

Report on blockchain technology & legitimacy

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Preamble

This report synthesizes the insights explored within the ERC BlockchainGov reading group on “Legitimacy in Blockchain,” taking place bi-weekly from July 2021 until June 2022. The report investigates the role of legitimacy in blockchain systems from descriptive, conceptual, and normative perspectives. It summarizes the discussions and provides recommendations concerning the role of legitimacy in blockchain systems drawing from the talks held by the reading group. The organizers of the reading group are part of several initiatives, including a five-year-long (2021-2026), EU-funded (ERC grant of €2M) on ‘[Blockchain Gov](#)’ at the CNRS (France)/EUI (Italy), a Future Fellowship project funded by the Australian Research Council on ‘[Cooperation through Code](#)’ at RMIT (Australia) and the Coalition of Automated Legal Applications (CO-ALA). The “Legitimacy in Blockchain” report is one of a series that includes the “[Blockchain Technology, Trust, and Confidence](#)” report (De Filippi et al., 2022) and “Blockchain Technology & Polycentric Governance” report (De Filippi et al., forthcoming).

The topics explored throughout the reading group were instrumental to acquire a better understanding of legitimacy not only as a justification for coercive power, but also as a means to accommodate power in polycentric systems. Indeed, much of the literature on the concept of legitimacy focuses on the legitimation of power exercised by a dominant party over subordinates (*i.e.*, Weber, 1964; Beetham, 2013), *i.e.*, it focuses on relatively centralized and coercive systems, such as national governments or companies. In contrast, the role of legitimacy in polycentric systems, which are less subject to coercion, remains fairly undertheorized.¹ The literature on the legitimacy of Internet governance focuses on the various power structures that shape the governance and operation of such a decentralized global network including actors like ICANN (*e.g.* Jongen & Scholte, 2021; Sylvain, 2015; Mounier, 2012), IANA (Palladino & Santaniello, 2021), and online operators like Facebook or Google (*i.e.*, Arun, 2022; Cows et al., 2022; Suzor et al., 2018). Yet, when it comes to blockchain technology, the academic literature on legitimacy is still in its infancy.

The few studies tackling the legitimacy of blockchain technology are mainly focused on *exogenous legitimacy*, *i.e.* understanding how blockchain systems are perceived by the outside world, including private and public institutions, in order to encourage adoption (Vilet, 2019; Rosati et al., 2021; Dimitropoulos, 2022; Reinsberg, 2021). However, *endogenous legitimacy*, *i.e.* how blockchain systems are perceived from within their own community of users, remains relatively unaddressed. The latter type of legitimacy ultimately depends on the structures and processes through which these blockchain systems are being governed (Reyes, Packin & Edwards, 2017). Marco Crepaldi’s thesis on the legitimacy of blockchain technology (Crepaldi, 2020) is one of the most advanced studies in that sense. Yet, in the past few months, the topic of legitimacy has become subject to much controversy, especially since Vitalik Buterin described legitimacy as an important, yet very scarce resource, fundamental to the operational success of blockchain systems (Buterin, 2021). Given this newfound interest in legitimacy, it is an opportune moment to draw lessons from existing scholarship on legitimacy, and apply it to the context of blockchain technology.

Another reason why exploring the *endogenous* legitimacy of blockchain systems is important is because it enables us to better understand (and potentially predict) how people will react to a particular event that is negatively affecting the system. According to Albert O. Hirschman (1970), whether people perceive an organization as “legitimate” affects how they will act during the perceived “decline or deterioration” of

¹ For the purpose of this report, *coercion* is understood as a situation in which one party—the coercer—has the ability to make another party—the coerced—behave in a certain way through means of pressure, intimidation, manipulation or threat, thus diminishing the coerced’s freedom or responsibility. As such, coercion may—but not always does—involve the threat of the use of force (Anderson, 2021).

such an organization—*i.e.*, when the perceived benefits they get from the organization are decreasing or when they disagree with the activities carried out by the organization. The same applies in the context of blockchain-based systems, whose perceived legitimacy can inform the way users will react to an unforeseen incident, such as a hack or market crash. In *Exit, Voice, and Loyalty*, Hirschman (1970) argued that when the 'performance' of a private or public organization declines, individuals can choose between *exit*—*i.e.*, leave the organization or stop buying its products—or *voice*—*i.e.*, express their dissatisfaction to anyone willing to listen (Hirschman, 1970, p. 4). Hirschman referred to *exit* and *voice* as representations of "economics" and "politics," respectively, two "contrasting, though not mutually exclusive categories" (Hirschman, 1970, p. 15). The third component of Hirschman's equation is *loyalty*, which the author defines as a "special attachment to an organization." According to him, *loyalty* makes *exit* less likely. *Loyalty* may give rise to *voice* if and when the individuals are willing to trade off the certainty of *exit* for the uncertainty of expressing their discontent, to the extent that they believe they can influence the operations of the organization (Hirschman, 1970, p. 77).

Other authors have expanded upon Hirschman's theory to provide additional clarity to its claims. According to Graham & Keeley (1992), Hirschman's model translates into two sets of decisions: one binary decision, "*exit* or *stay*,"; and a decision that resides on a spectrum between "*voice* or *silence*." As such, members have four possible choices: (1) to *exit* and lean more towards *voice*, (2) to *exit* and lean more towards remaining *silent*, (3) to *stay* and lean more towards *voice*, (4) to *stay* and lean towards remaining *silent* (Graham & Keeley, 1992, p. 192). The authors argue that the most misunderstood component of Hirschman's proposition is the effect of *loyalty* over *voice*.

Nearly all scholars agree that *loyalty* lowers the appeal of *exit* because it implies some "sort of positive attachment that binds the participants to the organization" (Graham & Keeley, 1992, p. 192). However, its effects on *voice* depend on the type of *loyalty* experienced by the members, namely: *unconscious loyalty*, *i.e.*, "inattention, selective perception, or even total blindness"; *passive loyalty*, *i.e.*, "tolerance, patience, and faith"; and *reformist loyalty*, *i.e.*, actively voicing disagreement and "pressuring the organization to change its way" (Graham & Keeley, 1992, p. 194-195). Several factors influence which type of *loyalty* may arise in a particular organization, including characteristics such as *cultural values* (participation versus obedience) and *governance structure* (decentralized versus centralized) (Graham & Keeley, 1992, p. 196).

In order to better understand the endogenous legitimacy of blockchain systems, we identified a few research questions which led to the establishment of preliminary hypothesis that are investigated in this report:

1. What does legitimacy mean in the context of blockchain systems?
2. Who are the different stakeholders, and what are their perspectives on legitimacy?
3. What are the different types of legitimacy that exist in blockchain systems and what roles do they play in the operations of these systems?
4. What are the different factors that may affect the legitimacy of blockchain systems?

The preliminary hypotheses concerning legitimacy of blockchain systems are the following:

H1. Loyalty is indicative of legitimacy.

- Legitimacy, as a *descriptive* concept, indicates ‘acceptance’ of a system. Hence, loyalty to a system is indicative of the legitimacy of that system.
- Loyalty is particularly important for any system that relies on network effects (*i.e.*, a system whose value increases as more people participate), be it either a centralized or decentralized system.

H2: Legitimacy is a prerequisite for loyalty.

- Legitimacy also has a *normative* component, *i.e.* a system ought to be constructed in such a way as to be perceived as legitimate, and in doing so, it will foster loyalty. Hence, legitimacy is a prerequisite to guaranteeing loyalty to the system.
- Even in cases where participants are free to *exit* the system (as in the case of blockchain systems), legitimacy ensures that participants will remain loyal to the system and abide by the system’s rules even if there is no coercion.

H3. Legitimacy is crucial for both centralized and decentralized systems.

- Acquiring and preserving legitimacy is crucial for both centralized (coercive) systems and polycentric (non-coercive) systems. Yet, there are different mechanisms at play in both systems: one cannot establish legitimacy in a centralized system the same way as in a polycentric system.

The “Blockchain & Legitimacy” reading group was formed precisely to test these hypotheses, with participants ranging from blockchain practitioners interested in the question of legitimacy to governance scholars knowledgeable about blockchain technology. Articles and book chapters on the topic of legitimacy were assigned as readings to the participants based on their expertise, availability, and interests. The reading group was held on a bi-weekly basis, with a format intended to maximize the opportunities for discussion and cross-pollination amongst the participants. Each session began with a discussant in charge of presenting and discussing the insights of the assigned texts. with the author of the text often joining the group and reflecting on the discussant’s remarks. After the presentation, the author of the text was given the opportunity to respond with specific comments and reflections, subsequently leading to an in-depth discussion by the larger group. Each session concluded with a conversation on how the text contributes to the group’s understanding of blockchain’s governance and legitimacy. This report synthesizes the insights collected and generated throughout this reading group.

The structure of the report is as follows:

- The introduction highlights the importance of addressing the *endogenous legitimacy* of blockchain systems, presents the concepts of blockchain technology, blockchain systems and distributed governance, and outlines the academic building blocks behind the notion of legitimacy.
- The second section is further split into three subsections. The first and second subsections review the academic literature on legitimacy in centralized and decentered (or polycentric) systems, respectively. As much has been written about legitimacy, our literature selection aims to explore legitimacy descriptively, conceptually, and normatively in light of Hirschman’s *exit*, *voice*, and *loyalty*. The third subsection analyzes the extent to which blockchain systems are, in fact, polycentric.

- The third section rethinks the notion of legitimacy in blockchain systems. It presents the views of renowned blockchain practitioners and it explores legitimacy in light of specific characteristics of blockchain systems, including Schelling points, forking, MEV, credible neutrality, community participation, politics, and trust and confidence. This section sheds light on our preliminary hypotheses, namely how 1) loyalty is indicative of legitimacy, 2) legitimacy is a prerequisite for loyalty, 3) previous academic literature on legitimacy cannot be readily transposed to understand these novel socio-technical systems.

The conclusion summarizes our key findings and proposes further research directions to continue investigating the subject matter.

Introduction

A blockchain is a distributed ledger that enables secure, transparent, and tamper-proof record-keeping, making it possible—among other things—to securely record and verify transactions without relying on a central party (DuPont, 2019). The potential applications of blockchain technology are far-reaching and have the potential to disrupt many industries, including banking, supply chain management, art, and even voting (Marku et al., 2019). In particular, blockchain technology has become a multi-purpose technology used in a variety of social, economic, and, potentially, also political activities with the development of the Ethereum network in 2014, and the proliferation of smart contracts, decentralized applications (dApps), and decentralized autonomous organizations (DAOs).

As of July 2022, more than 6,000 DAOs exist (Newar, 2022), with more than USD 10 billion in their treasuries (Redman, 2022). Yet, the technology is still in its infancy. Despite its promising potential, its attributes and affordances have also been misunderstood and associated with illegal activities, such as money laundering and drug trafficking. Hence, understanding whether and under which circumstances blockchain systems can be deemed legitimate—and by whom—has become paramount to comprehending how these systems operate in the present and how they may (and should) operate in the future.

The *exogenous legitimacy* of blockchain systems—*i.e.*, whether blockchain technology and its applications can be regarded as legitimate by the established systems of society—is an important aspect. For example, in August 2022, the U.S. Department of the Treasury’s Office of Foreign Assets Control (OFAC) imposed sanctions over an Ethereum-based virtual currency mixer or tumbler called Tornado Cash, based on allegations that it was being used for money laundering by terrorist groups (U.S. Department of Treasury, 2022). This case has raised concerns about how to employ blockchain systems to coordinate different realms of society, including private financial transactions.

However, this report focuses on the *endogenous legitimacy* of blockchain systems—*i.e.*, whether and the extent to which participants of a blockchain system regard it and its governance structure as legitimate. Hirschman’s proposition of ‘Exit, Voice, and Loyalty’ (1970) is particularly relevant to the understanding of the endogenous legitimacy of blockchain systems because their value depends on ‘network effects.’ A network effect is a phenomenon whereby the value of a good or service increases as more people use it. A classic example is the telephone network, which has more value to an individual as the number of people using telephones increases. A key consequence of network effects is that they make it costly for users to switch from one service to another, even if they are entirely free to do so.

In the case of blockchain systems, characterized by low exit costs, endogenous legitimacy plays a funda-

mental role in retaining users into the system—through loyalty—until they reach the point where network effects are significant enough to keep people from switching, exiting, or forking. Since the advent of blockchain technology through the creation of Bitcoin, blockchain communities have continued to discuss how to govern these systems *legitimately*. Still, a myriad of blockchain systems has encountered governance concerns that led to organizational forking—including the famous hard forks of Ethereum in 2016 (Ethereum Organization, n.d.), Bitcoin in 2017 (Spade, 2022), and Steem in 2020 (Baker, 2020). These and many other debates among blockchain *aficionados* help academics explain our understanding of the dynamics of legitimacy beyond known centralized and decentralized systems.

a. Introduction to Blockchain technology, Blockchain Systems, and Distributed Governance

While explaining the technical details of blockchain technology is beyond this report's scope, we provide a brief overview of the technology's distinctive characteristics and how they might affect the legitimacy of these systems. Blockchains are distributed ledgers that combine peer-to-peer networks, public-key cryptography, consensus algorithms, and hashing functions to create *distributed databases* that are stored and updated by a peer-to-peer network without relying on a centralized authority. These distributed ledgers are *tamper-resistant* because once data has been recorded on a blockchain, it can no longer be edited or deleted. Indeed, tampering with the records on a blockchain would require more than 51% of the resources invested in the network, which is highly costly in the context of the most popular blockchains. While there are different types of blockchains—from fully public and permissionless blockchains to fully private and permissioned blockchains—this report focuses mainly on public and permissionless blockchains, as they raise interesting questions concerning legitimacy. Public and permissionless blockchains are usually *pseudonymous*, *i.e.*, they do not require users to identify themselves to participate in the network and *transparent*, as transactions remain available for everyone to check and validate. Finally, these blockchains *guarantee execution* since any snippet of code deployed on a permissionless blockchain will always execute as planned because no one can influence, modify or even terminate its execution.

