

DAO, Blockchain and Cryptography: A conversation with Quinn DuPont

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Abstract

In Classical Athens, as well as in our modern digital era, governance has been achieved through tokens. Tokens enabled voting on projects, representation, and belonging. The Distributed Autonomous Organisation (DAO) launched on the basis of cryptocurrency and blockchain technology was conceived as a form of algorithmic governance with applications in the organisation of companies. The visionaries of the DAO envisaged, among other things, a new form of sociality, which would be transparent and fair and based on a decentralised, unstoppable, public blockchain. These hopes were dashed when the DAO was exploited and drained of millions of dollars' worth of tokens within days after launching. The conversation published in the present article is conceived as an interdisciplinary discussion about the phenomenon of the Decentralised Autonomous Organisation and its impact on perceptions of sociality. Topics include the idea of the DAO as an algorithmic authority, the lessons learned when the project failed, the revolutionary beginnings of cryptocurrency technology and its potential in voting technologies, as well as the changing notions of cryptography in light of cryptocurrency technologies.

Keywords: blockchain; Decentralised Autonomous Organisation (DAO); cryptocurrency; tokens; cryptography

Introduction

Quinn DuPont (figure 1) is a renowned expert on cyber security policy, information ethics, blockchains and cryptocurrencies. He received a PhD in Information Science at the University of Toronto before moving to the USA to take up a position as a research associate at the University of Washington (2017-2019). He is currently assistant professor of Management Information Systems at University College Dublin.

DuPont is the author of the book 'Cryptocurrencies and Blockchains' (2019), which has been instantly acknowledged as 'harnessing the richness of scholarly perspectives' and as informed by amazing insights into media, legal, monetary and social theory, review published in (Campbell-Verduyn, 2019). In his study, DuPont includes his personal experimentation with digital charity and trading cryptocurrencies. DuPont draws particular attention to the social nature of blockchains from Bitcoin to the Decentralised Autonomous Organisation (DAO) as a governance system with multiple applications. If governance is the process of decision making, then cryptocurrencies and blockchains cannot be considered separately from community consensus and visions of fair and democratic sociality.



Figure 1. Quinn DuPont with Mairi Gkikaki (right) and Clare Rowan (left) in the garden of the British School at Athens, where the conversation as well as the workshop 'Symbola: The Athenian Legacy to Modern World' took place. Authors' own image.

The DAO: How it was launched and how it failed

MG: Quinn, you have performed research on the DAO, a short-lived attempt to create a decentralised autonomous organisation. Could you tell us more about the DAO? What were the DAO tokens and what was achieved with them?

QD: The DAO is a bit of a complicated thing because it is an example of this more general idea, a decentralised autonomous organisation, which is what it sounds like: it is decentralised, it is autonomous, it runs on blockchain, and it is meant to replicate an organisational structure. Then, in 2016 there was a group of people who came together and created *the DAO*: a specific decentralised autonomous organisation. It was kind of like Kickstarter in that it was a funding mechanism to create new styles of organisation in companies. So, this is *the DAO*, not to be confused with the idea of decentralized autonomous organizations in general.

The DAO was very ambitious — it was an entirely new way of bringing people together, with new forms of power and hierarchy and structure. However, as it turned out, within just a few days of being launched there was a security issue that was not discovered until quite late, and then the DAO was attacked. Millions of dollars' worth of DAO tokens were exfiltrated and then very quickly the entire project was shut down (**DuPont, 2017**). That brought an end to this wonderful experiment, which I think was a real shame because there was a lot of opportunity for trying out new things. In the end, they ended up recovering all the money, but that was also the end of the DAO. And it turned a lot of people off the idea of decentralised autonomous organisations for that reason.

MG: It is interesting that they managed to retrieve their money.

