transmutation": The focus on self-transformation through esoteric practices.
5. "Practice of Concordance": The believe that a fundamental unifying principle exists from which all world religions and spiritual practices originate. The esoteric principle is that discovering this unifying principle can unify various belief systems.
6. "Transmission": The tradition of passing esoteric knowledge and secrets from master to disciple through initiation.

Favre defined esotericism as “form of thought” with the above four attributes, and one can immediately see that there is some resemblance between these described attributes and our daily experience with digital world, especially the first and the third, but also the fourth (for example with the concept of “grok”). And it can be assumed that through participating or thinking about interaction with this thought tradition, also hard skills that can be applied in the digital can be learned. And probably, esotericism has always acted in this way to provide a path toward digital skills (while potentially fostering problematic world views).

This means that we need to expand our understanding of digital thinking and we can also see in observations from daily life, why this makes sense: when we look at how people learn programming nowadays and the interaction with the digital in general, people already seem to learn digital thinking one way or the other but in different forms than what is currently the matter of interest for the computer science didactics community. Today, many people learn digital skills through different means. For example, many people in professional computer science typically did not find their way in the field through school but through modifying video games, playing Minecraft, learning prompting and watching YouTube-videos; and typically, they also share an affection for marble runs and fantasy novels with complex magic systems, like the ones from novels like Harry Potter, the Name of the Wind, etc.

And if it is the case that novels like Harry Potter teach people certain digital skills (albeit them being borderline to a magic understandings of them), consequently, they, or more generally speaking: formal language systems integrated in fantasy/science fiction contexts, could be used to teach people advanced knowledge about the digital and maybe even let them overcome the gap to an advanced understanding of the digital after David M. Berry [1] by making use of new ways of learning digital thinking.

However, there may be many other ways to learn digital thinking, as can be derived from the fact that many people that interact with digital devices today never attended a computer science course, because it did not exist there yet and still acquired the skills necessary for it. Therefore, in today’s society of an almost achieved universal access to the internet, one cannot not learn to think digitally. In this sense more generally speaking, there exists digital “alltagssprachen”, which after Wittgenstein are language games around the interaction with the digital that can be used to build a bridge towards advanced, generalized language games that are necessary to become a “mündiger” digital citizen. Therefore, we don’t need to worry about how to teach people digital thinking as it is already happening - but in which forms. As these new forms of

digital learning do not fit into the current definition of "digital thinking" as defined by computer science didactics, the term needs to be extended as well as the moral consequences of this debated upon, which will both be done in the next section as at the same time, people in fact do interact with the digital in deeply irrational ways, which also needs to be attributed for.

But first, we need to think about what "digital thinking" really is and how we can expand it to include these new forms of teaching resources, which have the potential to lead to new, effective and at the same time morally integer teaching resources.

5.3. Expansion of the definition of "digital thinking" based on Sybille Krämer

For strengthening this new understanding of "digital thinking" I would like to build on the description of the digital by Sybille Krämer, who puts it into a long, historical context far before the invention of the computer and has already been described in the section of concepts. By this, we can also put digital languages and their relation to magical thinking and esotericism in a historical context, which will further show the plausibility of the hypothesis. As we will see, the interconnectedness of the digital and esotericism has existed for centuries, an overlapping often occurring with the introduction of new forms of operative writing, followed again by an eventual separation of the two.

A general tension field between the daily understanding of digital thinking (which does not necessarily mean quasi-magical) and the scientific one, can already be observed at single phrases. For example, the term "being connected to" is used in various contexts of daily life as part of language games in relation to networking devices. Often, people ask: "are you connected to me?" (meaning to my device) or "I just need to connect myself" for example to a gaming console, or "I'm not connected, yet", while being very simple, it enables functioning collaboration with technical devices in many areas of life, but it quickly reaches its limits for example when faced with multiple sub-networks or devices with different interfaces or incompatible versions; and at the same time, the same term can be used in the interaction with esoteric devices for example voodoo puppets to "connect" to a person and harm them or for "being connected to the universe" in esotericism to gain physical possessions through this.

Here another example: a relative of mine uses an anti-virus scanning program after doing his banking, even though being told repeatedly that it would only make sense to do it before. He is a rational person, but at the same time, it's totally sensible for him to use the program this way, because he uses it as a religious cleansing ritual: he does an action he feels uncomfortable with and afterwards cleanses himself of that feeling with the anti-virus program. He is using a seemingly rational digital artifact but is actually participating in a language game that is closer to the interaction with religious artifacts than the technical game it is (primarily) made for. This is why my technical arguments are unlikely to have any impact on his behaviour: because we are participating in completely different language games, they simply don't make any sense to him or he doesn't want them to, because they serve a different purpose entirely, for example as relief for the feeling of powerlessness against the seemingly impenetrable and threatening complexity that lie in the digital.

This shows that in our daily terms to interact with the digital (like "doing a virus-scan"), lies a discrepancy in what the related technical artifacts are doing on a technical level and how we

actually use them in society, which to a certain degree cannot be avoided, because we cannot completely understand every technical device that we are using; but in which also the potential lies to use them in irrational or even immoral ways. This practice is by Sybille Krämer called “black boxing”. Black boxing enables people to use digital devices even though they do not understand them completely, but it also lets people anticipate potential properties of these black boxes that they do not have or even never will have, because they are impossible, which then fuels problematic world views.

In the case of astrology, if, for example a person is in love with someone, by using the birthdates of both persons, there exists an easy-to-follow algorithm to calculate whether the two “match”. It is used here to calculate things that cannot be calculated, implicitly assuming that these things in fact can be quantified and calculated based on a universal principle that everything in the universe follows a certain predictable course, in which free will has no place and people are just lifeless objects that are treated by this principle not different from all other objects in the universe. In this case, a form of digital thinking is acquired: a problem is solved with partially digital means and even partially algorithmic thinking, but it builds on an assumed black box that does not exist and in turn on a world view that is contrary to enlightening ideals. If esotericism is used in this form, it is in the following referred to with the term “object-oriented esotericism”, which also has its representation in modern philosophy through the line of thought of the “Object Oriented Ontology”, which will be closer observed later. In its most extreme form, calculations are not even used anymore to achieve a certain goal, but only through willpower, as can be seen in the esoteric practice of “manifestation”, which is especially popular on social media: ordering something from “the universe” could be directly replaced with “the digital” here and vice versa. More about magical understandings of the digital in our daily lives can be found at [22] and [23]. The Silicon Valley itself has historical roots in the hippie and new age movement and with it, influenced the MIT institute of technology [33]. An impactful figure like Steve Jobs went on a spiritual journey to India and let the experience influence Apple as a company in its message, its products and its self-understanding. Konrad Zuse, the inventor of the first working computer, published a paper suggesting that the whole universe could be calculable, which is now referred to as “digital physics” or “pancomputablism” [34].

This form of magical digital thinking could be related to the term magical thinking from psychology although more research would be needed here. In psychology, there exists many theories that try to explain why people try to use magic and magical thinking. According to Freud, it’s a behaviour that is seen most prevalent in children and is directly related to the cognitive development of early development stages [26] and found in adults has a strong relation to the faulty thinking of “neuroses” [27]. Other sources explain the use of magic with the need for a release of anxiety [25], which would also make sense given the stress-level that modern digital spaces cause. Related to different forms of magical thinking, one theory by R.R. Marett explains the use of magic or magical thinking from an anthropological perspective: when a person wants to take certain actions but does not see a realistic option to do so and resolves to irrational options of mere symbolic actions [24]. This would mean that magical digital thinking would fall under this form of symbolic, “developed magic” that Marett also spots in many other aspects of live. This again differs from a direct-action approach to magical thinking, which uses magic as a means to directly cause certain actions like the wishful thinking related to materialization [28]. This means that if magical digital thinking relates to magical thinking, there exist multiple causes for it and, that it can be used both in the sense of a symbolic understanding of magic as well as that of causing direct actions. What we know from research is that practicing magical-thinking (or here wishful-thinking) often leads to unintended

consequences [29], which could also apply for digital magical-thinking, but would need more scientific evidence.

So, people seem to learn quasi-magical ways to interact with the digital, for example in the form of esotericism, alchemy and astrology, which has seen a rise in recent years and can be seen as a quasi-magical, but anti-Kantian way to try to interact with the digital (Harry Potter and the recent astrology hype is just the most timely example of this). And not only can this be seen as mere symbolism, but they also acquire actual skills through this. In this sense, esotericism should be understood as yet another way of how people learn digital thinking skills or at least understandings of it that help them to manage their daily life in a digitalized society and achieve a certain degree of agency. And while it may lead to a potentially problematic world view and the supposed agency is without much substance, it should not be ignored by the computer science didactics community.

It is also interesting to look at this form of digital thinking from a social perspective, because it often has a strong social component. It can for example be seen in pagan rites like Wicca, in which dances can also be seen as programs that are "executed" through the dance moves, which act as symbols and functions. Or even in general prayers and rites found in most religions, which *can* be used as if they were digital automates that only need to be pressed in a certain way to achieve a certain goal, which is especially prevalent in charismatic, evangelical Christianity (also which practice of exorcism changed after the movie "The Exorcist" to more closely resemble the practice of getting rid of a computer virus by hitting the computer in comparison to how exorcisms worked and how the "possessed" person acted for example in the middle ages). Just as arithmetic and its symbols were already in the past tried to be used to gain possessions or information, this is also happening in the digital age, and as in the past, the types of thinking can be used to strengthen a system of strong hierarchic power, that can easily lead to abuse. And today, it can also be seen with software development itself and the community that developed around this; while developing software is of course an established, complex discipline, it managed in recent years to develop its own language around its subject matter, which is, at least in parts, quasi-magical. Not always, but often enough, these languages have complex-sounding words, but which do not add any complexity but only appear to do so and make the subject more mystic to listeners. This can be seen for example with words like "agnostic", which is used in software development to describe the degree of how much a piece of code, or a programming language is independent of the operating system; in other words: the degree of generalization of a piece of operative writing. A UI that uses blocks of visual programming without any variables or other programming constructs is called "fully agnostic", while the same with the construct of variables would be "less agnostic". A script, which can run on any operating system, would be called "fully agnostic". The word does not add anything meaningful to the discussion and it is questionable whether the subject-matter is as important to introduce an own word for it. Another observation is that generalization is seen positive here. And while of course this is basically the heart of computer science, the word is used here to describe features, which effectively provide "magical features" of programming to the average user; the differentiation between individuals, who "actually" program and those who not, is implicitly assumed, as well as the fact that users then take what is presented to them as a given like a religious dogma (agnostic actually comes from religious philosophy, which underlines the limitless of human thought). So, they are well aware that they provide a seemingly magical interface to the user, but rather than to try to overcome this, it is used as a means to sell more of the "divine knowledge" that they tell themselves they hold. Rather than making it easy for people to join, they make it hard, so it becomes a privilege to be in these circles.