From a governance standpoint, a blockchain system is a complex socio-technical system with multiple interconnected layers of hardware, software, and individual stakeholders involved in their operations (Voshmgir & Zargham, 2019). Several actors are responsible for building, maintaining, and using these blockchain systems: from miners and validator nodes to third-party application providers, cryptocurrency exchanges, hardware manufacturers, public institutions, and of course, token holders and end-users. Technically, a blockchain network is made up of a set of specialized hardware and software that enables the communication between network nodes, along with a particular set of rules and parameters that define the protocol of the blockchain network (*i.e.*, Bitcoin and Ethereum). On top of that, some blockchains also make it possible to deploy smart contracts, decentralized applications (DApps), or Decentralized Autonomous Organizations (DAOs).

All blockchain-based systems rely on “distributed consensus” for their network operations. Nevertheless, when assessing the governance of blockchain-based systems, one must look at both “governance by the infrastructure”—*i.e.*, the governance rules embedded directly in the technological fabric—and “governance of the infrastructure”—*i.e.*, all the social and institutional rules that define blockchain governance but that cannot be directly encoded into the technological infrastructure (De Filippi & Loveluck, 2016). One simply cannot be understood independently of the other (De Filippi & McMullen, 2018).

b. Introduction to the Notion of Legitimacy

We elaborate here on the specific approach to legitimacy adopted in this report. The modern concept of legitimacy has its roots in the work of Max Weber, who argued that legitimacy—understood as the acceptance of both *authority*—or in Weber’s words, “*herrschaft*,” sometimes translated as “domination” (Szelenyi, 2016)—and the *need to obey* (“*gehorsam*”) the commands of authority—as the basis for the authority of a political system (Weber, 1964). In this view, a political system has legitimate authority if it is seen to exercise power in a way that is consistent with the values and beliefs of the people it governs. Accordingly, legitimacy as conceptualized by Max Weber can be justified on three separate grounds; (1) *tradition*, whenever a particular political or social order is accepted because it has been there for a long time; (2) *charisma*, whenever the ruler inspires trust and confidence over the polity; (3) *legality*, whenever the law defines how authority is established and exercised.

Similarly, Julia Black (2008) argues that “legitimacy is rooted in the acceptance of [an] organization by others, and more particularly in the reasons for that acceptance” (p.144). She identifies three reasons for acceptance:

1. *Pragmatic legitimacy*: when people believe that an organization will act pursuant to their own interests, either directly or indirectly;
2. *Moral legitimacy*: when one considers the goals and/or procedures to be morally appropriate;
3. *Cognitive legitimacy*: when the organization is accepted as necessary or inevitable (p. 144).

Other scholars investigated the notion of legitimacy building upon Max Weber but extending his views from the perspective of their disciplinary standpoint. Indeed, different disciplines have different understandings of legitimacy. For the legal expert, legitimacy may be understood as *legal validity*: power is legitimate if acquired and exercised according to the established law. For the philosopher, the legitimacy of power requires a *moral or rightful justification*. For the social scientist, legitimacy is contingent on the subjective *belief* of the agents involved in a power relationship. Beetham (2013), speaking from a social science perspective, offers three dimensions that can be used to compare and assess the degree of legitimacy in power relations: *rules*, *beliefs*, and *consent*. In Beetham’s words, “power can be said to be legitimate to the extent that (i) it conforms to established *rules*; (ii) the rules can be justified by reference to *beliefs* shared by both dominant and subordinate, and; (iii) there is evidence of *consent* by the subordinate to the particular power relation.” (Beetham, 2013, p.16).

Hence, legal scholars David Dyzenhaus (1998) and Dan Priel (2011) identified that while the notion of legitimacy and legality must be kept separate, they remain necessarily interrelated. Dyzenhaus (1998) claims that jurisprudence is often decided based on legitimacy. Thus legitimacy can “take the practice of law forward” by informing the evolution of legal systems. Conversely, as history has shown, one cannot assume that what is *legal* is necessarily *legitimate* (p. 1). Priel (2011) elaborates on the fact that the analysis of jurisprudential debates must account for the interrelationship between four (and not just two) distinct and interrelated concepts: *validity*, *i.e.*, the belonging of a rule to a particular legal system; *content*, *i.e.*, that which the rule prescribes, proscribes, or empowers; *normativity*, which refers to the non-negotiable obligations established by the rule; and finally, *legitimacy*, or the entitlement of the issuer of the norm to make such demand (p. 8).

Dyzenhaus (1998) further explores three jurisprudential approaches to the interrelationship between sovereign power and the law. First, “*power over law*” reflects Carl Schmitt’s conceptualization of sovereign power as that which can decide on the state of exception, thus remaining unconstrained by the legal framework. Legitimacy, in this case, is a function of the perceived legitimacy of the sovereign. Second, “*law over power*” reflects Hans Kelsen’s view of a legally constituted sovereign power that follows the established legal framework. Legitimacy in this case stems from the legality of power and the validity of the legal rules. Third, “*law and power through contingent ethics*” reflects Hermann Heller’s argument that the sovereign power and the established law are legitimate so long they are rooted in evolving ethical and fundamental principles forged through citizen participation and deliberation. This third account is what Dyzenhaus portrays as the most comprehensive and suitable framework to “take the practice of law forward” (Dyzenhaus, 1998, p.6).

Ross Mitiga (2021) adds another dimension to understanding law and power’s legitimacy. The author proposes two complementary views. On the one hand, *contingent legitimacy* (which resonates with Heller’s conceptualization) contends that political power is legitimate to the extent that the sovereign exercises it in an “acceptable way” towards the subordinates. According to this “moralist” view, political power must be enforced in line with specific rules and criteria, such as appropriate participation, representation, deliberation, consent, and social justice. On the other hand, *foundational legitimacy*—which resonates more with Thomas Hobbes’ contractualist readings—contends that political power is legitimate whenever the sovereign exercises it to protect and support the most fundamental needs of its constituents, such as their safety and security. According to this “realist” view, legitimate power thus does not need to follow an ethical or inclusive process. Instead, it needs to be able to act expediently to safeguard the subordinates of a political organization.

Accordingly, as eloquently argued by Talcott Parsons (1960), legitimacy is always and necessarily a *relative concept*: it is a function of the congruency and consistency between the values of those who exercise power and those who are being governed by such power. Moreover, as Mark Suchman (1995) stresses, legitimacy is not only a multidimensional concept but also a *social construct* ultimately determined by the subjectivity of the individuals or groups that make up a society. He defines *legitimacy* as “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” (p. 574). Naturally, this means that what is considered legitimate in one society may not be seen as legitimate in another; and that what is regarded as legitimate by the established systems of society might not necessarily be considered legitimate by the supporters of this emergent web3 ecosystem.

Different conceptions of legitimacy

a. Legitimacy in centralized systems: Exit, Voice & Loyalty

In all systems characterized by some degree of coercion²—such as in the case of governments (through the threat of state violence) or companies (through the threat of firing employees)—people facing some level of discontent can react in three distinct ways: *exit*, *voice*, or *loyalty* (Hirschman, 1970). Each of these reflects a different sentiment regarding the system's perceived legitimacy.

Regarding the former, subversive citizens in a state or disgruntled minority shareholders in a company can seek to *exit* the system to which they belong by becoming a citizen of another state or selling their company's shares. However, uprooting one's life or selling shares in a company can be difficult, costly, and, in some cases, impractical. For instance, the logistical expenses for emigration and bureaucratic requirements for immigration into a new country typically require an investment of considerable financial and non-financial resources. Relatedly, restrictions on the transfer of shares in privately-held companies are increasing exit costs from certain companies. In many circumstances, exit may be neither feasible nor a meaningful option.

An alternative is to exercise one's *voice*. Citizens can vote out representatives who have lost their trust or launch petitions against specific government actions. A minority shareholder can wage a proxy battle or give feedback to the company. This is not to say that voice can only be exercised in (nominally) democratic contexts—physical and online protests can also be expressions of citizens' voice in authoritarian contexts. Moreover, exit and voice are not either/or options, with the threat or actual exit from a system often accompanied by expressions of voice by those left behind.³

Hirschman (1970) also accounts for situations where people might choose to stay within a system despite being discontent with the ways it operates or the outcomes of its operations. This form of *loyalty* reflects a "special attachment" to the system or the system's participants. *Staying*—with or without expressing one's *voice*—will thus be preferred over *exit* (p. 77). Even when exit opportunities exist, *loyalty* means that one is willing to undergo some sacrifices in order to retain belonging to the system. This typically indicates a sentiment of at least some degree of legitimacy in the system or at least an impression that this is only a temporary state of affairs, which may evolve towards greater legitimacy.

1. Exit

For Huemer (2019), *exit from the current dominant political system is the only meaningful option when one disagrees with the coercive efforts undertaken by the state*. As such, he challenges the fact that states have a claim on political authority, which—drawing from Weber—he subdivide into two distinct components: *political legitimacy and political obligation*

1. Why do states get to tell people what to do? (political legitimacy)
2. Why do people have to obey them? (political obligation)

2 "The concept of *coercion* has two different facets. On one hand, it refers to what agents can do to get other agents to do or not do something. On the other hand, it refers to the reason why agents are obliged to do or refrain from doing something." A state's legitimacy is sometimes considered to be contingent on the effective monopolization of violence (Anderson, 2021).

3 For instance, Hirschman (1993) discusses this in the context of the fall of the German Democratic Republic.

Huemer (2019) defines *political legitimacy* as “the state’s entitlement to force individuals to obey its commands in situations in which private agents would not be ethically entitled to force others to obey their commands” (p. 15). He defines *political obligation* as “the obligation on the part of individuals to obey the state’s commands in circumstances in which individuals would not be ethically required to obey similar commands given by private agents” (Huemer, 2019, p. 16). However, Huemer is skeptical of the justifications for the coercive privileges enjoyed by the state (i.e., the various social contract theories). He sees the state as having only *political power*, not *political authority*. In other words, the state has the *ability* to coerce but not the *moral right* to do so.⁴

Indeed, in his defense of anarcho-capitalism, Huemer (2019) defends the view that market competition allows for greater ‘equality of opportunities’ than a government’s monopoly over public services, where the scope for the competition is foreclosed. In his view, the fact that the vast majority of government functions can be privatized delegitimizes the state’s monopoly, especially over the use of coercive force. Huemer, therefore, not only calls for an *exit* from the dominant paradigm in which the state has a unique political power to coerce compared to other organizations but also advocates for the adoption of an exit-based logic of governance, allowing for participants to costlessly switch between a variety of private-order governance systems.

This notwithstanding, the question of *political legitimacy* remains an important one, even in a purely market-based setting. Indeed, Huemer’s refusal to grant political authority to governmental authorities ignores the problem of private organizations acting in a similar ‘monopolizing’ or ‘coercive’ manner. There is no platonic ideal of a market that would render market-based monopolies preferable to those of a state. Besides, markets and public institutions interact and constantly (re-)shape each other. Hence, given that we live in a world where states enjoy some degree of *political power* (even if there is no *political authority*, according to Huemer), it remains essential to investigate how such political power can be made morally justifiable.

2. Voice

Allen Buchanan (2002) offers one perspective on how political authority can be morally justified. Like Huemer, Buchanan sees *political legitimacy* and *political obligation* as two components of political authority (Buchanan, 2002, p. 691). Yet, he claims that it is the fact of wielding political power (i.e., “to exercise a monopoly, within a jurisdiction, in the making, application, and enforcement of laws” (Buchanan, 2002, p. 689-690) that requires moral justification, and therefore legitimacy.

An important distinction that Buchanan draws is that while *political authority* requires *political legitimacy*, the latter does not necessarily entail the former (Buchanan, 2002, p. 695). This is because having *moral justification* for wielding political power (i.e., *political legitimacy*) does not automatically entail an *obligation* for people to obey, which is the other prerequisite for *political authority*. This is particularly the case in non-political contexts.

