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Algorithmic governance, code as law, and the blockchain common: Power relations in the blockchain-based society

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"Code is law" became a buzz term in Web3 and blockchain reality. Despite the term being already used much earlier by Lawrence Lessig in the year 2000 in his book titled "Code and Other Laws of Cyberspace," when the internet and Web2 were emerging, the rise of smart contracts and complex algorithmic power made the term genuinely resonate with the (idealised) Web3 reality. The entrainment of technological solutionism in the brains of members of society gives an impression that a world governed by algorithms will be a fairer one. However, research has shown that many members of society are not standard statistical representations of the majority and whilst algorithmic governance leaves room for "standard deviation," individuals that fall outside this standard deviation are, in fact, very disadvantaged. There are numerous research papers as well as popular science books that address the issue of algorithmic bias and unfairness in Web 2. The proponents of blockchain and web3 technology argue that with a DAO-governed, decentralised society, problems of biased algorithmic governance are solved as power and decision-making are decentralised, and members use their governance tokens to collectively decide on the law encoded in the smart contracts that are the ultimate law enforcement apparatus. Web3 promises a shift of power from governments and corporations to people and token holders, arguing it will make a Web3-governed society fairer. This paper is based on decoding this promise and using Althusser's model of a state apparatus to show how the power relations changed in Web2 and Web3 realities. It shows that Web3 promises of the code becoming the law were already present in the Web2 discourse and discovers a model of an ideological apparatus power struggle between states and Web2 giants. Next, the power relations in the blockchain society are researched, starting from the idealised model of decentralised, token-holder governed power, which regulates the governments and corporations, to a discussion on what the actual power relations and struggles might result from encoding the law in the smart contract. Research shows that in Web3, "code is law" society. There will be power struggles and opposition on a vertical and horizontal level. The vertical struggle is the power enforcement (originally in the hands of the state in Althusser's (1970) model between the code and individuals, governments and corporations not willing to conform with the code-enforced law or falling outside the standard deviation of statistics-based AI algorithms hence being disadvantaged by the smart contract enforced laws. The horizontal power struggle is based on what Althusser describes as the ideological apparatus. Here, the struggle is based on a fight between individuals (the society), corporations, and the state for code-modifying resources and/or leverage over the governance token holders. Overall, the paper argues and shows that

blockchain-based "code is law" reality does not solve the issue of unequal power relations within societies but only as any technological revolution shifts the power relations and power struggles between existing and new actors. Unlike the founder of Polkadot, Gavin Wood states that blockchain, DAOs, smart contracts, and Web3 overall do not result in the new social sphere with revolutionised power relations. Where Web3 is now is much more similar to where Web1 and Web2 were 25–30 years ago—Creating a new space for social interactions and discourse yet being stuck within the same social sphere and uneven power relations that have governed our societies for centuries.

Introduction

The enthusiasts of cryptocurrencies, smart contracts, and decentralised ledgers see blockchain as a solution for the current data-oriented society, with many scholars and professionals within the online development field agreeing that centralisation of the internet, led by technological giants such as Facebook, Google or Amazon, is one of the most significant issues the internet society needs to deal with (Zuboff, 2019; Cloudry and Mejias, 2020; Larson, 2020; Bandara, R., Fernando, M., & Akter, 2020; Angwin, 2014).

Many underline that before data monitoring became the norm of the internet and the not-so-natural course of action gave immense power to tech companies, the web was decentralised (Barabas et al., 2017; Alabdulwahhab, 2018, p.1; Werdmuller, 2021; Clark, 2022). The early advocates of the internet claimed that accessibility and decentralisation of the internet could have revolutionised state and society relations, creating a participatory system with increased access to information and a new space for public debate, which would have allowed everyone to participate (Poster, 1995; Gates, 1996; Grossman, 1997; Docter & Dutton, 1999; Rheingold, 2000; Papacharissi, 2002). Take, for example, John Perry Barlow's "Declaration of the Independence of Cyberspace," where in 1996, he wrote: "Social space we are building to be naturally independent of the tyrannies you (governments) seek to impose on us" (Barlow, 1996). Nevertheless, as Web1 became Web2, data gathering and profiling did not make the internet society better informed but closed it into an information bubble, making it easier to manipulate views, beliefs, and behaviours (Susser et al., 2019; Zuboff, 2019). It makes sense that data is often being called 'the new oil'—Not only because it is a new form of a very viable resource but also because, just like natural resources, it needs to be appropriated from users (Couldry & Mejias, 2018,p.4–6). And just like historically, the harmful ways of those appropriation and the value of natural resources was not released by everyday people straight away. Similarly, many internet users are yet to realise the power and value of their harnessed data. The centralisation of power within the hands of internet data-gathering giants shifted the power of social control from governments and "industrial capitalists" onto tech giants, making data appropriation and manipulating behaviour the key power apparatus (Zuboff, 2019).

