
fractally
white paper
A framework for the
next generation of DAOs

fractally

The Next Generation of DAOs

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Abstract

This paper provides a blueprint, strategy, and background rationale on how groups of people can cooperate to provide public goods and mutual aid. Each of us is better off when we can collaborate for mutual benefit. Collaboration is not a zero-sum game because the value of the whole can be greater than the sum of the individual contributions. The challenge all societies face is ensuring the vast majority of surplus value created by voluntary collaboration is realized by the contributors instead of a governing elite. If we make it profitable to contribute to public goods, then we will unleash a powerful force for human advancement. ƒractally facilitates organic community growth and collaboration for the benefit of all.

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What is a DAO?

DAO stands for Decentralized Autonomous Organization. The description "decentralized and autonomous" was originally coined by ƒractally's founder, Daniel Larimer, in 2013, to describe the economics of Bitcoin. Larimer described Bitcoins as "shares" in a decentralized company which issued shares in exchange for hashpower.

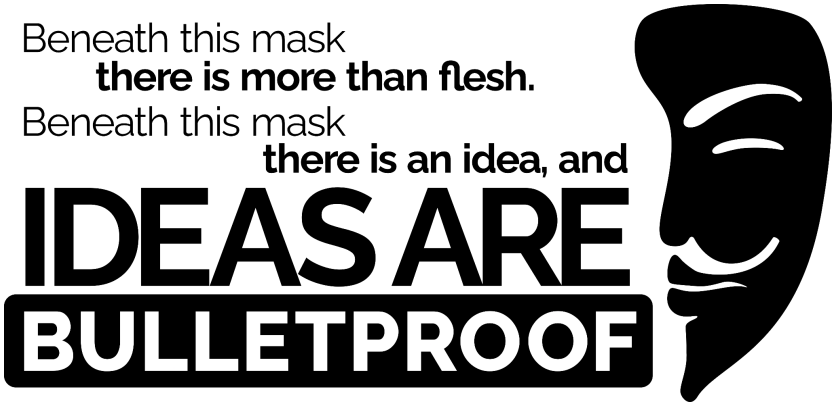
If someone wanted to organize humans to *autonomously* produce highly efficient computer chips for performing a specific task (sha256 hashing), then it is hard to deny the success of Bitcoin. Without any governing structures or centralized coordination millions of people cooperated to build the largest distributed supercomputer in the world. This process is on "autopilot" and "unstoppable" as long as people valued the currency and respected the algorithm.

The critical ingredient to being *autonomous* is being sovereign over information. Bitcoin, when viewed as a company, can make no promises, hold no secrets, and hold no assets that it is not fully self-sovereign over. By "fully self-sovereign" it means they are solely subject to the Bitcoin consensus algorithm.

A DAO is therefore consensus over information and can never be destroyed unless all copies of the information are destroyed. In the digital age, destroying all copies of anything is next to impossible.

When it comes to "governing a DAO", the information is "forked" and two copies of the information are created, each of which being fully complete, one of which has a different opinion on some part of the information. The free market, via voluntary exchange, resolves the dispute according to the value placed on each version of the consensus information. One or both sides of the fork can continue and are fully functional. This is the true test of a DAO.

We can therefore say that a DAO is pure information, the value of which is judged by the market. A DAO only depends on the freedom of speech and the open source software to deterministically interpret that speech into a shared consensus.



A DAO has no assets that can be seized, no laws it is subject to. A DAO is nothing more than a shared *idea* and is therefore bulletproof. If an organization depends upon secrets, then those secrets are centralized and the keeper of those secrets is *not* bulletproof. If an organization depends upon "shared ownership" of tangible property, then it is not a DAO, because the property could be taken or destroyed. If an organization depends upon any information it is not sovereign over, then it is not a DAO.

For example, "The DAO", an Ethereum smart contract, raised a record amount of Ethereum tokens to be managed in a "collective investment scheme" governed by another token. Despite the name ("The DAO"), we contend that it was merely a smart contract operating under Ethereum. Ethereum being a DAO while, "The DAO", was merely a transparent, smart contract operated, collective investment scheme. When the smart contract was exploited it forced the entire Ethereum blockchain to fork in order to resolve the dispute. This fork became known as Ethereum Classic.

A smart contract is only as decentralized and autonomous as it is independent. If "The DAO" had no shared state with Ethereum (the ETH balances), then there would be no way for an Ethereum fork to change "The DAO" and "The DAO" would have had to fork itself if there was any dispute.

The transparency and independence of information is what makes a DAO "autonomous", but what makes it decentralized? A DAO is decentralized when it continues to function regardless of what any subgroup of people do. As long as some people value the consensus state of Bitcoin, someone, somewhere, will do the proof of work necessary to keep the blockchain moving forward. If, on the other hand, people only value Bitcoin because of what Satoshi or a centralized team is doing to bring value to the consensus information then it becomes centralized.

Steem, the first social media DAO, had incentives that inspired the community to fork Hive when the founding company, Steemit, was sold and the new owner attempted to take the network in a different direction. The information being transparent, combined with the ability for anyone to step up and provide services around the information is what made it decentralized and autonomous. No matter what comes, the organization will keep going. This is what defines a DAO.

- No Secrets (e.g. communally owned private keys)
- No Legal Standing
- No Tangible or Intangible external Assets
- No Intellectual Property
- No Monopolies on Infrastructure
- Just consensus over forkable Information

If a DAO can inspire the creation of the world's largest supercomputer powered by extremely advanced custom silicon chips, what else can a DAO do? Can it create a new legal system? Can it motivate a surge in innovation, creativity, and open source software development? Can it find cures to diseases? Can it end corruption? What if a DAO powered by the right governance process could do all these things and more? ƒractally is creating a system that we believe has the potential to revolutionize how people realize the value created with the power of collaboration.

ℝ.E.S.P.E.C.T

Respect means to value someone or something. You can respect the property of others. You can respect the work other people do. Even if you don't respect the character qualities of a person, you can still respect what they produce.

Consider the act of serving the poor in a soup kitchen. This act is generally respected. The person who volunteers is generally respected for their service. However, if the server is paid to feed the poor, then the respect is typically accrued to the donor who paid the server rather than the individual providing the service.