QD: There is a story here, if you want. The recovery process wasn't 'really' a technical fix, as one might have expected. They actually came together as a community and went against the algorithmic rules, which was, of course, against the very idea of the decentralised autonomous organisation. It is supposed to be autonomous; it is not supposed to be something where humans are really in the mix, that's supposed to be the virtue of the system. But when things went wrong, when it got hacked, the algorithms failed the community, so instead they came together and implemented a 'hard fork', which is to say, they overrode all the old code and started fresh (**i3nikolai, 2016**).

MG: To bail out!

QD: Bail out was the term people were using. They said, 'OK now we've got bail outs for the blockchain,' which bothered a lot of people who joined

the DAO in the first instance, who were of the opinion that it was the 2008 global economic crisis that blockchain was designed to fix.

MG: It failed so quickly, so miserably and so disappointingly. It did not work at all.

CR: What I find interesting about it, also when examining the tokens of ancient Athens, is to what extent an existing media, like the blockchain, allowed people to create a community. But then it seems that community, with their vision, might then go on and shape the media that created them. A weird chicken and egg situation (**Crisà et al., 2019**, especially the introduction).

QD: Yeah, that's right! The term that gets used in the literature on decentralised autonomous organisations is algorithmic authority, this idea that power comes from the algorithms and that these are supposed to be infallible things (**DuPont, 2017**). But as it turns out: 1.) they are created by humans (so there's going to be issues there) and 2.) they are about humans, so, there is power and contests of differing visions that are part of the apparatus itself. So, while some people thought it was a bail out and that was terrible, other people thought that this was the community coming together and acting appropriately. They saw this as a test of the strength of the community, where the people were able to come to a smart, good resolution.

MG: All your recent papers on the DAO discuss the ethics of it. Can power also be discussed as an issue of ethics?

QD: Yeah, I think so. There are two ways that ethics for these technologies become really problematic. One, which I have been working on recently, is research ethics. Blockchain research ethics is really challenging because these technologies, these tokens, have value built into them. So, as a researcher it is difficult to engage with your research subject without bias, without harming users, or without causing security and privacy issues (**DuPont, 2020**). The other sense of blockchain ethics relates to the ways that we see the emergence of community, or an organisation. I think we are still very much in the early days of understanding what this kind of ethics might be, and I don't think we have any resolutions, in part, because the community takes itself to be committed to algorithmic authority, or what's sometimes described as 'code is law'. They believe that these technologies are trustless: they are amoral, they don't really have a moral quality to them. This, of course, plays into this perennial idea that technology is neutral. But as we see with the example of the DAO, and many other cases, this is simply not true. In my keynote¹, I talk a little about the ways in which the community needs to be socialised or has been socialised. The forms of socialisation are interestingly robust and play with

this idea that technology isn't where authority and power gets operationalised, but rather, the community uses these tools to *do* the socialisation. And so, the community coheres around these technologies rather than use the technology itself to get ethical behaviour and power and these sorts of issues on the table (**DuPont, 2019a; DuPont, 2019b**).

MG: Do you think that there are mechanisms that can be employed in the future to prevent a failure analogous to that of the DAO? Have we learnt something out of the whole story?

QD: I think it's too early to have any real solutions. The community still believes that there are technical fixes to these sorts of problems; I don't think that's right. I think that the technology plays a role but at the end of the day, it's made by humans and it is for humans, and so there is always going to be a human element. I think the challenge for the research community is to understand the ways that these technologies are social and then there's the possibility of social solutions and not just technological fixes. We are also learning about cyber security as an important part of a broader shift in society, which has been growing rapidly over the last couple of decades. This is something that is new in most people's lives and we do not really fully appreciate the ways that security technologies are basically essential to everything we do online.

CR: I am fascinated with the idea of trying to find a technical solution to essentially 'messy humanity'. And this is also the story with *kleroteria* in ancient Athens, the machines that were invented for drawing magistrates by lot. But they were also open to abuse since they were operated by a human at the end of the day (figure 2).

