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Teaching cryptocurrencies as cryptocultures

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Abstract

In this paper, I discuss an approach to teaching cryptocurrencies as cryptocultures. Cryptocurrencies are traditionally approached as technical or financial phenomena, but I argue that for students outside those specialist areas, a cultural approach will orient them better. I encourage teachers to first focus on situating students in a *place*, a shared public commons inhabited by the community of a cryptocurrency. I offer a way to model this place using a hash, bash, cash model of decentralised organisation. I build on this sense of place by then revealing to students the cultural *context* of a cryptocurrency. The context is comprised of the social imaginaries and the overarching goal animating a cryptocurrency culture. I show how this cryptocultural approach can be used to analyse different cryptocultures through an examination of the competing environmental imaginaries of Bitcoin and Ethereum.

Keywords: Bitcoin; cryptocultures; cryptocurrency; Ethereum.

Introduction

Teaching cryptocurrencies is *hard*. It is a discipline extending across technical, financial, and social scientific fields. It is also relatively new and developing at a rapid pace. I started teaching cryptocurrencies in 2016 to large classes and usually toward the tail-end of introductory modules within a business school context. Within two years, demand was high enough that I was teaching an undergraduate survey module and postgraduate seminar on cryptocurrencies. While I wish this was related to my teaching style, the reality is the topic is extremely popular among the younger demographic. This places the lecturer in an interesting position because not only is the topic multi-disciplinary, but the students know it very well themselves. On the plus side, it means students are energised about the topic in a manner not always common to the rather nuts-and-bolts nature of my subject area, the unfashionably titled Management Information Systems.

In what follows, I have attempted to distil the lessons from several years teaching a complex but popular topic liable to become a standard in many University degrees. My advice is perhaps unexpected: teach cryptocurrencies not as technical or financial phenomena unless you are specifically teaching the *practicalities* of them to computer science or finance students. To everyone else, teach cryptocurrencies as cultural phenomena because this is what they are in reality. Cryptocurrencies are cryptocultures. If you want to understand cryptocurrencies holistically, then you must look at the cultural characteristics they exhibit and then how those characteristics inform economic and technological decisions. We have come in our societies to prioritise *homo economicus*, the rational-technical decision maker, but this character is nowhere to be found in cryptocurrency, except in an idealised cultural form among some communities.

I don't discount – of course – the very central roles the financial and the technical play in cryptocurrencies, but I do protest how they overshadow the cultural dimensions. And I protest because a strictly technical or strictly financial explanation leaves the student stranded and confused. In contrast, a cultural understanding grounds them in an understanding where each cryptocurrency represents a specific culture to learn about, the same way they might visit Paris and learn a little bit about the French, not what holds the Eiffel Tower up. It's possible some specialist students want to know the latter, but more likely most will want to gain the former type of knowledge.

Literature review

In my teaching, I first introduce the concept of the commons (Ostrom, 2015) and how each cryptocurrency has a territory. At first, I explain this in the literal sense of the network and the blockchain (Kavanagh & Ennis, 2020), but in time I present cryptocurrencies as located within some bounded shared public space that each member has any kind of investment in – moral, social, political, psychological, financial – and then we are situated in a *place*.

I then introduce Taylor's (2002) understanding of modern social imaginaries. The concept of social imaginaries is quite helpful because it hardens the more nebulous one of culture. Taylor explains:

> Our social imaginary at any given time is complex. It incorporates a sense of the normal expectations that we have of one another, the kind of common understanding which enables us to carry out the collective practices that make up our social life. This incorporates some sense of how we all fit together in carrying out the common practice (2002, p. 106).

Our social imaginary names the background set of assumptions, responsibilities, and understanding that inform our actions in the social world. We don't consciously think of them all the time, but we can reflect on them and they are always in the process of evolution and transformation. We tend not to notice them until they breakdown as Heidegger (1962) and later Star & Ruhleder (1996) demonstrate. I typically present the imaginary as an *ideal* of the cryptocurrency's society. It is how the community imagines or wishes to see itself and that they strive toward, but it is not necessarily always adhered to. For example, we might aspire to justice and equality, but fail to meet it in practice, without that failure negating the central role justice has in our social imaginaries. The same happens in cryptocurrencies around ideals such as decentralisation or censorship resistance (Swartz, 2018; Schneider, 2019). This gets us the *context*.

