Cryptocurrencies as Narrative Technologies

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ABSTRACT

Transitions in monetary technologies raise novel ethical and philosophical questions. One prominent transition concerns the introduction of cryptocurrencies, which are digital currencies based on blockchain technology. Bitcoin is an example of a cryptocurrency. In this paper we discuss ethical issues raised by cryptocurrencies by conceptualising them as what we call "narrative technologies". Drawing on the work of Ricoeur and responding to the work of Searle, we elaborate on the social and linguistic dimension of money and cryptocurrencies, and explore the implications of our proposed theoretical framework for the ethics of cryptocurrencies. In particular, taking a social-narrative turn, we argue that technologies have a temporal and narrative character: that they are made sense of by means of individual and collective narratives but also themselves co-constitute those narratives and inter-human and social relations; configuring events in a meaningful temporal whole. We show how cryptocurrencies such as Bitcoin dynamically re-configure social relations and explore the consequent ethical implications.

Categories and Subject Descriptors

K4.1 [**Computers and society**]: Public policy issues – Ethics

E3 [**Data encryption**]: Public Key Cryptosystems

General Terms

Design, Human Factors, Theory

Keywords

Cryptocurrencies, Bitcoin, technology, mediation, narrative, Ricoeur, Searle, money

1. INTRODUCTION

One of the intriguing myths of our time concerns the narrative surrounding so-called "cryptocurrencies", with Bitcoin as its main instantiation [18, p12]. The technology appears to be promising: the possible applications of the underlying *block chain* technology seem to be spectacular and feasible in the near rather than in a distant science fiction-like future. According to Melanie Swift, it has the potential to bring about radical new forms of money, contracts and even governments and democracies [23].

Bitcoin's mysterious founder - or anonymous group of founders - Satoshi Nakamoto, characterises Bitcoin as an "electronic payment system based on cryptographic proof instead of trust" [16, p1]. Its architecture has been based on the underlying "'blockchain protocol', which assures transaction authenticity, integrity, and ordering" [6, p84]. Basically, the blockchain is a public ledger (like a book of accounts) that contains all the transactions made within its system. "Blocks" are records containing the most recent transactions that are cryptographically signed and added to the chain in a designated sequence, in a linear, chronological manner [23, p10].

The main innovative feature of the blockchain is not its potential for bringing about fully anonymous transactions, but its capacity to track transactions within a systems and therefore fully exclude counterfeiting [13, p33]. This feature correlates with its ability to de-centralise authority and conduct transactions on a peer-to-peer basis. In the case of cryptocurrencies, this means that governments and banks are not needed to authenticate and validate transactions; these tasks are *delegated* to the technology. Because of their capacity to challenge authority, cryptocurrencies are seen as "weapons in the new control society" [5, p7]. Transactions with cryptocurrencies are irreversible and they solidify economic contracts by turning code into economic law. Because of the great potential for social control through the technology of cryptocurrencies (social control in de-centralized form), there seems to be a significant need for developing an ethics of cryptocurrencies.

In this paper, we will address this need by creating a framework that enables us to ethically assess the implications of the crypto currency technology. We base our conceptual structure on a juxtaposition between John Searle's social ontology and Paul Ricoeur's narrative theory. We will argue that cryptocurrencies can be understood as "narrative technologies" that both configure our (economic) reality and bring about an abstraction from the practical realm of economic exchange. In accordance with this analysis, we will discuss the ethical consequences of these configurations.

2. CRYPTOCURRENCIES AS NARRATIVE TECHNOLOGIES

In this section, we will inquiry into the meaning and use of currencies by asking: what *are* they, and what *do* they? These questions need to be addressed, for no ethical implications can be derived from a phenomenon that is not properly understood and from which most possible implications lie in the future rather than in the empirical present. In order to answer these two questions, we will first of all interpret cryptocurrencies as linguistic

phenomena, whose ontology can be analysed by means of Searle's theory of social reality. We then juxtapose this conceptualisation with Ricoeur's narrative theory that will enable us to show how cryptocurrencies can configure our narrative reality.