This leads Buchanan to introduce a distinction between *political authority* and the notion of “authoritativeness” (Buchanan, 2002, p. 696). According to Buchanan, *political authority* can exclusively be exercised in the political domain as the notion implicitly justifies imposing rules on others, as well as obliging others to submit to political authority. In contrast, the notion of “authoritativeness” applies beyond the political domain, and does not imply any imposition of rules, nor an obligation to obey. Instead, authoritativeness

⁴ To paraphrase Saint Augustine in *The City of God*, “without justice, governments are just mafias” (as a pirate asks Alexander the Great how a kingdom differs from a great robbery if there is no justice).

emerges when the mere fact that an entity provides a direction is in itself sufficient for others to have a compelling reason to comply with said direction. For instance, a convincing normative recommendation voiced by a domain expert may be sufficient for people to willingly comply with the recommendation, without creating any obligations to obey. Particularly in non-political contexts where the imposition of rules and the obligation to obey is absent, the “authoritativeness” of an entity can be enough to ensure compliance to their directions without the need for coercion, as people will voluntarily comply.

So what are—according to Buchanan—the moral justifications central to legitimacy? How can an entity possess *authoritativeness* without an obligation to be obeyed? Buchanan takes aim at *consent theory* to argue that, while being an attractive theory in providing a moral justification for a government’s wielding of power and the citizens’ obligation to obey (because they consented to it), it is inadequate because mass or unanimous *express* consent is impracticable, and *tacit* consent is both hard to verify and unjust.⁵ Instead, Buchanan (2002) argues that any actor wielding political power can be said to enjoy political legitimacy if three conditions are met: (1) if it uses its power to protect and guarantee fundamental human rights, (2) if the process of protecting human rights itself respects human rights, and (3) if the wielded political power was not gained through usurpation (Buchanan, 2002, p. 703). This argument is based on Buchanan’s “Robust Natural Duty of Justice”—understood as a “general but limited moral obligation to ensure that all persons have access to institutions that protect their basic human rights” (Buchanan, 2002, p. 703), which supplies the moral justification for an actor to wield political power legitimately. This duty is implied by the principle “that all persons are to be accorded equal concern and respect” (Buchanan, 2002, p. 707). Buchanan goes further to conclude that, as everyone is under the obligation to fulfill the Robust Natural Duty of Justice, a wielder of political power can legitimately coerce people into performing this duty—even if such coercion is not necessary.

Buchanan (2002) goes on to clarify that democratic governance is not the *sole* basis by which an entity can be normatively legitimate, yet having at least an equal say in the crafting of basic laws or rules is a means by which the principle that all people should be accorded equal concern and respect is recognized. A democratic governance system and a democratic process of authorizing representatives reconcile the fundamental equality of persons with the delegation of political power to a third party. Hence, democratic governance, even if minimally understood, achieves *authoritativeness* as people see a reason to comply with laws and rules even without coercion, simply because a democratic procedure has been followed which recognizes the equality of all people (Buchanan, 2002, p. 714). In other words, when the “*institutional resources are available* to allow democratic authorization,” having a democratic procedure for authorizing representatives then becomes a “*necessary condition*” (Buchanan, 2002, p. 693, *emphasis added*). In turn, always according to Buchanan, when such democratic authorization exists, citizens of a political community owe it to each other to obey the rules laid down by the democratically-authorized wielders of power.

Buchanan (2002) concludes by distinguishing between *minimal* and *full* political legitimacy, with the former being satisfied through the three conditions mentioned above and the latter requiring the additional condition of democratic authorization (p. 719). In other words, a minimal conception of legitimacy is morally justified through respect for basic human rights and the avoidance of usurped power, while a fuller conception of legitimacy is morally justified through the use of a voice-based logic, *i.e.*, democratic procedure and authorization.

5 This is discussed further in the context of Amanda Greene’s chapter below.

It can be noted that Buchanan's "Robust Natural Duty of Justice" can be seen as being simultaneously over- and under-inclusive in its attempt to achieve justice. On the one hand, the focus on "basic human rights"—which is never explicitly discussed—presents an overly narrow conception of justice. On the other hand, it is unclear how the trade-offs common in human rights discussions (*i.e.*, right to equality vs. right to special protection under the law due to specific characteristics or the status of an individual) shall be better worked out.

Applbaum (2019), like Buchanan, also sees moral justification at the heart of legitimacy as he takes legitimacy to mean the *moral right to rule*. However, he departs from Buchanan by emphasizing freedom as a means to achieve legitimacy, as opposed to Buchanan's more specific democratic rights-based framework. Applbaum's introductory chapter argues against a procedural and legalistic conception of legitimacy. He claims that procedures and rules are not self-legitimizing, as their legitimacy can be questioned or lost if they go against underlying values. As an example, he brings up the Kosovo intervention, which was illegal for violating state sovereignty, and yet legitimate because the intervention was the only way to avoid humanitarian catastrophe and instability. Hence, as with Buchanan and Huemer, Applbaum (2019) finds that "legitimacy [alone] is a normative power that entails [moral] liability but not necessarily obligation" (p. 4). This leaves room for legitimate civil disobedience when confronted with unjust laws.

Applbaum also argues against a strictly descriptive conception of legitimacy, reduced to the mere fact that people believe a person or an institution has the moral right to rule. Instead, Applbaum thinks the necessary condition for legitimate rule over each other is collective self-governance or, more precisely, what he calls *free group agency*: "A legitimately governs B only if A's governance of B realizes and protects B's freedom over time, and this is the case only when A is a free group agent that counts a free B as a constituent member of that group agent" (Applbaum, 2019, p.4). According to Applbaum, legitimate government applies coercive authority in a way that preserves the *liberty, equality, and agency* of its subjects. Liberty, equality, and agency "guide three different dimensions of public governance, which protect against three distinct threats to free agency and therefore legitimacy" (Applbaum, 2019, p.4). Applbaum elaborates on each dimension:

1. Liberty affects what is decided; no protection of basic rights and freedoms leads to inhumanity
2. Equality affects who makes decisions; unequal input into the delegation and election of leaders leads to despotism.
3. Agency affects how decisions are made; decision-makers who do not represent the collective agency of their constituents leads to wantonism.

According to Applbaum, a wanton follows and pursues selfish desires without reflection on their underlying motivations. In contrast, a free and competent agent has second-order volitions, i.e., substantive reasons for some desires to be privileged over others. Applbaum's claims that collective self-governance requires reflection and deliberation on the second-order beliefs and feelings underlying our desires. For him, losing the capacity to share our views, hear and learn from each other, and work toward a third view that captures our different values is what erodes legitimacy. Thus, also for Applbaum, a voice-based logic animates legitimacy.

Amanda Greene (2016) also sees legitimacy as requiring the "consent of the governed" (p. 71). Nevertheless, like Buchanan, she critiques the *contractualist school*, where legitimacy can arise from tacit and hypothetical consent, as well as the *voluntarist school*, where legitimacy can only be determined via an expression of actual and explicit consent. She sees both of these approaches are impractical and likely to

hold many governance regimes (past or present) as inherently illegitimate. The example of online social media platforms can help illustrate the problem with both schools. With regards to the contractualist approach, the initial choice to participate in a social media platform may imply a degree of consent (i.e., by agreeing to the Terms of Service), and the continued use of the platform can be seen as implicit consent, thus conferring a veneer of legitimacy to that platform. Yet, as the online operator leverages network effects to keep their users on a social media platform which has become an essential tool for communication, the situation can quickly devolve into (soft) coercion, and participation may no longer qualify as an implicit expression of consent. Even a stricter definition of consent could still be problematic if it is not fully informed, i.e., if one does not fully understand the implications of the terms of use. The voluntarist approach is problematic because it assumes that consent is individual and unilateral, even where the decision of consenting participants can affect non-participants (i.e., social media platforms tracking non-users). Besides, unanimous explicit consent as a basis for legitimacy is regarded as a utopian ideal of self-government that is unattainable or at least undesirable. Indeed, while an online platform could try to maintain unanimous consent about its procedures and outcomes, as participants begin to engage in repeated interactions, the fine line between consenting to procedures and consenting to outcomes starts to break down. The need for unanimity might thus lead to the foreclosing of space for deliberation to prevent people from expressing conflicting interests and values.

Greene (2016) argues that the legitimacy of a governance system must not be predicated on achieving unanimous consent but rather on achieving “*actual quality consent to rule among subjects*” (p. 86). This notion captures the idea that consent’s value depends on the subjects making positive governance assessments. In short, legitimacy “corresponds to the proportion of individuals who consent: the greater the proportion of free submission to ‘rule’ under the authority, the more legitimate is the rule” (p. 87). Green sees legitimacy as an institution’s *fulfillment of its purpose* and the *wide recognition of its fulfillment*. For instance, a government’s purpose is to provide security for its people. However, according to the author, legitimacy is not limited to politics; it extends to all power relations. For example, we should consent to the role of the World Trade Organization in the international trade regime only if we believe that this is the best alternative for securing a degree of fairness and low trade tariffs. Conversely, we should not consent to it if we believe that the institution should pursue a different purpose for global trade. As with every institution, their claimed purpose will ineluctably affect how we evaluate them as better or worse than existing or potential alternatives and, thus, whether we choose to consent to their authoritative power.

3. Loyalty

According to Hirschman (1970), the concept of *loyalty* helps us understand where and how *exit* and *voice* may coexist and, in particular, when a person or entity will choose *voice* over *exit*. He reasoned that the “special attachment” (p. 77) connoted by the term ‘*loyalty*’ was linked to the availability of *voice* and the ability to use that *voice* to influence change. Therefore, in his view, *loyalty* and *voice* can mutually reinforce one another. The existence of *loyalty* is fundamental in environments where exit costs are generally low, as it reduces the risks of people leaving, either individually or all at once, and helps retain those who contribute considerable value to the group. According to Hirschman (1970), *loyalty* raises the cost of exit and makes the use of *voice* mechanisms more attractive (p. 81), especially if there was an initial period where *loyalty* was exhibited unconsciously and passively (Graham & Keeley, 1992). *Loyalty* is particularly beneficial for organizations experiencing a decline. It allows them to recover to the extent that the most loyal persons will choose not to leave and instead endeavor to use their *voice* creatively to arrest the organizational decline. At the same time, insofar as exit does not become impossible or prohibitively costly, even with *loyalty*, the threat of exit persists and can be instrumentalized by those trying to push

for changes (Hirschman 1970, p. 88). Sometimes, despite loyalty, exit occurs at a breaking point when the organization is no longer receptive to the influence of loyal members—but the exiting members may continue to try and shape the organization from outside.

Compared to *exit* and *voice*, Hirschman's *loyalty* construct is more enigmatic and less understood, leading to several interpretations. According to Laponce (1974), for instance, *loyalty*—like *exit* and *voice*—is both a “cognitive metaphor” and a “spatial archetype” (p. 20). In his view, *exit* evokes a horizontal movement *outward*, and *voice* evokes a vertical movement *upward* (pp. 75-76). At the same time, *loyalty* alludes to a movement *inwards* to an “undefined center: the closer to it, the more one is loyal” (p. 75). Other scholars who have used the *loyalty* construct have disagreed over the nature of the relationship between *loyalty* and *voice*, with some contending that the existence of *loyalty* encourages the use of *voice* (i.e., Barry, 1974) and others arguing that loyal behavior suppresses the uses of *voice* (Birch, 1975; Farrell, 1983). Indeed, while Hirschman's description of *loyalty* can be described as a form of “reformist *loyalty*” (Graham & Keeley, 1992, p. 195), other scholars have suggested that Hirschman's focus on *loyalty* in the context of salvaging deteriorating organizations ignores other forms of *loyalty* that exist in particular types of organization (i.e., a firm) or other stages of an organization's life cycle. For instance, as Birch (1975) and Farrell (1983) point out, *loyalty* can manifest as silent and passive obedience in which neither *exit* nor *voice* are used. Within traditional corporations, for instance, the exercise of *voice* by an employee may be seen as being disruptive, while remaining passive and silent demonstrates *loyalty* by being a team player and not rocking the boat. Silent *loyalty*, by its very nature, is ambiguous.⁶ People may be silent because they accept the status quo and are willing to defer to the competence of others. Alternatively, people may suffer silently and lack the characteristics or circumstances to exercise *voice*. Others have suggested that silence may not be evidence of *loyalty* at all, but of neglect (Withey & Cooper, 1989) or hiding (Laponce, 1974, p. 80). While acknowledging that several interpretations of the *loyalty* construct can exist, in this report we adopt a view of *loyalty* that includes silent, passive *loyalty* in addition to Hirschman's reformist *loyalty*. Indeed, as Graham & Keeley (1992) show, the type of *loyalty* demonstrated can evolve over time, from *unconscious* loyal behavior to *passive silent* loyal behavior to *reformist* behavior that seeks to generate pressure for change (pp. 194-195).