When blockchain technology took off in 2009 with Satoshi Nakamoto (2008) Bitcoin, the dream of a decentralised internet emerged again, giving broth to the idea that societies could be managed through decentralised ledgers. When Vitalik Buterin introduced Ethereum in 2015, this vision of the internet free from data gathering, power, and manipulation of data giants intensified as blockchains introduced smart contracts, allowing for DAOs' decentralised, token-based decision-making models for the "fair" and "unbiased" rule execution. The blockchain-based Web3 society gained hope that the promised participatory society propagated by Web1 will, in the end, find a way to exist and will be governed by the "ever-objective" principle of "code is law."

This paper investigates how power relations formed and changed from before the internet through Web1, Web2, and, finally, what they might look like in Web3. This can help determine whether Web3 offers a way for a fairer, more decentralised and consensus-based system.

Discussion

Power relations that led to centralised web

The current discourse around Web3 is highly focused on the critique of the centralisation of the social system in the 21st century (Drake, 2022; Weyl, 2022). That is why to understand the power relations that the blockchain economy is building the analysis must start with examining how the power relations were forming and changing throughout all generations of the internet.

Nowadays, it is easy to forget how limited access to information was before the internet era—Both when it came to the public having access to search and information verification tools and the centralised institutions such as governments, companies, or healthcare getting access to vast amounts of data regarding members of societies. From an institutional side, access was limited to the data passed onto the institutions by the individuals themselves or manually gathered during the interactions between the individuals and institutions. Sharing and analysing complex data sets and data points was much less complicated than now, as AI and automated algorithmic analysis were yet to reach today's level of development and complexity. The state and private institutions could not seamlessly share the data between geographical locations and branches and have a unified information-sharing system.

FIGURE 1
Power relations in the pre-internet era.
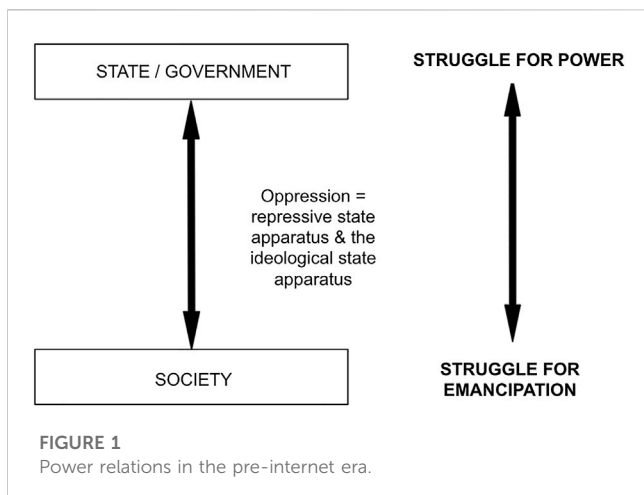
On the individual level, before the invention of the Internet and during its early days, the majority of society acquired information and knowledge about the world from traditional media, state institutions such as libraries, schools, or governments, and private institutions such as companies or churches. This was highly one-way and centralised communication with the institutions in charge of the mass information-sharing mediums being able to reach wider social groups. An individual that was not part of a private or state institution had little if no way to influence the discourse or publicly share views, opinions, and information that would reach a wider audience. Being simply passive receivers of the information, the general public could not take an active part in the public debate or have a real influence on the decision-making process (other than *via* elections every couple of years). The invention and popularisation of the Internet were meant to implant a more participatory system of two-way media and communication, allowing for a more active information exchange between decision-makers and general societies. The emergence of the internet itself was supposed to transfer part of the highly centralised power to the hands of society, making it a more decentralised social system (Rheingold, 2000; Papacharissi, 2002).