This behaviour shows that these forms of circles have come to a point that they almost develop sect-like dynamics: members of a group find themselves in a situation of power and want to assure themselves of that and justify their position, so they start talking in a made-up language that becomes ever more complex, so that "outsiders" are consciously left puzzled rather than enlightened, while in some of these circles, the same is often formulated as criticism towards the science community. What these communities share is a deep distaste for the old, although they often do not even actively participate in the creation of scientific knowledge. A deep self-assurance of lots of freedoms that they allegedly have but which often effectively mean a circumcision of other rights, for example the right to work whenever one pleases but at the same time being available 24/7 for phone calls; the same applies to "flat" hierarchies and pseudo-democratic processes like creativity-games.

This in the combination with eroding the border between private and job life, in a sense, these companies act as a new version of family businesses like that of the 19. century that take over both classical tasks by the family and even the state, sometimes referred to as "woke capitalism", and that can also been seen with similar dynamics at the example of evangelical congregations and medium-sized engineering-companies in Germany; while instead of salvation and redemption they promise their employees financial comfort, maximum freedoms and permanent technological progress. Although, effectively, they share the same promise: that of overcoming the feeling of the finiteness and limited progress of our lives; the more charismatic the congregations/software companies become, the more near this day of salvation is promised to be. The promise is that if you work in this type of software company, you neither need to accept reality nor death. You just follow charismatic leaders that make you feel like you live in this promised tech utopia already now; that is also why they do without any historical basis; they create kind of a state of an eternal awaiting for a future-to-come that works without a past, a present and an actual description how this future will look like. Often enough, members of these circles are themselves intimidated by the visions they create, which only increases their fanatism. This belief combined with allegedly generous freedoms, creates a distorted sense of how society should work, because everything below these extensive, seemingly freely given freedoms is seen as a set-back. And because the prices that of course do come with these freedoms are hidden under the ideology of permanent-progress and inherent superiority that they themselves foster, which, as described, also have threatening, excluding attributes. In the current debate about woke capitalism, the spiritual aspect of software companies is often neglected, in parts, because it shows us that we are much less enlightened than we think we are and how dependent we have become of this ideology that despises historical and societal contexts, and mystifies technology to make people feel better in face of the feeling of lostness that comes from the former.

The same mindset can be attributed to the popular school of thought around "user-centred design", which on the one hand can be seen as a movement to empower more people (especially from marginalized groups) to make better use of digital artifacts and also tries to embed them into existing domain-specific contexts, but on the other hands effectively means that much more functionality is hidden from the user, making digital artifacts even more black boxes; just as evangelical churches often attribute themselves to lower the threshold for more people to be introduced to the teachings of Jesus by making services easier to understand and less formal than those by the state's church (and easier to consume) but at the same time drop much theological tradition and complexity from the subject. User-centred-design works somewhat similarly: rather than teaching people the skills to use advanced tools, functionality is hidden from the user. Often enough, these two approaches are carried out by the same

actors. For example, many Silicon Valley firms by now embrace user-centred design, but on the other hands also support initiatives to learn children programming. However, the overall trend seems to be more to make digital products easier consumable and fun rather than empowering people to make better use of them. It can be stated that overall, the ontology that the Silicon Valley and parts of the software development community implicitly propagate resembles more an ideology that promises an idealized future in heavily monetized virtual worlds rather than actually bringing people closer to digital agency ("Mündigkeit").

The biggest "win" of this kind of ideology has been to convince computer science didactics and society as a whole that programming itself is the skill of the future. With the introduction of ChatGPT this illusion has finally ended. While the term programming has itself been a matter of debate throughout the decades (the question what programming actually is, also attached to the fights between various camps of programming languages, had always an economical dimension and this is also the case now), and there has always been a stark distinction to digital thinking in other parts of society for example as found in the digital humanities, which do not have a strong standing in the computer science community and at the same time, throughout history, this divide seems to open and close up in waves, with an overlapping of quasi-magical digital thinking with the introduction of new forms of operative writing for example with the invention of the letter press, and afterwards an eventual separation, for example during the age of enlightenment. However, during the 2010s, with the help of the silicon-valley ideology and (shortly before) the introduction of the smartphone and with it apps that were easy to program and then accessible to everyone over Apple's app store, programming managed to get out of its nerdy engineering image and become the one central digital skill itself. And now it's backing off again and what it is replaced with (quite forceful through ChatGPT), which is by the didactics community usually referred to as digital thinking, is much harder to grasp, which lead to the influx of quasi-magical digital practices that can currently be observed.

This mystification of digital interaction in reaction to the increasing black boxing of digital interfaces additionally falls together in a time were actually having access to spaces in the digital, in which one is able to make use of this space in a productive manner is not the case anymore (or for many people never was) and this potential is then tried to achieved by resorting to irrational ways to interact with the digital; but also in the broader historical context of "the digital" as defined by Sybille Krämer, there seems to have always been rational, Kantian ways to think digitally, and ways of not doing so.

This marks a major paradigm shift in our relationship towards symbolic machines since in the last centuries, people have tried more and more to behave like symbolic machines, because many people were necessary to run them, while there were only the resources available for a few to build them, it's now becoming more and more unnecessary to run the symbolic machines by manually processing them on paper by humans and more importantly to create them, for which different skills are required.

The same shift has already been long in the making and tried to react to in educational research and practice, both in math, natural and computer sciences, and also social sciences, but with the introduction of AI agents, this shift will become even more pressing. And these skills include skills that bridge humanity and natural sciences/mathematics. There will probably be the need to learn a semi-formalic language for the digital, which will not be as strictly formalic as programming languages but more effective than natural language. In fact, a kind of language for this already exists in the form of the semi-formalic language by the scientific community and in some cases as its most formalic form: as math and programming languages. In combination

with critical and rational thinking and moral reasoning from the enlightenment and Kant, these could be the skills that should be taught for people to become mature digital agents both in competence and morality.

Additional to our daily language, we learn digital languages of daily life ("Alltagssprachen"), which develop around the daily interaction with symbolic machines (for example the term "productive" in relation to TODO-lists or "do … until the water boils" in relation to cooking manuals) and also found their way into pop culture (for example in the form of Harry Potter). They are partly used to integrate and interact with them in daily life, which means that they are usually highly context-specific and build on the language constructs of these contexts by adding more technical terms to them and by this bridge the gap between daily tasks and the language games of normal language and by this enable to make use of digital artefacts in these contexts. From then on, currently, people usually further develop these digital languages in the direction of a Heideggerian, heretic understanding of the digital; the task of didactics should be to show them a path towards advanced, rational digital languages.

The digital alltagssprache is already learned in daily life, whether it is in the form of interactions with rational symbolic machines like TODO-lists, instruction manuals or cooking books, or through interactions with irrational ones like horoscopes or the magic systems of fantasy literature. In German, new additions to this language are often introduced as English words (e.g. TODO, meeting, date, etc.), and often integrated in established language games by the youth and internet culture (e.g. words like NPC, something is "bug-gy", life-hacks, etc.). However, it is usually highly context-specific and not able to be applied to solve more general problems like the description of a traffic light circuit. For these applications exist another, advanced digital language, which is used by the professional computer science and scientific community, which developed around this interaction with symbolic machines. To successfully interact with them on an advanced level, this language also needs to be learned.

That's why first curricula computer science students often have a hard time understanding what "programming" actually is. Even if they have already learned much of the theoretical concepts of a certain programming language, they still often ask "and when do we learn real programming?" or "but that's not really actual programming, isn't it?". Because the much harder part is to also learn the advanced, rational digital language attached to it. Being a programmer in our society does not only mean to be able to program, because that is relatively easy, but to speak this advanced digital language. Without it, programming is fairly easy, but basically useless. And this language is not only learned through programming but through scientific methods, mathematic logic, etc. It's about learning to speak a semi-formalic language that describes the world in a neutral, scientific matter and only enables to digitally interact with it, and, for example, think about ways to model it and do calculations with it. That's why the modelling part is one of the most central parts of software engineering teachings, but also mathematics and logics, because this only enables to do anything useful with symbolic machines, because it enables to apply them on things in reality in a generalized, context-independent manner. This counts for mathematical problems as well as for making a certain dish or creating a law that is impossible to exploit.

The term "programmer", more generally "computer scientist" or "mathematician" (which can actually be used interchangeable here) is used to refer to a person that is able to carry out these advanced digital language games, which in the future could more and more include the interaction with AI agents.

For example, there exists a very easy language for creating a cooking manual for certain kinds of pasta, which can be seen as a digital language since it is basically describing a manually executed algorithm. However, it is almost impossible with this language to describe the creation of any pasta dish, or the creation of an arbitrary pasta dish, which at the same time calculates the calories of all its ingredients. The simple language of cooking manuals simply does not include words that would be needed for this like placeholders, conditional tasks or loops. While it would be easy to add these to the language, because they initially do not exist in it, the thought to do something like this is very counter-intuitive, because the person may not know about these language constructs and the possibilities that would come with it.

And while the easy cooking manual language is usually enough, it is not enough for creating advanced cooking manuals or digital representations of it. Imagine a person planning to create a manual cooking app, but unable to formulate the cooking manuals in a generalized manner.