Concerning the relationship between legitimacy and *loyalty*, in the [Introduction](#), we have already outlined a common view of legitimacy being concerned with a subject's conformity and consent to rules (Weber, 1964), premised on shared beliefs by subordinate and dominant parties within an asymmetrical power relationship (Beetham, 2013, p. 16). Levi (2019) explores whether enhancing an institution's trustworthiness is sufficient to improve perceptions of its legitimacy and therefore increase *loyalty* toward the institution. In her view, a calculative, rational view of trustworthiness may not necessarily lead to legitimacy—with the example of the Trump presidency revealing how trust may persist in governmental organizations, even when deemed illegitimate by many citizens (Levi, 2019, p. 368). At the same time, no or too little legitimacy can corrode trust in institutions, which may be perceived to act arbitrarily, discriminatorily, or without democratic justification. In a situation without trust or legitimacy, coercion becomes the primary means to ensure compliance with a system of governance. With this in mind, and drawing on earlier research on trade unions (Ahlquist & Levi, 2013), Levi (2019) contends that for legitimacy to be generated in an organization—in addition to being trustworthy—there has to exist higher-order shared moral principles and common values between the governors and the governed, along with an opportunity for the governed to

6 According to Graham & Keeley (1992), silent, passive *loyalty* can be due to organizational characteristics (i.e., organization encouraging *voice* or not), situational characteristics (i.e., trivial or relatively harmless issue less likely to need *voice*), individual qualities (i.e., poor articulation skills discourage use of *voice*) or an individual's time horizon when engaging with an organization (i.e., shorter time horizon discourages use of *voice*). (pp. 198-199)

have meaningful input in governance (*i.e.*, *voice*). In other words, while trust and legitimacy regarding the organization's operations and outputs are essential, they are not sufficient to ensure '*loyalty*' towards that organization; input legitimacy is also required. This is because, in her view, the existence of both trust and this fuller conception of legitimacy will lead to people freely and willingly complying with a governance system without coercion or without requiring that other people are also compliant (Levi, 2019, p. 374).

b. Legitimacy in Polycentric Systems: Exit, Voice, Self-organization, Loyalty

The discussion of legitimacy in the previous section has focused on systems characterized by a centralized coercive political authority, which deploys many strategies to establish and maintain its legitimacy in a relatively clearly defined constituency. However, in the context of blockchains, systems are generally characterized by the absence of central, coercive authority, and dynamically constituted communities strive towards establishing a balanced system of power. Consequently, to understand legitimacy in the context of blockchain communities, the following section reviews research that discusses the role of legitimacy in decentered or polycentric systems.

The term "polycentricity" was first coined by Michael Polanyi (1951), and was subsequently developed into a broader theory by American economists and theorists Elinor and Vincent Ostrom (Ostrom et al., 1961; Ostrom E., 1972; Ostrom V., 1972). Paul Aligica & Vlad Tarko (2012) operationalized the principles of this theory into a set of features and indicators to help determine whether a social system is polycentric, how it may change over time, and how it relates to other polycentric systems. The first feature of polycentric systems is that they are made of "*multiple decision-making centers*" which can be assessed through (a) their ability to implement into practice their own distinctive opinions, (b) the existence of autonomous decision-making layers, and (c) the aims of the decision-making centers, which can be individual or shared goals. The second feature is that polycentric systems operate under an "*overarching system of rules*" or an "*institutional or cultural framework*." This feature is analyzed based on (a) the jurisdiction under which the decision-making centers operate, which may be territorial or non-territorial, (b) the rule design process, which may involve insiders or outsiders, (c) the mechanism for choice-making, which may be based on consensus, individual decisions or majority rule, and (d) the alignment between the rules and the incentives of the agents subjected to them. Finally, the third feature is the "*existence of a spontaneous order generated by the evolutionary competition among the decision-making centers*." This feature is examined based on (a) the capacity to exit the system which may be free or constrained, (b) the barriers to entry to the system which may be free entry, merit-based entry, or spontaneous entry, (c) and the nature of the information flow of the system which may be public or private (p. 256-257).

Julia Black is one of the scholars addressing legitimacy's role in polycentric systems. Black (2008) focuses on Polycentric Regulatory Regimes (PRR), described as multi-level systems of regulation seeking to change the behavior of constituencies that often transcend national jurisdictional boundaries (these include sub-national and transnational constituencies), using rules and norms to address collective problems. While state regulators have a legal mandate to govern a territory, in PRR, there are varying levels of state involvement. Their activities are not necessarily based on national or international law.

Black (2008) defines PRR as being constituted by "a set of interrelated units which are engaged in joint problem solving to address a particular goal" (p.139). Regulation in this context consists of sustained activities aiming to influence the behavior of a particular set of actors, to achieve a specific objective or address a collective action problem (p.139). These regulating activities can be undertaken via a combi-

nation of rules and norms enacted by one or more actors, with or without a legal mandate. Throughout this section, we will refer to “regulator” as that particular regulatory unit within the regulatory regime. The higher the number of regulators, and the greater the divergence in defining the problem that regulation is meant to address, the higher the polycentricity of the regime. Examples of PRR include accreditation bodies like the Fair Trade Labeling Organization (FTLO) or oversight organizations like the Basel Committee on Banking Supervision (BCBS). Black (2008) considers that these systems “are marked by fragmentation, complexity and interdependence between actors, in which state and non-state actors are both regulators and regulated, and their boundaries are marked by the issues or problems which they are concerned with, rather than necessarily by a common solution” (p. 138). Hence, upon closer inspection, many seemingly monolithic systems, like national governments, display some characteristics of PRR.

Polycentric Regulatory Regime

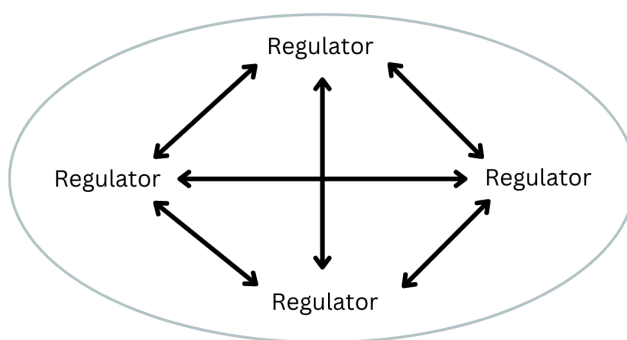


Figure 1: Polycentric Regulatory Regime.

Black (2008) uses the terms “decentered regulation” and “polycentric regulation” to describe these non-monolithic systems. The former characterization draws attention away from the state as the singular authority; the latter focuses on the multitude of regulation and decision-making centers (p.140). In such systems, actors engaging in regulatory activities cannot necessarily fall back on coercion or law to enforce their regulations. Consequently, legitimacy becomes a prerequisite for regulators to motivate behavioral changes from the actors they seek to regulate. Drawing on Giddens’ (1984) structuration theory, Black (2008) argues that “[r]egulation, like any set of social relations, is dialectical: both regulator and regulatee are at once autonomous and dependent on each other ” (p.140). This dialectic not only emerges between the regulators and the regulatees, but is also co-constituted between the independent actors that constitute a regulatory regime.

Polycentric Regulatory Regime

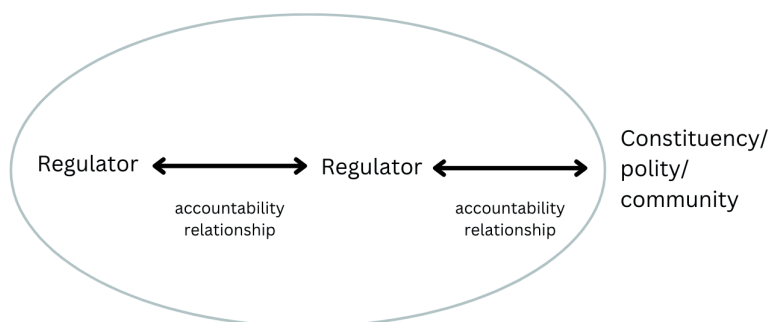


Figure 2: Polycentric Regulatory Regime and Accountability Relationships

In the [Introduction](#) of this report, we presented Black's (2008) notion of legitimacy, understood as "acceptance of an organization." Based on the reasons for acceptance, legitimacy can be pragmatic, moral, or cognitive. When analyzing legitimacy in the context of PRR, Black emphasizes the role of accountability relationships in building *pragmatic legitimacy*. Such relationships are again dialectic and are established among different regulators within the same regulatory regime, and between individual regulators and the regulatees or the constituency they seek to regulate. The constituency holds the regulator accountable for their legitimacy claims, i.e., claims made by a regulator about themselves, to establish and maintain their legitimacy. For example, the Fairtrade Labeling Organization (FTLO) states on its website that: "Fair-trade is the most recognized and trusted sustainability label in the world." Constituencies and other regulators who co-constitute the PRR can respond to legitimacy claims by making accountability demands, i.e., requesting evidence and proofs to corroborate these claims. Regulators respond to accountability demands by making information about themselves and their activities available through public presentations, reports, and other formats. As such, regulators constantly construct and reconstruct narratives about themselves and their legitimacy claims. Legitimacy claims and accountability relationships ultimately co-constitute each other. While *the constituency also evaluates moral and cognitive legitimacy*, they are less dependent on accountability relationships—i.e., "for a practicing Roman Catholic, the Pope is legitimate even though there is no relationship of accountability between them" (p.150).

As a general rule, transnational, non-state regulators struggle to build and maintain legitimacy partly because they must appeal and respond to multiple and sometimes conflicting interests, expectations, and claims. Black gives an example: "Conflicts between legitimacy claims based on functionality and those based on democracy are common" (p. 153). As a result, attempting to build legitimacy through an accountability relationship with one community can reduce legitimacy in another. While this is also true in the context of monolithic systems, these issues are even more pronounced in PRR because of the greater diversity of constituencies.

1. Exit

One of the essential features of polycentric systems is that both *entry* and *exit* are generally less costly than in monocentric systems. Indeed, according to Aligica and Tarko (2012), if polycentric systems are composed of "multiple and autonomous decision-making centers" interacting with one another within a "rules-based order" through a market-like "evolutionary competition", these systems can be said to be associated with *low-to-zero* entry and exit costs. Besides, "if the establishment of new decision centers under the existing rules is blocked, then one could not expect a polycentric order to emerge" (p. 246). Polycentric systems are thus characterized by an "absence of coercion" manifested by the relative lack of legal and technical barriers to opting in and out of these systems.

Exit is also an important feature of "collective action problems", where everyone would be better off if they coordinated to achieve a specific outcome. According to collective action theory, these problems arise when managing public goods (such as clean air) or common goods (such as fisheries) characterized by the inability to prevent *free-riding* or non-payers from consuming them "for free." As a result, cooperation is hindered by individual self-interest (Olson, 1989).

To Elinor Ostrom, polycentric systems may be a desirable approach to collective action problems. Instead of relying on a single central authority, polycentric systems make it easier to experiment and—hopefully—achieve benefits simultaneously at different scales (Ostrom, 2009; 2017). Scholars such as Peter Kurrild-Klitgaard (2010) have pointed out that polycentricity solutions to collective action problems fundamentally alter the possible interactions between rational individuals. Instead of traditional Prisoner's Dilemmas,

rational agents are faced with the options of defecting, cooperating, or *exiting*—what is referred to as the Prisoner’s Dilemma-with-Exit-game. According to Kurrild-Klitgaard, empirical studies have shown that the possibility of exiting may increase “conditional cooperative behavior” instead of “defection.” Whenever individuals have the freedom to exit dysfunctional groups and the ability to identify and remember defectors, reputation and trust become important—players cannot afford to “misbehave” (p. 346). This, in turn, increases the incentives for cooperative behavior and reduces the level of free-riding (p. 350).

The interrelationship between polycentricity, exit, and collective action helps us understand how Hirschman’s proposition applies to decentred systems, that are not that are not centralized and monocentric. However, the connection between exit and legitimacy is not yet apparent. One aspect to consider, in line with exit and individual incentives, is the issue of *network effects*. As mentioned in the [Preamble](#) of this report, network effects are a phenomenon whereby the value of a good or service increases as more people use it. Polycentric systems permeated by network effects may pose no legal or technical barriers to exit but may *de facto* increase exit costs.

An illustrative case is the Internet Corporation for Assigned Names & Numbers (ICANN), an institution operating within a multistakeholder global governance system and managing vital Internet infrastructure such as domain names. Jongen and Scholte (2021) surveyed the legitimacy beliefs towards ICANN to understand what motivates people to abide by the rules of a particular system to which they are not coerced. Similar to Black (2008), Jongen and Scholte (2021) conceptualize legitimacy as the subjective belief and perception held by the *regulatee* towards the *regulator*. Specifically, Jan Aart Scholte, Soetkin Verhaegen, and Jonas Tallberg (2021) define legitimacy as “the belief and perception that a governor has a right to rule and exercises appropriately” (p. 866). Legitimacy comes into play when people comply with the regulator’s rules, despite having no obligation to do so: “When people view a regime as legitimate, they will be inclined to follow its rules even if they oppose the current leadership and even if certain measures operate against their immediate interests” (p. 303). This concept is in line with the notion above of “*authoritativeness*” elaborated by Buchanan (2002). Nonetheless, one may follow the rules of an organization such as ICANN not because one believes it *has the right to rule*. Instead, one may remain because exiting to an alternative domain system will make one’s domain less reachable to the audience. In this way, network effects may pose obstacles to exercising exit in the face of organizational decline, including when one may perceive a system as illegitimate.

