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The First Blockchain: Bitcoin, Entropy, Religion

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Bitcoin did not suddenly appear in November 2008, at the heart of the subprime crisis. It has matured over a decade, notably through the exchanges of Nick Szabo, Hal Finney, and others, with key moments such as the publication of "The God Protocols" by Szabo in 1997. The theological analogy developed in the introduction to that text, which theorizes smart contracts, raises the question: simple facetiousness, geek irony, or a clue to religious references? By analysing not only the founding texts but also the discussions in the Extropian or cryptography mailing lists in which Szabo and Finney took part, this article seeks to answer whether religious references (vocabulary, imagination, symbolism, structure) may have played a role in the genesis of Bitcoin.

> Machines are much more than the children of reason, they are above all the daughters of imagination, dreams and myths; they are much more than technical instruments: they are metaphysical devices. From them, man expects more than liberating socioeconomic rescues, he hopes that they will bring him Salvation and deliverance, tearing him away from himself and his existential limits. But he also expects his consecration as an all-powerful Creator. And that's why he worships them. The essence of the machine is to be considered as a dispenser of ecstasy, even in its works of death, because we see them as necessary apocalypses for the emergence of new dawns.
>
> Jean Brun, "Biographie de la machine"

Introduction

Often, humans enchant technology without even being aware of it. Most of the processes of re-enchantment are involuntary and largely unacknowledged. Digital technologies are not immune to this mobilization of the sacred. This was noted by many observers as early as the 1990s and continues to be demonstrated by the excitement surrounding every piece of news related to artificial intelligence. Indeed, W. A. Stahl has shown that the discourse on computers and the internet is magical and mystical (Stahl 1995, 1999). Lee Worth Bailey, in *The Enchantments of Technology*, writes that there is a background of enchantment in human engagement with technologies. He gives the example of android robots, which are arguably among the most enchanting machines (Bailey 2010, 155). As this article shows, blockchains are no exception to this phenomenon.

The blockchain is often presented as a "general-purpose technology," a neutral infrastructure that allows the renewal of communication procedures between individuals and increases their efficiency. It is a distributed transaction register, a decentralized database based on a peer-to-peer network. It is encrypted and thus avoids going through a trusted third party. It is also collectively administered by all nodes in the network. This is the paradoxical promise of a blockchain: disintermediate trust through a "trustless" technology. The blockchain thus marks the transition from a system based on trust to a system based on proof: if we trust the underlying technology, we do not need to trust anyone. As a tool for decentralization, it holds the promise of emancipation from centralizing powers, either economic or political. Yet, looking back on its genesis provides evidence of the tensions that have appeared since its birth, both within user communities and in its the relations with existing institutions, whether they be justice, law enforcement, or financial structures.

My hypothesis is that there is a link between these tensions and the theological infrastructure at work in the blockchain. The formulation is abrupt, and has been considered as a supposition that this article attempts to verify by revisiting the

origins of Bitcoin, the first blockchain. What is the role of religious imaginaries and theologemes[1] mobilized around this technical device? At what level of this device do they operate? My starting point remains that their presence is not fortuitous or decorative, but that they play an active role in the configuration of the technical device. Is this a simple analogy by substitution, where the techno-scientific imaginary would recover the functions of the old religious imaginary? Or is it a more complex reconfiguration, variable according to the regimes of secularization, the actors, and the moments?

The notion of religious imaginaries must be clarified. It is used here as a component of the socio-technical imaginations developed by certain sociologists. The concept of the imaginary can be used to analyze society's relationship with technology. Indeed, technological development is always caught up in a web of social meanings. The choice of a technology or the failure of an innovation does not depend on purely technical issues, but also on a technology's ability to "make sense" and fit into a specific socioeconomic context. Infatuation with an innovation can contribute to its development in a certain direction. In this sense, American sociologist Sheila Jasanoff defines "socio-technical imaginaries" as "visions of desirable futures that emerge from a shared understanding of the forms of life attainable through scientific and technological development" (Jasanoff and Kim 2015, 4). According to this definition, the material measures employed to develop a technological innovation are always accompanied and supported by an equally important production of meanings. Of course, this work is partly in line with the sociological analyses conducted on the religious dimensions of transhumanism, notably by Robert Geraci (2010), Hava Tirosh-Samuelson (2012), or Liogier and Servais (2016), but with one particularity: the ability to analyze a technical device, not just discourses or narratives. One could even go further: the ability to analyze a technical device in its discursive and narrative dimension. Philosophers of technology Wessel Reijers and Mark Coeckelberg (2018) recently introduced the notion of "narrative technologies," which seems to fit well with blockchains.

A certain teleological conception of modernity believes that religion would disappear with time. In reality, religion has gone through waves of high and low intensity. Secularization is to be understood as an ongoing cultural reconfiguration in which questions of the theological-political, but also the theological-technological, intersect (Dupuy 2004). The basic argument of this article is that these elements are not a priori unknown technology. On the contrary, the processes of secularization mobilize them according to different modalities that are specific to each historical context.

The interest in studying the origins of blockchains is twofold. First, the main players are not motivated by religious convictions or affiliation, and some even consider themselves beyond such perspectives. That is why this study cannot resemble that conducted by David Noble in *The Religion of Technology*, where

the scientists and engineers he studied, whether in the field of biology or the conquest of space, often claimed themselves to be religiously affiliated. The second interest lies in grasping the core of the origins of a technology at a stage in its genesis (in Gilbert Simondon's sense) that enables the identification of tensions and structural features. The technical object is a socio-cultural construct in which social relationships and crystallized imaginaries can be read like sedimentations in a glacial core. Gilbert Simondon emphasizes that the genesis of a technical object is part of its identity (Simondon 1958).