We value people. We respect their talents, their character, and their honesty. We respect them just for being alive, and we respect their potential. This is non-transferable respect. A person can eat healthy, train, and pursue personal growth. This may increase the amount of non-transferrable respect one person has for another. A person can also lie, cheat, and steal and lose non-transferrable respect. This kind of respect can also be viewed as *reputation*. More accurately, we value (aka respect) someone because of their reputation.

That said, money can be viewed as a measure of respect someone has earned for past contributions to a community. We value money because others value money. Money is therefore respected. When money transfers hands, one person loses this measure of community respect and another person gains it. When you sell a product that someone in the community values, you earn respect. Note that all "property", of any form, is a measure of respect. Theft of "property" is a form of disrespect. Property and "ownership" are simply ideas that express a peace treaty among cooperative beings to end the war of all against all under the law of the jungle where might makes right. Respecting the idea of property is therefore respecting others.

Community ℝespect

ƒractally empowers a community to reach a consensus on the *merits* of each individual's contributions and rewards them with the ℝespect they are due. In this case, ℝespect is synonymous with community money or currency.

Most countries have their own money and regardless of what name they give to their money, it is still money. BTC and ETH are the "ℝespect" of their respective[1] communities. Each ƒractally community, which we call a ƒractal, will have its own form of ℝespect.

How we characterize ℝespect and community money has huge legal implications. Is ℝespect a contract, an obligation, a commodity, or an opinion? Is it the property of a person or the opinion of other people? Is it something you "own" or is it something bestowed upon you? Do you receive "income" or "loss" when someone's opinion about you changes or only when tangible things change hands? Can someone be forced to hold a particular opinion?

Most people think of money as a *thing* that belongs to a person. For example, Ludwig von Mises defined money as the most marketable *commodity*[2]. However, in ƒractally, ℝespect isn't a thing; it's an *opinion*. While you may respect (value) something, others may have a complete lack of respect for it. If ℝespect is a measure of community consensus on the relative value of individual contributions then ℝespect remains a consensus *opinion* of the community, not the *property* of an individual.

Free market prices are one means of discovering the relative ℝespect (value) for various goods and services. For example, you may own a stock that has a certain value (measured in ℝespect or money); however, other people can reach a new consensus that the stock is worthless. This change in community *opinion* does not constitute "theft", and the *value of the stock* isn't the "property" of the owner of the stock.

Some people might say that while the value of the stock isn't property, the stock itself is still property. However, stock ownership, like *all* property, is a matter of consensus *opinion*. Did you acquire the stock fairly? Did you honor all of your agreements with respect to the stock? Who gets to decide these things? Is it not just a consensus opinion? In this case, the consensus is that the government, as elected, gets to decide. In other words, all titles to all things are in fact a consensus opinion. If the consensus opinion changed, you would find it difficult to retain control of your things.

The Value of an Opinion

If ℝespect is just an *opinion*, does it have any value? Opinions can be valuable or they can be worthless depending upon the source. You likely value the opinion of your husband or wife far more than the opinion of a random drug addict. Expert opinions are often more valuable than the opinion of laymen. Likewise, the value of a community's collective opinion depends upon the reputation of a community and its ability to reach a *respectable* consensus. Therefore, a community's reputation is also a ƒunction of the reputation of the members of the community.

[1] pun intended
[2] a raw material or primary agricultural product that can be bought and sold

Predictability of outcome is a major component of building trust and therefore building the value of ℝespect. A country that respects "property rights", has honest courts, and allocates government funds reliably, with minimal corruption and graft, will prosper. Thus, people will respect the opinion of its courts, they will follow its laws, and the people will prosper. Alternatively, a country that falls to corruption and spends the country into bankruptcy, loses the respect of people at home and abroad. The end result is currency devaluation and lawlessness. Hyperinflation is ultimately the result of a complete loss of respect for a currency.

Evidence of Transfer vs Intent to Transfer

What is interesting about ℝespect being an opinion is that opinions can never be stolen. If you steal someone's car keys, it doesn't make the car yours. The government has a clear and unchanged *opinion* on who owns the title to the car. Traditional cryptocurrency makes the simplifying assumption that the car always belongs to the person who holds the keys. This simplifying assumption is made because it removes opportunities for disputes and corruption.

Outside of the cryptocurrency world, people consider both objective and subjective facts when determining the legitimacy of a transfer. For example, a transfer coerced at gunpoint is not generally considered legitimate; however, the Bitcoin community's consensus algorithm would consider such a transfer to be legitimate in practice and provides no court of appeal.

The proposed way to resolve this kind of theft of Bitcoin would be to track down the thief, arrest them at gunpoint, throw them in jail, convict them in court, and force them to return the Bitcoin. The Bitcoin protocol has no means to enforce the outcome of the trial without the threat of government violence against the key holder.

Many in the Bitcoin community lost faith in the ability of people to reach an honest and respectable consensus. Instead, they have opted for an immutable set of rules that people opt-in to. Everyone who holds Bitcoin implicitly agrees to these rules. Ownership of Bitcoin goes to those who can secure their keys while (optionally) stealing other people's keys. It's the law of the jungle, where might makes right.

Good Governance vs No Governance

ƒractally thinks differently: we believe that good governance is the foundation of sound money. If a protocol provides only objective consensus, then a community will unavoidably institute a parallel and overriding subjective governance system. This is what happened when Ethereum forked from Ethereum classic. If the subjective governance system is corrupt, then it may outlaw and/or frustrate the use of objective money such as Bitcoin. It will classify, confiscate, regulate, and otherwise control who can own Bitcoin and when.

Suppose a whistleblower has a Bitcoin account and a corrupt government seizes his computers, takes his Bitcoin, and then auctions the Bitcoin to fund the government. The broader Bitcoin community would largely consider this outcome just and hold the opinion that the government and those who bought the Bitcoin at auction are now the legitimate owners and worthy of *respect* in the market.

However, if Bitcoin balances really were the collective opinion of property rights respecting people then the government's theft of a whistleblower's Bitcoin would not be recognized. After a *respectable* process, the community would be able to return the Bitcoin to the whistleblower while the corrupt government and those who participated in the purchase of the stolen Bitcoin would lose community respect.

A *respectable process,* carried out by people with integrity, is the key to good governance and sound money. This is a challenge given how difficult it can be to keep the bad guys out of power.