Another interesting exploration angle is exit, *forking*, and legitimacy. Open Source Software (OSS) is a digital commons or common good (Curto-Millet & Corsín Jiménez, 2022). Alastair Berg and Chris Berg (2017) argue that what makes OSS peculiar is that they allow for a specific kind of exit: software forking. Strictly speaking, software forking occurs when the publicly available codebase of a piece of software is copied by software developers, which may or may not be modified and re-released to the public. Forking is both a ‘technical’ and a ‘social’ phenomenon (p. 5). Reasons for forking include everything from the decision to change aspects of the software infrastructure to disagreement and mistrust over how the OSS project is governed (Nyman & Mikkonen, 2011). From an institutional theory perspective, the act of forking may be extrapolated to a ‘secession (exit) that takes an existing set of institutions and creates a new ‘society’ with a shared history but divergent futures’ (p. 2). A common thread to forking as a type of exit and the way polycentric systems may evolve through time is that the reasons for forking may be inherently tied to perceptions of whether a system is legitimate. Moreover, much like Black’s argument on legitimacy claims in PRR (2008), the act of *exiting by forking* may be seen as ‘legitimate’ by one part of the polity and not another.

2. Voice

As discussed above, polycentric systems are characterized by lower exit costs than monocentric systems. So, what role does voice play within these systems, and how does voice relate to legitimacy? A priori, one might believe that, since exit is low-cost, there are fewer incentives for members of polycentric systems to voice their discontent—rather than just exit the system. However, the interaction between exit and voice in polycentric systems (particularly systems in which online communities operate) is more intricate than in Hirschman's original formulation (1970). Focusing on online communities, Seth Frey and Nathan Schneider (2020) propose two types of voice, which may coexist with and complement one another. *Affective voice* is "expression that courses through a collective cultural and emotional landscape, seeking to move, motivate, and mobilize its hearers." On the contrary, *effective voice* is "a form of individual or collective speech that brings about a binding effect according to transparent processes" (p. 3). Compared to, for example, a nation-state, the authors argue that *affective voice* is "the debate" whereas *effective voice* is "the vote" (p. 3).

Frey and Schneider (2020) contend that online communities differ in two aspects from the private and civil society organizations that Hirschman based his analysis on. First, online communities make certain kinds of exit and voice much less costly than most organizations in the 70s. Indeed, not only can community members more easily create alternatives to online platforms, but they also can massively spread messages of discontent among users, seen as an expression of affective voice. Secondly, because of network effects, online communities are inclined to cluster around a few platforms managed and controlled by a small group of administrators, usually with unrestricted power to silence or remove users. Effective voice is thus less familiar in online communities: "while participants can attempt to persuade, shame, and annoy power-holders, platforms do not provide a process by which organized users can vote a moderator out of the role" (p. 16).

What are some of the avenues that we can create to encourage effective voice in polycentric systems? According to Frey and Schneider (2020), there are three types of mechanisms: (1) *mechanisms of authority and accountability* to ensure "consent from the governed," i.e., by (a) making rules binding on everyone, including administrators; or (b) providing procedures for selecting and removing administrators; (2) *collective action mechanisms*, including (a) mechanisms through which users can aggregate their demands, (b) mechanisms allowing communities to self-organize into smaller ecosystems within existing platforms to express voice or, (c) mechanisms that permit different forms of input, i.e., a liquid democracy where one can either delegate one vote or vote directly on an issue; (3) *mechanisms for community change*, allowing for community participation in (a) proposing changes, or (b) deciding if and how to change their governance based on specific events such as membership growth or trajectory (p. 17-20).

A final consideration concerns the manner in which 'voice' in polycentric systems relates to legitimacy. Much like some literature presented in [Legitimacy of Centralized Systems](#), Frey and Schneider (2020) seem to believe that, also in polycentric systems, 'voice' is required for the system to be deemed legitimate. The first and third mechanisms resemble Buchanan's argument on the importance of having an equal say in crafting basic laws or rules (2002). In contrast, the second mechanism comes closer to Applbaum's principle of 'free group agency' or collective self-governance to preserve liberty, equality, and agency (2019). Additionally, Frey and Schneider's (2020) underscoring of the importance of fostering both affective and effective voice (debate and vote) seems to coincide with Applbaum's argument against *wantonism* (2019). In their pursuit of legitimacy, polycentric systems should thus encourage and allow for deliberation among its members about the 'beliefs behind their beliefs' to avoid decisions being guided merely by wantons or individuals pursuing selfish desires.

3. Self-Organization

Another reaction to inadequate institutional environments—which uniquely emerges in polycentric systems—is *self-organization*, which Eleonor Ostrom considers to be a crucial mode for self-correction in polycentric systems: “A political system that has multiple centers of power at differing scales provides more opportunity for citizens and their officials to innovate and to intervene to correct maldistributions of authority and outcomes. Thus, polycentric systems are more likely than monocentric systems to provide incentives leading to self-organized, self-corrective institutional change” (Ostrom, 1998, in Aligicia & Tarko, 2012; p. 246). Self-organization is a means through which system participants alter the system from within without requiring them to exit the system. In many cases, self-organization implies adding another institution to the existing polycentric regulatory regime. Thiel et al. (2019) define self-organization as the “establishment of alternative entities for provisioning and producing collective goods in order to replace existing relations with which they were discontent.” (p. 98). Because regulating entities involved in PRR cannot exert coercive authority over their constituencies, system participants are free to self-organize and establish a new regulatory entity—thereby exiting a particular entity’s regulation without exiting the PRR as a whole. In fact, complex adaptive processes, including the re-negotiation of the institutional environment, are vital in maintaining the survival and dynamic equilibrium that PRRs subsist in.

While self-organization is required to ensure the adaptivity and survival of PRR, it does not come without substantial costs. McGinnis et al. (2020) draw on existing literature to establish a non-exhaustive list of factors contributing to the high transaction costs involved in self-organization. Some of the costs include the need to identify similarly minded individuals with whom to self-organize, the need to establish a forum and mode of communication for the group, discussion costs for agreeing to altered rules of the new group, and deliberation costs arising from making decisions within the new institutional environment. Although only constituting a small fraction of the costs involved in self-organization, such examples show that self-organization is a costly undertaking and thus not necessarily an efficient means to bring about institutional change.

Furthermore, self-organization is not only a costly means to address institutional shortcomings but can also undermine the functioning and overall survival of the PRR. As new organizations are added to the PRR, the overall system’s complexity increases, and inter-organizational relations need to be renegotiated. Furthermore, the newly self-organized entity needs to establish its own relations with the existing regulatory environment in order to maintain the functioning and integration of the overall PRR. Excessive self-organization without established connections between entities acting in a regulatory capacity can result in the overall system losing its polycentric character and becoming fragmented. The two systems are contrasted in the figure below.

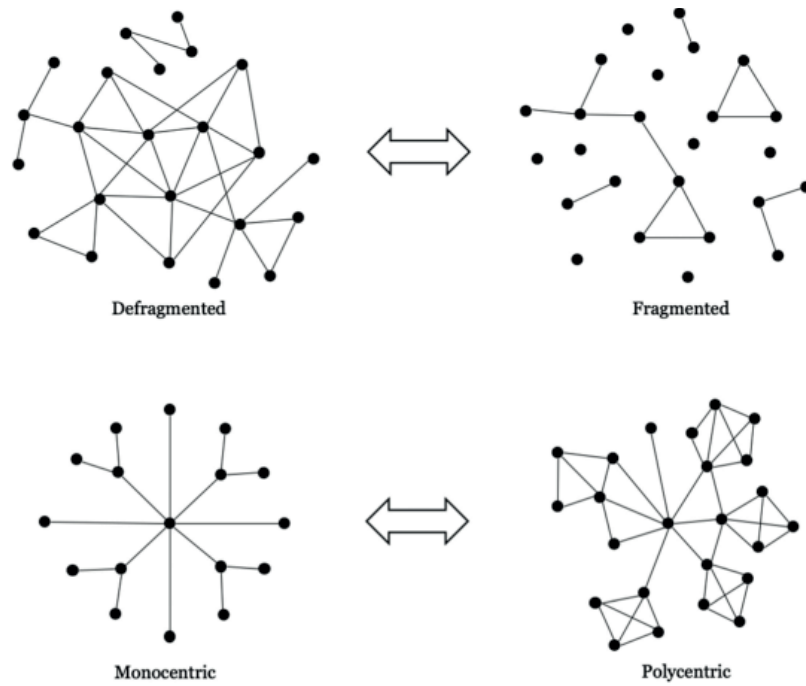


Figure 3⁷: Different typologies of networked governance systems

While polycentricity and fragmentation are both used as analytical lenses to analyze regulatory systems with multiple independent decision making centers, the polycentric lens emphasizes positive outcomes due to cooperation, whereas the fragmentation lens highlights the potential for conflict and failure that may emerge with a PRR (Kim, 2020). In some cases, self-organization can lead to fragmentation as an unintended consequence by increasing the potential for conflict within a PRR.

Overall, self-organization presents a viable alternative to exit or voice to change the overall institutional structures within a PRR. However, while self-organization is necessary for the constitution, adaptivity, and survival of PRR, it does not come without significant challenges. Firstly, self-organization is associated with high costs for individuals engaging in such an endeavor. Secondly, if not adequately managed, excessive self-organization may increase the potential for conflicts within the PRR, thereby increasing the degree of fragmentation, which may ultimately undermine the system as a whole.

4. Loyalty

Polycentric systems are characterized by low exit costs and the possibility for participants to self-organize to adapt or modify the structure of the overall system. Nevertheless, as argued above, both exit and self-organization risk fragmenting the system, thus undermining effective governance. Furthermore, in polycentric systems, individual regulatory units lack the means of coercion to maintain their authority during periods of crisis. Consequently, establishing loyalty is critical to maintaining well-functioning polycentric regulatory regimes.

In polycentric systems, loyalty can refer either to one regulatory unit or to the entire institutional framework (Kuyper et al., 2017): the former may incentivize people to use voice to influence the regulatory unit, whereas the latter dissuades people from exiting the PRR as a whole. In practice, loyalty can be observed through the absence of exit or self-organization, despite significant disagreement. Loyalty can be enact-

⁷ From Kim, R. E. (2020). *Is global governance fragmented, polycentric, or complex?* The state of the art of the network approach. *International Studies Review*, 22(4), 903-931.

ed differently by different constituency groups, where the loyalty of insiders is often important to invoke loyalty from more outside groups. For example, Kuyper et al. (2017) found that various non-state actors involved in global climate regulation via the UNFCCC built loyalty by resolving significant differences behind closed doors, maintaining a harmonious image, and speaking in a unified voice to the outside. Consequently, loyalty works in multi-layered and complex ways to moderate voice and exit in polycentric regulatory regimes.

Overall, given the paramount role of legitimacy for the effective functioning and adaptation of PRR, building and maintaining loyalty becomes a crucial task for each regulatory unit and the system as a whole. Loyalty is paramount in regimes where individual regulatory units rely on network effects to govern their respective domains effectively since exit or self-organization would likely reduce the saliency of the system because of reduced network effects. Strong network effects often come into play in networked applications where the greater the number of nodes in the network, the greater the value all network participants can extract. This is often the case for social media applications, where the greater the number of users, the greater the combinations of potential connections. Usually, network effects are supported by opening up these networks and making them interoperable. Nonetheless, proprietary platforms also exist, which rely more on walled gardens and consumer lock-ins in order to ensure that consumers stay within one particular system and that competitors cannot benefit from the network effects generated by the platform. In the case of polycentric systems, however, where exit costs are relatively low, walled gardens cannot quickly be established. Consumer lock-in is, therefore, not a viable strategy, as any attempt at reducing the opportunities for users to interoperate with other systems will be perceived as a reduction in the value of the service and will therefore incentivize users to exit towards a more interoperable system. Loyalty is thus key to preserving users in a polycentric system.

c. Blockchain systems as Polycentric Systems

Blockchain systems are socio-technical systems with multiple autonomous decision-making centers—including miners, validators, developers, cryptocurrency exchanges, and token holders—influencing each other by building institutional rules and cultivating norms, with no single established sovereign to rule them all (Alston et al., 2022). As discussed [further below](#), despite the difficulty of direct coercion by any single decision-making center, these systems are nevertheless subject to a shared set of rules defined *endogenously* by the various participants in the blockchain network. Indeed, every network participant must agree to the same design choices concerning the blockchain protocol rules and the economic incentives that enable coordination without communication. Yet, these rules are also shaped *exogenously* by external influences, such as, for example, state regulation.

PRR and blockchain systems (Van Zeben & Bobic, 2019; p. 307-308) are characterized by low *entry* and *exit* costs. Indeed, participation in a blockchain system is generally permissionless and voluntary. Moreover, a core feature of an open-source blockchain system is the availability of seemingly costless *exit* for those unsatisfied with the system. This is due to the fact that many competing blockchain systems currently fulfill similar functions. Besides, the possibility of *forking* (*i.e.*, copying and implementing alternative versions of any given blockchain system)—discussed in more detail below—strengthens individuals' opportunities for exit by enabling easy replicability of the network and thus further undermines the coercive potential of a blockchain's system.