2.1 What cryptocurrencies *are*: technologies & linguistic institutions

One straightforward answer to the ontological question of what cryptocurrencies are can be that they *are* their blockchains: that the essence of the technology is the ever-growing chain containing records of transactions. Advancing on the ontological question, we can state that the blockchain consists of *code,* of a sequence of symbols that can be read by computer algorithms. However, this "code" has a significantly human and indeed social-institutional dimension. Cryptographic code, as argued by Lessig, is similar to human-made law while it can enforce confidentiality as well as identification in similar ways as law can [14, p53]. John Searle offers an ontological grounding that explains the similarity between law and programming code by pointing at their linguistic origin. He states that all human made phenomena, ranging from streets to governments to laws, share a linguistic basis. The origin of certain artificial phenomena, called institutional facts, is traced back to linguistic entities called "status function declarations" [20]. An example of a simple status function declaration is: "I hereby declare that the provided information is true".

Status function declarations include both a locutionary aspect (a linguistic aspect) and an illocutionary aspect (an extra-linguistic aspect). They are characterised by what Searle calls a "double direction of fit", a notion which refers to the fit between the locutionary, propositional aspect of the declaration and the human directedness to the world implied by the illocutionary aspect. For declarations, two different illocutionary aspects coincide: the desire to make something the case and the belief to make something the case. In other words, if we declare something to be the case, we might *create* a reality while *desiring* it to come about. For example, when a certain person is declared to be the President of the United States, the propositional form of the declaration "I, (Barack Obama), hereby declare that…", fits with the desire to bring about a new state of affairs *and* with a new ontological reality (the new president of the United States).

If we apply Searle's explanatory model to ontologically ground the phenomenon of cryptocurrencies, we can state that they indeed are status function declarations. They are declarations because they have a propositional structure that is such that it allows them to bring about their own reality. Moreover, they are *status function*[1] declarations as their meaning depends on a coinciding structure of human *desires* and *beliefs:* when using the blockchain of a crypto currency, we belief the new state of affairs (a transaction) which coincides with our want to bring it about (we wanted the transaction to occur). These desires and beliefs, however, don't belong to the individual but to the *collective.* We can collectively *intend* for status function declarations to become part of our social reality.

However, this does not seem to be an adequate way to wholly explain the semantics of cryptocurrencies. Two main lacunas make Searle's theory incapable to serving as a solid basis for the examination of cryptocurrencies. First of all, Searle leaves the gap between individual intentions and collective intentions unexplained, stating that collective intentions are merely biologically primitive phenomena. By suggesting this reductionist view, he disqualifies the impact of *culture* that is precisely not reducible to human biology [9, p259]. Secondly, his theory does not include an aspect of normativity that is needed to explain *why* declarations can have a status function at all [9, p260]. In the case of cryptocurrencies, we would want to explain *why* we assign a status function to them. In more common terms, we would want to explain why people value cryptocurrencies. This is not a trivial point, for the meaning of cryptocurrencies (as well as their classification as money) depends on their relation to human normative values. In order to deal with the two problems of culture and normativity, we turn to a theorist who takes quite a different stance on the role of language: Paul Ricoeur.

2.2 What cryptocurrencies *do*: configuring narratives

In one of his major works, *Time and Narrative*, Ricoeur constructs a comprehensive narrative theory. Unlike Searle, Ricoeur does not focus on the formal structure of language (like the formal structure or syntax of programming code), but on its hermeneutic aspects: the way people interpret language and their life-world. His theory revolves around one basic model that describes the way in which a text considered as a narrative can mediate human reality. This model consists of three conceptual moments that indicate the move from "not having read" to "having read" a narrative. Ricoeur claims that our social reality is embedded in a *prefigured time.* This means that the way we experience our temporal, social existence is embedded in a cultural context that is shaped by narratives [17, p54]. For example, we understand ourselves due to national narratives ("I'm a citizen of the Netherlands), economic narratives ("I lost my job due to the financial crisis") and even technological narratives ("robots are going to take our jobs"). Hence, whenever we engage with language we act from this cultural basis, which means that our understanding is shaped by the narratives that are so-to-say a part of our *collective* memory.