With the commons as our place and the social imaginary as our context we can always come back to what the shared space and beliefs a cryptocurrency has are. Once set in the minds of the students I drop the -currency and replace it with -culture.

Cryptocultures: An overview

I define a cryptoculture as the *shared commons* and social imaginary associated with a cryptocurrency. I illustrate the shared commons using my hash, bash, cash model of decentralised organisation.

Hash refers to the blockchain. Blockchains are complicated, but in its simplest form refers to a distributed secure record-keeping system. In the famous case of Bitcoin, the blockchain tracks a unit of account, bitcoins, on a ledger. It is extremely difficult and expensive to undermine the veracity of the Bitcoin blockchain and this renders it a shared source of truth for the Bitcoin community (Wamba et al., 2020). In the case of Ethereum, Bitcoin's closest competitor, the blockchain tracks the state of a shared world computer (Chen, 2018).

Bash refers to the social community. Most cryptocurrencies have a vibrant core community built around social media platforms (Reddit, Twitter, Telegram, Discord) or discussion forums. In these public forums different parts of the community socialise. This can encompass everything from celebrating victories to engaging in drama and gossip.

Cash refers to the micro-economy surrounding a cryptocurrency. Most cryptocurrencies are either themselves primarily a currency like in Bitcoin or have a functional currency, like in Ethereum. The micro-economy is constituted by the currency or token, but also the financial activities associated with them such as trading and entrepreneurship.

To illustrate the shared *social imaginary*, I outline the imaginaries animating the community plus their goal. This usually requires overcoming the hurdle that not all cryptocurrency is the same monolithic culture, especially Bitcoin's. It is true you must first introduce Bitcoin because it's the original, but then you must ensure Bitcoin assumptions are not unconsciously carried over into other projects.

Here are two examples of shared social imaginaries found in cryptoculture: Bitcoin and Ethereum. These are the two foundational imaginaries to grasp in a pedagogical context.

Bitcoin is infused with two imaginaries originally and they both complement one another and generate an underlying tension. These are an digital privacy activist streak known as cypherpunk and a libertarian one known as crypto-anarchism (Swartz, 2018). The cypherpunks envision Bitcoin as an infrastructural project designed to implement a censorship-resistant and pseudonymous digital cash. The crypto-anarchists see Bitcoin as non-state money that cannot be manipulated by central banks because the supply is limited by the code. They are united in their opposition to central authorities and the concentration of power in the state and its various wings (Karlstrøm, 2014). Their goal is to replace state money with non-state money (Dodd, 2018). It is quite important to this imaginary that Bitcoin's code is not changed or interfered with too much because the "neutrality" of the codebase is the alternative to the corrupted human institutions they want to replace.

Once the new student comes to understand these imaginaries – cypherpunk, crypto-anarchism – and their shared goal of non-state money, then the counter-intuitive decisions – to outsiders – of the Bitcoin community become much easier to understand, as we'll see in a moment.

Ethereum is infused with a different set of imaginaries. The dominant imaginaries of the Ethereum community are a hacker-engineer mindset and a public goods philosophy (Brekke, 2021; Brody & Couture, 2021). The hacker-engineers envision Ethereum as a shared world computer that is both unstoppable and permissionless (open to anyone to use). The public goods imaginary has emerged recently to add into this vision a commitment to building Ethereum in a fair manner that does not allow oligarchic forces to dominate the 'commons' (the Ethereum blockchain and ecosystem) (Buterin et al., 2019).

The goal is to replace the centralised networks of the current Internet, usually called web2, with the decentralised 'network autonomy' of web3 (Brekke, 2021, p. 651). The same point holds here about understanding the decision-making process of Ethereans. Whenever Ethereans take action, it is almost always motivated by a sense of hacker-

engineer commitment to network autonomy and public goods fairness.

Armed with these two sample cryptocultures – with their shared commons and social imaginaries – let's put a cryptocultural approach to the test by examining one of the most common points of confusion for students (and others): why does Bitcoin cause so much environmental damage and why won't they address the problem?