However, network effects also play an important role for blockchain networks. Indeed, the greater the number of users in the network, the higher the demand for the associated cryptocurrency and, conse-

quently, the greater the value of the overall network. Interoperability is therefore desirable because blockchain systems rely on the existence of strong network effects to maintain a high price for their native cryptocurrency and, as such, have a powerful incentive to protect users' interests and prevent them from exiting the system in favor of another blockchain system (Alston et al., 2022: 716). Yet, as opposed to traditional open source software, where forking does not necessarily affect interoperability amongst the different branches, forking a blockchain-based system will always create interoperability issues because 'distributed consensus' requires all network participants to play by the same rules. While a 'hard-fork' (i.e., one that is not backwards compatible) will immediately preclude interoperability amongst the different branches of the blockchain, a 'soft-fork' (i.e., one that retains backward compatibility) will remain interoperable with the previous blockchain protocol, but not with the different branches that might spin off from it. Besides, as opposed to centralized software solutions, the openness and decentralization of blockchain networks make it impossible to rely on consumer lock-ins in order to maintain users into a particular network.

Loyalty thus becomes a core driver of economic value for these networks. Indeed, as the option to exit or fork the underlying protocol are available by deliberate design, frictionless exit can compromise blockchain networks' financial and social viability. The existence of loyalty could theoretically put a brake on this (Hirschmann, 1970). However, while people might have a special ideological attachment to a particular network, as a practical and technical matter, it is difficult to cultivate the "special attachment" that is usually associated with loyalty in a blockchain network. Two reasons for this are the pseudonymity of network participants and the absence of coercion. The former feature inhibits the creation of more prosperous social ties among participants, primarily when some participants (i.e., miners) compete with another. The latter feature weakens the efficacy of most voice mechanisms, as no one participant (or group of participants) can impose their will on other participants or the network at large. In other words, there is no "dictatorship of the majority." Thus, loyalty as a form of "reformist behavior" is more challenging to achieve in practice in blockchain systems than in the context of more centralized systems. Silent passive loyalty may play a more critical role in the context of blockchain networks, especially where participants in a network have an economic interest in ensuring that the network grows to maximize network effects and, therefore, the potential economic returns of participating in the network.

Loyalty can also be achieved, among other things, by strengthening the perception of the system's legitimacy (Tormos-Aponte & García-López, 2018). However, empirically gauging the legitimacy beliefs of the various participants in a blockchain network is challenging, given the diversity of the roles and interests. In that regard, defining the entire constituency of a blockchain system may require identifying the concentric layering and recursive nesting of "insiderness"—as Jongen & Scholte (2021) have done with ICANN. For example, in a blockchain-based organization (i.e., a DAO), core members and administrators may be regarded as insider constituents, whereas users relying on the services provided by the DAO are more akin to the general public. As shown by Jongen & Scholte (2021), when investigating the perceived legitimacy of ICANN, it is likely that, also in blockchain communities, the legitimacy beliefs from more insider constituencies would significantly diverge from other constituency groups.

Finally, in line with Black (2008), there are complex, often competing accountability relationships that organizations in the blockchain industry maintain. For instance, if a blockchain company were to build accountability relationships with a regulatory authority, it might acquire more *exogenous* legitimacy among certain external actors but will simultaneously lose a significant degree of *endogenous* legitimacy in the eyes of many members of the blockchain community. Maintaining both *exogenous* and *endogenous* legitimacy is therefore essential for many blockchain systems.

Rethinking Legitimacy in Blockchain systems

Academics are not the only ones concerned with legitimacy and how it works. During the meetings of our reading group, practitioners and academics alike agreed that legitimacy is crucial in blockchain systems. Indeed, because of the decentralized nature and the low costs of exiting or forking, blockchain systems are under the threat of constant fragmentation. Many participants, however, admitted that understanding legitimacy *descriptively* is necessary but insufficient to guarantee the long-term sustainability of blockchain systems. On the one hand, it is vital to identify the extent to which a system can be regarded as legitimate by a particular community and what factors contribute to such a feeling of legitimacy or illegitimacy. On the other hand, it is also important to incorporate a *normative* element into the notion of legitimacy, with a view to identifying the various steps that can be undertaken by blockchain communities in order to improve the legitimacy of their blockchain systems. This means assessing the current practices of blockchain communities and their perceived degree of legitimacy and normatively suggesting some best practices or building blocks that can be adopted to ensure that a decision will be considered legitimate within a particular community.

1. Legitimacy as the “Most Important Scarce Resource”

Ethereum co-founder Vitalik Buterin (2021) argued in what has become one of its most popular blog posts that “*legitimacy is one of the most important scarce resources*” in blockchain systems. In the absence of any centralized authority or coercive force, legitimacy—he claimed—is the main “social force” that directly influences blockchain’s governance. Indeed, legitimacy is at play when a blockchain community decides how and where to allocate capital. Following Vitalik’s argument, *perceptions of what is a legitimate course of action* explain why the Bitcoin and Ethereum communities decide to invest a disproportionate amount of capital on rewards to miners and validators instead of, for example, research and development. Legitimacy also plays a role in the context of *organizational decline* (in the case of failure or hack of a blockchain system), affecting whether community members will decide to ‘stay’ or ‘exit’ to another blockchain. As such, legitimacy helps us understand why two blockchains that are, from a technological perspective, nearly identical—Ethereum and Ethereum Classic—rally very different communities and amounts of capital. Again, legitimacy is critical for predicting how likely a fork will occur within a particular blockchain system and fostering a community’s loyalty to that system.

Buterin (2020) defines legitimacy as a “higher-order acceptance” occurring in contexts of coordination, *i.e.*, contexts in which “large groups of actors [...] work together for their common interest”. Vitalik considers legitimacy as a *descriptive phenomenon*: it ultimately refers to the community acceptance of a particular blockchain system, which depends on whether most people perceive some of a system’s traits as “psychologically appealing.” On that point, he identifies six traits that he believes are appealing to most blockchain communities:

1. *brute force*, if someone is powerful enough to ‘impose their will,’ making resistance hard;
2. *continuity*, if a system was legitimate at some point, it will likely continue to be;
3. *fairness*, if a system satisfies an intuitive notion of fairness;
4. *process*, if the procedure in place for making decisions is perceived as being legitimate;
5. *performance*, if a system’s outputs are considered to satisfy people’s needs and expectations;

6. *participation*, i.e., how many people participated in the system's decision-making process.

In his view, while a blockchain system does not need to exhibit *all* of these characteristics, these increase the chances of a community deeming the system *legitimate*.

Although Buterin's essay is mostly conjectural and clearly not grounded in existing academic literature, the notion of legitimacy provided by the Ethereum co-founder resembles pre-existing scholarly notions of legitimacy. Like Julia Black (2008), Vitalik (2020) addresses legitimacy *descriptively*, with 'performance' resembling the reasons for Black's 'pragmatic legitimacy,' and 'fairness,' 'process,' and 'participation' is closer to Black's 'moral legitimacy.' The concept of 'brute force,' however, remains controversial. While it could be regarded as a trait of 'cognitive legitimacy' and the acceptance of authority because one cannot escape from it (Black, 2008; p. 247), its underlying notion of coercion also bears a resemblance to Huemer's definition of 'political power' versus 'political authority'—the state simply having the *ability* instead of the *moral right* to coerce.

2. Schelling Points: a source of Legitimacy?

According to Vitalik Buterin (2021), legitimacy is also affected by Schelling Points, which refers to individuals behaving according to what they think the rest of the people will do (Teng 2018). This phenomenon makes it possible for people to coordinate without engaging in any direct communication by trying to guess what other people think that other people think [...] that other people will do. Buterin's blog post reflects a common assumption that legitimacy in blockchain systems—as in other coordination games—is more directly influenced by Schelling points than by 'common knowledge' (which requires communication amongst people). As such, 'acceptance by doing' (as a form of implicit consent) may become a possible expression of legitimacy, where doing is based on what community members believe that others will regard as 'psychologically appealing.' There is a degree of directionality in Schelling Point-based legitimacy that, in terms of cognitive metaphors and spatial archetypes, resembles the concept of loyalty described by Laponce (1974). While exit evokes a horizontal movement outward and voice evokes a vertical movement upward, loyalty alludes to a movement inwards to an "undefined center: the closer to it, the more one is loyal" (Laponce, 1974, p. 75). Similarly, in striving to coordinate around a Schelling Point, community members that are part of this coordination game also converge towards a single solution.

However, to what extent Schelling Points may be a source of legitimacy remains contentious. Firstly, while 'consent of the governed' can be regarded as an expression of legitimacy, it is not a question of whether consent is implicit or (unanimously) explicit, but instead, whether it amounts to "*actual quality consent* to rule among subjects" (Greene, 2016). Depending on what is being decided and who is deciding, Schelling points may lead to an "implicit consent" among the users of a blockchain application choosing to upgrade their software after a soft fork because they think everyone else will do the same. In some cases, Schelling points may also lead to "explicit and unanimous consent" among a small group of network participants, i.e., the blockchain miners or validators, to decide upon which chain to opt for following a hard-fork, such as the one that happened in the [Bitcoin network in 2013](#), and the [aftermath of TheDAO hack](#) in 2016. In either case, to become a source of legitimacy, consent must be indicative of acceptance of the system's *fulfillment of its purpose* and the *wide recognition of its fulfillment*.

Secondly, Schelling Points are not only shaped by beliefs of what everyone else will do but also by what some influential individuals or groups will do. Indeed, leadership roles greatly influence the direction Schelling Points take. The opinion of prominent figures such as Vitalik Buterin on the benefits of Proof-of-Stake versus Proof-of-Work played a fundamental role in how the community behaved after Ethereum 2.0

was released. Likewise, the opinion voiced by one of the largest Bitcoin mining pools during the accidental hard fork in 2013 determined which version of the chain they would stick with. As such, while Schelling points occur in highly distributed environments, the existence of these leadership figures implies an important degree of centralization in establishing expectations, which may undermine Buchanan's recommendation of everyone having an equal say in the crafting of governance rules (Buchanan, 2002).

Finally, even if Schelling Points lead to expressions of "*actual quality consent* to rule among subjects," the outcome of a Schelling point may still be deemed illegitimate. Indeed, suppose we are to understand legitimacy both descriptively and normatively. In that case, it is not sufficient that a large number of members of a blockchain system consent to be ruled by it: according to Applbaum (2019), it is vital that the governance practices of the system also follow principles such as liberty, equality and agency and, following Beetham (2013), that it also abides by existing rules.

3. Legality vs. Legitimacy: Forking and MEV

While fully recognizing their reciprocal influences, Dyzenhaus claims that the notions of *legality* and *legitimacy* must remain distinct. Notably, while *legality* is regarded by Max Weber as one of the three factors upon which legitimacy can be justified (along with tradition and charisma), one should not assume that *legality* always and necessarily leads to legitimacy. Indeed, as shown by Dyzenhaus (1998), there are several instances throughout history where actions undertaken in full compliance with the existing legal framework were not regarded as legitimate by the constituents. Vice versa, actions incompatible with the legal system might sometimes be regarded as legitimate as they can justify legitimacy on other grounds, such as *necessity* or *morality*.

An interesting case to investigate the distinction between *legality* and *legitimacy* in the context of blockchain networks is the TheDAO attack (Mehar & al., 2019), which brought to the forefront the divergent opinions, amongst the Ethereum constituency, on whether legality (*i.e.*, compliance with the rule of a blockchain protocol or smart contract) might, in exceptional circumstances, give rise to an illegitimate outcome. TheDAO attack refers to an incident on the Ethereum network, whereby an attacker identified a vulnerability in the code of a smart contract and exploited such vulnerability to 'steal' over USD 150 million worth of Ether from the smart contract. While the attacker did not violate any of the rules enshrined in the smart contract code (*i.e.*, there was no hacking involved), such action was obviously not intended either by the smart contract developers or by those who sent funds into the smart contract. This event triggered heated discussions amongst the various members of the Ethereum community, debating on whether such action was legitimate or not (DuPont, 2017). Proponents of '*code is law*' claimed that the attacker did not do anything wrong since no rules had actually been breached—*i.e.*, the '*wording*' of the code must prevail over the intent of those writing or using that code. Those adopting a more legalist approach claimed that what the attacker did was illegitimate (despite it not being illegal) and that an intervention was, therefore, necessary to remediate such tort—*i.e.*, the '*intention*' of the parties must prevail over the wording of the code (Reijers & al., 2021). Intervention happened through a hard fork, which '*killed*' the vulnerable smart contract and expropriated the funds the attacker had drained to redistribute them to the '*legitimate*' token holders. The majority of the Ethereum network followed that fork under the premises that, in line with the principle of '*distributed consensus*,' if the network participants agree that a particular protocol change must be made, then such intervention can be regarded as legitimate (De Filippi & McMullen 2018). However, a small minority of the network participants rejected the protocol change and remained on the previous network, which now goes under the name of Ethereum Classic. According to them, any intervention that goes against the immutability of the Ethereum network is an outright vio-

lation of protocol rules and is thus necessarily illegitimate (De Filippi et al., 2020).