Prefigured time indicates the moment at which we start to interact with a text. From the prefigured time, we proceed to the moment of the *configured time,* which is the backbone of Ricoeur's theory. The paradigm of configured time is the notion of the *plot* in a story. The plot is defined as an organisation of events that mediates between the heterogeneous factors (like agents, goals and interactions) and the syntagmatic order of a narrative as a whole [17, p65]. More commonly said, the plot is the organisation of elements of a story that makes it possible for a reader to follow it to a certain conclusion. This organisation depends on two distinct temporal dimensions: a chronological and an a-chronological one. The chronological dimension comes about by means of a sequence of events ("first *this* happened, secondly *this* happened"). In contrast to the chronological dimension, the a-chronological dimension makes it possible to oscillate between the story as a whole and separate events, to jump between different "times" (e.g. as happens in a flash back) and to create a sense of ending.

By means of configuration, a text *refigures* our understanding of the world we live in. The world of the text and our human world intersect during this moment [17, p71]. For our analysis of cryptocurrencies, we will focus on the *configurative* capacity of these technologies. Starting from the paradigm of a text, Ricoeur shows that the process of *configuration* encompasses two distinct

[1] A "status function", according to Searle, is the function ascribed to an entity solely because of its status. For example, the king's seal has a function because of the status assigned to it, not because of its physical properties.

capacities of narratives that are significant for our understanding of cryptocurrencies. First of all, configuration brings about an *active* process of interpretation: a narrative actively re-organises the pre-figurative understanding of a reader. An analogy with a computer process might be helpful here: in the process of *reading* data by a computer, data are simultaneously *written*. Hence, the interpretation of a narrative implies a coinciding active process of (mental) *reading* and *writing*. Secondly, narrative structures can be made increasingly abstract by means of constructing so-called second- and third order entities that are based on first order entities (real characters and events) [17, p181]. For example, socio-cultural structures like companies and countries are *abstract* entities that do not directly denote real *people* or *events.* Nonetheless, any attempt aimed at explaining these structures will include first order entities: it will include narratives about real people who act in real situations.

Unlike Searle, Ricoeur addresses the two aspects of linguistic mediation of social reality we discussed in the previous section. Firstly, he characterises narratives as *cultural* phenomena: we interact with narratives from within our cultural embedded (prefigured) situation. Secondly, he explains *why* narratives can configure our social reality: they have the function of emplotment. Emplotment has an outspoken *normative* character because the characters in a narrative are not just "doers" as Searle would portray them but are "endowed with ethical qualities" [17, p59]. Unlike generalised "doers" like the *homo economicus* who act mechanically according to non-normative motives*,* characters can be good or evil; the protagonists or antagonists of their (life-) stories. These two features of Ricoeur's theory enable him to go beyond Searle's formal approach and to provide a holistic and normative account of linguistic mediation of our social world.

How then, could we employ Ricoeur's narrative theory to understand the *technological* phenomena of cryptocurrencies? We want to explore in what sense technologies could be "narrative". But since Ricoeur's theory revolves around the paradigm of the text, both as history and as fiction, we need to justify the claim that the concept of a narrative in a text can be extended to the concept of a narrative *technology*. Can Ricoeur tell us something about technology? Technology only plays a very marginal role in Ricoeur's work. However, Kaplan has drawn a connection between Ricoeur's work and the philosophy of technology. He suggests that Ricoeur's hermeneutical method as well as his analysis of the hermeneutic circle between human experience and narration can be fruitful in discussions about technology [11, p43-44]. Moreover, he argues that "the model of the text is also the model for the mediation of experience by technology" [11, p169]. Thus, Ricoeur's theory can be used to improve our understanding of technology.

Our conceptual model of narrative technologies is inspired by Ricoeur's model of emplotment. We argue that technologies configure our narrative understanding by organising events into a meaningful whole that includes both humans and things. For instance, a *car*, as a technology, configures events like "starting the engine" and "adjusting the mirrors" in a meaningful whole that includes both human and non-human *characters*. However, technologies do not configure our narrative understanding in only one single way for some of them might be very similar to the paradigm of the text and others very different. Nevertheless, we argue that these differences are matters of *degree* rather than matters of differences in *kind.* All technologies affect our narrative understanding, but the extent to which this is the case and the ways in which they do so differs between technologies. We propose two distinctions: one between active and passive narrative technologies, and one between abstracting and engaging narrative technologies. Let us explain these distinctions and use them to develop our hermeneutic framework.