The "talking *about*" or "talking *to* symbolic machines" is not a language game that can be participated in solely by learning programming but by learning logical thinking, abstract thinking and reasoning, too. However, people that mistake the digital language game for actually being the "using power" or even "using magic" language game and therefore think that they can gain access to through the means of this wrong understanding, may think they to need to learn these games instead of acquiring the skills to reach advanced digital language games, which then acts as an ersatz for the same but leads to no actual progress; and sometimes, even leads to immoral behaviour as it results in frustration and the morals implicitly attached to a quasi-magical, esoteric understanding of the world. And as we have seen, this can happen easily, because for example astrology or magic systems of fantasy have always been borderline to or even part of the language games of interacting with the digital, and are therefore often mistaken for being the real thing. The cooking manual for a pasta dish is just a representation of a manual algorithm as a cooking manual for a magical potion, only that the latter tries to play the game of digital interaction in the language game of the digital alltagssprache of cooking manuals. The hope is here that, given all the possible cooking ingredients that exist and the ways to combine and "process" them, there could theoretically exist a cooking manual for processing even something impossible like a potion for eternal live. In this case, the symbolic machine is tried to be used to calculate something that it is not able to by giving the black box that the cooking meal represents to the unknowing consumer, abilities that it can never have, like increasing a humans live span; just as neuronal networks are tried to be used nowadays to create conscious. The same can be applied to magic spells, esotericism, astrology and so on.

It is therefore important to introduce rational digital languages in school education and bridge the gap between the digital language game of daily digital interaction and advanced interaction with it, for example, by showing how loops can be used in a cooking manual and then, how loops can be used to build a simple program, or maybe, there could be programming language based on cooking manuals, or as already described: marble tracks or magic systems. Through these context-specific digital languages that build on top of digital alltagssprachen, the gap could be bridged without the need to resolve to esoteric-magical digital languages or jumping right to the most abstract, generalized forms of it, when at the same time the described ethical guidelines are respected.
There already are approaches to try this, however, they usually do not start with the digital alltagssprache, but instead for example already start with a programming language like "Scratch" to build a cooking game (although Scratch's design of blocks can also be seen as being based on jigsaw-pieces). Instead, an approach build on top of digital alltagssprachen could look like this: you start by explaining cooking manuals to kids (of course this could also

happen through actual cooking), then problems are presented to them that cannot be solved with the language game attached to the cooking manuals they just learned. For example, a cooking manual with input values like the number of chocolate cookies on the cake, or the "Pi-Cake", a circle inside a rectangle-shaped cake, which through counting the chocolate chips randomly placed on top of it can be used to approximates the number of Pi (Monte-Carlo-Algorithm). Instead, they automatically need to use techniques of the advanced, more generalized language game. In this manner, a whole cooking book for learning advanced concepts of digital languages could be created and used for education; and in the same way, it could be also done for other forms of digital alltagssprachen.

In general, also the history of philosophy, the mystification of numbers has a long tradition as can for example seen of Pythagoras understanding of numbers and as the basic of everything in the universe and gave numbers many quasi-magical attributes. In fact, the differentiation between those Pythatogerians that practiced hard mathmatics and those that were more worried about attributing mystic allegories to mathematical concepts actually led to the term of "esotericism" [32].

But after observing the mystification of the digital throughout the centuries, in the following, we will take a step back from continental philosophy and turn in the direction of analytical philosophy to observe digital thinking and magical thinking more closely on a linguistic level.

5.4. Expansion of the definition of "digital thinking" based on Alan Turing and Wittgenstein

After making a case why digital "alltagssprachen" could exist based on historical argumentations, I will now try in the following to also theoretically argue for it for the example of magic systems.

Until now, computer science didactics saw it as its purpose to teach people the advanced digital language game with different means, either by teaching them how to use them in practice (learning-by-doing-approach), or by making the symbolic machines behind them transparent and giving some technological background as well (transparency-approach). However, the new approach that I propose puts digital language games of daily life at the centre. A first attempt in this direction can be seen with "Coding with Minecraft", however, much more should happen in this direction; the turn towards languages in philosophy that was set off by Wittgenstein (linguistic turn) should also happen in computer science didactics.

To summarize the observations from daily life from the last section, most people's understanding of the digital is based around the existence of the following concepts, which are not "believed" in the explicit sense of the word, but implicitly through interacting with the digital and talking about it:

1. Digital artefacts that enable interaction with the internet sphere
2. Spaces of digital energy that enables access to the internet sphere:
    a. Spaces of internet energy for connecting with the internet sphere (if you „have Wi-Fi", you have access to the internet)
    b. The digital sphere contains everything on the internet about things, people and knowledge in general, also it offers services that do stuff for you

3. Circles of digital energy that spawn around devices with Bluetooth-ability, for connecting to other Bluetooth-compatible-artefacts in the circle
4. Spells/Movements for controlling artefacts
    a. Including ones for the defence against bad digital actors (viruses, hackers, etc.)
5. Magic Screens for seeing into and interacting with artefacts (and people who also use artefacts)
6. Google/Tic Toc/ChatGPT for getting answers to questions out of the internet sphere

It is clear that already with these fairly easy concepts, one is able to master much of the daily interactions with the digital. However, neither does it enable one to become a mature digital agent, nor does it pose a sense of responsibility for the consequences of one's digital actions (for example in the sense of energy and resource consumption); and, as further explained later, its similarities to esotericism could result in problematic world views. One example that shows this is that in this world view, it is almost impossible to wrap one's head around the concept of "programming". It becomes a completely divine discipline that basically changes how reality (as it is perceived) works internally and therefore, it is also almost impossible to become able or even to imagine to program oneself.

Therefore, it should be the task of the digital didactics to enable people to overcome this pagan understanding of the digital and bridge the gap to advanced digital language games. Therefore, in the following, we will show how a bridge can be built from this digital "alltagssprache" of magic systems to the advanced digital language of Turing-complete programming languages. For this, the argumentation of the following section (and also the general task of C.S. didactics) will be as follows:

1. Describe advanced digital languages
2. Describe digital "alltags"-languages
3. Show mapping of at least parts of advanced digital language constructs, which act as a homomorphism
4. Show how they could easily be extended to reach advanced language games.

As for the first point, advanced digital languages have already been sufficiently described by computer science (computational theory, first-order-logic), analytical philosophy, epistemology/critical thinking and the social sciences. It is not necessary to do much more there.

Secondly, the digital "alltagssprache" of magic systems has already been sufficiently described by the fan-community of various franchises like that of Harry Potter.

To the third and fourth point, in the following, it will be done with the digital alltagssprache of magic systems with relation to the advanced digital language of Turing-complete programming languages.

For this, I will in the following lay out mathematical proof that, based on computational theory, there exist five different levels to distinct magic systems from which the initial hypothesis can be directly inferred. If the proof is verified to be correct, everything that could be said against the five levels, and in turn the initial hypothesis, would be that the way I defined magic systems does not correspond to actual magic systems. However, I tried to capture them as closely as possible with mathematical means.

Proof: Based on computational theory, magic systems can be distinct into five different levels of magic puzzle complexity (or short: puzzle complexity). The higher the puzzle complexity-level, the more complex puzzles are possible to create within that magic system. It will be shown that these level of complexity are equally powerful to the language of WHILE-programs if certain language constructs are present in the magic system.

5.4.1. Level 1 - 3

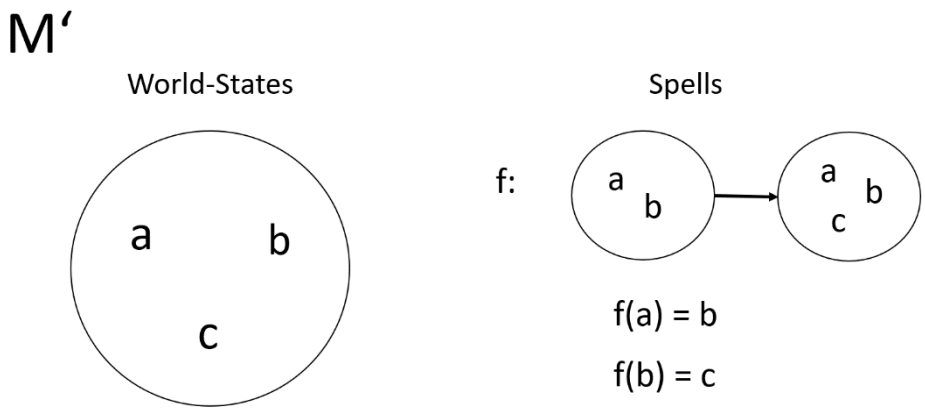
To define the level of puzzle complexity, there first needs to be a mathematical definition of magic systems.

I will define Magic Systems for the definition of puzzle complexity as follows:

Definition Let M = (W, S) be a magic system with the world states W, being a not-necessary-finite set of objects and the spells S, a finite set of functions on $P(W) \to P(W)$ (with $P(x)$ being the power set of x). W cannot be the empty set.

For Example: ({a, b, c}, {f}) is the magic system M' with f: {a, b} → {a, b, c} and f(a) = b, f(b) = c.

Or visualized:



That means that if our world is in state a, we could cast f and get to the world state b. From this we could again cast f and would get to world state c. Then we are not able to cast f anymore, because it is not possible in this world state.

Then we have puzzles on magic systems (or "magic puzzles"), which consist of a number of spells that can be used, given by the magic system, one or more possible start states and a goal state:

Definition Let P_M = (s, g) be a puzzle on a magic system M = (W, S) with the start-state $s \in W$ and the goal-state $g \in W$ (P_M means that M is written below P). For every element s of S: $s \in W$.

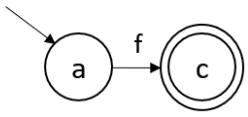
For simplicity, we will for now only assume one start state. This definition will be extended in the next section to allowing multiple start and end states, which generally does not change the argumentation of this section.

A puzzle could, for example, be P_M' = (a, c).

This could be formulated as: the start state is a. How can the spells of M' be used to come to c?

Or visualized:

P_M'



The goal of the puzzle would now be to reach a certain goal-state by combining the functions of the magic system only by composition of the functions. The creation of new functions is not allowed.

Now we could try to solve this puzzle, which is easy, because we just need to apply f to a.

But to also show this in a mathematical correct form, we need the definition of a solution for a given magic puzzle.

A solution is a sequence of spells, which can be consecutively applied on a world state to reach the goal state of a puzzle. Therefore, it is defined as follows:

Definition Let S_P = (S') be a solution for a puzzle P = (s, g), which was defined for a magic system (W, S) with the spell sequence S' being a finite tuple of casted spells: S' = (S1, S2, S3, , ..., SN) and for Si with 0 <= i <= N: Si ∈ S. Additionally, for S_P holds that g can be reached by applying the spells of S' one by one on the start-object s ∈ S of the given puzzle through function-composition.