Central banks and the governments that charter them allocate new currency to fund insiders, war, special interests, and to buy off everyone they need to maintain their incumbent advantage. ƒractally gives us a new system of governance that returns power over the allocation of community ℝespect to *all* community members.

ƒractally leverages the wisdom of the crowds to mitigate rational ignorance, incumbent advantage, voter fatigue, and the bias created by the Pareto distribution of fame and fortune.

Join ƒractally and help us bring true democracy to communities around the world, so we can realize a more productive world without politicians, political parties, or overt incumbent advantage! We can fix our broken systems– but we must work together to reach a consensus first.

ℝespect Tokens

You can *earn* respect, *give* respect, *lose* respect and *hold* respect, and now, with ƒractally, you can finally *HODL* ℝespect. The one thing you can't do is *steal* ℝespect. ℝespect is a symbol of the trust a community has for the person who receives it. When a person holds ℝespect (instead of selling it), it is an expression of their trust in the community and the community's appreciation for an individual's contribution to the community.

ƒractally empowers people to come together, reach consensus, and build *trust.* This *trust* is expressed through the value of their currency, ℝespect. The more *trust* a community builds, the more valuable its ℝespect becomes.

ℝespect is a *real* currency of the people, by the people, and for the people. The distribution of ℝespect is the collective *opinion* of the community. No one is entitled to ℝespect and the

community is free to change its opinion at will (through a *respectable* process). ℝespect cannot be stolen because no one, not even governments, can change a community's opinion against its collective will. ℝespect is not the "property" of the "HODLer" it is an expression of the opinion of the community.

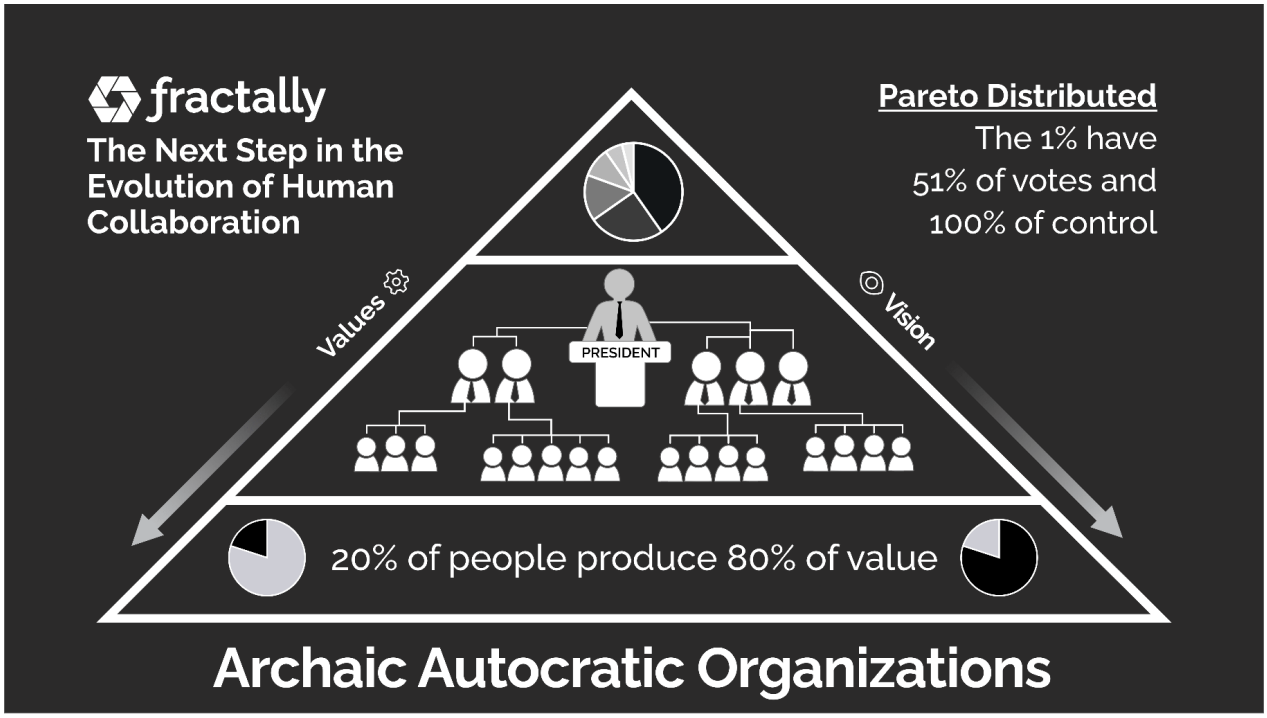
A community and its currency thrive when people value the community's ℝespect (opinion). This is achieved when a fair governance process is adopted and corruption is systematically rooted out. Hyperinflation is the result of people placing no value in the government's opinion on who should receive new currency.

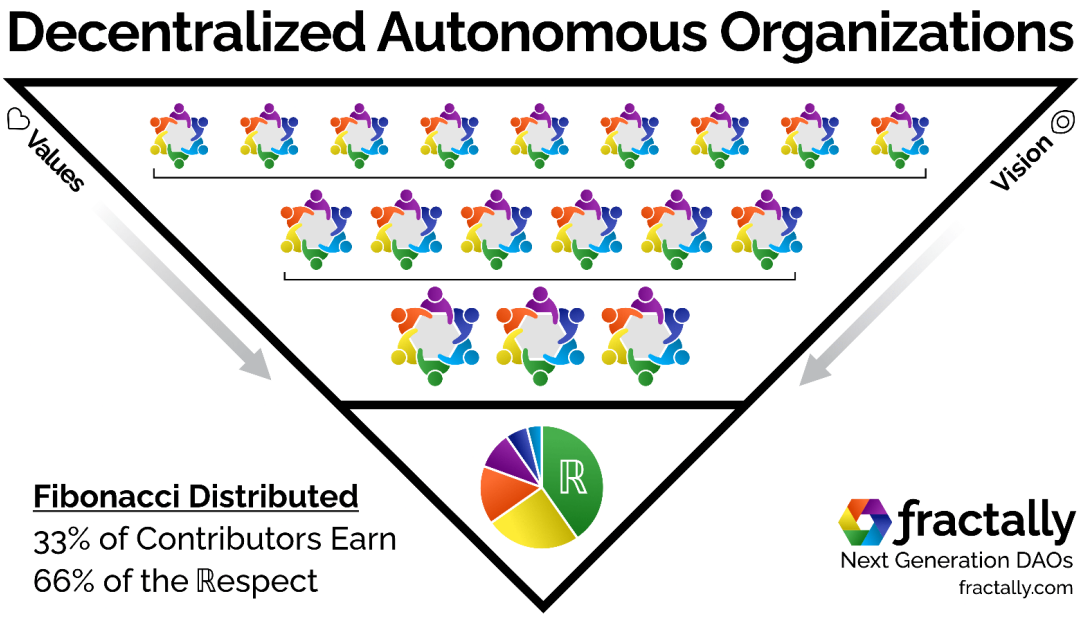
ℝespect is voluntary and confers no contractual rights or obligations between the giver and receiver (i.e. not a security). When someone HODLs the community's ℝespect, others who value the community's ℝespect may do more things for them in the future.