After setting the appearance of Bitcoin in its Californian context and recalling the way it was cultured by the Extropian network cultured until it reached maturity, this article studies how religion and theology appear at all stages of the history of the first blockchain.

Cryptocurrency as a California Dream

Before the 1970s, cryptography was mainly practiced in secret by military or espionage agencies and was classified as category XIII on the United States Munitions List. But that changed with the United States government's publication of the Data Encryption Standard and the development of basic encryption techniques during the 1970s (Levy 2002). For the first time, someone with modest computer resources could encrypt a message in a hidden way for the authorities. The "crypto" became a tool everyone could use. In 1985, computer scientist David Chaum (founder of the International Association for Cryptologic Research) described the possibilities of developing systems that would guarantee user anonymity (Chaum 1985). In 1989, he launched the DigiCash project, which was inserted into the traditional banking system: it allowed the withdrawal of electronic bills with private key cryptography. Those electronic payments became untraceable by the issuing bank, the government, or a third party.

The trajectory of cryptography towards these cryptocurrency projects independent of any state structure is in line with what Benjamin Loveluck writes about computing in general: "Initially denounced as one of the most advanced embodiments of the alienation of the individual by technology, and as an impersonal machine serving the interests of the bureaucracy or the government, [computing] became one of the main tools for individual emancipation while at the same time providing a collective solution for dealing with the resulting severance of social ties" (Loveluck 2015a, 242).

As the appropriation of the internet began to spread, electronic money sparked the interest of multiple Californian actors. Indeed, David Chaum's project was widely discussed in the early 1990s in circles motivated by the defense of cyberspace, as evidenced by Stephen Levy's article in *Wired* (Levy 1994), but also in magazines like *Mondo 2000* or the multiple mailing lists around the San Francisco Bay Area. On the Cypherpunk list, commenting on Chaum's

work, Hal Finney (1992) clearly states the problem in a message often shared in the archives and on crypto mailing lists: "Here we are faced with the problems of loss of privacy, of deceptive computing, of massive databases, of increasing centralization—and Chaum proposes a completely different direction to take, one that puts power in the hands of individuals rather than in those of states and large corporations. The computer can be used as a tool to liberate and protect people, rather than to control them." In this Californian melting pot, the cryptocurrency project acquired a structured ideological framework at a time when liberalism was more broadly being reconfigured by this new socio-technical dimension.

Indeed, the program of the "new economy", which saw the internet as a new field for the extension of liberal capitalism, was quickly challenged by the hacker movement and that of free software. Both contested a second "movement of the enclosure" through the multiplication of patents and other limitations. The 1990s saw the emergence of cyberlibertarianism, notably embodied in the magazine *Wired*. For such radical liberals, who seek to extend the logic of the market to all aspects of social life, the economic and social sphere is a self-organizing organism in which the circulation of information is crucial: the full automation promised by the internet is obviously received as good news. They often mobilize Richard Dawkins' thesis on memes as cultural entities. In their view, the internet is both the opportunity and the device of a major cultural revolution, supporting neoliberals, as evidenced by John Perry Barlow's "A Declaration of the Independence of Cyberspace" in 1996: individual autonomy must be protected from any state interference; cyberspace must remain autonomous. Within this movement, other sensibilities are developing, such as the Cypherpunk movement, which mobilizes hackers to defend the free use of cryptography, imagining the advent of a "cryptoanarchy." Tim May compares "the crypto" to the invention of the printing press, or a wire cutter that will "dismantle the barbed wire around intellectual property" (May 1992). It is in this context that many projects such as Wikipedia, WikiLeaks, peer-to-peer sharing systems, and cryptocurrencies have emerged (Loveluck 2015b).

In this nebula, the group that has most continuously worked towards and carried forward the project of a cryptocurrency, that truly "cultured" it until it could be implemented, is not the largest or most visible one. It also stands out for its global approach: the question of the flow of information is just one element of the complete overhaul of human existence advocated by the Extropian movement.

A Techno-Utopia Cultured by the Extropians

In 1988, Max More and Tom Bell founded Extropy, the first structured transhumanist movement. The Extropians seek to reverse the entropic dynamic. This formulation is not metaphorical to them. For human beings, Extropy

entails overcoming the limits of their biological condition through the increase of their physical and cognitive capacities, the eradication of aging mechanisms, spatial colonization through new technologies (cryonics, genetic manipulations, transmutation of the body into a cyborg, etc.), and a new worldview that must be embodied in a radically new lifestyle. Concretely, Extropy is a movement animated by a dozen active members who spread their ideas through a mailing list, a publication, and conferences, and probably had a few hundred sympathizers at the end of the 1990s.

Extropy constitutes in many ways a vanguard of transhumanism (Damour 2018b). Its modes of activism have greatly influenced the transhumanist movement, for example, through the formalization of positions in the form of a common charter (the Extropian Principles anticipating the Transhumanist Declaration, etc. with its FAQ); an inclination for speculation on technological developments rather than practices; and a concern to position itself as a think tank to influence the public debate. Its positions, even today, serve as a standard within transhumanism, either to conform to or distance from.

To better understand the Extropian system of thought, it is necessary to know a little bit about who the Extropians are. An analysis of the email addresses on the Extropian list allows for identification of half the members of the Extropy network in the winter of 1991–92, a year before it made cryptocurrency central to its program. It is a male network, most of whom have a professional connection to computers. It is possible to identify three subsets among the active contributors to this mailing list.