The puzzle P_M' can easily be solved by casting f once. The solution to this puzzle would therefore be: (f).

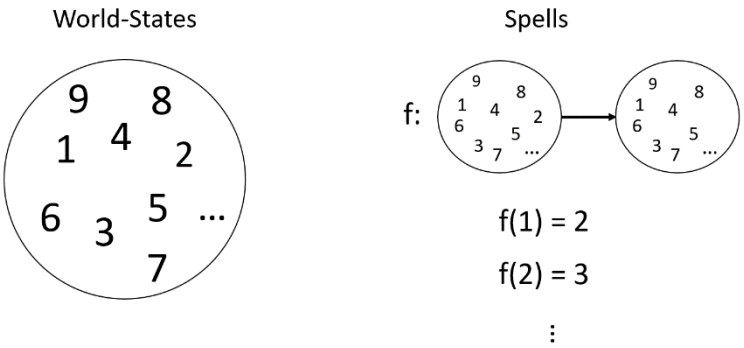
Or visualized:

Solution to P'_M':

Now let's look at an example with a more complex magic system M' = (ℕ, {f}) with f: ℕ→ ℕ and x ↦ x + 1.

Here the world states are the set of natural numbers 1, 2, 3, … and f is the successor function.

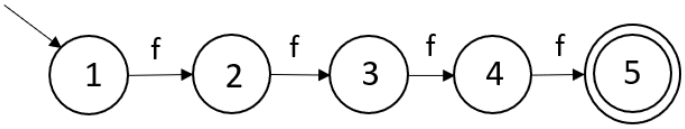
M''



The Puzzle P_M'' is now (1, 5), meaning to reach states 5, from start state 1 with the spells of magic system M''.

Or visualized:

P_M''

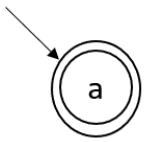


The Solution in this case would be to cast f four times: S_P_M'' = (f, f, f, f)

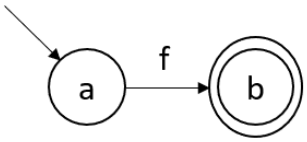
Or visualized:

Solution to P_M'':

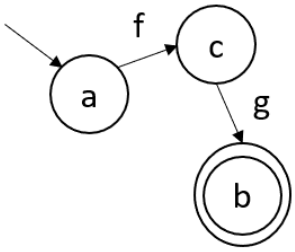
Here are a few more visual examples of puzzles and their solutions:



This can be solved trivially, because the goal-object is already the start-object. Therefore, no spells need to be casted. It is questionable whether it should be considered a magic puzzle at all, but for definition purposes is considered as such here.



For this puzzle, it can be easily solved by casting f on a. But it is needed to cast at least one spell. The solution is not trivial anymore.



In this example the solution is the cast first f on a and then g on the result. It is not anymore enough to cast only one spell. Multiple spells have to be cast after the other.

In the last examples, it could be seen that there exist different complexity-levels of solutions.

These are now defined as in the following:

Definition A solution S_P is of complexity level 1 if P is solvable and S_P is the empty tuple.

Definition A solution S_P is of complexity level 2 if P is solvable and S_P contains one element.

Definition A solution S_P is of complexity level 3 if P is solvable and S_P contains at least two elements.

That means that the last three shown solutions would be of complexity 1, 2 and 3 respectively.

Based on this categorization we can define the first three levels of complexity for magic puzzles:

Definition For a given puzzle P, the set of all solutions of the puzzle is called S*_P.

Definition A puzzle P_M is solvable if S*_P is not the empty set.

Definition A puzzle P_M is of complexity 0, if it is not solvable.

Definition A puzzle P_M is of complexity 1, if it is solvable and all solutions of S*_P are at least of complexity-level 1.

Definition A puzzle P_M is of complexity 2, if it is solvable and all solutions of S*_P are at least of complexity-level 2.

Definition A puzzle P_M is of complexity 3, if it is solvable and all solutions of S*_P are at least of complexity-level 3.

That means the shown examples of puzzles, because for the puzzle examples, no other solutions exist, are of puzzle-complexity 1, 2 and 3 respectively. An example for a not solvable puzzle would for example be: P’’’_M’ = (c, a). In this case, no solution can be found and therefore, it has a puzzle-complexity of 0.

Now we can define the first three levels of puzzle-complexity for magic systems.

Definition For a given magic system M, the set of all puzzles is called P*_M.

Definition A magic system M is of puzzle-complexity 1, if a puzzle p ∈ P*_M exists, for which holds: p is of complexity level 1.

Definition A magic system is of puzzle-complexity 2, if a puzzle for this magic system exists, which is of puzzle-complexity 2.

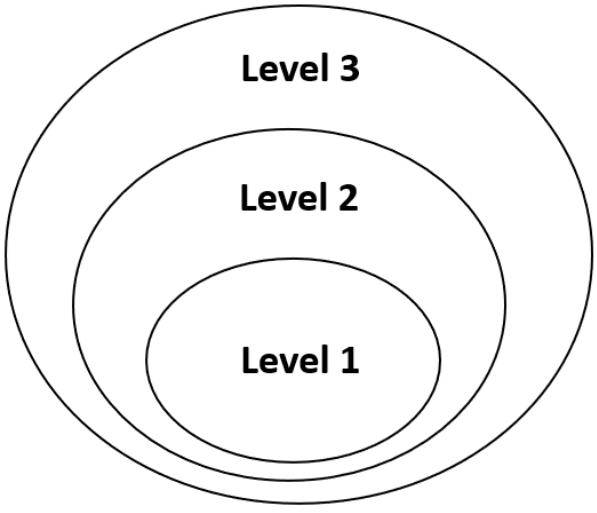
Definition A magic system is of puzzle-complexity 3, if a puzzle for this magic system exists, which is of puzzle-complexity 3.

There is no level 0, because due to the fact that the set of world states is never empty, a puzzle of level 1 can always be created.

After this definition, M’ and M’’ would be both of puzzle-complexity level 3, because level 3 puzzles are possible to create for them.

That these three levels of magic systems are strict super-sets of one another was already shown with the examples.

This leaves us with the following intermediate step of magic system-distinction:



5.4.2. Level 4

Now we want to find spell-sequences to reach not only one end-state, but multiple, each with its own start-state. That means, with the solution, we are basically defining a new spell.

As will be seen, even with a puzzle-complexity of level 2 and 3, certain of these more complicated puzzles will be possible to solve.

But for this we need to modify the definition of puzzles from the last section to the following:

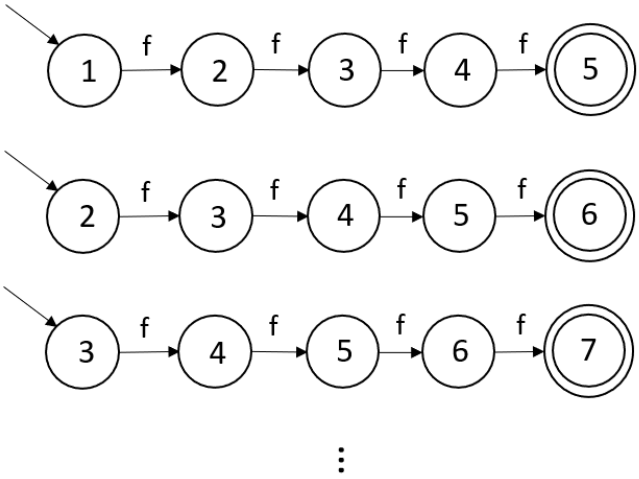
Definition Let P_M = (g) be a puzzle on a magic system M = (W, S) with the goal-spell g, a function with g: *P(*W) → *P(*W).

That means in this puzzle, start and end-states, and which of the end-states should be reached from which of the start-states, are defined within the goal-spell g.

For example a puzzle for M'' could now be P'_M'' = (g) with g: $\mathbb{N} \to \mathbb{N}$ and $x \mapsto x + 4$.

Or visualized:

P'_M''



Now we want to find a solution, that uses the allowed spells to describe the behaviour of g. For this, we also need to update the definition of solutions.

Definition A solution to a puzzle P_M = (g) is a spell-sequence S being a tuple of spells, that, applied on every element of the domain of g results in the result, which would also g give.

The complexity levels of the earlier section stay the same and effectively, the modified definitions do in general not change the argumentation of the last section. As can be seen in the solution of the last example: A solution for the last puzzle would therefore be (f, f, f, f).

Or visualized:

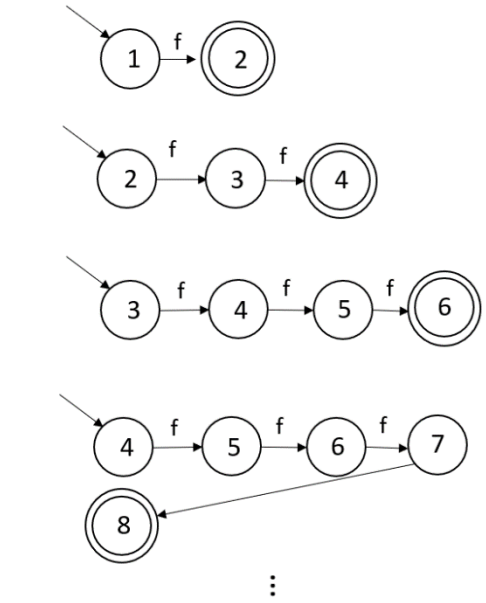
Solution to P‘_M‘‘:

This is actually just as easy as in level 3. A solution to the last example could easily be found and one can see that it is of puzzle-complexity level 3. That means, that level 3 can already be used to create some kinds of spells.

However, not all kinds of spells, as we will see in the following puzzle: let P’’_M’’ be (h) with h: $\mathbb{N} \to \mathbb{N}$ and $x \mapsto x * 2$, which doubles every input.