ℝespect can be transferred from one person to another; however, it is always held in the opinion of the community. A signed transfer is merely one way to change the opinion of the community.

Companies vs DAOs

Traditional companies and organizations are operated by a board of directors elected by shareholders. The shareholders are Pareto-distributed which means, typically, 1% of shareholders effectively control 51% of the voting rights and 51% of the voting rights is often enough to convey 100% of control. Furthermore, most day-to-day decisions are delegated from the board to a single CEO who sits on top of a pyramid of power.





A DAO turns the power upside down and gives it to the employees/customers. In the case of Bitcoin, miners make objective contributions and the work produced is judged objectively based upon the difficulty in finding a hash. The tokens, aka Bitcoin, have no voting rights. A ƒractally DAO, aka a ƒractal, replaces objective proof of work with subjective proof of work. Prior attempts at creating DAOs used token-weighted voting which caused them to mirror a

corporate structure. ƒractals are different: their ℝespect is more like Bitcoin and conveys no voting rights.

All power in a ƒractal is derived from the contributors. Like Bitcoin, the more the contributors work and produce value respected by other contributors, the more ℝespect they earn.

Earning ℝespect

There are hundreds of communities out there that need people to contribute their time and attention for the greater good. Whether you want to organize a political party, start a mutual aid society, share the gospel, or clean up the ocean, ƒractally empowers autonomous[3] communities to reach a consensus on how to give the ℝespect due to everyone's contributions.

ℝespect is initially allocated proportional to community growth. Assuming a fixed size community, the inflation model is a fixed amount of ℝespect per week or 6% annually whichever is greater. The relative quantity of earned ℝespect will scale to maintain the fixed annual supply increase of 6%. This mandatory minimum recognizes that present contributions are necessary to maintain community growth and that the value of historic contributions will decay with time. Different ƒractals may have different policies and they should all remember the principle that present contributions are more valuable than historic contributions.

1. Attend Meetings

ƒractally rewards those who are proactive in doing things for the community. This effort is then recognized and accounted for after the fact. Is there something you think you can contribute to a community? Go for it and you can start earning the ℝespect you deserve.

Once you join a community that shares your values, you can immediately start earning the ℝespect of your community by simply attending a 1-hour video conference and reaching a consensus with five other randomly selected community members. Whether you are a developer, marketer, blogger, YouTuber, event organizer, graphic designer, networker, lawyer, CEO, doctor, priest, or farmer, there is a place for you to contribute to a ƒractally community. The more a community values your contributions, the more ℝespect you earn.

Your opinion matters. Every week you get to share your opinion with 5 random members and get a say over how the community collectively respects their contributions. Over time everyone in the community gets to hear what you respect. Everyone has an incentive to negotiate with you in weekly meetings because 4 out of 6 people agree or no one earns

[3] Autonomous - self-directing, self-governing, self-sovereign; not subject to outside governance.

ℝespect. There is no other system where your voice has so much influence over how the community allocates its ℝespect.

2. Post Respectfully

If you don't want to attend weekly meetings, you can still earn by making contributions in the form of social media posts. These posts can have direct value to the community or they can document your indirect contributions. The more people who like (aka respect) your content the more ℝespect you earn. ƒractally ensures that only real and active contributors can vote. If you liked the idea behind Steem or Hive[4] then you will love how ƒractally community governance takes content rewards to the next level. Unlike prior systems, ƒractally is resistant to bots and Sybil attacks.

3. Team Up

People get more done when they are on a team. ƒractally encourages everyone to join a Team by granting their Team matching ℝespect for every ℝespect earned by the Team members in other activities such as weekly meetings, posting, etc. Teams can have 4 to 12 members who must reach a consensus on how to distribute team funds among the team members.

4. Provide Liquidity

When you fund an automatic market maker between two ƒractals, you help connect communities and are simultaneously staking your tokens for 6 days (144 hours). In addition to earning market maker fees, one or more ƒractals are also subsidizing the liquidity which increases the ℝespect you earn. While providing liquidity, a member has an economic interest in two different communities and this interest ties everyone together for a stronger whole.

5. Recruit the Best

A community is only as effective as its members; therefore, the most critical component of success is for a community to recruit the most passionate and competent contributors it can find. To provide this incentive, all community members earn a commission equal to 5% of any ℝespect earned by the people they invite.

So if you recruit Joe and Joe earns 55 ℝespect in his first weekly meeting, then you would earn 2.75 ℝespect and the person who recruited you would earn 0.13 ℝespect. If Joe never earns anything, then no recruitment incentives are paid to you. If the people you recruit don't show up or aren't producing you have an incentive to encourage them to contribute.

[4] Hive - hive.blog

6. HODL ℝespect

When you HODL ℝespect of your favorite community, you are honoring everyone who has contributed to that community in the past and creating productive and mutually beneficial incentives for more people to contribute in the future. Nothing aligns community interests like shared ℝespect. When you commit to HODL for 6 months, you earn even more ℝespect. We call HODLing ℝespect, "sponsoring" a community.