Because there were no internet giants and internet monopolies in Web1, the discourse propagating the intensified communication and social action *via* the use of the internet was (rightfully) placing the government and centralised institutions as the centres of power and society (Barlow, 1996). The standard members of society were members of the group oppressed by the centralised power relations, which with the emergence of the web, was meant to get a new tool (the internet) to gain control over some parts of the decision-making mechanism (Figure 1).

The current studies of the internet and the power relations in Web2 show that the internet did not emancipate society but added a third actor to the power juxtaposition. Those three actors of the internet society are the society with the new internet two-way debate tool, the state with the traditional state decision-making tool, and the technological corporations (such as Facebook and Google), which have taken over the role of the state when it comes to monitoring access of the society to information through filtering and targeting information through user profiling. Unlike traditional forms of colonialism, data colonialism involves not one center of colonial

power (the West) but multiple actors (such as Facebook, Palantir, Accenture, Microsoft, etc.) appropriating data or trading handing off data for basic human rights provisions (Howson, 2020). Despite what might seem like an equal three-way opposition (Figure 2), the Web two reality is still an opposition of the society against the centralised decision-making and information filtering powers (the state and technological corporations), while the two oppressors are in direct competition over the tools to control the society (Figure 3).

To understand how the power relations were transforming, starting with the beginnings of the internet (Figure 2) until the current state of Web2, it must be considered what has led to the emergence of that new power of the web society—Internet tech giants (tech corporations). The internet has brought people closer by predominantly making it possible for those who otherwise would have never met or talked to engage in discussions and form new, web-anchored social groups. Those new social groups fell outside the national jurisdictions but very much within the jurisdictions of the internet giants relying on them for interaction and communication. The role of the state as the regulator and an institution ruling over society has diminished significantly (Hoffmann, 2011). The internet had become something beyond the state, uniting people from around the world, which made it harder for governments and states to establish their jurisdictions over the online realms. This also meant that it has become way more challenging for nations and states to govern and regulate internet giants to defend their societies. Laws and regulations such as the EU's General Data Protection Rules (GDPR, 2018) aimed to give the members of societies control over the data that internet giants can use for their behaviour-modifying apparatus. However, due to having multiple headquarters around the world and passing and processing data under different jurisdictions, it has become increasingly hard to truly monitor and regulate those internet giants (Browne, 2022), even with cross-national laws such as GDPR.

Before Web1 and Web2, cross-state communication on a regular citizen level was hardly accessible and not very common, but the internet has made it all possible. While information bubbles still did exist in the pre-internet era, spanning whole local societies, their reach and size were much smaller since no global information bubbles were forming. As already mentioned, information was distributed one way *via* institutions that Althusser (1970) calls the "ideological state apparatuses" that influence how societies perceive reality.