MG: Obviously. We tend to think that *kleroteria* were invented because there was the phenomenon of bribery, the phenomenon of vote buying in ancient Athens. *Kleroteria* and tokens were used to prevent relationships between a patron and his clients corrupting the democratic system (**Taylor, 2007; Maurer, 2019**). Tokens were devices that were supposed to prevent fraud (**Bubelis, 2010**). Tokens were the high technology of the fifth century BC. But when society changed, then tokens were also abandoned. And I think that it all begins with humans and society.

QD: Allusions to ancient tokens are frequently found in the contemporary token communities as well. This is something Bill Maurer has previously discussed (**Maurer, 2019**).

MG: The way communities connect meaningfully to the ancient world.



*Figure 2. Reconstructed Kleroteria in the Ure Museum, University of Reading.
Photo by Philafrenzy. Available at: <https://w.wiki/Lms> (Accessed: 29 January 2020).
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QD: They connect meaningfully, yes — to forms of voting, of community representation. There is a strong connection.

MG: In the case of the DAO, because the DAO was a social community, was there a code of conduct, a code of correct behaviour, or nothing?

QD: The community does not think of itself as requiring these sorts of —

MG: Autonomous, they are autonomous!

QD: That's right! It's the technology that's supposed to be controlling people; the authority is invested in the technology. Now, as it turns out, there is very much a code of conduct. Including, even, the way that the DAO was set up. It was set up in a very remarkable way to preserve the

‘purity’ of the technology. Nobody knows who launched the DAO because it was launched by simultaneous groups, who —

MG: Spontaneously and simultaneously —

QD: — Yes. They purposely had multiple groups all pressing the button at the same time. The idea was that it randomized which actual instance of the technology would be born. And that way it had no human place of origin. It was just somebody, somewhere, somehow. They were trying to walk back social influence; to have this technological origin story, and of course it very much does. And so everything stems from that, including, of course, the kinds of proposals submitted to the DAO. Remember, the DAO was intended to fund proposals, which would be products that the community invested in. DAO tokens would fund these products. But also, sometimes, other, stranger ideas emerged. For instance, there was something that I was involved in — unfortunately, however, just as I went to submit a proposal the DAO was hacked!

CR: The whales!ⁱⁱ

QD: Exactly!

MG: The charity project!

QD: Exactly! I thought this would be an ideal way to create a very future-orientated charity, because people often say that one of the issues with charities is mismanagement of funds. I thought this is something that the technology could help prevent (DuPont, 2017). This idea of vote buying and collusion that you mentioned — and all sorts of things — you can prevent a lot of this with a DAO.

I think that if you look at how this technology was born, and its very brief life, it has an implicit code of conduct; it is just that the community didn’t understand this and didn’t think that this was essential.

Virtue, Voting and Blockchain Systems

MG: You also talked about Bitcoins. Bitcoins have many things in common with Athenian tokens: the singularity of the transactions, the cryptography, the anonymity. Could you explain what you mean with the expression the ‘virtue of Bitcoin’ (DuPont, 2014)? Is the virtue of Bitcoin its cryptography and anonymity?

QD: It depends on the sense of virtue. There are definitely ways that you can be virtuous within the Bitcoin community — for instance, being a virtuous trader. There is a term called ‘hodling’ [sic] — if you hodl, they say, you are very virtuous and will make money.

There are virtues encoded in the technology of Bitcoin, which very concretely emerged from the 2008 global economic crisis. This, in my opinion, structures everything about Bitcoin and, in fact, pretty much all the blockchain projects that have emerged since.

Bitcoin started out as a punk ideal. It was for people who were unhappy with the bank bailouts. At the time, there was a great deal of financial exclusion and social unrest and this is the world that Bitcoin emerged into. But, interestingly, many people who became familiar with Bitcoin a decade later, around 2017, were unaware of these political origins, or didn't care. In 2017 there's an 'ICO boom.' That's a boom of Initial Coin Offerings, which are kind of like Initial Public Offerings. An ICO is a way of funding companies very much inspired by the DAO. The ICO boom moved the community away from the punk ideals of Bitcoin. It was largely millennials that drove the ICO boom. They had been excluded from the traditional financial and labour sectors and drew linkages between Bitcoin and their own social situation. So, they took Bitcoin and transmuted it — into a significantly more capitalist, even consumerist, sort of thing. And that's why, I think, the 2017 ICO boom emerged out of its antithesis. Bitcoin was punk!