> *"Give, and it will be given to you. A good measure, pressed down, shaken together, and running over, will be poured into your lap. For with the measure you use, it will be measured to you." - Luke 6:38*

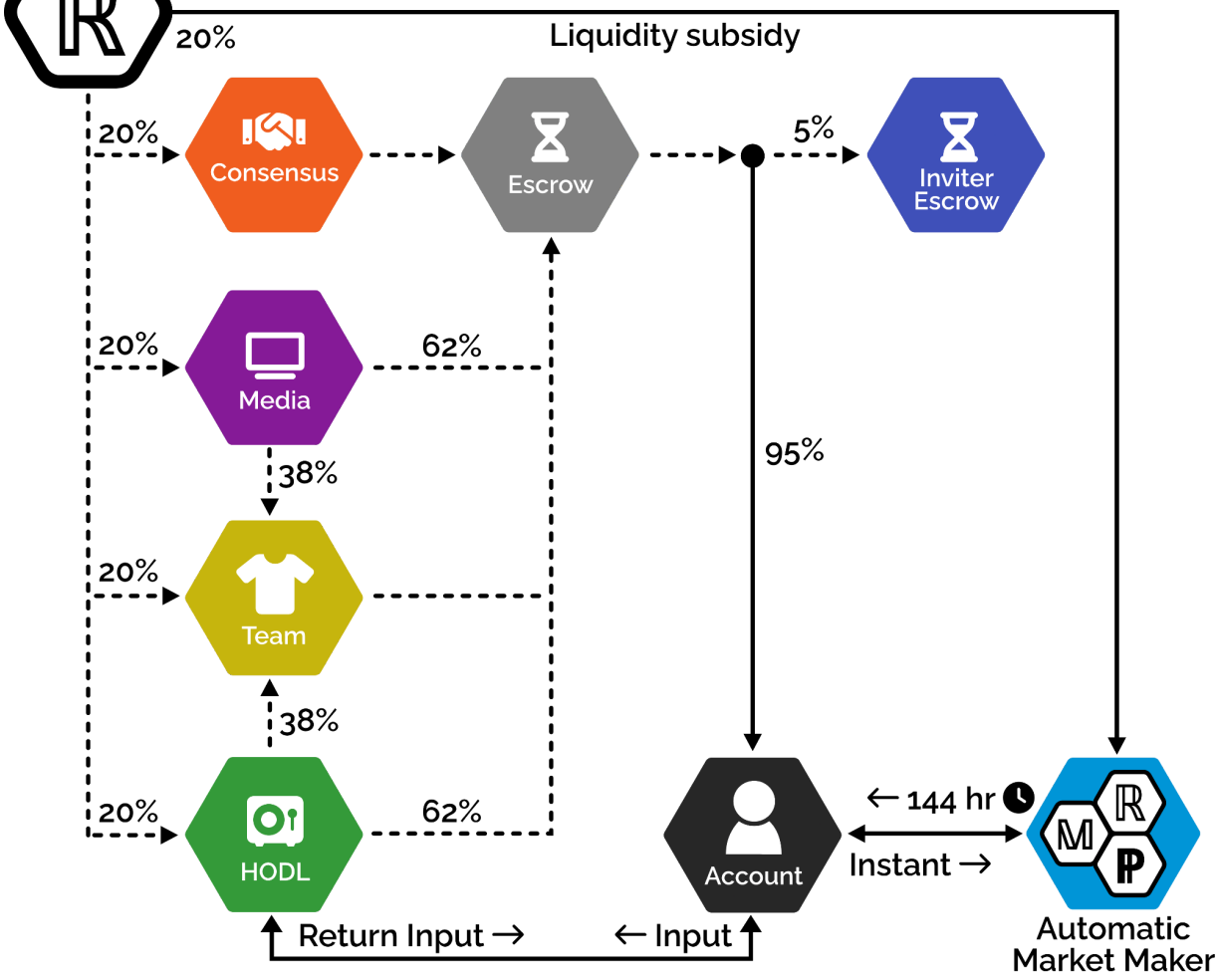
Respect Flow Diagram

The following diagram shows how respect flows from account to account through the system. All ℝespect starts out as "pending ℝespect", meaning that it is not yet issued nor considered part of the ℝespect supply. The ℝespect amount indicated on the diagram are "relative" and are subject to the community consensus of each ƒractal.

All ℝespect earned from any source (except market making), flows into a pending ℝespect account. At most 5% of the pending ℝespect can be converted to actual issued ℝespect per week and only once per week. An account that waits 20 weeks can convert 100% to issued ℝespect. Upon conversion, 5% is transferred to the inviter's pending ℝespect account.

This pending ℝespect account serves as a bond which the community can levy fines against via the governance process. It also serves as an automatic staking mechanism to ensure those making governance decisions have skin in the game.

Distribution of ℝespect



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Issued ℝespect

Pending ℝespect

All % subject to ƒractal consensus

ℝ = respect

𝕄 = mutual respect

℗ = peer respect

Weekly Consensus Meetings

The idea of a weekly meeting is similar to the standup meetings held by many companies. All employees are used to attending weekly meetings and expect to get paid for doing so. It is no different with members of a ƒractal.

The purpose of the weekly meeting is to build consensus on the rank-order value of each individual's contribution to the ƒractal's cause. Rank-order means sorting from greatest to least. 4 out of 6 or 3 out of 5 must agree or no one earns anything.

The highest ranked individual from each of the groups is sent to the next round where the process is repeated in a ƒractal manner (aka ƒractally). This process is repeated up to 5 times or until there are less than 6 people in a round.

Schedule

All groups in a round meet at the same time. This prevents one person from having multiple accounts and attending multiple meetings. The community governance process determines the schedule for the meetings.

83% of the participants are only required to attend for 1 hour. 13% are required to attend for 2 hours and 2.3% are required for 3 hours. There is a 15 minute break between 1 hour sessions. For really large ƒractals it may take 4 or 5 hours for the top 1% of most valuable members,

but these members are also earning significantly more for their time. If you use a corporate analogy, higher level management spends more time in meetings to reach consensus than lower level employees.

Checkin

To operate efficiently and prevent empty groups from "no shows", everyone must check-in during the 10 minutes before the start of the meeting. This involves opening the ƒractally application and visiting the meeting page. Everything from here is automatic.

Only those who check-in are assigned to groups. With the check-in process, there should be very few people who are unable to join their assigned meeting and very few groups that have 5 members instead of 6.

At the time of check-in a secret hash is submitted to the blockchain. After the check-in window closes every client has 2 minutes to reveal their secret. Only those who reveal their secret will participate in the meetings. The random groupings will be assigned based upon the collective hash of all revealed secrets. Each person is thereby given the power to change a single bit of randomness by waiting for "everyone else to submit" and then deciding whether to reveal or opt out. For all practical purposes this ensures mathematically provable honest shuffling of the groups.