Althusser (1970) calls the state laws the "repressive state apparatuses" (just like in Figure 1) that, in addition to repression, can also use the ideological apparatus of the specialised institutions (in both the public and private domains) such as churches, labour unions, families, schools, newspapers, cultural institutions, etc., to popularise its way of thinking and ideology. This might be where the centre of the problem of the fight between states and Web2 giants lies. "To my knowledge, no class can hold State power over a long period without at the same time exercising its hegemony over and in the State Ideological Apparatuses. [. . .] Ideological State Apparatuses may be not only the *stake* but also the *site* of class struggle [. . .]" wrote Althusser (1970). Back in the 1970s, when Althusser wrote his paper, the web did not exist. It was hard to imagine that a medium, the size of the internet, would take over the crucial role in information sharing within society. Internet giants and social media have become the (non)-state ideological
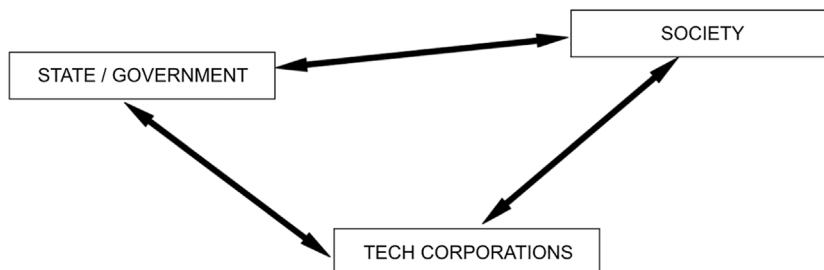
FIGURE 2
The equal (non-existent) power relations in Web2.
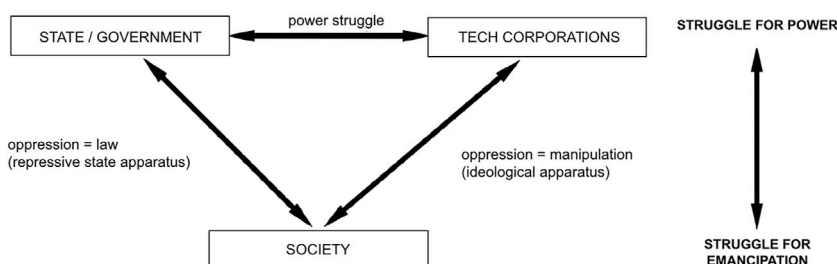
FIGURE 3
Power relations in Web2.

apparatuses, having largely overtaken the ability to influence societies in a non-repressive way by, as Zuboff (2019) shows, being able to predict and influence behaviour. The rise of the internet and later Web2 did not bring decentralisation and the ability for societies to influence decision-making in a decentralised way or the emancipation of the society. It has simply decided the power between governments (repressive power) and Web2 giants (the power of manipulation), as presented in Figure 2.

Why were the Web2 giants so successful in taking over the ideological apparatus? The data gathering has allowed for profiling and knowing what information will draw the most interest for various internet users. As a result, it did not get people better informed but rather ill-informed and locked within their informational bubbles, prone to information manipulation from the centralised power.

The power relations of the blockchain society

Blockchain proponents argue that Decentralised Ledger Technology (DLT) offers a way forward with a truly decentralised model of a society that can aid internet societies in the fight against all kinds of centralised power oppression, no matter whether it is the censorship of the state or the behavioural manipulation by the data-gathering tech corporations. Such claims can be found in speeches, interviews, opinion editorial articles, social media posts and more by thought leaders and managing members of organisations built around Web2. David Coleman, the CPO of iov42, a decentralised identity solution, says that "DLT can enable communities to redefine legacy architectures of governance and law, reigniting faith in a true democracy" (Coleman, 2022). A similar vision is shared by Gavin Wood, the founder of the Polkadot and Kusama ecosystems and one of the key leaders of the Web3 space, who argues that the difference between Web1 and Web3 lines in the fact that Web1 offered only the expansion of the physical space into the internet realm whereas Web3 offers tools to create a new model of society (Williams, 2022). Nevertheless, is this vision a realistic future for achieving a decentralised blockchain-based society? Being able to answer this question requires analysing what the Web3 discourse promises and what are the repressive and ideological apparatuses from Althusser (1970) framework in the Web3 society (if they exist in Web3 at all). It must be looked at what role, if any, national states and technological corporations play in the vision spread by Web3 supporters. It must also be remembered that Web3 is not an entirely new social model built from scratch but rather a framework building upon Web1 and Web2 that is currently at a very early stage of the centralised to decentralised web transition.

The below discussion is based on the idea of a public blockchain, meaning that anyone (who acquires the protocol-native tokens) can participate in the core activities of the blockchain network, and the blockchain is managed based on a consensus (Seth, 2022). As Irresberger et al. (2021) explain:

"A blockchain is an electronic ledger that is distributed across a network of agents referred to as validators. Blockchain validators differ from blockchain users in that users submit transactions for processing on the blockchain, whereas validators determine whether those transactions achieve a settlement. Blockchain users generally submit transactions *via* a native platform currency that we hereafter refer to as the native cryptoasset. For the blockchain to be useful for users, there must be a process by which submitted transactions achieve settlement. By definition, a transaction is considered settled on the blockchain only if the validators agree on the transaction being entered on the blockchain. Accordingly, agreement among validators, known as consensus, is a key concern for any blockchain. Each blockchain attempts to resolve that concern *via* a rules for updating the blockchain known as a consensus protocol" (Irresberger et al., 2021, p. 4).