Understanding the distinction between *legality* and *legitimacy* in the context of blockchain networks might also shed light on the controversy around the legitimacy of Maximum Extractable Value (MEV) practices that have spread amongst blockchain networks since the advent of Decentralized Finance (DeFi). MEV enables network participants to profit from the transactions submitted by other network participants, often provoking them to a loss. These practices were initially done by miners or validators, who can manipulate the order of transactions within the blocks they create to, i.e., front-run the most profitable transactions (Judmayer et al., 2021). However, miners are not the only ones that engage in these practices. Anyone can access the public ‘mempool’ of a blockchain network and monitor the transactions submitted to the network to identify the most profitable ones and resubmit them in their own name—ideally with higher transaction fees so that these copycat transactions are more likely to be included into the next block than the original ones.

The controversy around MEV is inherently linked to the discussion concerning the relationship between *legality* and *legitimacy*. Strictly speaking, MEV does not violate any of the protocol rules. The blockchain protocol simply states that miners or validators need to include transactions into a block. It does not stipulate any rules about choosing amongst these transactions—although it is expected that, because of economic interests, the transactions with the highest transaction fees will be included first—nor any constraints against the arbitrary re-ordering of transactions. Similarly, given the public availability of a blockchain’s mempool, there is nothing to prevent network participants from monitoring the mempool and replicating profitable transactions. Nevertheless, while the legality of these activities is clear, opinions differ regarding the perceived legitimacy of these practices. For some, MEV is perfectly legitimate; in fact, it is even desirable since many of these practices actually contribute to increasing the network’s efficiency (Qin et al., 2021). For instance, *arbitrage* is generally regarded as a productive activity that improves the efficiency of a financial system. Yet, some MEV practices may also have a negative impact on the network, such as the higher transaction fees that any attempt at front-running transactions generates. The more aggressive forms of MEV may even use flash loans to sandwich a transaction in between two other transactions specifically designed to extract value from the original one (the so-called ‘*sandwich attack*’). These transactions are not contributing to increasing the efficiency of the network. They may even be detrimental to the network as they may dissuade people from participating because of the higher transaction fees or simply out of fear that a potentially profitable transaction might turn out unprofitable. Effectively, this means that those engaging in MEV are essentially ‘free-riding’ on the work of those who have spent time and effort to identify profitable transactions but will not be compensated for it (Poux, De Filippi, & Defains, 2022). It is precisely this ‘unfair’ appropriation of value that motivates the perception that, despite their legality, MEV shall not be regarded as legitimate.

4. Legitimacy and Fairness: Credible Neutrality

Building upon MEV and the ‘unfair’ appropriation of value, there is a relationship between legitimacy and fairness. Following Vitalik, one of the ‘psychologically appealing features of a system based on which members may perceive it as legitimate is *fairness*, with *credible neutrality* as an example (2021). In his view, mechanisms that deliver high-stake outcomes or decisions people care about need to be credibly neutral. At their core, coordination mechanisms aggregate the collective intelligence of diverse and large groups of people. They do so by taking inputs and delivering outputs efficiently, using incentives to encourage honest participation. Following Buterin, coordination mechanisms are credibly neutral if they do not ‘discriminate for or against any specific people.’ Neutrality is never total, but some mechanisms are

more neutral than others. In other words, all mechanisms built to address coordination failures—or to support the achievement of the best possible outcome—are likely to discriminate against specific agents. However, according to Vitalik, not all types and levels of discrimination are equally ‘unfair.’ For example, Buterin suggests that ‘on-chain miners rewards’ are more *credibly neutral* and, thus, *more fair* than ‘on-chain developers rewards’ because it is easier to identify miners than to identify developers. It is typically easier to reward the former based on tangible contributions, while the latter might be rewarded based on favoritism. Finally, it is not only important that a mechanism be credibly neutral, but it also must successfully convince a diverse group of people that it is so (Buterin, 2020).



Figure 4⁸: Blockchain Legitimacy and the Perceived Role of the Miners

The notion of “neutrality” underlying Buterin’s argument has long been conceptualized in liberal political theory. As a leading proponent of political liberalism, John Rawls (1971) formulated a theory of justice explaining how free and equal individuals could peacefully coexist in democratic societies comprised of a plurality of (often incompatible) conceptions of the ‘good’ amongst different religious, philosophical, and moral traditions. His notion of justice relies on two principles. First, each individual should be afforded equal rights and liberties. Second, social and economic inequalities are justified so long as everyone has fair and equal opportunities for offices and positions. To this idea of *justice as fairness*, Rawls (1993/2020) prescribes that the political institutions of liberal democracies should be designed to foster justice, unity, and stability, while providing significant benefits to the least-advantaged members of society. These institutions shall remain ‘freestanding’ (*i.e. neutral*) so as to be endorsable by a plurality of individuals subscribing to competing yet ‘reasonable’ doctrines.

Whether it applies to socio-technical systems like blockchains or socio-political systems like liberal democracies, the value of “neutrality” remains largely controversial. While Buterin admits that neutrality is *never* completely achievable, his vision of neutrality reinforces the bias behind Rawl’s original formulation. According to Dyzenhaus’ critique (1998; p. 233), Rawls’ theory of justice does not rely on neutrality: it upholds assumptions of the liberal individual—male, white, capitalist, individualistic—which are definitely not *neutral*, let alone universally endorsable. Similarly, blockchain systems rewarding identified agents (such as miners) based on their contributions to the network, or even just rewarding agents based on a

8 From González, J. [@JavierGonzalez]. (2022, October 1). *The governance of the blockchain is exactly part of the miners’ business and their core mission. Only they can decide with security and legitimacy, voting or hashwar. The opposite is the power centralized in devs. Read the last two sentences of the whitepaper.* Twitter. <https://twitter.com/JavierGonzalez/status/1576199604869410816?s=20&t=3CBmhXgQZRR0WNdQq-ysTQ>

meritocratic approach, are underpinned by assumptions on what types of efforts should be rewarded—something that, in light of the MEV explanation above, is not necessarily neutral nor unequivocally fair.

5. Legitimacy and Participation

For Applbaum, *free group agency*—or, more simply, *collectively self-governance*—is a fundamental condition for legitimate ruling. To recapitulate, “A legitimately governs B only if A’s governance of B realizes and protects B’s freedom over time, and this is the case only when A is a free group agent that counts a free B as a constituent member of that group agent” (Applbaum, 2019, p. 4). He argues that it is only through conditions such as political participation that people can show that they are free enough to construct a free group agent that rules them legitimately (Applbaum, 2019, p. 91). There are also threats to legitimate rule, including when decision-makers (i.e., free group agent A) act wantonly by not representing the collective agency of their constituents (i.e., agent B). According to Appelbaum, wanton agents act selfishly and opportunistically without reflection and deliberation on why some desires and interests should be privileged over others during decision-making. *Wantonism* is a threat to a legitimate ruling, as collective self-governance requires participatory reflection and deliberation on these second-order beliefs.



Figure 5⁹: Blockchain Legitimacy and Community Participation

In the context of blockchain systems, the absence—or reduced impact—of coercion, the competitive dynamics between network participants, and the pseudonymity of participants make it difficult to establish the existence of a free group agent. For instance, core developers of a blockchain protocol may seek to realize the freedom of the users of the protocol. However, they cannot unilaterally act to protect pseudonymous users from threats to their freedom—i.e., state sanctions imposed to prevent transactions with specific smart contract addresses—. Miners or validators are subject to competition amongst themselves—i.e., to produce blocks—where legal and economic considerations may often trump an interest in preserving the freedoms of other network participants—i.e., Ethereum validators voluntarily complying with US sanctions by filtering out transactions from sanctioned wallets—. In short, in keeping with its polycentric nature, agency is fragmented across several decision-making centers rather than being exercised collectively by a free group agent ‘A.’

Nonetheless, despite the limitations in both constructing free group agency in blockchain systems and for any actor to unilaterally act wantonly, there is voluntary recognition by some actors that *transparent*

9 From Siri, S. [@santisiri]. (2022, January 12). *and i'll use \$ubi as an example: it exists thanks to the cooperation of democracy earth with kleros and the integration with proof of humanity, uniswap and yearn finance was key for its growth. building stuff in the open with a community is priceless and generates legitimacy.* Twitter. <https://twitter.com/santisiri/status/148106708439793665?s=20&t=hin0SPOfvUD6IKVkusU00Q>

and *participatory* development of protocols and products—such as the universal basic income initiative indicated in figure 5—are instrumental in generating legitimacy in the system as a whole. This transparency and participation should not be limited to how products are built but should extend to preventing ‘informational wantonism’ by requiring important actors to explain and give an account of why they hold certain beliefs or their underlying motivations for making certain decisions. This reflection and deliberation on second-order beliefs are as key to the legitimacy of blockchain governance as an advanced understanding of how blockchain systems function.

5. Legitimacy and Politics

As discussed above, the notion of *political authority*, as conceptualized by Michael Huemer (2019), requires *political legitimacy*—i.e., acceptance of authority - or ‘*Herrschaft*’ in Weber’s terminology—and *political obligation*—i.e., the need to obey - or ‘*Gehorsam*’ in Weber’s terms—. Specifically, *political legitimacy* is characterized as “the state’s entitlement to force individuals to obey its commands, in situations in which private agents would not be ethically entitled to force others to obey their commands” (p. 15). In contrast, *political obligation* is defined as “the obligation on the part of individuals to obey the state’s commands in circumstances in which individuals would not be ethically required to obey similar commands given by private agents” (p. 16). After reviewing a few theories of authority, in their attempt to justify a government’s political authority, Huemer concludes that “there is nothing special about the state that explains why it would have authority over everyone else. The state, therefore, only has political power, not political authority. It has the *ability* to coerce other agents and take their resources, but it has no more moral right to do so than any other agent has.” (p. 16). To him, exit from the current dominant political system is, therefore, the only meaningful option when one disagrees with the coercive efforts undertaken by the state.

Huemer (2019) also defends the idea that a government’s monopoly over public services (i.e., public infrastructure, national security, healthcare, education, etc.) in exchange for taxation is foreclosing market competition, which would allow for greater equality of opportunities, and, therefore, more legitimacy. Huemer thus argues for an exit-based approach to most government-provided services, allowing alternative services to emerge in the private sector and compete on a level playing field with public services and utilities.

When applied to democratic governments and nation-states, the arguments of Huemer might have too much of a hyper-libertarian flavor to many people. Despite recognizing the flaws and insufficiencies of many governmental services, many also recognize the benefits of public services and social welfare provided to all citizens in a redistributive fashion rather than on a purely market-based, pay-per-use model. However, when applied to the context of blockchain systems, the arguments raised by Huemer appear surprisingly similar to arguments proposed by many blockchain advocates. The idea that no centralized authority should be in charge of regulating the issuance of money (Anderson, 2019), that we need self-sovereign identity systems that do not rely on centralized identity providers (Baars, 2016), that mechanism design and economic incentives are enough to prevent people from free-riding (Chen et al., 2021), and most importantly, that no one should ever have the right to coerce anyone else into a particular system or decision (Anderson, 2022), are all common claims shared amongst many blockchain communities (Gaggioli, 2018), which perfectly reflect the exit-based logic proposed by Huemer.



Figure 6¹⁰: Blockchain and Governance by Exit

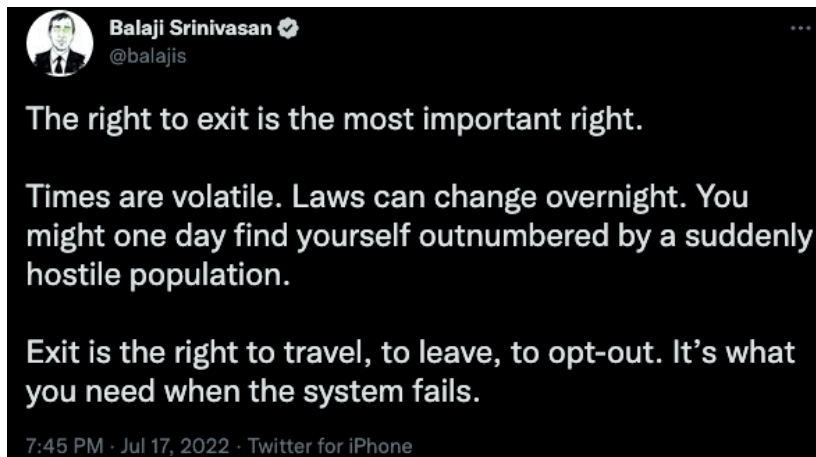


Figure 7¹¹: Blockchain and the Right to Exit

Nevertheless, Huemer, like many other crypto-anarchists or crypto-libertarian, might be missing the point that even in a system with low exit costs, politics simply cannot be avoided. The focus on distributed governance and distributed consensus may prevent people from engaging in a more in-depth analysis of the underlying politics of polycentric systems such as Bitcoin (De Filippi & Loveluck, 2016) or Ethereum (Brody & Couture, 2021). Indeed, governance and politics do not fulfill the same functions, and the latter cannot simply be replaced by the former. While governance is concerned with ways in which to coordinate action amongst multiple agents, politics is more about finding compromise across different agents with different preferences and priorities, which are not always, nor necessarily reconcilable with one another.