Or visualized:

P‘‘_M‘‘



This cannot be solved as easily as seen before. For this, we need certain kinds of functions to be included in the set of spells of the magic system: recursive functions as well as the composition operator and the primitive recursive operator as defined in the following:

The basic primitive recursive functions are given by these axioms:

1. *Constant functions* C_n^k: For each natural number n and every k, the *k*-ary constant function, defined by $C_n^k(x_1, \ldots, x_k) \stackrel{\text{def}}{=} n$, is primitive recursive.
2. *Successor function*: The 1-ary successor function *S*, which returns the successor of its argument (see Peano postulates), that is, $S(x) \stackrel{\text{def}}{=} x + 1$, is primitive recursive.
3. *Projection function* P_i^k: For all natural numbers i, k such that $1 \leq i \leq k$, the *k*-ary function defined by $P_i^k(x_1, \ldots, x_k) \stackrel{\text{def}}{=} x_i$ is primitive recursive.

More complex primitive recursive functions can be obtained by applying the operations given by these axioms:

4. *Composition operator* $\circ$ (also called the *substitution operator*): Given an *m*-ary function $h(x_1, \ldots, x_m)$ and *m* *k*-ary functions $g_1(x_1, \ldots, x_k), \ldots, g_m(x_1, \ldots, x_k)$:

$$h \circ (g_1, \ldots, g_m) \stackrel{\text{def}}{=} f, \quad \text{where} \quad f(x_1, \ldots, x_k) = h(g_1(x_1, \ldots, x_k), \ldots, g_m(x_1, \ldots, x_k)).$$

5. *Primitive recursion operator* ρ: Given the *k*-ary function $g(x_1, \ldots, x_k)$ and the (*k* + 2)-ary function $h(y, z, x_1, \ldots, x_k)$:

$$\begin{aligned} \rho(g, h) &\stackrel{\text{def}}{=} f, \quad \text{where the } (k+1)\text{-ary function } f \text{ is defined by} \\ f(0, x_1, \ldots, x_k) &= g(x_1, \ldots, x_k) \\ f(S(y), x_1, \ldots, x_k) &= h(y, f(y, x_1, \ldots, x_k), x_1, \ldots, x_k). \end{aligned}$$

(From Wikipedia, https://en.wikipedia.org/wiki/Primitive_recursive_function)

From now on, the world states are always modelled as the set of natural numbers. Because the primitive recursive functions run on them, they can always be used, however, care must be applied with the arity of the respective functions, because solutions can only be found if they are 1-ary.

That means, from now on the definition of magic systems is extended as follows: the set of spells may also include the three following functions: constant-function, successor, and projection-function, as well as the composition operator and the primitive recursive operator.

With them, a solution to the puzzle can be found if the functions are allowed in the magic system.

For that, first we define the macro Add, which can be used instead of the hard-to-read function calls. Add is defined as: Add = ρ(P^1_1, f ○ P^3_2)

Then, a solution can be defined as follows:

(Add ○ (P1_1, P1_1))

(We need in this case to also set parenthesises, which can be interpreted as wand-movement-figures)

Based on this, we define the next level of puzzle-complexity:

Definition A solution has the level 4 of puzzle-complexity if it uses at least one of the basic primitive recursive functions or at least the composition operator or the primitive recursive operator.

Definition A puzzle has a puzzle-complexity of level 4 if it has only solutions of at least level 4.

Definition A magic system M has a puzzle-complexity of level 4 if P*_M contains a puzzle of puzzle-complexity 4.

That level 4 magic systems are a strict super-set of the other defined levels was shown in the example.

It should be proven but it's kind of obvious that level 4 is equal powerful to primitive recursive functions, but it is surely weaker than them. That means, even if the first statement is not proven, one can still also use the loop-operator to bring a magic system to level 4, because the set of loop-programs is equally powerful as the set of primitive recursive functions.

5.4.3. Level 5

Now one could think that one is able to define all kinds of spells. However, there are still spells that cannot be defined with the spells of the magic systems seen above.

One of these is the Ackermann-Function.

As proven by others, the Ackermann-Function can only be described by including the μ-function to the set of primitive recursive functions.

Therefore, from now on, the spell-set of a magic system can also include the μ-function.

With this, we define the last level of puzzle-complexity as follows:

Definition A solution has a level of puzzle-complexity of 5 if it uses the μ-function.

Definition A puzzle has a puzzle-complexity of level 5 if it has only solutions of at least level 5.

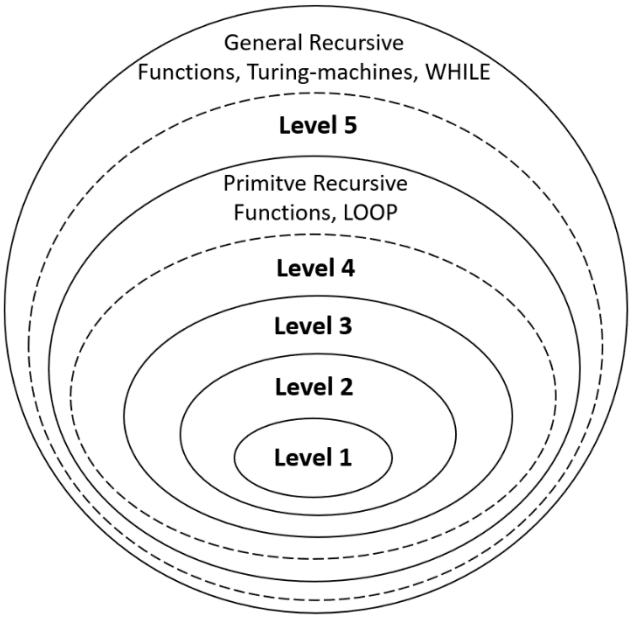
Definition A magic system M has a puzzle-complexity of level 5 if P*_M contains a puzzle of puzzle-complexity 5.

The fifth level of magic systems is obviously a hard super-set of the sets of the other puzzle-complexity-levels, because the Ackermann-Function cannot be solved with primitive recursive functions alone but can be computed by combining them with the μ-function, with which the set of level 4 magic system is strictly smaller than level 5.

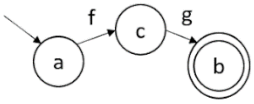
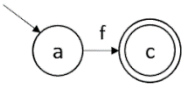
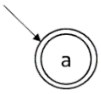
Level 5 is also obviously Turing-complete (though this should be proven in the near future), however it certainly is weaker. That means that, instead of functions, one can also use all constructs of computational theory that are equally powerful as Turing-machines, meaning predicate logic, while-programs and so on to achieve level 5 puzzle-complexity.

That means one can use functional programming as seen in this post, but one can also introduce the loop/while-constructs (of which the latter also requires the definition of conditional logic and loading/storing of variables to achieve a level 5 magic system).

This leads us to the following figure:



Here is also a quick summary of the different puzzle-complexity-levels:

	Examples that distinct from lower level	Allowed functions and operators	Puzzle-Description
Level 5	Ackermann-Function	μ-function	„Not solvable without casting multiple spells and allowing whiles.“
Level 4	Multiplication-Function with successor-function	Basic primitive recursion functions and the two primitive recursion operators	„Not solvable without casting multiple spells and allowing loops.“
Level 3		Composition of functions	„Not solvable without casting multiple spells.“
Level 2		Functions	„Not solvable without casting a spell.“
Level 1		–	„Solvable without casting a spell.“

That also means that most magic systems in fiction would belong to Level 1, 2 or 3, however, they can be easily brought to higher levels from level 2 or 3 by allowing certain constructs (composition for Level 3, loops for level 4 and while-loops for level 5) if they already have complex enough spells in their spell-set.

In the case of the magic system of Harry Potter, which can be considered as being of puzzle-complexity level 2, it could easily be brought to a puzzle-complexity of level 4 by allowing combination of and looping through spells, and it could even, with a little more thought be elevated to level 5, if while-constructs would be allowed, though this would probably require some additional adjustments to apply them to the world of Harry Potter, so that they can be used in a way that makes sense.

5.5. Conclusion

After having shown that there exists a bridge between magic systems and advanced digital language games, this bridge could be used for creating learning resources based on magic systems and possibly many other forms of digital alltagssprachen (as will be done in the next sections). Whether this alltagssprache can be considered a moral choice as a teaching resource, will be discussed in the next sections; this section only showed magic systems as yet another way with which people could acquire the digital skills needed to make full use of the Fediverse.

6. Question 2: How can we act morally in the Fediverse?

If the described digital skills are brought to people and they acquire the ability to access the Fediverse through them, there comes first the question how to use the Fediverse access for good; and secondly, how the skills that made one able to acquire Fediverse access can be used morally in general.

The following section will therefore primarily be about answering the question how to act morally in the Fediverse. However, closely related to this, there is the question about whether this also holds for the skills that were made possible with the ways of thinking introduced in the last section as they also enable people to acquire Fediverse access and therefore need to be attributed here as well.

The answer to these questions could lie firstly in the nature of the Fediverse itself: because of its openness, it enables us to understand our full potential in the digital and as the view in the universe enables us to embrace our own morals, the Fediverse does the same here in the digital. And secondly, by applying the teachings of Habermas regarding the concepts of enlightenment and anti-enlightenment on digital thinking.

Hypothesis 2: The Fediverse above me and the moral law within me: moral behaviour in the social web can be achieved by realizing the potential of the Fediverse (and: we must differentiate enlightening from anti-enlightening digital learning resources)

In the first part of this section, we will look at how we could acquire a moral in the digital through Kant and after that, we will take into account the observations about new ways of learning digital thinking from the last section, because they were the means to reach Fediverse access, which acts as a presumption to this section and should therefore be observed and its merits carefully weighed against its consequences, including that one's digital morals in the Fediverse are also influenced by how one is introduced to it. For that, first of all, the didactic term of "digital thinking" was extended in the last section to include these new forms of acquiring digital skills and now secondly, it will need to be thought about how to differentiate enlightening forms of them from anti-enlightening ones.

6.1. The Fediverse above me – Moral in the Fediverse through the interconnectedness of subjectivity and objectivity after Kant

As for the first part, Kant famously said: "Two things fill the mind with ever new and increasing admiration and awe, the more often and steadily we reflect upon them: the starry heavens above me, and the moral law within me." Now with the Fediverse, the same realization can be made in the digital by "looking" into the potential of the Fediverse and through this, result in the development of morals in the Fediverse and the digital in general. This relation between subjectivity and objectivity is central to Kantian thinking, because after Kant, it leads to the development of morality through it: by realizing the potential of the universe, we become conscious of the fact that we can expand our knowledge of it but never fully grasp it. And with this reason, Kant encourages us to set our own moral rules, which by following them, is what Kant calls freedom. Therefore, the potential in the Fediverse could result in the same realization but for the digital and enable us to set our own moral rules in the digital.