A public blockchain model discussed in this paper is a blockchain that works similarly to or as a DAO (Decentralised Autonomous Organisation), meaning that all decisions as to how decisions relating to the blockchain and its participants are conducted through the consensus of the token holders. It is a blockchain common, meaning that a 'blockchain-anchored' society self-governs itself *via* decentralised voting without any hierarchy or centralised entity. In DAOs, decisions are usually made using the "wisdom of the crowd" principle through the use of the DAO governance token, which DAO participants use to express their opinion and vote in favour or against the proposed change—This is also known as 'the wisdom of the crowd'. Public blockchains that work as DAOs differ slightly in how proposals to update the code are made. Unlike the Web2 platforms, whose underlying code is a trade secret, codes of pubic blockchains are open source, meaning that anyone can see and copy the code. Let us look at this in more detail on the blockchain of Ethereum—There is a team of developers who ultimately implement changes to the Ethereum mainnet. This group is called "core developers," and it consists of a long list of people who have been developing either from the start (such as Vitalik Buterin) or who have made significant contributions to the protocol (Jameson, 2023). On Ethereum, anyone can propose a protocol update change *via* an official proposal (EIP—Ethereum Improvement Proposal), which moves through the process of peer review (anyone can become an editor, while current editors are listed on the Ethereum website (ethereum. org, n.d.). Once approved, the EIP is discussed on the core developer core and the update in the protocols' code. This system of proposing and implementing changes aims to ensure that a given blockchain (like Ethereum) remains public and open to anyone who wants to participate based on "code is law."

"Code is law" became a viral expression in the world of crypto and blockchain technology (Quinn, 2022). It is supposed to mean that code (and smart contracts) can replace the decision-making and rule execution so that the subjective human judgement element can be eliminated, putting an end to abusing the "law" to protect their interest or manipulate the way societies are governed. However, it is worth noting that the principle of "code is law" did not arise with the rising popularity of blockchain technology. It was present in the web discourse much earlier, when Lawrence Lessig (2009) first used it in his book titled "Code and other laws of cyberspace" having previously dedicated his 2000 article in Harvard Magazine to the discussion of the potential applications and consequences regarding

basing the societies dispute resolution system solely on code (Lessig, 2000). "This regulator [...] determines how easy it is to protect privacy, or how easy it is to censor speech. It determines whether access to information is general or whether the information is zoned. It affects who sees what or what is monitored. In a host of ways that one cannot begin to see unless one begins to understand the nature of this code, the code of cyberspace regulates." argues Lessig (2000). Yet, as Quinn (2022) points out, Lessig (2009) wrote about "code is law" over 20 years ago. His primary focus was how the governments and the code could work together by having their own (separate) applications within the social reality. However, today's technology is much more advanced. Lessig's (2000) words very much resonate with statements made by the blockchain proponents such as the Polkadot founder Gavin (Wood, 2022, cited in Williams, 2022), who argued that Web1 did not have a chance to create an entirely new social model as it simply offered the duplication of existing social systems and its power relations. Coleman (2022) adds to (Wood, 2022, cited in Williams, 2022) vision by saying that DLTs can change the power relations heritage of how societies are managed by reinstalling the "real" democracy, starting with supply chain and healthcare management systems. The below discussion defines power and power relations as understood by Althusser (1970). Whenever power or power relations are mentioned, it refers to the power of one (social) group over the other, which resists power and strives towards emancipation. It refers to repressive and ideological power as described by Althusser in his 1970 essay "Ideology and Ideological State Apparatus."