There are obviously some latent right-wing ideologies preexisting within Bitcoin (**Golumbia, 2016**), and Bitcoin had an anarchist ideology to begin with. So, it wasn't like Bitcoin was completely unfamiliar with capitalism, but it was definitely not of the sort that we have today: big banks, technology companies, and start-ups galore.

MG: So, the basic idea is voting, people's votes for projects.

CR: For the DAO you mean?

MG: For the DAO and also for Agorism! Agorism is also this idea: people voting for a project, perhaps a financial project, or a project that has to do with politics (**Maurer, 2019**). So, it is something that emerges from the community and goes back to the community. In a way the community is free to destroy the system, if it thinks that it doesn't meet expectations any more.

QD: Voting is definitely one of the key parts of the DAO. Most of the cryptocurrency and blockchain systems use voting, in part, because they are token systems, so it seems like a natural thing to do. The term that gets used in the literature is 'cryptoeconomic systems.' These are mechanisms that use behavioural economics to encourage certain behaviours, and then, when combined with voting, you get political representation. This is the way that most blockchain systems get governed.

There are two senses of governance. One is called ‘off-chain’ governance. ‘Off-chain’ governance is what we normally associate with governance, in our regular world. This sometimes involve voting or establishing company by-laws, and other regular mechanisms. But ‘off-chain’ governance is generally seen as a last resort.

The way these projects really imagine themselves being governed is through ‘on-chain’ governance. These are voting mechanisms that are built into the system itself. Any decision that needs to be made, small or large, can be voted on from within the mechanism itself (**DuPont, 2019a**). In an ideal world, these projects would evolve towards ‘on-chain’ governance: humans are made reference to only through these voting mechanisms. There are many possible benefits to this: if it was possible to do this perfectly you could have secure and transparent forms of governance and that would be great.

But as people are starting to realize, ‘off-chain’ governance is just as important. The trick here is that nobody is supposed to be able to ‘stop’ these mechanisms. Some envision themselves as being censorship resistant or impervious to stoppage. Bitcoin is definitely of this sort - you can’t stop Bitcoin today. No one person can stop it. No government can stop it. It lives on. This governance issue is also the source of the trouble we saw with the DAO: its autonomous nature. And, I think this is what makes it so exciting. You could, in theory, program the system to just to keep doing what it does with no mechanism for stopping it. You could even have it do illegal or immoral things — you just set it up and let it run. It’ll just keep going forever, unless you build into it these ‘off-chain’ governance mechanisms to give us some kind of human control over it (**DuPont, 2019a**).

CR: Even with the Ethereum Classic there was an attempt at governance and it didn’t work in the end. It’s impossible to stop in a sense. I find it fascinating that there is this parallel existence.

QD: Ethereum Classic grew out of this ‘off-chain’ governance. This spin-off coin emerged from a community that, some people say, behaved intelligently, given the DAO crisis they faced. But there were some people who disagreed with the intelligent, reasonable decision to do a hard fork, so they split off and didn’t bail out the blockchain (**DuPont, 2017**). They’re considered the ones that lived by their ideals: it is the algorithm where truth lies and they stuck to that.

The majority, however, adopted the bailout because of powerful leaders. It was just a campaign of influence that convinced people to adopt the hard fork solution, and that’s the one that lives on today. Ethereum today is really Ethereum that has been bailed out.

MG: So, there is a future for blockchain technologies.

QD: Yeah, I think there is.

MG: How do you imagine this future?

QD: People always ask me this and I always say that the future of blockchain technology is a transition to something much more like plumbing.

MG: Fixing and repairing?