The first distinction relates to the capacity of technologies to constitute an active process of interpretation. The degree of activity is determined by the extent to which a technology closes in on the paradigm of the text. Some technologies have very little in common with the paradigm of the text and for the most part play a role in our prefigured understanding. For instance, a bridge is part of a prefigured narrative structure in which events and characters are already configured into a plot: for example it may be a bridge to transport goods and people across the Rhine river. When a bridge gets built, it plays a role in configuring our narrative understanding (for example by disclosing new areas of a country) but soon it becomes part of our prefigured time; a *passive* element of our narrative understanding. However, some technologies *actively* configure our narrative understanding. They can "read" and "write" our narrative understanding by means of emplotment. ICT technologies are exemplary for this type of narrative technologies and are most similar to the paradigm of the text. This can first of all be derived from their very "textual" character: many forms of human-computer interaction revolve around mediation by symbolic and textual information. More importantly, though, ICT technologies and humans so-to-say "co-author" and "co-act" the narratives they engage in. Consider for instance video games. Players can interact with each other in a game, which *also* organises the characters and events into a plot. The unfolding of the narrative is co-created by the technology and the humans. The technology can be explicitly *narrative* and *social*.

The second distinction we propose is one between abstracting and engaging narrative technologies. Technologies have the capacity to create distance, which can be understood in two ways: as creating a distance between people and between people and things. In line with Ricoeur's theory, we argue that abstracting technologies remove themselves from the realm of action by configuring quasi-characters and quasi-events in a plot. Monetary technologies bring together not so much humans and direct interactions between them, but rather quasi-characters and quasi-events; also referred to as "second- and third-order" entities by Ricoeur as opposed to "first-order" entities which are actual characters and events. They organise quasi-characters such as "markets" and "exchanges" and quasi-events (e.g. algorithmic trades) in quasi-plots (e.g. the flash crash)[2]. This interpretation of what monetary technologies do is also in line with the claim – partly inspired by Simmel [22] – that modern financial technologies have abstracting effects Modern technologies even render time itself abstract, as Ricoeur suggests: the machines that measure time enable an: 'abstract representation of time" [17, p63]. Indeed, modern time technologies (clocks) serve to abstract time from concrete events, characters, and plots. Similarly, one could argue that the configuration of our narrative understanding by Fordist production technologies such as the conveyer belt abstract from the narrative of engaging labour (the artisan). Thus, these technologies distance themselves from the direct narrative they constitute, from the organisation of events in which actual

[2] Heidegger discussed such a process of abstraction as a typical feature of modern technology [8]. A hydroelectric plant configures people and the electricity they use in a way that abstracts from actual characters and events.

characters play a role. Engaging technologies, by contrast, instantiate a narrative as a direct interaction between human and non-human characters in actual events. Instances of such engaging technologies can be pre-modern ones like hammers, but not exclusively so. Modern ICTs can likewise create engaging narratives that re-situate people as characters that can partake in a narrative. Video games are primary examples of ICTs that enable engaging narratives but online communities like Github or Wikipedia can be said to do the same. These kinds of technologies engage people as actual characters in the plot of a digital narrative.

The above analysis gives us four categories for a hermeneutics of narrative technologies, with crypto-currencies assigned to one of the cells of the matrix: the category of active and abstracting narrative technologies:

Table 1. Hermeneutics of narrative technologies matrix

Narrative technologies:	**Abstracting**	**Engaging**
Passive	Power plant	Bridge
Active	Crypto-currencies	Video games

In line with the above-mentioned schema, we can now give a more precise description and understanding of what crypto-currencies are and do: we argue that crypto-currencies are active narrative technologies that abstract from the narrative they instantiate. First, they are active as they time-stamp transactions and thus co-create the transaction narrative. Through the technology, the human event of a transaction becomes an integral part of computational bookkeeping. The technology thus configures what we may call an "accounting" narrative. Second, although cryptocurrencies mediate events (transactions) between actual characters (traders, consumers), they remain remote from that level of human action and instead operate on a calculative, mathematical level. The transactions become a matter of algorithmic calculations; they are removed from actual people and events – including from the concrete material realities such as the goods that are traded and from the computing infrastructure. Hence, they can be said to create distances, both between people and between people and things.