The most numerous subset is centered around physicist Eric Drexler, who was then in the limelight for "inventing" nanotechnology, partly through his bestseller *Engines of Creation* (Drexler 1986). The Extropian list includes members of groups interested in nanotechnology and space colonization, notably linked to the L5 association, of which Drexler was one of the main leaders in the years 1986–89 (Damour 2018a). It also includes members of the Xanadu project, founded and directed by Ted Nelson, on which Drexler worked in 1988 (Drexler and Miller 1988). The second set comprises computer scientists, often specializing in cryptography. Some of these individuals were also involved in cryptography-related mailing lists, including some who were part of the emerging Cypherpunk movement. These mailing lists are partly professional: technical questions and utopias such as cryptocurrencies are discussed. One can note the number of important actors linked to the nascent web industry: executive members of the Xanadu project; Jean-François Groff, a close collaborator of Tim Berners-Lee and Robert Cailliau at CERN (the European Organization for Nuclear Research); Mike Linksvayer, the creator of Creative Commons; Lee Daniel Cooker, one of the architects of Wikipedia; not to mention Julian Assange, who was involved in the mailing list at one point. Of course, these different people do not take part in the mailing list

equally. There is a significant porosity between these more ideological lists, such as the Cyberpunks list, and the more professional discussion lists, where similar themes are discussed, and technical standards and processes developed. The third set is polarized by Max More: cryonics enthusiasts from the 1980s; members of the University of Southern California, where FM-2030 worked; members of the robotics and artificial intelligence laboratory of Hans Moravec; and other (Figure 1).

Extropy is thus a mix of personalities and institutions recognized academically or economically and marginal movements such as cryonics. This heterogeneous assembly is polarized around three horizons of expectation, three techno-utopias also in search of official recognition: cryptocurrencies; Drexlerian nanotechnology; and cryonics. As Finn Brunton has shown, it is essential to link them to understand them (Brunton 2019). It is probably significant for the purpose of this article to note the central role played by Ralph Merkle, the only member of all three sets. Merkle is a computer scientist and mathematician, and one of the inventors of public-key cryptography. The fact that one of the main architects of blockchains and cryptocurrencies is at the intersection of the three techno-utopias promoted by Extropy—cryptocurrencies, Drexlerian nanotechnology, and cryonics—suggests that these three are intrinsically linked. It is impossible to understand cryptocurrency according to Extropy without considering it alongside two other speculative technologies.

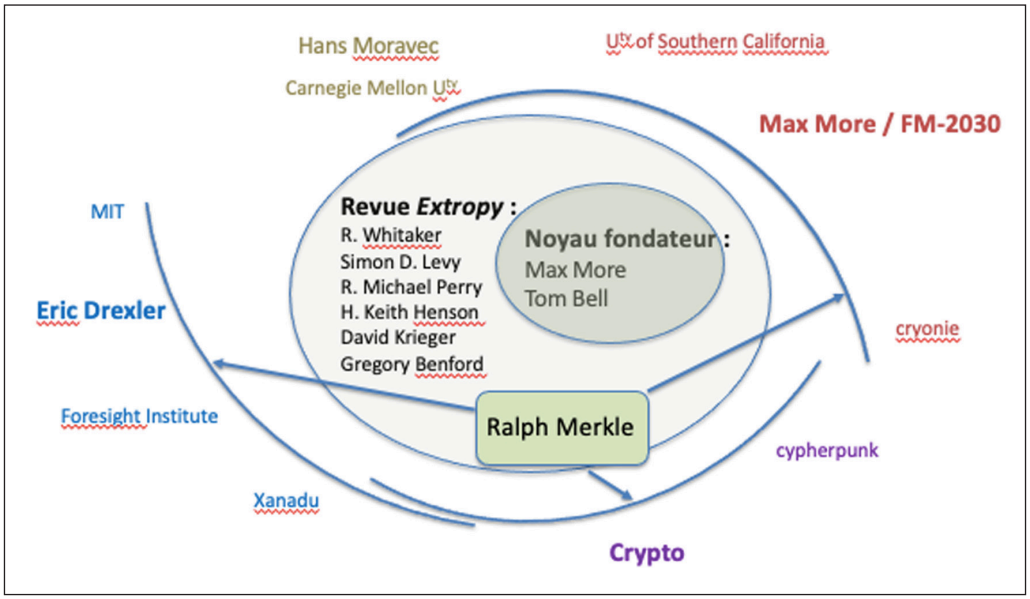

Figure 1: The three circles of Extropy in its early days. Source: Author, personal archives. This diagram visualizes an analysis of the users of the Extropian mailing list from December 1990 to December 1991. An analysis of the list's email addresses made it possible to identify half of the members of the Extropy network and characterize two-thirds of them.

Extropy made cryptography a major issue during the winter of 1992–93. It took its place among other techno-utopias such as nanotechnology, cryonics, and artificial life. The idea of a crypto was discussed on the Extropy mailing list from November 1992 onwards, giving rise to multiple exchanges between Tim May, Nick Szabo, Hall Finney, Charlie Stross, and Sasha Chislenko, all of whom are also found on other cryptography, or the nascent Cypherpunk, movement lists. Extropy, the movement's magazine, published a series of articles on the subject, including an article by Hal Finney ("Protecting Privacy with Electronic Cash" in the spring of 1993), an interview with Mark Miller, and the article where Nick Szabo theorized the idea of "smart contract," a key concept in blockchain, for the first time (Szabo 1996b). Extropians continue to speculate on cryptography, with as much assiduity as with cryonics, as evidenced by the gatherings called Extros. Thus, in June 2001, Extro 5 offered a series of speeches around privacy with Mark Miller, Nick Szabo, and Lee Daniel Crocker in San José, California.