QD: It will be infrastructural, probably. I assume we will see less discussion or hype around blockchain. For example, if we look at cloud computing today we don't really think about cloud computing as being special. Blockchain will probably end up in that direction. What will change in the future—what blockchain provides—is a whole different suite of tools for, for instance, voting, autonomous organisations, new mechanisms for funding, and new forms of payment. These will seep into other technologies that we won't label as blockchain projects or companies, but they will use these mechanisms.

Old and Modern Notions of Cryptography

MG: If I may use one of your expressions, you say that that 'the cryptographic machines used for Bitcoins can be reimagined and reconceptualised' (DuPont, 2014). In my opinion, this view deviates from the traditional view that cryptography essentially means secrecy. This is the meaning in relation to Athenian tokens: cryptography meant secrecy, that the community of a magisterial board in ancient Athens had a 'secret' (Bubelis, 2010). Holding a token was like sharing a secret, a piece of information. But then the token is shared, and this creates a feeling of belonging, the interaction of the community based on this token (Rowan, 2019).

QD: Secrecy has always been part of cryptography. This is something I've researched in depth, which I find endlessly fascinating and I think is really important.

A lot of my research tries to put the newest forms of cryptographic technologies in dialogue with the very old history of cryptography, which is, in some cases, many thousands of years old. Secrecy has always been part of it. Military and state organisations have always needed to communicate secretly.

The problem with this view is that it is a little too narrow and ends up not giving full appreciation of the other modalities of cryptographic technologies. There is a great, big, long history here, but I can give a couple

of examples to flesh out some of what I mean by this. In the Middle Ages, for instance, cryptography was deeply associated with the occult and magic, but this also meant that it was used for scientific purposes. Even Francis Bacon, a noted cryptographer, looked at the world as a cryptographic puzzle to be solved. Pesic has previously explored Bacon's relationship to cryptography (**Pesic, 2000**). This is the 'scientific' use of cryptography.

Most people, however, think that cryptography is a system of mathematics. In fact, this is what all cryptographers today believe. I've asked the top cryptographers in the world and they say 'of course it's mathematical'. But this is, I think, absolutely wrong. I think it's a form of writing; it's a representational system. Once you have that vision in mind you understand it's a much more powerful technology. As a system of writing and as a representational system there are many more things we can do with cryptography.

The reason why cryptographers today think cryptography is mathematical is because it was industrialised, around the time of the American Civil War. At some point, maybe in the 19th century, the study of cryptography (cryptology), moved away from the occult. But, that also meant it moved away from the scientific and the representational, and this is when we start to see the narrowing, to just this notion of secrecy and mathematics. Cryptography started to become only for secret communications, only useful for governments and militaries. Technically, cryptography also had to transform itself into something that was repeatable, with a public algorithm and a private key that was kept separate and secret. This is, of course, precisely how we think about cryptography today. But, if you go back to Francis Bacon, this would have been completely alien. The algorithm was part of the mechanism. There wasn't this separate notion of a key that is somehow kept separate and private. And so, this was an essential transformation within the industrialisation process, because it is only once you have a separate private key and a publicly known algorithm that you can have efficient secret communication.

Except, what I think is really exciting about blockchains, Bitcoin and DAOs is that we are inadvertently returning to a much broader vision of cryptography. All of a sudden cryptography is money. That is not something that we have ever thought about, except for maybe the folks in the 1980s who were creating cryptocash. So, it is not unique to today, but it's all occurred within the last couple of decades. The 'encrypted information society' is the label I give it. Money is all of a sudden something that can be cryptographic.

We're starting to see a return to the 'scientific' modalities of cryptography. Look at the way machine translation works today: it is effectively code

breaking. It's cryptanalysis. Machine translation goes back to the Arabs, who invented cryptanalysis and who used their sophisticated linguistics and statistical knowledge to invent scientific code breaking (**DuPont, 2018**). I think this is very exciting. We get away from this idea that cryptography is just this narrow tool of secrecy. And of course, most recently, we now do politics, we do law, on blockchains.