However, this also makes it necessary to ask the question about the skills that we needed to acquire the possibility for this realization, possibly including the new ways of the last section.

6.2. Moral evaluation of different digital learning resources based on expanded definition of digital thinking

As for the second part of this section, as seen in the last section, there seems to exist more ways to teach digital skills than what computer science didactics have on their radar and that could enable new ways to teach people digital skills or at least have to be accepted as modern practices to acquire digital skills outside of school. But if one where to do so and expand the understanding to include these new types of teaching resources, and use them to acquire Fediverse access, one would also need to evaluate which of these lead to morally good understandings and that could theoretically be used in educational practice as they are already used in daily life. And because these practices are used in any case, it becomes even more pressing.

Generally speaking, learning resources of digital didactics research can in almost any case be considered morally integer; however, as described in the last section, there may be other ways to acquire digital skills that also need to be taken into account. This brings us back to the magic systems. As we will see, they often already contain moral implications and should therefore be carefully observed in regard to their influence on the learner. It should carefully be thought of how they are applied in the fictional work as well as designed, and what their underlying world view is.

The main observation is that there clearly exist forms of digital thinking that can be viewed as problematic; and that perhaps we need to broaden our understanding of what we consider resources that teach digital skills (already made in the last section). Based on this, the main points of the following argumentation will be as follows:

0. Basic conclusion from the observation from the last section that new ways to teach digital thinking exist: we need to expand our understanding of digital thinking and in consequence, we need to think about morally and unmorally forms of it and what that means for computer science didactics and morality in the Fediverse.
1. Show examples of magic systems that would not be considered as classic computer science learning resources but that could lead to the learning of digital thinking skills. Show in the course of this one that teaches digital thinking in a way that should be considered problematic and one that is not.
2. Based on this: New conclusion that we cannot not learn to think digitally in a society with almost universal internet access, but that there are also downsides to this; namely that there are also ways to use it immoral, and that there are also ways to learn to use it in an immoral way and these learning resources can be considered immoral themselves.
3. Therefore, more than to think about how to teach people digital thinking (we do not need to do that, they are already doing that), we need more to think about how to teach people moral digital thinking, and potentially use new ways to do so. And for being able to do that without becoming immoral: to differentiate them from ways that can be considered immoral like that of object-oriented esotericism.

Regarding the first point, to get a sense of what the moral side of the previously defined extension of the term "digital thinking" should include and to what it should be differentiated to; in the following, two examples are given, one positive example, which could lead to the development of digital skills but is not included in the current definition and a negative one that could teach digital skills but should be starkly separated from by the term. First, the magic system of object-oriented esotericism will be described as a generalized example for an immoral learning resource and more concretely in the form of "the Ether", an earlier work by the author, which turned out to be an intellectual dead end; after that, MarblePunk will be introduced as a moral learning resource that does not fall under the current understanding of what is considered a learning resource in computer science didactics. At the end, this should result in an educational understanding of digital thinking that includes new concepts like MarblePunk and excludes potentially harmful ones, like object-oriented esotericism. Finally, we will also take a close look at Harry Potter and the Methods of Rationality, a Harry Potter fanfic, which could also achieve to be considered a moral digital thinking resource but at the same time to teach digital skills through magic; and after that, coding with cooking recipes, which will show an approach closer to daily life experiences.

Concretely, the language games that we will take a look at will include anti-Kantian, Heideggerian magic systems like that of object-oriented ontology-based esotericism (here referred to as object-oriented esotericism), which will be introduced in the next sections at the example of "the Ether" [21] and include new but enlightening, Kantian forms like MarblePunk [4] [5], which will also be introduced in the following. A third one that will be looked at will be Harry Potter and the Methods of Rationality [12], which is a fantasy book that teaches digital thinking skills through magic while basing it at the same time on the principles and standing in the tradition of the enlightenment. And finally, based on the observation that there exist digital alltagssprachen in all parts of daily life, the digital alltagssprache of cooking recipes will be observed and then tried to be expanded for reaching advanced digital language games with the help of friendship-bread used as a loop-construct.

After that, we will look at ways to differentiate between moral and immoral teaching resources and take a look at the relation of AI agents to all of this.

6.2.1. Negative example: Object-Oriented Ontology and "the Ether"

Regarding the magic system itself, a negative example would be a supposed line of digital didactics that should here be referred to as object-oriented esotericism, and which will be shown at the concrete example of "the Ether", which builds on traditional astrology and pagan dances like Wicca to run programs on an object-oriented world model, which enables to program in an object-oriented world in the form of magic dances, which are basically object-oriented programs. Indirectly, it assumes an objective-oriented state of the world, which is completely calculatable. It was built to create an ideal learning environment for acquiring digital skills by declaring the laws of object-orientation natural law and take the teaching in this environment; however, it turned out to be a mistake for reasons laid out in the following. Its attributes can be observed in many contemporary practices of society for example astrology, esotericism and neo-paganism.

OOO, the philosophical framework that stands behind it, actually argues that the world does in fact only consist of the objects as found in object-oriented programming, represents a different form of digital thinking that we try to avoid, as well as the teaching resources/methods that lead to it. At the same time, in this observation also lies the chance to expand the common

understanding what teaching resources of digital skills actually are and thereby discover new ones that don't lead to this problematic world view and can be applied in practice. OOO refers itself to Heidegger, who argued in the tradition of Nietzsche against humanist universalism and can be considered anti-Kantian [13] [14]; he despised rational machines, calling them in his antisemitism "Jewish", but by his support of the Nazis contributed to or at least turned a blind eye on the usage of the same rational machines to carry out the Shoa. While being highly tech-critical, he was against using symbolic machines per se, but by this indirectly called for a mythologization and further black-boxing of the same, which together with the ideology of the Nazis, resulted in an industrialized machine for mass killing only made possible by the symbolic machines it was based on and that could through their mythologization be hidden away under German folklore and Nazi ideology. In this sense should the Holocaust not only be thought of as a crime partly made possible by bureaucracy, but also by symbolic machines and more in general: the digital; and it should be paramount to prevent something like this from happening ever again.

At least the mythologization and with it, its implied irrationality and anti-Kantian ground-understanding can be found in the Ether as well, which is why from the point of view of the author, it should be avoided to be used for education and in practice in general; but makes nevertheless for an interesting object of theoretical discussion and philosophical reasoning.

The problem here is not that the world is modelled object-oriented as it is done in computers; but that this is thought of as how the world actually works internally by its natural laws; however, of course this propagates a certain world view as well. Object-orientation is then not thought of as one way to model the world, but the best and only way to do so. Instead, object-orientation should be understood as it is used in programming: as a highly insufficient but useful tool for modelling things in the world as we perceive them in a way that it becomes understandable for computers and thereby enables calculations to be possible on them.

Therefore, teaching digital skills with the Ether as a magic system is not the problem per se, but the world model behind it; that it assumes object-oriented esotericism as the real-world model behind it and not just a way by humans to model the world and make it useable for magical interactions. Instead, a better way for object-oriented magic in a sense that does not openly contradict Kant would be that the model of the world is created by the magic-casting person only temporarily; its actively constructed and not something that's always there. While there can still be an objective truth in the world, the magic system is constructivistic and created by rational beings. However, as this would be much more complicated to explain, it renders the approach practically useless.

6.2.2. Positive examples: MarblePunk and coding with cooking recipes

Existing positive examples that implement such a teaching resource include "Coding with Minecraft" or "Scratch". Another, more abstract example is the philosophical programming language "MarblePunk" by Jan Bingemann [5], which can be seen as physical representations of "computation tree logic" and uses magic sporadically to abstract the inner mechanical workings of the marble machines that represent the actual calculations and program state, but which are irrelevant to the subject matter of understanding how programs behave. It enables to build programs with marble tracks; they are constructivistic, something that everyone can use to model the world to interact with it in new ways, rather than explaining it. In contrast to quasi-magical programming, programming with MarblePunk does not appear to the person building the marble track to model how the world actually behaves and gives supposably access to aspects of it, which are calculable. Rather than this, they are ways to artificially make aspects

of the world calculable, but always in an imperfect manner and with the definitive inherent knowledge that all of it is human made. Of course, these models can be shared, too, and they can be used to try to model real world behaviour, but it's not the case that everything in the world could be accurately modelled by this, which shouldn't be put into people's head as an understanding of the world.

More generally speaking, the MarblePunk-like approach assumes the concepts of Automata-theory to exist in the world and to interact with them (including Turing machines) or more broadly defined as the symbolic machines described by Sybille Krämer [8]; while the object-oriented esotericism-like approach assumes formal languages to exist and enable an interaction with the world. While the second, Automata/Symbolic-Machine-Punk-approach, stands in line with a constructivistic way to see the relation between the analogue and digital world, the first, formal-language-punk-approach resembles ideas of Heidegger (most prominently in Object-Oriented-Ontology). Therefore, for now, the first one should be preferred for the teaching of digital skills and the second one avoided. Therefore, pure magic systems (which make use of formal languages) should in general not be used to teach computer science skills; although it's possible to use Magic as a way to abstract certain workings of a fictional world to define a constructivistic learning system like MarblePunk.

Similarly to magic systems as seen in the last section, showing a bridge towards advanced digital languages can be done for other digital "alltagssprachen" like cooking recipes as well. They usually are closer to different advanced digital languages and could therefore all be useful to teach certain aspects of an advanced digital understanding.

In the case of cooking recipes, they can easily be extended to come closer to an analogue version of the computer. By interpreting ingredients as objects with attributes, measuring devices like kitchen scales as writing-operators to access and overwrite an object's attributes (usually the weight) and tools like mixers as operators on objects and their attributes (in this case the addition of number attributes), dishes and cups as variables, and the person cooking as the processor of the "program" (it could here be debatable whether this is a moral legit way of interpreting daily life like that here since a human is not a machine, so it should always be differentiated between "calculator" and "central processing unit" for example), it can be easily be used to run programs with it and do complex computations.

One could think that the digital language of cooking meals quickly loses its ability to interact with the digital; however, as it turns out, its rather flexible and volatile: explaining for example sites like GitHub can be explained through sites like chefkoch.de.