3. THE ETHICS OF CRYPTOCURRENCIES

What does this mean for the ethics of cryptocurrencies? Usually, computer ethics but also ethics of finance are concerned with values such as privacy, democracy, autonomy, and with the behaviour of humans such as bankers, money traders, etc. and the fairness of financial institutions. For instance, Boatright [1] sees finance ethics as being concerned with the fairness of markets and the duties and rights of the participants in those markets. Technology is considered, but is seen as normatively neutral, or is view in a merely instrumental or consequentialist way, for instance by asking: do cryptocurrencies enable fraud? Do miners act responsibly? Do cryptocurrencies lead to more democratic economic and political systems? These questions are important, but lack a connection with humans as narrative beings that understand their world through an interaction with technologies. By contrast, this paper proposes a different approach that may complement existing approaches in ethics of technology: the focus is on tying to understand how technologies configure our narrative understanding. We offer a framework that enables us to analyse the narrative hermeneutics of financial technologies such as cryptocurrencies. Let us now say more about normative dimension of this narrative-hermeneutical role and the ethical implications these technologies bring about. We propose to structure this discussion by distinguishing between the configuring and the abstracting functions of crypto-currencies.

First, we consider the way cryptocurrencies influence our narrative understanding both *passively* (as elements of our prefigured narrative understanding) and *actively* (as technologies that actively configure the understanding of characters they interact with). These processes are not normatively neutral. The notions of *transaction* and *trust* are central to the rationale of cryptocurrencies, and the way transactions and trust change through the new technology has ethical implications. Let us briefly discuss these normative aspects and ethical implications of crypto-currencies as configuring narrative technologies.

When analysing the *prefigured* time in which cryptocurrencies play a role, we have to consider the normative-ethical dimension of the narrative structures that surround money as a technology. Cameron argues that our understanding of the monetary system is thoroughly shaped by narratives. Recently, these narratives have been placed in the greater context of the global financial crisis. This is everything but ethically neutral. Cameron forcefully shows how abstract financial processes are broken down into narratives about people (bankers, traders) that are *characterised* as "Gods" and "demons" [2, p12]. Systems that were perceived as being ruled by abstract rational calculations appeared to be embedded in a narrative structure incorporating characters with strong ethical qualities. The wake of cryptocurrencies can be interpreted in line with these global economic and political narratives. One of the major catalysing factors in the development of Bitcoin was the political blockade of Wikileaks by the world's major payment companies [18]. On the one hand, this blockade revealed the narrative structure containing the roles these companies play, which showed that the assumed neutrality of the monetary system was illusory. On the other hand, the emergence of Bitcoin configured this narrative understanding by presenting an alternative based on two distinct features: the decentralisation of power and the delegation of *trust* from legal authorities to the authority of the blockchain protocol. The emerging narrative is one of securing the integrity of the monetary system independently of authorities whose supposed neutrality was shown to be ill founded. Cryptocurrencies are thus part of a normative-ethical field where different narratives compete.

However, we have shown that cryptocurrencies are not merely passive elements of our prefigured understanding, but actively configure our narrative understanding through human interaction. Let us focus on the notion of *transaction* to show how this configuration takes place and what ethical consequences it brings about. A transaction may be defined as a configuration of human action (acting *through* something, as the term implies). Georg Simmel, in *The Philosophy of Money,* shows how the development of money has transformed transactions (which he grounds in the notion of *exchange*) from more direct forms to less direct, abstract forms [22]. We can reframe Simmel's theory by using the conceptual apparatus developed earlier in this paper. The more direct, original form of inter-human exchange has a narrative character in the sense that it configures events (deliberating on a price, handing over goods) between characters (the merchant, the farmer) in a meaningful whole we call a transaction. But with the introduction of money, this configuration changes. Money, according to Simmel, mediates these transactions and makes them indirect. People now interact

through money to engage in the narrative structure of exchange. Monetary technologies, as active narrative technologies, therefore configure our understanding of transactions: they no longer mediate organisations of events "between people" but actively configure these organisations through the use of a technology. This different kind of configuration is not normatively neutral: it concerns the way we think about and construct what transactions *should* be. But then how do cryptocurrencies configure our understanding of transactions? Based on the previous analysis, we could say that they render the a-chronological dimension of the transaction narrative obsolete by enforcing chronological time (time-stamped transactions) in their systems. This configures the understanding of making a transaction from an organisation of events with no fixed order that can be reversed, to one with a fixed order that is irreversible. This has an ethical implication, as it constrains the transaction in a specific way. Therefore, we have to decide and discuss whether this is what we want transactions to be, or if want another configuration.