The problem with the DAO hack was that we were operating in the industrial mode of cryptography, rather than this much richer one I'm sketching here. If we look back, if we look very seriously at ancient practices using tokens and cryptographic technologies, I think that we will also start to see some of the ways these technologies are broader than as tools of secrecy. They have everything to do with senses of belonging—political belonging, representations—ways of being and thinking about the world in ancient and different senses. These are things that can be excavated out of a richer history.

MG: Yes, it's completely different from what people commonly believe. Cryptography is about sharing and belonging and it is also like a language. Cryptography means first and foremost a code of language, a code of communication and not exclusion. It's not about exclusion, which is something connected only with secrecy.

QD: This is another thing I have been working on recently: understanding how exclusion and secrecy are tied. Actually, I think that a lot in our current (politicized) view of privacy has, unfortunately, adopted security technologies in place of what should have been much more human, with a true respect for privacy. Privacy today is security, and it's made possible through security technologies. It's trite, but privacy for its own sake is rarely valued. Someone like John Stuart Mill would say, I paraphrase, 'we need privacy to have flourishing lives, to have independent creative thoughts, and so on'.ⁱⁱⁱ Well, none of this is captured by security technologies. Security technologies are mechanisms of exclusion and of course this means there is a political economy here, as well. Companies recognise they can sell security in place of a more genuine, more robust, sense of privacy.

MG: There is another project at the University of Warwick about the concept of the pledge.^{iv} This is also a kind of security, a security in communications, a security in the knowledge that something has been promised and can be collected.

QD: I think it is bad to approach essential human qualities as security technologies. On the other hand, there are a lot of people who are exploring a broader sense of security technology, who are able to use the best parts of the technology. Bitcoin being a really interesting example of...

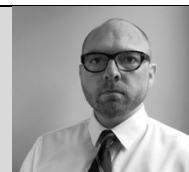
MG: The potential!

QD: Yes, the potential! Now we have different ways to imagine what money might look like in our modern, digital world. I think that's really positive and encouraging, as long as we don't forget that humans still have to use these technologies and that it does us no favour to turn everything into a security technology and erode what it means to be a human. Laugh, love, play — all these things are part of what it means to be human, and I know that there are people investigating this with an open mind. I think that is really positive and exciting.

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Mairi Gkikaki is a numismatist and a Classical Archaeologist and member of the Team in the ERC-funded research project, *Token Communities in the Ancient Mediterranean*. Since 2018 Mairi holds the Marie Skłodowska-Curie Post-Doctoral Research Fellowship with the Project *Tokens and their Cultural Biography in Athens from the Classical Age to the End of Antiquity*.



Clare Rowan is an Associate Professor in Roman History and Numismatics at the University of Warwick. She is currently the PI of an ERC-funded research project, *Token Communities in the Ancient Mediterranean*.



List of Illustrations

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- Figure 2. Reconstructed Kleroteria in the Ure Museum, University of Reading. Photo by Philafrenzy. Available at: <https://w.wiki/Lms> (Accessed: 29 January 2020).
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End notes

ⁱ The keynote lecture of the Workshop ‘Tokens: The Athenian Legacy to Modern World’, The British School at Athens 16-17 December 2019. Available at: <https://www.blod.gr/lectures/the-social-order-of-crypto-communities/> (Accessed: 15 April 2020).

ⁱⁱ ‘The DAO of Whales’ was the environmental charity proposed by Quinn DuPont. The charity, which would run in a transparent fashion on the Blockchain, sought to care for a pod of orca in the Pacific Northwest. The voting mechanisms supplied by the DAO would help choose the research group to receive funds. The payments would be automated, verifiable, and censorship-resistant. ‘The DAO of Whales’ was cut short when the DAO was erased by the hard fork.

ⁱⁱⁱ John Stuart Mill is famous for his philosophical essay *On Liberty* published in 1859.

^{iv} *Pledge* was the title of the workshop run by Nina Boy in November 2019. Available at: <https://financeandsocietynetwork.org/pledge-workshop-2019> (Accessed: 12 January 2019).