Additionally, as already mentioned above, the chain-letter-language-constructs from Herman-cakes can be seen as a GOTO or recursion-operator. In fact, cooking recipes historically advanced as a language game just like the symbolic machines of mathematics/computer science in the last decades as can be seen with the "Herman Cake", a friendship cake, which can be seen as introducing new inputs to cooking recipes (or the go-to-operator). While it is thought to have originated with the Amish people, it was able to be performed on a higher scale in the 70s and 80s through chain letters and gained popularity both with the invention of the world wide web [18] and the rise of social media [19]. While new developments in the areas of networking like telephone cables or the internet contributed to the development and increased popularity of this cultural technique, it was only possible with the introduction of new words (from chain-letters) to the existing language game of cooking recipes.
In this sense, it is fairly easy to introduce advanced concept of digital languages through cooking recipes (in a sense, cooking recipes were always a form of operative writing). Functions

are already included in most recipes through hiding complex instruction sequences in words like “boiling”. A learning resources could look like the following, which could be themed as a recipe-book and worked through by cooking together and thinking about how to create new recipes:

1. Simple, procedural recipes
2. Recipes that introduce functions
3. Recipes that introduce loops (for example through the “Herman Cake”, which could also be introduced as distributed computing. One could ask, what other recipes could be cooked/calculated on the “Herman-cake”-network)
4. Recipes that introduce variables and user input

Through this, cooking recipes can be used to get to a quasi-Turing-complete understanding of digital processes. However, it should be noted here that while currently, programming knowledge is still valuable, with the further advancing of AI agents, the digital language game that should be reached may be adapted to these changes and with this also the learning resources. In this sense, digital language games from all areas of daily life could be used to teach people digital skills (this is to give them access to advanced digital language games to become mature digital agents).

All of this could be done in the same way for marble runs (for example through MarblePunk, which is trivially Turing-complete as it enables the creation of WHILE-programs, which are equal to Turing-complete languages), musical compositions, Rubin Goldberg machines, etc. and it should of course also be further studied with scientific research, especially in the relation to cultural techniques that contain certain kinds of operative writing like game books such as “Chose your own adventure”, chain-letters, interactive-games like paper-fortune tellers, contracts, laws, department processes (e.g. also the school timetable), etc. Interesting could be thematic esoteric programming languages in general and programming games like the ones by Zachtronics. Also, digital advanced languages may shift in the next years or change with the continuing advancement of AI agents, which is why both digital alltagssprachen as well as advanced digital languages may be described time and again. Of course, turing-completeness should not be the only advanced digital language that computer science didactics should try to bridge to, but also first order-logic, relational database theory and with the introduction of AI agents possibly also skills from epistemology, and more “soft” (meaning less formalic) forms of operative writing that may also have a context-relation like the semi-formalic digital alltags-language of the judicial system in the form of laws and the semantic definition, interpretation and execution of them.

In general, the esoteric programming languages community has a long tradition of turning daily activities into advanced digital languages (also called thematic esoteric programming languages, like Chef [8]); however, there has not yet a connection been made between these original activities and these esoteric programming languages (which are also a form of advanced programming languages); from that the realization that the original activities may already be a simple digital language that could be used in computer science didactics to reach advanced digital language games, for example in the form of esoteric programming languages that expand upon them.

6.2.3. Semi-positive example: Harry Potter

One could ask whether fantasy literature can be considered a moral digital teaching resource. Next to the popular Harry Potter-series, these include Harry Potter and the Methods of

Rationality, a Harry Potter fanfiction, the magic system of Name of the Wind by Patrick Rothfuss and also visual magic systems like the one in the manga “Atelier of Witch Hat”.

Regarding the world of H.P., it is not entirely clearly Kantian or Heideggerian, because on the one hand, fundamental interactions with digital objects (delete, ...) are introduced in the form of spells and therefore a magic world behind the physical objects is to be assumed; however, a too Zweck-rational (in contrast to communicate rationality as defined by Habermas [15]) usage of them, which views everything as a magic object to interact with and act accordingly, is only freely used by the evil death eaters and heavily sanctioned by the rest of the wizarding community. Therefore, it teaches the reader basic skills in the digital and comes with a set of moral ground rules attached to them. Whether it implies a Kantian or Heideggerian world view would need to be further studied.

Harry Potter itself cannot be considered a Kantian digital learning resource, because Harry Potter himself uses spells repeatedly in a zweck-rational way to achieve his goals. Therefore, a new Harry Potter would be needed, which, additional to teaching digital skills in a fantasy setting, also includes a path towards using them morally in a sense of Kant. A basis for this could have been laid by Harry Potter and the Methods of rationality, in which Harry Potter learns magic in combination with the rational method in the sense of the enlightenment; although he uses the spells in a zweck-rational way here too, there could be room for some moral development if the series would to be expanded. It could therefore become the realization of a both effective and morally integer digital learning resource based on a fantasy setting, although at this point it would be more appropriate to categorize it as science fiction.

6.2.4. Conditions for morally “good” learning resources for digital skills at the example of cooking recipes

Overall, there need to be conditions to these new learning resources to differentiate them from immoral ones.

The main condition for new learning resource would be for them not to be zweck-rational (after Habermas); and what currently comes closest to this is the Harry Potter-fanfic “Harry Potter and the Methods of Rationality”, which creates a Harry Potter-version in line with the ideals of the enlightenment that teaches one both digital skills and skills of rational thinking, thus bridging the gap between the skills related to symbol machines (and more generally: arithmetic and sciences) and that of critical and rational thinking, if it is extended to include also an introduction to the teachings of Kant and a development of Harry’s behaviour in the course of this.

Secondly, the digital should always be introduced as something artificial, human-made that does not model the world as it is, but that was created by humans for processing data. Regarding the standard to both teach skills of computer science (or the interaction with symbol machines in general) and skills related to critical thinking, it is clear that these learning models of the digital are limited and that this should always be understood more as a feature than a bug, because the goal should always be to eventually introduce people to real computer science concepts and not stay in the quasi-magical understanding. But in contrast to environments that induce quasi-magical digital-thinking, the ones of rational digital thinking include limits that can only be overcome by adopting real computer science skills, while in

quasi-magical digital-thinking these do not exist and people could also stay in this understanding. While environments (or learning resources) of magical digital thinking give people no reason to leave them, environments of rational digital thinking include means to come to their world limits and show a path toward hard computer science, in the ideal case bridging the gap between soft and hard digital skills.

Therefore, in fact, the fanfiction “Harry Potter and the Methods of Rationality” as well as more engineerical settings like MarblePunk could work as a moral integer bridge between digital alltagssprachen and at least the advanced digital language of programming. In this sense, this could actually be the skill that should be taught in digital education lessons and beyond: navigating and interacting with the digital world with rational skills, combined with the skills to determine moral ways of this endeavour based on Kant; and Harry Potter and the Methods of Rationality, MarblePunk and (as will described later) cooking recipes could be a start to reach a learning resource for this and from that to go further in the direction of both morality as well as elaborateness of these digital skills.

6.2.5. Integration and representation of AI agents in these new teaching resources

Now that we have found that there exist moral and immoral forms of this new definition for digital thinking and found first examples for them, we can think about the potential impact that AI agents will have on this.

Because the traditional way of teaching digital skills as it has been for hundreds of years if following the understanding of “the digital” by Sybille Krämer, was mostly to give students skills to interact and use symbolic machines. It was therefore only logical to now try to teach them programming.

However, with the introduction of AI agents like ChatGPT, this again changes, because people are able to ask questions to ChatGPT and receive answers more like in the critical thinking and that the skills related to this might be more useful for becoming digital agents than the symbolic-machine-related skills of programming. Sybille Krämer calls the skills related to this “operative writing” and the cultural technique related to this “flattening” [11].

The question which skills this new era will bring is a tricky one. And the problem is not solved by the current digital skills resources. But maybe, the new forms that we saw may solve it? Or more concrete: how could this combination of critical/rational thinking and symbolic machine skills be represented in the described digital language examples?

Regardless of the concrete answer to this, first of all, given our findings from earlier, we can say that the task will stay the same as before. In any case, there will develop a new digital alltagssprache around AI agents just as with all symbolic machines before, maybe even new advanced digital languages will develop in the course of this. And just like before, computer science didactics will have the task to describe this new language from daily life and build bridges towards advanced, general ones.

So, how would the described bridges work here? In the case of MarblePunk and similar constructivistic language systems, one could ask how it would be possible here to teach skills related to LLM-programs like ChatGPT for the skills related to “prompting”, it could seem natural here to apply means of a more language-focused approach, for example making it easy through magic systems to succumb to Heidegger methods of digital teaching, which clearly exist and

are necessary to understand the digital. There are certain tendencies in the didactics community to make learning digital thinking skills ever more enjoyable and consumable. This should be avoided, but it also does not mean that children should be kept away from advanced digital skills like the interactions with AI agents. Instead, they should only be introduced after acquiring skills of rational digital thinking, for example through MarblePunk. Then LLMs could for example be explained as giant marble runs, which can be used to generate other marble runs through natural language commands. How they would work internally would not really matter, only the understanding that they could be build up with marble runs is crucial to avoid a quasi-magical understanding of LLMs. In conclusion, the detour over first describing digital concepts through automates is the basis to acquire rational digital thinking and things like LLMs and the skills related to them can be added later. If one has the understanding that all software programs are marble runs, it is easy to imagine a program that process natural language. But if one starts with introducing people to how to use language in the most powerful way, one ends up with a magical understanding of the digital. Also, magic systems are theoretical still possible, they would only be needed to be temporarily constructed by the spell-caster. Maybe Harry Potter and the Methods of Rationality could be the direction to go for, but it may have the potential to easily slip off into OOO-thinking. Overall, further research and discussions should happen here.

6.3. Conclusion

Finally, because OOO and with it many other magic systems imply a quasi-magical understanding of digital thinking, they should definitely be avoided. However, with the widespread usage of these systems in fantasy, a quasi-magical understanding of the digital currently seems more prevalent than a rational one.

Maybe, there will even be the need for a for bridge between critical/rational thinking/epistemology and arithmetic by combining rational sciences with learning of rational thinking through reason in a digital world represented by magic, as well as “operative writing” and the cultural technique of “flattening” as described by Sybille Krämer, both of which basically mean the usage of symbols to interact in always more powerful ways on 2D pieces of paper and represents the combination of these two forms to interact with the digital, which responsibility she sees in digital humanities, but which could also be seen in the digital didactics.