The difference between Alhuhsser's (1970) and the web society is that whereas, before the internet era, that power lay with the state, then in the current Web2 era, it lies with both the state and Web2 giants. Studying the discourse around Web3, one might find that a common theme of overruling the repression coupled up with the ideology power relations model. Figure 4 shows this new, visionary model of the society that blockchain proponents present as the future of the blockchain-managed society. This model builds upon what has been presented in Figures 1–3 showing the changing power relations and what blockchain visionaries expect these relations to change into soon.

The model presented in Figure 4 shows a society in which the code becomes the law that regulates and mediates the relations of all actors involved. On a blockchain, code often regulates how decisions are made and funds are spent, who can asses what and how, etc. Let us take the example of a hypothetical Decentralised Autonomous Organisation, which is meant t be used for managing investments for social causes. In such a DAO, no centralised decision-maker approves the decisions and manages the funds. Those decisions are made collectively by all members of the DAO, who can use their governance tokens (tokens they were given when they became part of that DAO) to express their opinions and decide how the funds should be spent. The code ensures that the vote is followed through. At the same time, it also governs the funds themselves, for example, *via* a self-custody multisig solution, an everyday DAO use of code to ensure decentralised access to treasuries. With multisig, more than one private key is needed to validate the transaction and transfer the funds out of a blockchain wallet. In most DAOs, those who hold multisig private keys will usually be the project initiators or DAO members chosen by that DAO's community. Some multisigs require all private keys to access the wallet. In contrast, in some multisigs,

FIGURE 4
Web3 power relations propagated by blockchain visionaries and the Web3 discourse.
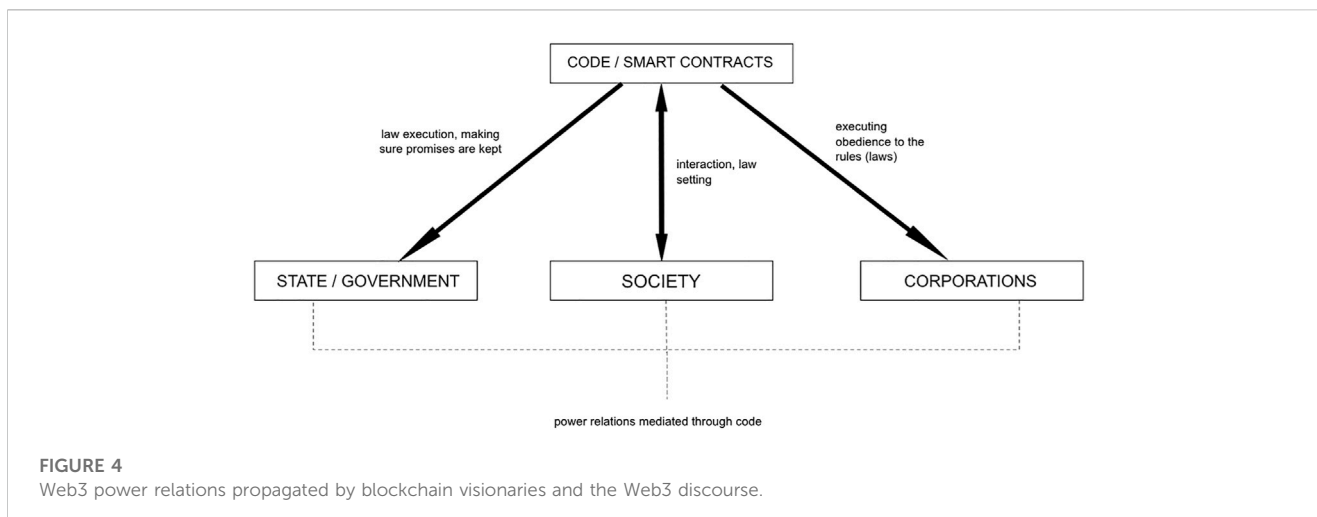
only a proportion is required (the rules are embedded in the open-source smart contract regulating a given multisig (Mcshane, 2023).

But how would that work in a larger society? Could we ever speak of societies (or even countries) becoming DAOs? In an ideal (for blockchain proponents) world, the code would be created, supervised, and changed only through a consensus of all members of society. It would mediate how politicians are elected and how political decisions are made. It would be critical to ensure obedience to the rules and that politicians and governments deliver on their promises.