Bitcoin, mining, and the environment

Many students new to cryptocurrency are sympathetic to Bitcoin at first. They are often already somewhat interested in cryptocurrency and then over the course of the opening lectures find its political critique of the inherited financial system intriguing. However, at some point, or perhaps already primed in this way, they are forced to address the environmental impact of Bitcoin mining. In 2021, you will be hard-pressed to find a young student who will hand-waive *this* particular issue away. With a cryptocultural analysis, I think it is possible to show why Bitcoin culture is conservative on the matter and then also to show how Ethereum is more liberal on it, since these have been our examples so far.

First, I will explain why Bitcoin's carbon footprint is as large as Sri Lanka's/Jordan's (Stoll et al., 2019). Then I will explain why Bitcoin *culture* will not address this. I will turn to *why* Ethereum *culture* is able to address it.

The Bitcoin shared commons comprises a software codebase that enacts a shared digital ledger (hash), a social community that discusses these on discussion forums, Twitter, and Reddit (bash) and a micro-economy involving the trading of bitcoins (cash).

The Bitcoin social imaginaries are, we recall, partly cypherpunk and partly crypto-anarchist. Both see the ultimate goal of Bitcoin as non-state or apolitical money. To the cypherpunks, this means Bitcoin is a neutral piece of open source software that anyone can inspect and that a network of volunteers maintains, but does not radically alter (De Filippi & Loveluck, 2016).

For them, Bitcoin's selling point is the "trustless" nature of the software codebase. You don't have to trust people (much), but just trust the code and how it structures Bitcoin's processes.

Now, what Bitcoin encodes is a decentralised ledger system and this is the part that interests the crypto-anarchists. I'll return to them soon, but we need a quick detour into Bitcoin mining to make sense of the environmental situation.

Digital gold

Built into the Bitcoin software is a mechanism for reaching consensus in the absence of a central authority (Böhme et al., 2015). Since Bitcoin is decentralised it is up to the community to collaborate to update who owns what bitcoins. Instead of a central authority – the bank, a payment processor – maintaining a digital currency by directly updating accounts, in Bitcoin the ledger is updated by a network of "miners" distributed all across the world (Xu et al., 2020).

Each time transactions happen these miners collect them and bundle them into a block, representing the emerging state of ownership, but no single miner can unilaterally add to the historical chain (the blockchain) (Vidan & Lehdonvirta, 2019). Instead, each miner races to find an inherited puzzle solution using computational resources, pointing their hardware at the problem. Eventually one miner finds the solution and wins. They add the next block and get a reward of bitcoins. Then everyone starts building the next block. This way no one entity, except using extreme tactics, determines the history, but instead the distributed network of miners decides (Easley et al., 2019).

Crucially, this system involves a race to find a puzzle solution and this race sees miners expend computational resources. The puzzle involves hashing data until you get the right output (Maurer et al., 2013). In the beginning, mining was undertaken by everyone using their home computers, using their Central Processing Unit (CPU). However, the more computational power you have the better your chances of winning the puzzle. Nakamoto overlooked this, a rare oversight, but as soon as Bitcoin became valuable, users began an computational arms race (Swartz, 2018). It started with video game cards, Graphics Processing Units (GPU), and eventually specialist hardware known as Application Specific Integrated Circuits (ASICs).

As it stands, Bitcoin mining has become an industrial affair and vast warehouses point thousands of ASIC machines at the construction of blocks and the race to find the puzzle solution (Xu et al., 2020). Estimates as to how much energy this process involves vary, but recent studies suggest energy usage equivalent to the nation states of Sri Lanka or Jordan (Stoll et al., 2019).

Crypto-anarchists see the computational expenditure behind mining as an important answer to the question 'where do bitcoins get their value?' Like how physical gold is difficult to extract from the Earth, Bitcoin mining operations must work hard to earn bitcoins because the competition from other miners is so fierce.

Add into the mix that there is an in-built hard cap of 21 million bitcoins that will ever exist and the idea that we might alter this codebase suddenly becomes *taboo* (Corradi & Höfner, 2018). It is worth noting that Nakamoto left Bitcoin in December 2010 and has had no involvement since, and this means there is no way to determine what his/her/their vision was and whether this hard line on unchanging code reflects his/her/their view.