But the network did more than just theorize about cryptography. Some of its members developed the technical device on which Bitcoin would rely in the future. The constituent elements of the technical device of Bitcoin are (De Filippi 2018, 15–30):

1. a decentralized database
2. dual-key encryption
3. the "hash" function
4. mining functions
5. a distributed consensus process.

Elements 3 and 4 were developed by major actors of the Extropian network.

The "hash" function is based on "Merkle trees." Invented in 1979 by Ralph Merkle, this technique uses a hash function to create a tree-like data structure. In this structure, each node has its hash, which is generated by the hash of all the nodes that stem from it. This mechanism allows for more efficient verification of the integrity of large databases. Bitcoin uses Merkle trees to organize transactions within each block of the chain, where each transaction can be uniquely identified by its fingerprint. As has been shown, Ralph Merkle is a prominent figure in the Extropian movement, at the crossroads of all the networks that comprise it.

Mining functions were gradually developed in various projects, including Adam Back's HashCash and the electronic payment systems BitGold and B-money, respectively designed by Nick Szabo and Wei Dai in 1998. B-money was theorized in an article by Wei Dai, cited by Nakamoto in the Bitcoin white paper: it uses the "proof-of-work" principle developed by Adam Back to secure email for issuing currency, with Wei Dai proposing to reward this work by issuing

virtual currency. The same year, Nick Szabo described BitGold, whose issuance is determined by the computing power spent to solve a mathematical equation.

However, BitGold introduces an element that allows the network to work asynchronously: the solution of each equation becomes an integral part of the next equation to be solved, thereby producing a series of transactions that are linked together chronologically. BitGold already presents most of the technical building blocks with which Bitcoin was built. Nick Szabo and Wei Dai are very active members of the Extropian network.

A functional prototype of a virtual currency was developed in 2004 by Hal Finney. He is a figure of the crypto: he worked with Phil Zimmermann on Pretty Good Privacy, or PGP, the first freely available, strong encryption tool, and designed the software's "network of trust" model for verifying the identity of PGP users. Finney is linked to the Cypherpunks and Extropians, actively publishing on their mailing lists and in the Extropian journal. Finney spotted Satoshi Nakamoto's Bitcoin white paper on a crypto mailing list in 2008 and immediately began exchanging emails with him, helping him debug his code and run his first transaction tests.

The hypothesis that Hal Finney or Nick Szabo is the enigmatic Nakamoto has often been advanced and discussed. Beyond the validity of these hypotheses, they are an acknowledgment of the role of Finney and Szabo—and thus of Extropy—in the creation of Bitcoin. This role is not exclusive: the idea of crypto belongs to the Californian zeitgeist, and Bitcoin cannot be exclusively linked to Extropy. Nevertheless, the cultivation of Bitcoin by Extropians is to be questioned and evaluated. This article does so while being attentive to the mobilization of religious or theological elements.

A Religious Imaginary

The analysis of this religious imaginary can be conducted on three levels: prospective texts; the vocabulary used and the choices made in the technical system; and the discourse within the blockchain communities. The prospective texts constitute a heterogeneous corpus in its form (articles, emails, manifestos) and describe the purposes and principles of a cryptocurrency. The technical device must also be analyzed for the technical choices made, with an emphasis on the white papers and the nomenclature used. Finally, the imaginary worlds mobilized in the form of images, vocabulary, and even narratives by the users organized in "community" should be considered.

Two metaphorical universes are mobilized around Bitcoin. Of course, there is the gold rush and the world of the pioneers, with the use of a vocabulary (miners, coins, gold, etc.) and images depicting them, contrasting strongly with the material reality of mining. In the American context, this can be placed in the register of the imaginary of the frontier and can be linked to the libertarian and Randian affinities of Bitcoin actors, even if transhumanists', Friedrich Hayek's,

reading of objectivism are very singular (Caré 2019; Brunton 2019). However, the second imaginary—religion—is more unexpected. It is the only referential mobilized across the three levels.

It is a diffuse, yet cobbled together and hybrid imaginary, often mobilized ironically. Its use undoubtedly stems from a very "geek" turn of mind, but that should not prevent it from being taken seriously. After all, the mobilization of revolutionary references in Tim May's 1992 crypto-anarchist manifesto or Barlow's 1996 "A Declaration of the Independence of Cyberspace" is also part of this mobilization that is both ironic and serious: these references are nevertheless interpreted as indicators of the ideology mobilizing hackers. In the same way, the uses of religion in the cyberculture of the 1990s, often interpreted as cybergnosis, or in an event like Burning Man, are both distanced and invested. It seems legitimate to interpret the religious references mobilized by blockchain communities as significant.