Similarly, the code would limit how corporations can act, make decisions, and be structured to ensure that they are not given too much power, which would make the power relations in the society centralised again. It can be argued that in this model, the code becomes the sole repressive (state) apparatus from Althusser (1970) model of society. What would become the ideological (state on non-state) apparatus then? So far, the Web3 discourse does not offer a clear answer to this question. It would probably be a mix of state ideological apparatus and the Web2 giants' ideological apparatus, at least, until Web3 is fully ready to take over the existing real-world and online governance models. It is also plausible that new ideological apparatus would emerge stemming from the new power relations of the consensus-ruling society.

The main question stands: Would the new power relations work as promised by the DLT proponents, or would the fight for power that the societies have seen hundreds of years prevail, and will Web3 see a duplication of the existing power relations with just a simple rearrangement of social actors? Figure 4 presents a hierarchical structure in which the code is the regulator of how the society functions—As shown by Lessig (2000) and later (Wood, 2022, cited in Williams, 2022) and Coleman (2022). Hence, the first question is—Will not the code become the oppressor from under whose power the society will try to be emancipated? Is "code is law" the trap of technological solutionism, which beginnings have already seen some examples, as presented by Cathy O'Neil (2016) in her book titled: "Weapons of Math Destruction," where she presents how algorithmic governance is already putting some members of society at a noticeable disadvantage. Back in 1930, when reforming the Frankfurt School, Horkheimer (1931) argued that society must
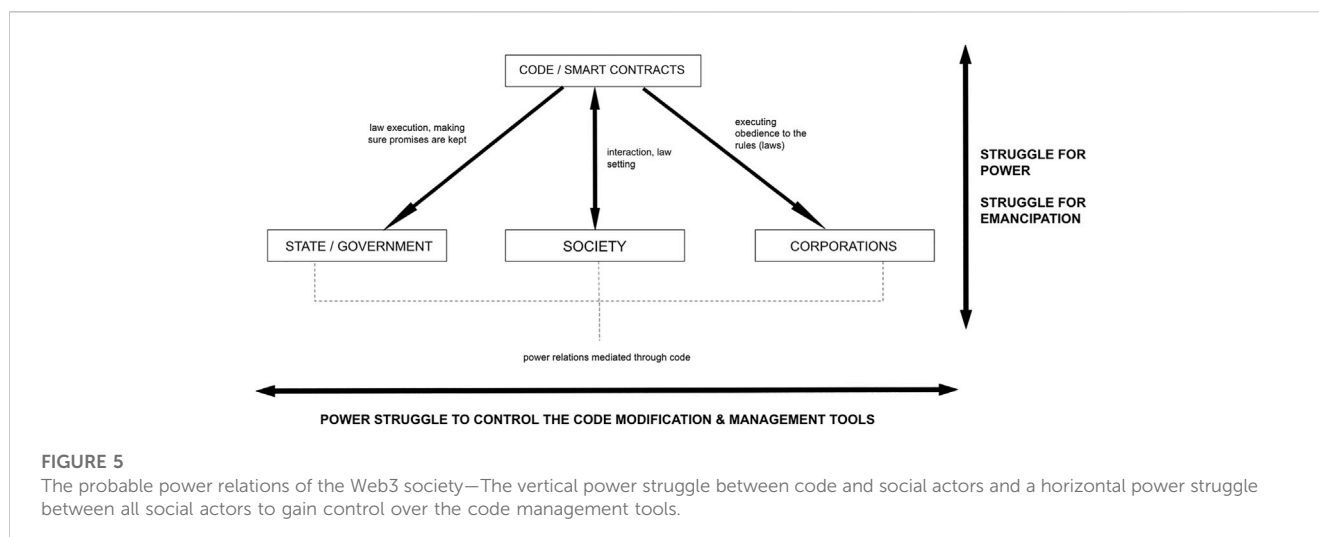
be studied at a given point, and the same tools and assumptions cannot be used to analyse various societies. Horkheimer (1931) pointed out that any social analysis should be a combination of empirical and qualitative evaluation, taking history, politics, social studies, philosophy and psychoanalysis into account. Blockchain governance is just one—Statistics and algorithmic analysis with no room for qualitative analysis and individual case-by-case evaluation.