The curious aspect is that Bitcoin mining is not the only option for maintaining a blockchain and Bitcoin could conceivably transition to another with lesser environmental impact. Let's look at how this is happening in its closest competitor, Ethereum, and then later we'll return to why Bitcoin *culture* won't follow this path. What I am driving at here is that it is Bitcoin's specific cultural imaginaries that preclude the

transition and not technical or economic barriers.

Ethereum, staking, and the environment

The Ethereum shared commons comprised a software codebase that enacts a shared world computer (hash), a social community that discusses this code and ledger on forums, Discord, and Telegram (bash) and a micro-economy centred around that ledger involving the trading of Ether and tokens built on the Ethereum blockchain (cash).

The Ethereum community is engaged in a prefigurative politics (Reinecke, 2018) where the hacker-engineers slowly introduce analogues of declining state or social functions, but in a decentralised manner. For example, many groups within Ethereum organise as digital cooperatives called Decentralised Autonomous Organisations (DAOs) (Wright & Law, 2021). These surrogate organisations act as a 'third place' or surrogate for the declining presence of shared social spaces (Oldenburg, 1999).

Hacker-engineers are infused with a public goods orientation where it is crucial to build the future they want to see in the here and now (Brekke, 2021). This means avoiding the re-creation of the problems of the inherited financial system, but also, notably, the unfairness they feel exists in Bitcoin's hyper-individualistic crypto-anarchist streak.

Ethereum is not designed as non-state or apolitical money. It has a currency, called Ether, but this currency is functional and used to power small applications on Ethereum's distributed world computer (Bartoletti, 2020). Thus, while economic concerns are important, they don't dominate everything and can be overridden if it serves the public good. Such as, for example, in response to the climate crisis.

The competing environmental imaginaries of Bitcoin and Ethereum

Ethereum has long stated its intent to switch from mining to a different consensus mechanism known as staking (Saleh, 2021). In staking, there are no mining machines drawing energy to fuel the race to find a puzzle solution. Instead, users agree to produce blocks (updating the ledger), but also put a substantial stake of a cryptocurrency that they will lose if they misbehave (Roşu & Saleh, 2021).

Staking is uncontroversial in the Ethereum cryptoculture because, unlike Bitcoin, the digital gold mining motif was never essential to Ethereum's self-image. Bitcoin's *raison d'être* is to be an unchangeable and unbendable digital gold that will not bend to any whims. This is not some incidental feature of Bitcoin, but an intrinsic part of what makes Bitcoin what it is. Ethereum can change its consensus mechanism and no cultural taboo is broken.

This is why, the cultural reason, Bitcoin users reject outright demands to change from mining to staking, despite the environmental impact. It is to ask Bitcoin to stop *being* Bitcoin. In other words, if you examine Bitcoin in a void – focusing on financial and technical concerns – then the problem seems easily solvable and often my students find it hard to comprehend, at first, why the answer to 'stop using so much energy to mine bitcoins' is 'we will never stop mining bitcoins.'

In Ethereum, this cultural barrier is absent and this is why its users are comfortable and supportive of efforts to transition to staking. The question has nothing to do with technical limitations and financial motivations.

Conclusion

In this paper, I have introduced a means to teach cryptocurrencies to students at undergraduate and postgraduate level in a University context. Against type, I have argued it is best to teach the topic from a cultural rather than financial or technical perspective. I suggest first to situate the student in *place*, in a shared public commons along the lines of my hash, bash, cash model of decentralised organisation. Hash refers to the blockchain, bash refers to the social media relating to that blockchain, and cash refers to the micro-economy built upon it.

I then provide students with the *context*, the shared social imaginary (or, as we have seen, more typically, the many imaginaries). The imaginaries are the ideals of the community plus the goal of the community, such as Bitcoin's desire to be an apolitical form of money. Or Ethereum's decentralised analogues to state functions.

Armed with a sense of place and a context, the student can then examine each cryptoculture on its own terms and in light of its unique properties. This enables the student to analyse the decision-making of each respective community in line with some guiding assumptions about what that community values. Of course, as time progresses, the student will come to see the deviations, the nuances, the complications, but as a pedagogical launchpad it is, I believe, the fastest path I have found from feeling overwhelmed by cryptocurrency to feeling well-equipped to understand it.

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