A quick analysis allows for the identification of the main elements that mobilize Christian references, as David Golumbia (2016) has shown. Some have claimed the title "Bitcoin Jesus" in order to identify their expertise or their claim position; a satirical Bitcoin church has been launched, with its own Ten Commandments; contributors to cryptocurrency have been called "true believers" from the beginning, and following another cryptocurrency is a form of apostasy, as with the creation of Bitcoin Cash; there are also fasting and feast days. This effervescence finds its foundation in the tutelary figure of Satoshi Nakomoto: this hidden prophet multiplied the proofs of his veracity in regularly issued messages before disappearing, giving free rein to speculation about his true identity. As Golumbia specifies, "Since its inception, speculation about Nakamoto's true identity has been one of the galvanizing forces within the Bitcoin community. And few circumstances could have reinforced the cryptocurrency's 'distributed' and 'decentralized' mythology better than a leader who seemed to waver in and out of existence, whose identity is likely fictional (Golumbia 2016).

How to interpret this appeal to the religious? First, it must be considered that this technical device is a currency. What gives Bitcoin its Golumbia is not its technical efficiency but rather the collective belief in its value. From this perspective, it is a currency like any other. However, it is a currency without apparent institutional legitimacy; therefore, it must draw on ideological legitimacy (Orléan 2019). In Europe, it finds justification in the political field, but a very particular political field (anarchism, left, or right), which in many ways take on forms of secular religiosity. The secularized system of the United States is of a different modality, allowing for the explicit mobilization of elements of religious ideology.

This mobilization also fulfills a function of "ideology masking," to use Patrice Flichy's terminology (Flichy 2001): the actual development of Bitcoin

sometimes gives rise to disillusionment, which the use of these religious references makes it possible to mask, no doubt explaining the ironic distance. It also serves to perpetuate narratives that hide the fact that the absence of instituting third parties has a very material cost: the development of an electrical network. Indeed, the solution found is the "proof of work" to guarantee the inviolability of the register. This proof of work is not real "work" but an energy cost. Any modification of the registry is very costly, and this cost is the price to be paid for the absence of trusted third parties.

There is also a governance issue. Indeed, Bitcoin operates thanks to an infrastructure that requires governance: contrary to the discourse surrounding it, there is nothing automatic about it. Nigel Dodd has described the hierarchy that allows to function, composed of a team of developers and discussions between groups of experts ("Bitcoin Classic" versus "Bitcoin Core") (Dodd 2017, 2018). Technical choices must be made regularly, and these choices are negotiated between a small set of experts and the user community, with the former seeking the assent of the latter. It is within the framework of these technical choices, sometimes leading to "forks," divergences within the blockchain communities, that, depending on the cultural contexts, this or that ideological aspect is mobilized (see De Filippi and Loveluck 2016; Rolland and Assen 2017). It is as if during moments of tension in governance, there is a reactivation of initial patterns, a need to carry out reform by returning to an original matrix. To understand this, one must go back to the prospective layers of the technical device.

A Theological Infrastructure

Among the prospective texts, those of Nick Szabo play an important role in the theoretical development of cryptocurrency. Little is known about Szabo's biography, as he is very discreet and does not talk much about his background. He has, however, been a regular and central contributor to the Extropian and Cypherpunk mailing lists, just as his articles have generated a lot of commentaries.

In 1997, he published a major programmatic text, "The God Protocol":

> Imagine the ideal protocol. It would have the most trustworthy third party imaginable—a deity who is on everybody's side. All the parties would send their inputs to God. God would reliably determine the results and return the outputs. God being the ultimate in confessional discretion, no party would learn anything more about the other parties' inputs than they could learn from their inputs and the output. Alas, in our temporal world we deal with humans rather than deities. Yet, too often we are forced to treat people in a nearly theological manner, because our infrastructure lacks the security needed to protect ourselves. (Szabo 1997)

This text establishes an equivalence between theology and technology, with the latter replacing the former until it is sufficiently developed. This idea is frequent on the Extropian forum. Technology should allow access to an efficient and true social structure, a palliative device for humanity's mortal insufficiencies. This shows that, for the Extropians, the question of individual freedom is metaphysical rather than political.

What is Nick Szabo's God? One can already note that the figure of this "ordering" God is a familiar one, if not frequent, as the linguist Jacques Perret invoked it in 1955 when IBM asked him to find a word to designate these new economic calculators: referring to the "Deus Ordinator," he proposed "computer." This God who administers everything optimally and enables perfect communication—the realization of a horizontal communion that preserves the singularity of each—also calls to mind Leibniz's God: a perfect communicating God, as shown by Michel Serres (2007). Furthermore, according to John Elster, Leibniz's conception of providence is consistent with market logic—a thought that makes "forces" the fundamental unit of the universe, recognizes a pre-established harmony, and posits perfect rationality as the effect of a God maximizing his undertakings—which is not displeasing to an avid reader of Hayek (Elster 1975).

Indeed, Szabo seems to find in Friedrich Hayek the main keys to his worldview. In his criticism of nineteenth-century economic theories, Hayek continually denounces a "scientism" based on a hidden theological model—this God who could administer everything, who would have perfect knowledge—which is what classical economists seek, particularly Léon Walras, inventor of the theory of general equilibrium. Hayek criticized this claim, referring to an argument from seventeenth-century scholasticism: only God can know the totality of prices, but calculating and revealing it to humans makes no sense to him, so he leaves this question to the free action of the latter (Hayek 2007). This challenge had already been taken up by Pierre de Jean Olivi in the thirteenth century and relayed by the modern scholastics (Piron 2018). The influence of this theologian's *Treatise on Contracts*, which forged a number of key concepts in modern economics, starting with that of capital, is clear to see. Olivi, along with other Franciscan theologians, contrasted the diabolical figure that prevents money from circulating with the virtuous merchant who allows wealth to circulate: religious faith and the merchant's credit are two sides of the same *fides*, that trust that is so difficult to establish.