Secondly, cryptocurrencies create a distance between the narrative structure of economic exchange and the transaction process contained in the blockchain protocol. Again this is a normative-ethically significant shift in our understanding of exchange and transactions. Simmel already questions the processes of abstraction and distancing entailed in the development of modern money [22, 4]. With crypto-currencies, this modern process of abstracting and distancing now further increases. Mediated through the blockchain technology, economic exchanges and financial transactions seem now even more abstracted from concrete people and events. Transaction now seems entirely a matter of numbers and algorithms. To say it in a Simmelian way: the quantification of modern life seems now to have reached a (new?) summit. Again, we may discuss whether this quantification is desirable and acceptable and draw consequences for the financial technologies we use.

This normative shift is also illustrated by the notion of *trust* as it is used in the established rationale of cryptocurrencies. The trust between the first-order entities in the narrative, the miners, the traders and the cryptocurrency users, is substituted by the systemic rigidity of the technology, that is, by a second-order entity. People using a cryptocurrency know that they are dealing with authentic and validated transactions not because they can trust the other people in the network, but because these features are *enforced* in the system. However, it would be a mistake to suppose that the notion of trust is altogether removed from the use of the technology: trust is still needed [4]. However, rather than trusting the people in the system, we need to trust the system itself. In modern times, trust related to first-order entities such as persons and material forms of money was already replaced by trust in a more abstract monetary system (think for instance about trust in "the system" after the end of the gold standard). As money dematerialized, trust also already depended increasingly on what was written down and recorded [4]. But now blockchain technology seems to further enhance this function of money by turning trust between people into trust in technology and systems. Just as a text might abstract from a narrative by substituting first-order with second-order entities, cryptocurrencies can be said to similarly do so, as they create (new) second-order entities, for instance Bitcoin technology and Bitcoin currency, which may be trusted (or not), depending in turn on changes in our narrative understanding. Explaining these second-order entities will always involve a referral to first-order entities. For example, whenever a cryptocurrency system gets affected by malfunctioning software, by attacks on cryptocurrency exchanges or by any other intended or unintended factor, the narrative structure of first-order entities (miners, hackers, programmers) is revealed. Apparently abstract entities such as "Bitcoin" still depend on concrete people and events. However, usually these are hidden from view. We only see them when the technology breaks down, when trust is (already) eroding. Moreover, although there is 'trust in the algorithm' (or not) [4, p165], the technology still requires 'trust between people': if no-one trusted and *used* Bitcoin, for instance, then it would not work; trust now also depends on whether our peers use it – revealing that transactions and trust in the financial sphere and elsewhere were always already a *social* matter [4, p165].[3]

What further ethical implications can be derived from this analysis? First, it leads us to a discussion on the ethics of transactions. By allowing transactions to be delegated to blockchain technologies, and therefore by getting rid of the a-chronological dimension of inter-human exchange, we are able to transform social relations (including contractual relations) in fully rigid forms. Now one could argue that for some social relations such as financial transactions, this level of rigidity can be very beneficial for it prevents cases of fraud, counterfeiting and "creative bookkeeping". However, this draws a firm line between on the one hand those areas of human exchange that we want to fully formalise and configure like crypto-currencies do and, on the other hand, those areas of exchange that would benefit from the human freedom implied in the a-chronological dimensions of exchange. Is such a clear boundary conceptually and practically sustainable? In any case, if we draw such a line we can then argue that there are illegitimate boundary crossings between two spheres. For instance, we may want to prohibit a crossing from the financial sphere to the sphere of health care. When informal human relations, like the relation between caregiver and caretaker, would be put in the rigid format provided by cryptocurrencies, inter-human relations might become "entangled" in their technological dependency as argued also by Hodder [10]. We would regard the transaction or the contract as the end-points of our relations with other human beings, rather than intermediate relay stations. In case a contract is practically breached, the blockchain protocol itself will be the arbiter: its acceptation or rejection of a transaction functions as the final verdict without a question being asked as to whether the transaction is ethically desirable in the first place. For example, in the context of care relations, a blockchain approach would mean that those relations do not only become very contractual and impersonal, but also that there is no room for interpretation and revision. Assuming this might be undesirable, we may want to avoid and prevent this from happening.