Introductions

If a meeting starts at 6:00 PM, then everyone is expected to join the meeting by 6:05 PM. These first 5 minutes are reserved for working out any connectivity, video, and audio issues. People can also introduce themselves while waiting for everyone to join. Anyone who fails to join the video call within 5 minutes should automatically be the lowest rank in the resulting consensus. If more than two people are late, then the latest member should rank lowest. This will be subjectively enforced by each group and any group that fails to enforce this promptness rule may be held accountable by the governing Council. Established communities should adopt a preamble (purpose) & an operating framework (rules such as promptness rule) as part of their initial construction. The recorded video call should provide all the objective evidence of tardiness required. The user interface will also enforce these rules which should make it exceedingly difficult for a random group of 4 people to utilize an alternative method of reporting a different consensus.

Presenting Work & Reaching Consensus

In each meeting, people are given a 5 minute time slot to present their contributions. After all presentations are made, the group has 25-30 minutes to reach a consensus on how to rank each member from highest to lowest. These rules are subjective and enforced via the peer review part of the process.

Individuals can advocate for their individual contributions as well as the contributions of the Team they have joined because the Team will receive 50% of the ℝespect earned by the individual.

The group can use any process they like to reach consensus so long as everyone agrees by the end of the 1 hour window. ƒractally intentionally avoided implementing a voting and tallying system because all such systems encourage people to "vote strategically" instead of honestly. Instead the meeting should be a back and forth discussion and negotiation.

The lack of a "voting" system means that people are forced to build trust that everyone is in agreement so that they can accurately report their opinion on the consensus. Building trust is a vital part of strong communities and identifying those who violate trust is critical to securing the integrity of a community.

Proof of Consensus - Two Phase Commitment

Once consensus is reached, all members report to the blockchain with a two-phase commit. First they submit a salted hash of the consensus opinion; then, after everyone has committed, everyone reveals the consensus rank order. This process will be automated by the user interface.

The purpose of the two-phase commitment is to prove that consensus was actually reached. Anyone who wasn't part of the video call and any automated systems would not know how to report in. Furthermore, this is not a "vote" on what each individual thinks the order "should be", but rather, the mutual reporting of the shared consensus. At least 4 of 6 or 3 of 5 must report and agree. Anyone who doesn't report a consensus aligned with the majority does not earn any ℝespect. In practice, this means that all people will report the same order.

Peer Review

At the end of each call, members can rate their experience with the other members. Members who monopolize the call by talking too much, or are combative, rude, etc. should receive a low rating. Members who are friendly, polite, courteous, and pleasant to work with should get a high ranking. Over time everyone will be rated by everyone else and these ratings can serve as evidence for toxic individuals whom the community may want to consider removing.

Meeting Times

The governing Council of each community (more on this later) has the power to set the day and time of each round of the weekly meetings. Communities that want to prevent members from dual membership should consider scheduling at the same time as the competing community. ƒractals that encourage dual membership may wish to schedule their meetings on different days and times.

Respect Distribution

The following table shows how new ℝespect is allocated based on consensus meetings.

Round 1

Member Contribution Rank Round 1	ℝespect Earned
Rank 1 - Least Contribution	2 ℝ
Rank 2	3 ℝ
Rank 3	5 ℝ
Rank 4	8 ℝ
Rank 5	13 ℝ
Rank 6 - Greatest Contribution	21 ℝ

The contributors of the first round rank 1-6. Everyone at rank 6 of round one participates in the second round and 5 of the 6 participants in that second round get promoted to higher ranks (7-11). Because membership is not a multiple of 6, some groups will have only 5 members. In that case, the ranking is 2 through 6 and no one receives a rank of 1 from this group.

This distribution pattern follows the Fibonacci sequence which is commonly found in nature. Under this sequence, 16% of the participants in the first cycle earn about 40% of the compensation. This is a softer form of the 80/20 Pareto principle.

Round 2

After the first round, those members who rank highest are then randomly grouped into a second round. In this round, the Fibonacci sequence continues.

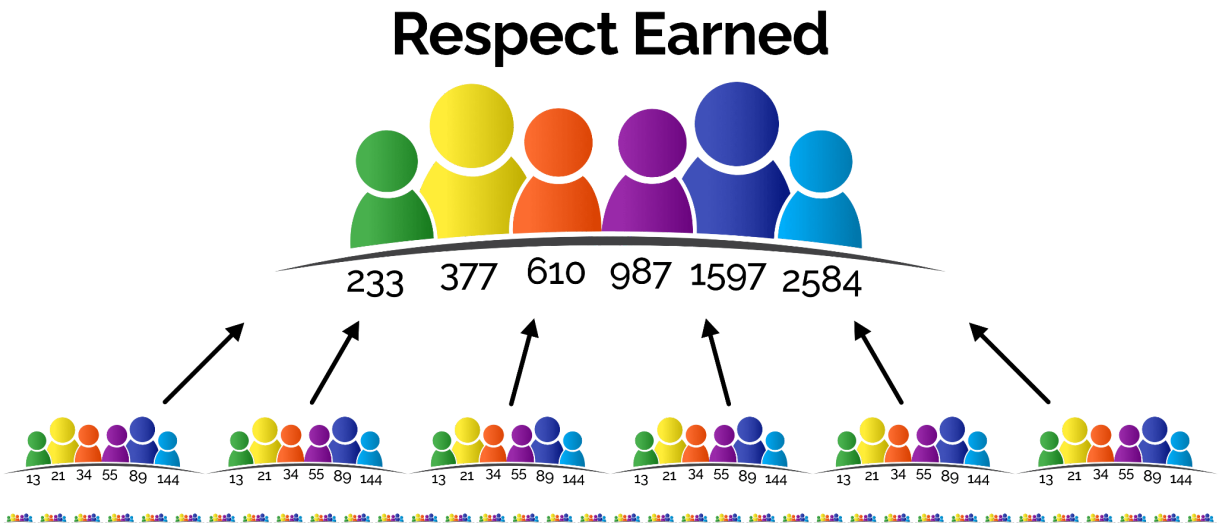
	Respect Earned		
Member Contribution Rank - Round 2	**Current Round**	**Prior Round (1)**	**Net Increase**
Rank 6 - Least Contribution	21 ℝ	21 ℝ	0 ℝ
Rank 7	34 ℝ	21 ℝ	13 ℝ
Rank 8	55 ℝ	21 ℝ	34 ℝ
Rank 9	89 ℝ	21 ℝ	68 ℝ
Rank 10	144 ℝ	21 ℝ	123 ℝ
Rank 11 - Greatest Contribution	233 ℝ	21 ℝ	212 ℝ

Note these are cumulative rewards meaning the net increase in the second round is 0 (21-21) for the least and 212 (233-21) for the greatest. The goal is to rank-sort all contributors and to have their reward grow according to Fibonacci.