Potential candidates that were evaluated in this work could be H.P. and the methods of rationality (after further development), MarblePunk and coding with cooking recipes, and established methods like Coding with Minecraft or Scratch.

Regarding the didactics community, after seeing multiple examples of how digital alltagssprache can be expanded upon to build a path towards understanding and participate in more advanced language games in the last section, I state the following as the five main goals of computer science didactics, which will also contribute to achieving universal Fediverse access:

1. Teaching a certain technical, mathematical, linguistic and scientific ground understanding (possibly some of these areas taken over by other didactic departments)
2. Spot digital alltagssprachen

3. Build path from these digital alltagssprachen to advanced digital language games
4. Push against adoption of Heideggerian, quasi-magical digital language games as main way to interact with and speak about the digital
5. Describe advanced digital language game and its changing in the course of advancing digital technologies

Overall, the main observation of this section for computer science didactics is that there exist digital languages in our daily and professional lives and that these digital "alltagssprachen" can be built on to reach advanced digital languages like Turing machines, formal sciences or first-order logic. This means that already context-specific, semi-formalic alltagssprachen can be considered digital teaching resources and should be studied, expanded and after proving their sufficiency and legitimacy applied in practice by computer science didactics to build a bridge to advanced digital languages and actively push against anti-Kantian, Heideggerian digital language games. Rather than building on the pagan understanding of the digital that many people hold, it needs to be overcome and encouraged to embrace a more rational understanding of the digital and build on healthier digital daily languages like cooking manuals.

7. Question 3: How can the Fediverse itself become and stay moral? (and implicitly: how can the Fediverse contribute to a morally better world?)

Now, regarding the last question, it should be pressed that in almost any case, only moral actions should be used to keep the Fediverse morally; even when acting against potentially abusive or monopolistic servers from within the Fediverse or from third-party actors that try to join the Fediverse.

7.1. For a declaration of a universal declaration of fediverse rights

The question whether the Fediverse should replace traditional social media or stay small, by some deemed "small" and "big Fedi" standpoints has already received much coverage both in the Fediverse-community and journalism especially with the future joining of Threads to the Fediverse; however, what actually lies underneath this debate is the question how the Fediverse can stay moral while experiencing (rapid) growth.

First of all, one way to push back against possibly abusive servers is of course defederation, but there also exist smaller, more measured ways to counter-act morally bad behaviour, for example by putting posts of said severs less prominently on one's UI. The rules how these actions should be taken and cooperated on should be by establishing shared conventions among federating servers or by adhering to rules by the national states or groups of them, while in the long run, the Fediverse should try to become less and less independent of them and eventually even get its own regulating powers. A way to contribute to this could be the declaration of universal Fediverse rights; a beginning of which could be made by using the European Declaration on Digital Rights and Principles by the European Union [16]. It could be used to propagate the rights to be able to freely explore the potential of the Fediverse, while holding up some moral ground rules; to enable everyone to become mature digital agents and in the course of this, make the web overall better. Because a central problem of the current Fediverse is, that Fediverse servers do not seem to come together over a set of shared values, which is necessary if they want to position themselves and actually implement an alternative to traditional social media. Therefore, it would be best to come together and create a document to put these rights and standards down on paper and therefore to create a standard that can be used to hold actors that agreed to it can be held accountable for and that can be used as a way to show what the Fediverse exactly stands for and how it tries to improve the social web specifically.

And it could over time fix another dilemma that regulators outside the Fediverse face regarding it: on how to ensure moral behaviour on the social web while at the same time to allow people the freedom to become mature digital agents and in consequence, their own digital gatekeepers and eventually for democratic structures to develop in the web itself.
Therefore, the arguments provide also first arguments to the question regarding the Fediverse's own moral and legal accountability: developing one's own moral conscious and overall self-governing moral structures in the digital could be an alternative way to the one described by Habermas in his latest book about the digital transformation of the public sphere [10] (the last of which is also central to the argument of Buckman), which quickly results in more regulations by national states. This is also in the sense of Kant, since he called for the founding of nation-spanning agreements and would have probably expected democratic structures to develop on the web as the amount of "Vernunft" increases. However, as long as this is not definitely the

case, Fediverse users, companies and private server owners should after Kant always follow the given law of the server's jurisdiction; just as there should never be any forced or violent overthrowing of centralized, walled-garden services, whether existing ones that do not want to join the Fediverse or those that entered the Fediverse, then enter regression and close their walls again. If anything, steps like these can only be taken by regulators of the state.

7.2. The Copernican Revolution of the social web

Still related to the question regarding digital morals, the question remains, how this new moral view into the Fediverse can be achieved if it depends on realizing the full potential of the Fediverse. Gaining this understanding comes additionally to the digital skills as described in the last section (to participate in the development of the Fediverse and understand how to use it); additionally, there needs to be a new understanding of the social web. This, I call the Copernican Revolution of the social web: that people realize in several stages, in which dependencies they find themselves in the social web and are able to compare it to the ideal that is the Fediverse and through this realize its full potential; and that this brings one in the position to become moral, which is the hypothesis of this section. It aligns with Habermas argumentation to show people their own dependencies to authorities.

Hypothesis 3: A condition for realizing the potential of the Fediverse is to realize the Fediverse as an ideal for an open, digital ecosystem to which all implementations of it can only try to thrive for (Copernican Revolution of the social web).

Regarding this new understanding of the social web, I constitute five stages to this (from the point of view of the user):

- **Provider-Exclusive:** "There is only the app of my provider."
- **Provider-Centric:** "There exist other apps, but the one I'm using is the main one."
- **Service-Centric:** "There is no main one and I'm trying to use the one that fits my ideal the best."
- **Protocol/Ecosystem-Centric:** "There exist other protocols/ecosystems, but mine is the main one."
- **Fediverse-Principle:** "There is no main one and I'm trying to use the one that fits my idea of an open ecosystem the best."

This can be well described in relation to the development of Twitter. The decline of it made users realize that their go-to microblogging service was not the centre of the web, it could be bought and with that, other competitors came into the public consciousness. Next, Twitter was renamed to X and Elon Musk introduced his vision to turn it into an "everything app", which even though it was never realized, decoupled the app completely from what many users expected it to be: a microblogging platform. Therefore, the app became separated from the idea primarily attached to it and people started to try out different apps that they had until then only seen as secondary products to the original one, now became promises to realize the old idea behind Twitter, which Twitter itself never was, but which the old version realized much better in the view of the people that migrated to services like Mastodon, Bluesky or Threads. And finally, with Threads joining the Fediverse, new forms of irritations will occur, for example through being able to follow blogs from WordPress on Threads, which questions the understanding of distinct apps for communication on the web: one for microblogging, another for link aggregation, another for microblogging. This opens the digital world view for open protocols like

ActivityPub. And when then people realize that ActivityPub also only tries to realize an ideal, that of a truly open social web also called “The Fediverse”, they decouple the idea from the protocol, here, too. And it could be that only with this last realization can people also see the full potential of the Fediverse and realize the moral implication of this.

Hopefully, as this new view of the web will progress; it will help people to realize the potential of the Fediverse and become moral, digital beings.

7.3. For a Silicon-Valley-ideology-independent ontology of the digital

There is no given that once the Fediverse and the access to it is established, it cannot turn again towards web2 social web; it is not something that is achieved once and then always stayed, rather than that, it’s existence and well-being must be continuously thriven for. Just like any other cultural institution and structure (like democracy) there needs to be anti-bodies to keep them intact; or otherwise, they reverse themselves. For example, if people just use their Fediverse-services like web2-services, monopolistic actors could again take control over the Fediverse and push it in the direction of a walled-garden again. To prevent this, people need to be constantly reminded of the Copernican revolution on the social web, as well as making them conscious of properties that could threaten the Fediverse existence like the accumulation of too many parts of the Fediverse by one company, or the decline of digital skills related to getting access to the Fediverse (which are two of the most pressing threats for keeping up the health and moral integrity of the Fediverse internally) and a general education regarding the digital in general and more specifically: that we start to think digitally independent. That’s what enlightenment on the social web should be like, because currently, large parts of the people on the social web still have a quasi-magical, heretic/pagan way of digital thinking.

Therefore, rather than a revolution of the social web in the form of the Fediverse, what is even more important to achieve is a revolution of how we think about the digital; that it does not revolve around the ideology of eternal progress propagated by the Silicon Valley (or the societal institutions that are represented by this term), but one that is created by society itself and that allows individuals to anticipate digital developments and act as independent agents in the digital. Therefore, also regarding the “Fediverse” above me: it could just as well be the digital, which can be seen as an extension of/reaching into the world of objective, which is actually exactly what Immanuel Kant meant when he spoke of what he saw in the universe, and put that in relation to his own subjectivity. So rather than the Fediverse, it’s a digital ontology that enables to become moral digital beings. What this ontology should include is able to debate, according to current C.S. didactics is should not go beyond that was can be said according to early Wittgenstein; however, as we have seen, the digital could also go beyond that, even if it is only simulating the language games of the late Wittgenstein, some of which may be harmless or even useful and some usages of them may even be immoral in itself, our definition of the digital should include these language games (as they are already participated in and digital skills acquired through them), which attempt has been made in this work as well as the stark differentiation from some parts of them.

If the ontology of the digital is defined this broadly (of course it will need to be developed further as our understanding of the digital develops), it needs necessarily to be accompanied by an ethic, which can be come across through the teachings of Kant and should stand against quasi-magical understandings of the digital. The ontology itself should be highly descriptive. Then again, the concept of the Fediverse, which this text is about after all, is still an important

concept in this process of digital enlightenment, even if it is nothing groundbreaking in the moral sense, as argued earlier, it could become a place that fosters an enlightened understanding of the digital. And the Copernican revolution as well as building bridges to advanced digital languages could be a part of that.

8. Conclusion

There exists a universal right to Fediverse Access, from this, four questions can be derived, two of which this work has tried to find first answers for (and some hints for the last one). While all three hypotheses will need further research and elaboration, each of them has been tried to be given some argumentative ground here and overall tried to give a first idea how morality on the web could be achieved through the Fediverse with implications for related disciplines like computer science didactics, political theory, philosophy, psychology, sociology and computer science itself.

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