Secondly, our narrative approach can be used to reveal the ethical consequences of the abstracting narrative capacity of cryptocurrencies. As Simmel shows, these consequences can be both positive and negative. The positive effects of abstracting monetary technologies like cryptocurrencies lie in their capacity to emancipate and empower people. If social relations become less personal, then this also renders them more free: relations become a matter of choice and money becomes a guarantee of inclusion in the realm of economic exchange, regardless of your

[3] Consider also Heidegger's distinction between present-at-hand and ready-to-hand [7]: we could say that first-order entities are revealed when, because of malfunctioning, the technology appears to us present-at-hand rather than ready-to-hand.

personal, racial, or cultural background and status[4]. Moreover, like other forms of money the technology enables you to communicate and transact with anyone on earth; there are no physical-geographical boundaries. These effects are in line with the predominantly cosmopolitan and libertarian ideology most present in the narratives offered by cryptocurrency communities [12]. Since within the system any transaction can be performed without the parties involved in the transaction having to trust one-another, *who* you are is totally irrelevant. This enables people from any kind of background to engage in transactions without an authority preventing them to do so. Moreover, it is said that cryptocurrencies could empower people to gain the benefits from financial services in developing countries that have so far been secluded from access to banking services [3]. Crypto-currencies thus seem to radiate positive and optimistic ethical and political promises. However, as Simmel already suggests, the abstraction from the narrative of inter-human exchange comes with a cost. Firstly, by delegating the trust in transactions from first-order entities to second-order entities, the responsibilities of people acting through the system are delegated to the level of the system itself – thereby excluding and rendering invisible the level of first-order entities and events. Whatever kind of transaction one performs through the system, the only normative check is whether the system allows or declines it. What kind of transaction is performed (which can be a "good" or a "bad" transaction) is irrelevant. Currently, these technological loopholes have to be countered by legal measures and as yet it is unsure how this can be dealt with in the future. Furthermore, politically speaking the abstracting capacity of cryptocurrencies will likely have significant effects on power-relations between people and institutions. With *trust* being delegated to the second-order entity of the cryptocurrency system, power struggles might arise; first between cryptocurrencies and states (several states like Iceland and China have fully or partly banned cryptocurrencies) but more importantly *between* cryptocurrencies. While already banks are investing huge sums of money in blockchain technology [19] and cryptocurrencies might be viable forms of state currencies [15], it is uncertain that the decentralised features of the technology will also result in decentralisation of institutional power. Since the ability for social control is optimised within a cryptocurrency system, the question of who controls the system remains of pivotal ethical and political importance. Hence, to describe, reveal and discuss these political implications we are again forced to explain the changes at the systemic level of second-order entities by means of a narrative of first-order entities: of real characters interacting through an organisation of events.

4. CONCLUSION AND IMPLICATIONS FOR THE ETHICS OF CRYPTOCURRENCIES

"All the world's a stage, and all the men and women merely players" [21, p52]. These words of Shakespeare remind us of the importance to consider the impact technologies have on the narratives that shape our lives. We are narrative beings; yet we are also technological beings, and in contrast to what many people may suppose, both are related. In this article we have argued that technologies are not merely "narrative" in the sense that they are part of the narrative we – as persons, communities, societies, and cultures – tell about ourselves; technologies do much more: they also shape these narratives. As our analysis shows, financial technologies are no exception, and as they actively configure our understanding of financial practices and abstract transactions between people, they re-shape human and social reality in normatively significant ways. If we want to discuss the ethics and politics of finance, therefore, it is important to take into consideration these financial technologies and their narrative capacities. For crypto-currencies, this means that discussing finance in the light of these new technologies requires us to attend to their ethical and political implications as narrative technologies. We have argued that crypto-currencies do and might change transactions, trust, and power – and indeed the very way we think about these concepts. Discussing about crypto-currencies, therefore, is not a "technical" matter but does and should concern all of us. It is not so much about "ethical issues" with cryptocurrencies but about how we might re-imagine and re-design the social – how we might tell new, better stories about ourselves and indeed stage a better play: one we think is more ethically and politically responsive and responsible. Ethics of finance is, of course, about people. But *therefore* it is about the technologies-narratives we want.

[4] See also [22, p324]

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