Round 3

	Respect Earned		
Member Contribution Rank - Round 3	**Current Round**	**Prior Round (2)**	**Net Increase**
Rank 6 - Least Contribution	233 ℝ	212 ℝ	21 ℝ
Rank 7	377 ℝ	212 ℝ	165 ℝ
Rank 8	610 ℝ	212 ℝ	398 ℝ
Rank 9	987 ℝ	212 ℝ	775 ℝ
Rank 10	1597 ℝ	212 ℝ	1385 ℝ
Rank 11 - Greatest Contribution	2584 ℝ	212 ℝ	2372 ℝ

This process will continue until there are fewer than 6 people or up to 5 rounds.



In the event any group fails to reach a consensus, they receive ℝespect based upon the consensus of the last group in which they were able to reach consensus. In other words, instead of 5 of the 6 people being promoted from Rank 11 to Ranks 12-16, everyone would remain at Rank 11. Consensus failure in the first round results in a Rank of 0 and no ℝespect earned.

Anyone who submits a consensus report that disagrees with the majority will also receive a Rank of 0 irrespective of the group's actual consensus.

Ultimatum Game

There is a well-known economic experiment known as the Ultimatum Game[5]. In this experiment, one person is given $100 and asked to share some part of it with another player. The other player then has the option to accept or reject the offer. If the offer is rejected then neither player gets to keep the money. If it is accepted then both players get to keep it. In numerous experiments, it was found that offers below $30 were routinely rejected even though $30 is better than nothing. The actual results varied from culture to culture which indicates that ƒractals will likely work best when composed of people from a similar culture.

When asking a group of people to reach a consensus or get nothing, we face a similar problem. If you put six people in a room and all of them believe they have made equal contributions to a community, then they are likely to reject any consensus where they get significantly less than someone else. By following the Fibonacci sequence, any two consecutively ranked contributors agree to a 38/62 split in the award and are therefore likely to reach consensus even if they both feel a 50/50 split would be fairer. The more stubborn individual would likely get 62%. Furthermore, the group winner receives about 40% while the rest, the runner-ups, collectively get 60%. This means that if you can view the runner-ups as one logical person agreeing to the proposed split and the winner as being asked to accept or reject, the winner would still accept even if no one else did anything to deserve their compensation.

In a hypothetical situation where all members contributed an objectively equal amount, they would have to decide between everyone getting nothing or allowing others to get more. Chances are they would find some basis, perhaps even random chance, to reach a consensus on the order rather than everyone getting nothing. Over multiple iterations of this process, the community should correct for any past imbalances.

Any individual who is consistently part of groups that fail to reach consensus is automatically removed from the community. This creates a bias toward building a consensus instead of rejecting an unfair outcome. Those who are persistently stubborn would be naturally filtered out to prevent them from griefing others. The proposed threshold for automatic removal is failing to reach consensus 5 out of 10 consecutive weeks. Over a 20 week average, an individual needs to reach a consensus 67% of the time to remain in the governing community.

When you consider mimicking nature with Fibonacci, applying the experimental results from the Ultimatum Game, and the Pareto Principle rule of thumb, we discover three metrics in alignment which is a good indication the system may be balanced and aligned with human nature.

[5] Ultimatum Game, Wikipedia

Party Ultimatum

One of the potential outcomes of this game is that approximately 50% of the population attempts to form a political party. This party attempts to demand that their members rank in the highest 3 spots of every group of 6 and everyone else gets the bottom 3 ranks. To back this demand, they threaten to block consensus and force everyone to get nothing. In this game, the stubborn half takes 81%, and the passive half takes 19% of the rewards. Based upon experiments with the Ultimatum Game experiment, the non-colluding parties are likely to reject the efforts of the colluding parties outright. That said, the colluding parties can bribe the first defector with the highest of the bottom 3 ranks.

Because 67% are required to agree to make a consensus and it takes 50% to block a consensus. A two-party system would end up in a deadlock.

The reality is that any political party attempting to collude and split the bounty would still require an internal party governance system. This governance system is necessarily less democratic than the ƒractally process and would depend upon extreme party loyalty over loyalty to the ƒractal. If such a party could create a better governance process then it might just be beneficial for the entire community to adopt it. In any event, we speculate that the incentive to form a minority party is relatively small relative to the gain party members might expect from the attempted collusion.

Group Size

Eden[6] had previously used groups of 5 people. ƒractally has intentionally changed the target group size from 5 to 6 in order to prevent a 40% collusive party from holding a 60% majority hostage. Requiring 5 out of 7 to reach consensus would allow 42% to hold 58% hostage. Going to 4 out of 7 would only require a 57% for consensus, which is significantly below the byzantine fault tolerance[7] (BFT) level of 67%. The next closest group size that maximizes BFT consensus and minimizes minority ultimatum is 6 of 9. The larger a group gets, the less efficient a conversation becomes. A few people will tend to dominate the conversation in large groups.

In a paper titled "*Group Discussion as Interactive Dialogue or as Serial Monologue: The Influence of Group Size*[8]", Nicolas Fay, Simon Garrod, and Jean Carletta studied the impact of group size on communication patterns. They identify two kinds of communication: dialog and monolog. In a dialog, members of a group discussion are likely to be most influenced by

[6] Eden - a blockchain community that utilizes a fractal governance process

[7] While BFT is not relevant in the traditional sense, if you assume there exists a 33% "bad" minority that is attempting to co-opt the governance process and a 66% majority which is aligned with the intention, then it still requires 50% of the "good guys" to agree.

[8] Group Discussion as Interactive Dialogue or as Serial Monologue: The Influence of Group Size - Nicolas Fay, Simon Garrod, Jean Carletta, 2000

those with whom they interact, whereas in a monolog they are likely to be most influenced by the dominant speaker.