It is also possible to put Szabo's reflection into perspective within the framework of the American religious heritage, specifically the millenarian tradition of a techno-utopia where technical progress would allow for the realization of perfect communication, a kingdom already there. A lineage of American historians, from David Nye to David Noble or Harold Bloom, has well documented the investment of religious expectations in technical progress.

America is conceived as a second creation constructed, a new Eden. In his analyses of the religious currents born in the United States, Harold Bloom emphasizes the gnostic dimension of American religiosity, particularly since the Second Great Awakening, offering a synthesis between evangelicalism and the Masonic heritage (Bloom 1992; Noble 1997). Indeed, the Second Great Awakening (1795–1810), notably embodied by the evangelicals or the Church of Jesus Christ of Latter-day Saints (Mormons), proposes a resolutely optimistic vision of humanity and its actions and cultivates a progressive and nationalistic millenarianism. The great preachers of this revival, such as Francis Asbury or Charles Finney, proposed a voluntarist puritanism in which the transformation of the body tended to perfection, valuing a long life as a sign of the Election. Influence of the movement of "muscular Christianity," born in England and diffused in the United States from the 1850s onwards, took over, especially through powerful associations like the Young Men Christian Association (YMCA). This analysis is still valid for the technological utopias of California at the end of the nineteenth century. It is significant that these Californian technological utopias developed in the 1970s and 1980s, a period marked by a major religious awakening in the United States, whose esoteric component nourished a strong sensitivity to the technological and scientific dimension. While charismatic revivals (the Charismatic Movement, Neo-Pentecostalism, and the Catholic Charismatic Renewal) seem less sensitive to the cosmic question, currents of Californian origin claim it, aspiring to a new alliance between science and religion, cultivating the idea that the use of technologies makes it possible to overcome levels of consciousness and metamorphose human intelligence, psyche, and even its body (Champion 1993). Thus, Marilyn Ferguson thinks she has succeeded in her groundbreaking book *The Aquarian Conspiracy*: she announces a new alliance between science and religion. It opposes classical science with another conception of science, one more sensitive to the global and spiritual dimensions of the universe.

This fusion of the scientific and the religious took other paths during the 1980s and the 1990s: the cult of the internet, which could take the form of "technopaganism" for Mark Dery or a "technognostic awakening" for Erik Davis (Dery 2007; Davis 1998). As early as the 1970s, engineers working on the development of the internet used religious metaphors, speaking of an immortal body in cyberspace. When Stewart Brand, Howard Rheingold, and John Perry Barlow created the WELL in 1985, the forerunner of discussion forums, it was to make it a tool for social and spiritual renewal. Oliver Krueger has studied these discourses that make the internet a moment in the evolution of the global history of humanity and the universe (Krueger 2007). To complete this picture, it would be necessary to describe how the apocalyptic breath that accompanied the conquest of space from the 1950s onwards has reappeared in the development of artificial intelligence in the following decades (Geraci 2010).

The Extropian movement, although defining itself as materialist, participates in this religious sensibility by describing technology as a religious experience: as has been discussed, technology replaces theology and assumes the same functions. Technology transforms (bodies and minds), transcends (increases human capabilities, overcomes its limitations), and unites (connects people), three expectations often linked to religion in the Western context. Some transhumanists perceive technological progress as a revelation, an experience of a religious nature that can simply replace religions, rendering them obsolete by fulfilling practices often conveyed in secret. Thus, when Gilbert Hottois decrypts the origins of the transhumanist idea, he emphasizes on the one hand, the opposition between transhumanism and religion, and on the other, an esoteric and gnostic subtext to Western history in which transhumanism would be inscribed: "We could, however, dig deeper and especially earlier toward alchemy, gnostic thought and mythology the idea of a technological material self-transcendence of the human species" (Hottois 2015, 41–42). The role played by esotericism in the origins of the movement has been described by Remi Sussan, particularly the work of Robert Wilson or the influence of Timothy Leary (Sussan 2016).

These contextual elements make it possible to reread Szabo's texts differently. Thus, in a 1996 Extropy article, he describes smart contracts as follows:

> I call these new contracts "smart," because they are far more functional than their inanimate paper-based ancestors. No use of artificial intelligence is implied. A smart contract is a set of promises, specified in digital form, including protocols within which the parties perform on these promises . . . The legal force of the claim can be based on the text itself, rather than overstated, obscure, and often implicit interpretations about what "certifying" is supposed to mean. (Szabo 1996b)

According to Szabo, a smart contract removes the intermediation of human language. It bypasses human institutions and the difficult social and psychological work that accompanies their establishment and operation. It testifies about an aspiration to immediacy, to an automaticity that would do away with human transactions. This is not new; it is the characteristic of all writing. In the region of Susa in the fourth millennium B.C., the invention of envelope-bubbles proceeded in the same way. These envelope-bubbles were like clay purses containing calculi, small clay objects describing the contents of the merchandise the envelope-bubbles accompanied. Sealed, they allowed the recipient of the goods to know that the cargo delivered corresponded to that which had been sent—the word of the messenger, considered unreliable, was replaced by the fixity of the material trace. However, it is revealing that Nick Szabo (1996b) contrasts this animated contract with the "inanimate paper": it mobilizes an

effective word, carrying the spirit/intelligence. Its legal force comes from the text itself: no need for hermeneutics, no need for interpretation. Szabo has examined the hermeneutic question where, criticizing a Heideggerian tradition, he imagines with Hans-Georg Gadamer (as he rereads him) and Hayek the possibility of a totally transparent transmission thanks to its automation:

> I suggest that the "hermeneutic circle" of part and whole can be formalized along the following lines—the more bits of patterns, the more information we have; it is infeasible to learn from the whole. So we need algorithms that scan larger parts for the easy regularities, and smaller parts for the difficult regularities, then we need to compare, abstract and synthesize what we have learned about the parts, and so on. This is a whole field full of algorithms to discover, algorithms that approximate in polynomial time the uncomputable solution to the problem of learning from the whole. Put most generally, the problem of learning the whole is formalized as a matter of finding all regularities in the whole, which is equivalent to universal compression, which is equivalent to finding the Kolmogorov complexity of the whole. This formal method of analyzing messages is, not surprisingly, derived from the general mathematics of messages, namely algorithmic information theory (AIT). This formal model will apply most directly where the situation is formalizable: for example to induction from messages from the environment, scientific data. Formal models from AIT such as distance, logical depth, etc. can also be usefully applied informally. Indeed, "distance" has long been a used in hermeneutics, again showing the strong similarities between these disciplines heretofore seen as about as distant as one could imagine—AIT at the forefront of modern computer science, and hermeneutics a seeming throwback to the Reformation theology. (Szabo 1996a)

The reference to reform is not anecdotal, but an indication of a structure of thought, which is seen even more clearly in the technical configuration of Bitcoin.

A Temporal Infrastructure

It is impossible to judge the technical choices that were made: what other technical devices could have worked? To answer such a question requires considering the technical possibilities, the purposes, the material, and the human context (resources, production, diffusion, etc.), which goes far beyond the limits of this article and its author. All that remains is to interpret and analyze the elements of language mobilized as close as possible to the technical device, i.e., the nomenclature of the technical elements and what Satochi Nakamoto's white paper puts forward. The interpretation of certain choices of vocabulary with religious connotations (the first block in the blockchain is called the "genesis

block"; the trusted entities that are part of a blockchain network, transporting information from the physical world to an intelligent contract, are called "oracles", etc.) is difficult to conduct without a precise survey of those who chose them; otherwise, the door is left open to overinterpretations. Nakamoto's founding text is a more solid basis.

Released on October 31, 2008, the white paper "Bitcoin: A Peer-to-Peer Electronic Cash System" describes a decentralized payment system with a virtual currency that can be exchanged between peers, without the need to go through any bank or financial intermediary. This preamble introduces the key elements of the system:

> Commerce on the Internet has come to rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. While the system works well enough for most transactions, it still suffers from the inherent weaknesses of the trust-based model. Non-reversible transactions are completely impossible, since financial institutions cannot avoid mediating disputes. . . . What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse would protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers. In this paper, we propose a solution to the double-spending problem using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions. (Nakamoto 2008)

For Nakamoto, timestamping is the pivot of technology, as it ensures the immutability that solves the problem of trust. The disappearance of a third-party organizer of human relations marks the end of traditional politics. In Nakamoto's eyes, timestamping is, among all the technical elements constituting Bitcoin, the solution to eliminate the "cost of mediation" and automate hermeneutic work (Nakamoto 2008). In doing so, Nakamoto indirectly pays tribute to the work of Nick Szabo, because the main theoretical innovation of Bitgold, Szabo's proposal to create a cryptocurrency ten years earlier, was to use strict timestamping as a guarantee of the system's efficiency as a fiduciary foundation. This element allows the network to operate asynchronously: the solution to each equation becomes part of the next equation to be solved, producing a series of transactions that follow one another in chronological order. This mechanism allows the issuance of new money to be timestamped. Thus, the nodes of the network can verify at any time the validity of a transaction in connection with its execution in time. This solves the "double spending" problem that affects most decentralized electronic payment systems. But this temporal dimension is not simply a technical element in Szabo's eyes.

Indeed, Szabo's interest in the question of time and clocks is part of a much broader deep thinking, both political and metaphysical. He expresses this in one of his articles, "A Measure of Sacrifice," peripheral to his computer activities but central to his thinking. In the article, Szabo looks back at the appearance of mechanical clocks in Europe in the thirteenth and fourteenth centuries, when the question of time had led to a series of historical publications, which Szabo cites. For him, the possibility of a quantified and reliable measurement of time allows an essential operation to the structuring of human societies:

> First with the bell towers, then with their new clocks, Europeans measured with increasing accuracy and integrity the quantity of a most basic human quality—the sacrifices we make for each other. . . . The most important institutional breakthrough that accompanied the clock, the time-rate wage, was based on a largely implicit idea that grew with the invention of the clock—the idea of time as a measure of the sacrifice. Mechanical clocks, bell towers, and sandglasses provided the world's first fair and fungible measure of sacrifice. So many of the things we sacrifice are not fungible, but we can arrange our affairs around the measurement of the sacrifice rather than its results. Merchants and workers alike used the new precision of clock time to prove, brag, and complain about their sacrifices. (Szabo 2002)

Mechanized time measures sacrifice. What is this sacrifice? The sacrifice of time "we make for each other." At the start of his article, Szabo quotes a passage from Plautus in which an idler complains about solar clocks, which exert a moral constraint because they count time objectively, using the movement of the stars. Szabo's problem is to optimize the sacrifice each person makes of his or her time. By quantifying time and freezing it in irreversibility, the clock provides a solution. Timestamping is only the ultimate result of this process, by implementing the clock in money, i.e., to merge the measurement of sacrifice and its translation into monetary value. The measurement of time makes it possible to define an optimal price and create an efficient market, which is Szabo's immediate concern. But it is striking that he formulates this not with the concern to coordinate supply and demand, but with that of optimizing sacrifice, of distributing sacrifice among all in such a way that everyone receives a just reward. The aim is to ensure that there is no time theft between economic players, to establish a technical system whose efficiency will have made trust unnecessary. For medieval theologians, the issue of "time theft" was the same as that of interest-bearing loans. Olivi was one of those who lifted this theological assumption and, in turn, justified capitalist activity (Le Goff 1986).