As complex socio-technical systems, blockchains involve many stakeholders with divergent—and often conflicting—interests and values. To the extent that there exist enough incentives—primarily economic, as a result of network effects—for these actors to find ways to coordinate their activities on the same network, despite the compromises that this may entail, rather than separating into many different networks, any discussion about the legitimacy of a blockchain system cannot exist without reference to politics (Groos, 2020). Thus, blockchain governance must implement a system to mediate conflict and establish a compromise amongst divergent and conflicting interests. The evolution of multiple processes and forums such as Bitcoin Improvement Proposals, DAO voting, and public discussions around protocol upgrades on various social media platforms show that the blockchain community actively participates in political

10 From Lopp, J. [@loop]. (2017, September 24). Democracy is governance by overwhelming voice / force - Bitcoin is governance by exit. I doubt you can slap the former on top of the latter. Twitter. https://twitter.com/lopp/status/911782366951231488?s=46&t=fWBSk_gbGCa3YQadVDYzQA

11 From Srinivasan, B. [@balajis]. (2022, July 18). The right to exit is the most important right. Times are volatile. Laws can change overnight. You might one day find yourself outnumbered by a suddenly hostile population. Exit is the right to travel, to leave, to opt-out. It's what you need when the system fails. Twitter. https://twitter.com/balajis/status/1548725591687303168?s=46&t=fWBSk_gbGCa3YQadVDYzQA

discourse and voice-based mechanisms for institutional reform, rather than following the exit-based logic espoused by Huemer and many blockchain advocates (Atzori, 2015).

Another popular sentiment in many blockchain communities akin to Huemer's exit-based logic is the idea of forking. Forking is a mechanism for self-organization that exists in many open-source software environments and usually becomes a tool to encourage more experimentation in an open and interoperable manner. Forking generally entails taking a particular piece of code, tweaking some of its functionalities to satisfy the needs of a particular community, and re-deploying the code to see whether it gets adopted and by whom. However, blockchain forks do not allow for interoperability between the two resulting networks because of the difference in their protocols. Hence, forking necessarily leads to fragmentation and requires establishing a new community of miners, validators, infrastructure providers, and users.

The claim towards fork-based governance faces similar limitations as the arguments advanced by Huemer. It assumes that competition between different blockchain networks competing for a community is preferable to having a few large, consolidated systems with persistent communities. Like Huemer, this argument artificially separates "the system" and "the community," ignoring that blockchain systems are fundamentally built, maintained, and used by people. Even though forking a protocol's code invokes meager costs, building a community for successfully deploying a new network can be very costly. This tension can be observed empirically in many situations where we have seen a steady consolidation of market power in a few large networks despite the relatively easy and seemingly low exit cost in the blockchain space. For example, at the time of writing, the Ethereum network is more than 52 times larger by market cap than its main competitor fork Ethereum Classic, and Bitcoin's market cap is 177 the size of its main competitor fork, Bitcoin Cash (CoinMarketCap, n.d.).

7. Trust, Confidence, and Legitimacy

Centralized systems attempt to create legitimacy through specific constitutional constraints that limit the discretionary or arbitrary power of the dominant over the subordinate. In blockchain systems, on-chain mechanisms can be used to impose similar types of constraints, using code-based technological guarantees to constrain the actions of network participants. However, relying on the "rule of code" does not necessarily mean that such rules are perceived as legitimate.

Legitimacy in a blockchain system cannot be analyzed without accounting for two key distinct yet inter-related aspects: *confidence* and *trust* (De Filippi et al., 2022). Confidence comes from the predictability derived from the technological guarantees of a blockchain and its on-chain governance structure (governance by the infrastructure). Trust, instead, lives within the uncertainty and unpredictability of off-chain governance (governance of the infrastructure), characterized by a set of social and institutional rules agreed upon by the relevant stakeholders, which nonetheless retain the ability to breach these rules. In our previous BlockchainGov report on "[Blockchain Technology, Trust & Confidence. Reinterpreting Trust in a Trustless system](#)" (De Filippi et al., 2022), we explain how trust and confidence in blockchain systems are inherently interrelated because trust in the underlying governance structure of a blockchain network constitutes an essential precondition to generate confidence in the operations and technological guarantees of such a blockchain (p. 16-19).

Both trust and confidence can contribute to establishing perceived legitimacy in a blockchain system. Drawing from Vitalik Buterin's classification of the various "sources" of legitimacy, it appears that *continuity*, *process*, and *performance* are instrumental to increasing confidence in the system. For a system to be perceived as legitimate, however, it needs a proper balance between confidence-building and

trust-building elements. If there is not enough confidence, lots of trust will be required to perceive the system as legitimate—since the *process* and *performance* guarantees are missing. Yet, according to Levi (2019), trust can contribute to legitimacy but is not as such sufficient to guarantee such legitimacy (p. 368). Additional elements are required, such as shared principles and values (*fairness*) and the possibility to provide meaningful input in governance (*participation*). At the same time, too much confidence might also hinder the system’s legitimacy since a pure “trustless” system with perfectly codified rules will not leave enough room for *participation* and *trust*, ultimately eliminating individual agency and freedom from decision-making. The elimination of agency will likely reduce the system’s legitimacy, as the constituents do not feel they have a say in how the system operates or evolves. As discussed above, Applbaum (2019) believes that a legitimate government must apply coercive authority to preserve its subjects’ *liberty*, *equality*, and *agency* (p. 4). In a blockchain context, it means that, in order to be legitimate, the coercive authority of technological rules must preserve individual agency and autonomy.

Conclusion

In this report, we set out to explore the role of endogenous legitimacy in blockchain systems, where practitioners have recently taken to referring to the concept, albeit without specific reference to its many (and at times conflicting) underpinnings throughout existing academic and political thought. To fill this gap, we explored the notion of legitimacy through a bi-weekly reading group, which generated deep discussions and insights through conversations among blockchain practitioners, blockchain academics, and scholars from various disciplines who had explored legitimacy in their respective contexts. Specifically, the group was guided by four research questions:

1. What does legitimacy mean in the context of blockchain systems?
2. Who are their different stakeholders, and what are their perspectives on legitimacy?
3. What are the different types of legitimacy that exist in blockchain systems, and what roles do they play in the operations of these systems?
4. What are the different factors that may affect the legitimacy of blockchain systems?

To answer these questions, we investigated legitimacy by reviewing the notion and how it impacts the decision of users, participants, or citizens to *exit*, use *voice*, or remain *loyal* to a system in times of disagreement or crisis. Simply put, legitimacy is “the belief and perception that a governor has the right to rule and exercises it appropriately” (Scholte et al., 2021; p. 866). Alternatively, in Beetham’s words, “power can be said to be legitimate to the extent that (i) it conforms to established *rules*; (ii) the rules can be justified by reference to *beliefs* shared by both dominant and subordinate, and; (iii) there is evidence of *consent* by the subordinate to the particular power relation.” (Beetham, 2013, p.16). However, the ways legitimacy is constructed and maintained are complex, varied, and often supported by various accountability relationships between regulators and their constituencies.

The report shows that legitimacy can significantly contribute towards *loyalty*, making it more likely for people to rely on *voice* rather than *exit* in times of disagreement and crisis. Furthermore, we found that legitimacy plays a different function in *monocentric systems*, where regulators can fall back on coercive authority. Thus, legitimacy is necessary to justify this authority, compared to *polycentric systems* where regulators typically do not have a legal mandate or the ability to coerce others. In other words, legitimacy

is necessary to promote loyalty to the system.

The latter presents a more accurate lens from which to study blockchain systems, drawing attention to the interconnectedness of different stakeholders engaged in regulatory activities within the network—miners, validators, developers, infrastructure providers, users—and their nestedness in the system—i.e., multisig signers or general token holders, in a DAO governance structure.

Nevertheless, both our analysis of legitimacy in monocentric and polycentric systems yielded interesting specific insights into the functioning of the concept within the blockchain community:

1. Legitimacy as the “most important scarce resource”: Without any centralized authority or coercive force, legitimacy is the main “social force” that directly influences blockchain’s governance. Perceptions of “what is a legitimate course of action” or a “legitimate mission” steer the direction of blockchain communities and help us understand why two technically-identical projects may enjoy very different amounts of support. Legitimacy is, in part, a higher-order acceptance of a system based on the perception of some of its traits as psychologically appealing. These traits may include *continuity, fairness, process, performance, and participation*. *Brute force* has been highlighted by Vitalik Buterin as another possible source of legitimacy, although it remains controversial to the extent that it is not deemed psychologically appealing. Following Huemer’s proposition, it resembles the ability to coerce rather than, for example, a moral right to do so.

2. Schelling points: Blockchain systems are characterized by Schelling points according to which *individuals behave the way they think the rest of the people will*. Schelling points as an ‘acceptance by doing,’ or a form of implicit consent, may become a possible expression of legitimacy, where *doing* is based on what people believe that others will believe, that others will believe [...] that the others will do. However, the degree to which Schelling points may increase the legitimacy of a blockchain system is debatable. Firstly, legitimacy requires “actual quality consent” as the acceptance of the system’s fulfillment of its purpose and the wide recognition of its fulfillment. Secondly, leadership roles greatly influence the direction Schelling Points take and undermine the level of decentralization and democratic participation in decision-making, thus potentially reducing legitimacy. Finally, even if Schelling points are expressions of “actual quality consent,” their outcome may, in some circumstances, be nonetheless illegitimate.

3. Legality vs. Legitimacy: The notions of *legality* and *legitimacy*, albeit inherently intertwined with one another, must remain distinct. One should, therefore, not assume that legality always and necessarily leads to legitimacy or, vice versa, that all actions incompatible with the legal system would necessarily be regarded as legitimate. The DAO attack illustrates this distinction, bringing to the forefront the divergent opinions on whether legality (i.e., compliance with the rule of code) might, in exceptional circumstances, give rise to an illegitimate outcome. The controversy around MEV also shows that the ‘unfair’ appropriation of value associated with these practices might motivate the perception that, despite their legality, MEV shall not be regarded as legitimate.

4. Legitimacy and fairness: One of the sources of legitimacy for blockchain systems is *fairness*, which Vitalik Buterin defines as “credible neutrality”, i.e. a system built and perceived as not discriminating for or against specific people. While absolute neutrality can never be achieved, he argues that some mechanisms are more neutral than others. The correlation of “neutrality” with legitimacy can be traced back to the tradition of political liberalism and John Rawl’s famous theory of justice. Yet, even today, mechanisms promoted as “credibly neutral” are never actually so, nor can they claim to be universally endorsable. As such, the notion of “neutrality” is inherently biased, just as the notion of “fairness,” and may therefore not

lead to a greater degree of legitimacy according to the constituency as a whole.

5. Legitimacy and participation: The ability of community members to participate in governance has been deemed by scholars such as Applbaum (2019) as fundamental to a legitimate ruling. Without the freedom to participate in political processes and deliberations, individuals cannot be said to be free enough to construct a 'free group agent' that can rule them collectively (and legitimately). However, in blockchain systems, it is challenging to ascertain a single free group agent that legitimately rules over others due to the properties of the system, where agency of the system is fragmented across several actors. That being said, some blockchain protocols and projects voluntarily strive to develop protocols and products in a transparent and participatory manner, even without a free group agent, due to perceptions about endogenous legitimacy within those protocols and projects.

6. Legitimacy and politics: Many blockchain advocates invoke the same type of exit-based arguments as Huemer (2019). However, the fragmentation that results from enacting a predominantly exit-based logic severely undermines the network effects that blockchains require, particularly to maintain the economic value of their respective cryptocurrency and digital assets. Furthermore, we identify the need to establish and maintain arenas for political discussion that can help alter systems and settle disputes while maintaining their integrity, size and value. Strengthening a system's legitimacy will make constructive political processes more likely, which will increase its participants' loyalty.

7. Trust, confidence, and legitimacy: Legitimacy in a blockchain system cannot be analyzed without accounting for two key distinct yet interrelated aspects: confidence and trust. Indeed, for a system to be perceived as legitimate, it needs a proper balance between confidence and trust. If there is not enough confidence, lots of trust will be required to perceive the system as legitimate—since the technological guarantees are missing. Yet, too much confidence might also hinder the legitimacy of the system since a pure "trustless" system with perfectly codified rules will not leave enough room for participation and trust, ultimately reducing the perceived legitimacy of the system.

Overall, many insights generated from our readings about legitimacy in polycentric systems helped deepen our understanding of good governance in blockchain systems. However, the readings addressing blockchain systems were significantly less developed than those referring to legitimacy in monocentric and coercive systems. Furthermore, an academic discussion and rigorous analysis of blockchains as polycentric systems are also lacking. To fill this gap, subsequent exploratory studies are required. Specifically, to advance our understanding of legitimacy in blockchains in specific and polycentric systems more generally in the future, we plan on investigating the following questions:

1. Is polycentricity a key feature of blockchain-based systems in theory and practice?
2. How can the polycentricity of blockchain-based systems be quantified?
3. What methods could we use to study the multi-stakeholder governance arrangement of polycentric blockchain-based systems?
4. What constitutes good governance in a polycentric blockchain-based system? What are the qualities of an effective and legitimate polycentric blockchain-based system?
5. What are the challenges that polycentricity brings to the governance of blockchain systems?
6. How can we increase legitimacy and the degree of trust and confidence in polycentric blockchain-based systems?

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