Blockchain seems to promise a system that would treat everyone equally. Nevertheless, would that be a truly viable social system? Would society oppose the ruling code? There is an appearance from the other two actors of the blockchain-based society—The state rolling class and corporations seem clear—Those who currently have the power will not be happy to hand it over. As demonstrated in Figure 5, the fight for power will take place on two levels in the blockchain-based reality. A vertical power struggle will be the fight between the actors of the society opposing the code and its regulations. The horizontal struggle will be the fight between all the actors of the society for ownership and management of the resources that allow for control over the code—The actual instrument of Web3 power.

Other constraints to consider

Currently, larger societies are far from adopting blockchain as a primary tool for constructing and governing social structures. It is mainly because blockchains have a limited transaction throughput, which makes it impossible for a large volume of transactions to be performed quickly and in one block (Chauhan et al., 2018). Furthermore, many DAOs struggle with implementing the "wisdom of the crowd" principle since weighing on more minor or more technical decisions too often leads to low voter turn-up and voter fatigue, which means that although any DAO participant can take part in the decision-making, most decisions are weighted upon by minority (Kim, 2022).

Finally, the essential question of implementing blockchain-based governance for societies on a local or national level is: Why should anyone want to be a validator (it can be safely assumed that on such a scale, a PoS or DPoS consensus

FIGURE 5
The probable power relations of the Web3 society—The vertical power struggle between code and social actors and a horizontal power struggle between all social actors to gain control over the code management tools.

mechanism would probably have been used)? With most public blockchains, an economic incentive is tied to being a blockchain validator or staking one's tokens to validators. Blockchain-native tokens have an economic value, and those who participate in the network's governance earn additional tokens for their work. This economic incentive would have to be considered if a public blockchain were used in a society or a state. In this case, public finances would need to be used to facilitate the blockchain. However, the question remains—What would ensure that validator accountability? On the "commercial" public blockchains, validators need to lock up the proportion tokens until the block is validated and conformed to avoid fraudulent actions. Perhaps, in a state system, part of the validators' wealth would also need to be locked up. In this case, governance tokens (that would not be considered securities) could be distributed amongst the members of the society. At the same time, a validator could be tied to yet another (financial security) token and be a way for investing money through the state—Just as in the case of government-issued bonds, etc. The above is just the tip of the iceberg of the technological and conceptual constraints to incorporating blockchain solutions for governance in larger societies.

Conclusion

Web1 was the dream of the decentralised internet, promising emancipation from state repression and a more decentralised system of information sharing and decision-making. However, as the past 25–30 years have shown, the internet has only made society more misinformed while the new ideological power apparatus arose—Web2 tech giants who base their business models on data gathering and predicting behaviour (Zuboff, 2019). The same old models of colonialism and appropriation became present in Web2 with the new most powerful resource—Data (Couldry & Mejias, 2018). Web3 promises to rectify this by decentralisation of web and decision-making, propagating consensus-managed societies in which relations would be mediated *via* code. However, there are some major fallacies to this logic. First, there is a significant probability that

social actors will be in a power struggle to gain control over the tools and resources needed to control the rule-setting code. Secondly, the current power relations model of the oppressed and those wanting to be emancipated may be duplicated with code. Technological solutionism, taking the role of the oppressor, boils society down to algorithmic analysis. At the same time, all other actors will try to emancipate themselves from being ruled by the code to allow for more subjectivity and qualitative governance. Thirdly, blockchain-based solutions do not offer a way to emancipate from the ideological apparatus. If there still be ways to dominate the public discourse to sway and manipulate societies' views (like in the case of the Cambridge Analytica crisis (Kaiser, 2019), then using blockchain and DAOs for the 'wisdom of the crowd" solution does not solve the issue of centralised players using ideological manipulation to influence how decisions are made. This ideology will become the way to gain dominance over the tools that can govern and execute "the code." The Web3 model might be further from perfect than many blockchain visionaries might think.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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