The blockchain's timestamping feature goes a step further by preventing reversibility. It guarantees transmission and communication and makes them

robust by economizing on mediation and hermeneutics: there is nothing to interpret because the text itself self-certifies through timestamping. The technical device is self-founding. The blockchain is thought of as the socio-technical translation of a new relationship with time and a new social contract. Indeed, the blockchain carries with it the ideal of an indelible, unfalsifiable memory constituted in a decentralized manner. Each transaction recorded on the network is grouped in a block that fits into the previous block through a cryptographic validation process. Each new block forces the whole chain to undergo a new cryptographic treatment. There is therefore both intangibility and a rewriting that is always starts over. So, there is no need to interpret the blockchain to ensure the validity of what it records. The blockchain achieves this transmission without intermediaries, without interpretation, because it is automated: it is a hermeneutic freed from any hermeneutist, an immediate revelation, which underpins the idea of a "smart contract."

The automated temporality implemented in the blockchain addresses two distinctly theological questions that concern Nick Szabo: the issue of immediate transmission, devoid of hermeneutics, and just retribution for the temporal sacrifice made. These questions are closely intertwined with the concept of an optimized monetary system. The amalgamation of these inquiries might appear incongruous, given human's collective memory loss regarding the theological underpinnings of economic theory (Piron 2018; Hayek 2007; Perrot 1992).

These two questions should also be understood within the context of the Extropian program, which aims to equip humanity with technologies (cryonics, cryptocurrency, nanotechnology) that facilitate a detachment from our temporal reality (Brunton 2019; Damour 2018a, 2023).

The analysis presented here aligns with those establishing a connection between the transhumanist perception of time and millenarianism, as explored by François Hartog in his essay on the articulation of temporal modalities, namely "chronos" and "kairos," in Western culture. Examining contemporary representations of the future, Hartog posits transhumanism as an ultimate avatar of Joachimism, aligning itself with the legacy of Joachim de Flore and his millenarianism (Hartog 2020; De Lubac 1979–81; Geraci 2010). It is also worth noting that Pierre de Jean Olivi developed an eschatology in the tradition of Joachim de Flore.

But explicitly linking Szabo's or Nakamoto's positions to American millenarianism or Joachimism is, of course, impossible. These connections are intended solely to underscore the presence of theological structures, or theologemes, working alongside others—an ordering god, the self-founding text, optimized sacrifice—that ultimately coalesce into a system, forming a theological matrix of the blockchain. This matrix is reactivated when its development encounters a governance crisis, drawing upon religious references.

Conclusion

Religion contributes to the aura of the Bitcoin technological device: it allows for mobilization, creates a sense of belonging, confers legitimacy, obscures real governance, and brings compensatory satisfaction. It bridges the gap highlighted by Antoine Garapon and Jean Lassègue between the logic of the blockchain and that of institutions. This disconnects the graphical order and the spatiotemporal order that "only a surfeit of belief attempts to synthesize" (Garapon and Lassègue 2018). However, this mobilization of religion, mostly Christianity, is not merely a "supplement of the soul" (Bergson 1932). It is implemented in the blockchain from its inception and is part of the "soul" of the blockchain, so to speak. The theologemes constitute a subtext of the technological proposal and allow it to be inscribed in a collective narrative, to give it meaning and orientation.

They undoubtedly contribute to the narrativity of this technical device, which has been considered revolutionary (in the 2000s) or disruptive (since the 2010s) by its promoters: by proposing to reform the temporal structure and short-circuit any hermeneutics, the blockchain is invested with the theological charge of the Reformation. Without doubt, this also contributes to its reception as a spiritual and emancipating experience.

Gilbert Simondon can help an understanding of this. The technological does not go without the religious in Simondon's philosophy. The religion and the technology are the result of a "dephasing" of the same "primitive magic unity" (Simondon 1958). This is not in the sense of a historical origin but of a logical or "genetic" origin: the technicity and the religiosity are thus essences as modes of being in the world, connected by laws of transformation. Religion is, in Simondon's view, a phase of culture in which the "fundamental qualities" have developed and detached from the "figures" of the primitive magical unity (Simondon 1958). Symmetrically, in this same cultural phase, technology has developed the "figures" in the form of detachable elements from the foundation. Religion and technology thus respectively generate the first "subjects" (the divine, the priest) and the first "objects" (artifacts) in this world. Spirituality, for Simondon, is then the higher form of the trans-individual, the intuitive consciousness that the "pre-individual charge" the subject possesses always allows to rise and progress. It is not surprising that the blockchain can be invested with this expectation. Yet to dwell on this observation would be to miss the essential: not all spirituality and theology are equal when it comes to building a common world and technological systems that protect and cultivate rather than enslave and destroy.

Notes

[1] A unit of theological meaning is called a "theologeme," and theologems combined according to their own syntax constitute a particular theology, a theological system. Here, "theologeme" designates the use of theological concepts outside a religious context for their symbolic charge, their semantic richness, or their historical depth (Pagé 1982).

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