This paper indicates that increasing group sizes beyond 5 tends to increase the likelihood of a monolog style discussion. Therefore, to maximize the influence of individual group members, group sizes of 5-6 people are ideal.

While we are designing based upon theoretically equal groups, the reality is that not all groups can have exactly 6 members (pigeon hole principle[9]). This means that in any given round up to 5 groups may only have 5 members depending upon how many check-in. It is possible for more than 5 groups to have 5 members and some groups to have less than 5 if some people check in but fail to show up in the meeting. When factoring in no-shows and remainders, the target group size needs to consider the consequences of two group sizes at the same time. So the options are 4-5, 5-6, 6-7, 7-8, or 8-9. Of these options, having some groups of 5 is better than having some groups of 4. With a group of 4, 3 of 4 must reach consensus (75%) and 2 of 4 (50%) can block consensus. If all groups could be groups of 4 then it would be a stronger consensus and easier dialog than if all groups could be groups of 6; however, in this case, some groups would end up being 3.

After much consideration, a target group size of 6 with some groups of 5 was found to be the best compromise. The rule for consensus within each group is either 4 of 6 or 3 of 5. This means that it always takes at least 50% of the group to abort a consensus and at least 60% of a group to reach a consensus, with the vast majority of the time requiring 67% for consensus.

[9] The pigeonhole principle states that if n items are put into m containers, with n > m, then at least one container must contain more than one item.

Teams

Joining a Team is one of the fastest ways to make friends and start earning more ℝespect.

ƒractally makes every effort to align with human nature. The book *"Blueprint - the evolutionary basis of a good society"* by Nicholas A. Christakis provides a treasure trove of useful information about how human social cooperation functions. Teams of people who engage in regular and repeated interactions have more incentive to cooperate than random individuals who only meet a couple times per year.

Teams make everything more fun. People working together with a diverse set of skills are far more productive than the same number of people working independently. Teams enable managers, organizers, and leaders to bring together people with diverse talents to produce something collaboratively. Absent teams, it would be hard for a "manager" to communicate their less-visible contributions in weekly meetings. It would be hard for the more introverted, soft-spoken, individuals to compete with the more extroverted public speakers.

Furthermore, teams working closely with a small group of people builds trust, provides accountability, and facilitates the division of labor. It is far harder to review the work of a random individual; however, if you are working as a team you have a far more intimate knowledge of each other's contributions.

When team members attend a weekly meeting, they are advocating for both their individual contributions *and* the contribution of their entire team. Since team members are randomly distributed among all the groups this process amplifies the number of people reviewing your and your team's activities each week.

While it is not necessary to join a team, doing so is the best way to get recognized for your contributions to the community.

Joining a Team

Any active member may start a new team and ask others to join. Once a team has 4 members it can select a team leader with ⅔ approval. The Team Leader is then eligible to participate in global ƒractal governance decisions. More information on the role of Team Leaders is provided in the governance section of this paper.

Allocating a Team's Respect

From this point forward, the team qualifies to earn matching Respect for any Respect earned by its members. Each Team reaches its own consensus on how to divide the Team's ℝespect. The way this works is that any team member can propose a transfer of team Respect to their personal account. Votes are then collected over the next 72 hours and as long as ⅔ of the votes cast approve the transfer then it goes through. This means that if there is no objection, then a single vote is all that is necessary to allocate team funds. If ⅔ of the team approves, then the transfer can occur immediately without further delay.

If the transfer is rejected then the original person who proposed the transfer loses ℝespect held in their escrow account. More detail on the escrow account will be provided later. A team member without sufficient funds in their escrow account cannot propose transfers from the team account.

Leaving a Team

If you would like to leave a team to join a new team, there is a mandatory 20 week waiting period before you are removed from one team and are eligible to join a new team. This creates intentional friction that encourages teams to collaborate to work out their differences rather than disband. It also causes people to think carefully before joining a team. This is based upon research described in "Blueprint" in which experiments

demonstrate that people collaborate the most when there is friction associated with changing social ties.

Media Rewards

ƒractally can be viewed as a massively multiplayer collaborative budgeting system that seeks to identify and reward the best contributions to a cause. Weekly meetings are not for everyone, so if you want to earn respect by contributing to the community without attending a weekly meeting, then posting rewards may be for you.

Historical Lessons Learned from Hive

Steem/Hive was the first social media platform that rewarded people who posted content with tokens. Under Hive, users would stake their tokens (lock them up) for 3+ months and in exchange receive voting power proportional to their staked tokens. An assumption was made that large token holders would tend to vote in the best interest of the token price. By rewarding a post proportional to the square of the votes cast, we incentivize users to concentrate votes. Posts With above-average concentration would get the vast majority of the rewards. Either one large holder or an army of smaller holders could allocate rewards, but individuals acting alone or in small groups would not earn much.

Turns out that vote-buying became pervasive and automated. Large holders could not be trusted to act in the best interest of all token holders. Smaller holders would frequently choose to rent their voting power and the vast majority of rewards intended for those who contributed quality content were instead allocated by algorithms as a convoluted form of staking rewards. Despite the abuse, there was still some signal in the noise and content creators could still earn.

Hive allowed up and downvoting and would calculate the net vote before applying the quadratic function. Eventually Hive adopted linear voting to “distribute tokens more evenly”, but it ultimately provided no opportunity cost for voting away from the consensus. This made vote buying even more profitable.

Assuming all users had an equal vote weight, the last upvote cast would have the most impact on the reward and a single downvote would cancel it. For example, if a post had 3 upvotes, the reward would be 9 (aka 3^2) which represented an increase of 5 from 2 upvotes ($4=2^2$). The first downvote would therefore cost the poster 5. This made it very easy for angry or vengeful people to cause grief to other users. In effect, the net of up and down votes did not accurately reflect consensus opinion on whether the content was “good”, “bad” or “neutral”.

If we are to improve upon Hive, then we will need to change the incentive structure to provide accountability and minimize the potential reward from vote buying. Ideally, those

who attempt to buy votes and subvert the public good for private gain see losses and get removed from the community.

ƒractally vote tally algorithm

ƒractally changes the algorithm such that the post-weight is equal to the sum of upvotes squared minus the sum of downvotes squared. This means that a post that has 3 upvotes and 1 down vote would end up with a weight of 9-1 or 8. A post with 3 upvotes and 2 down votes would end up with (3*3-2*2=5). A post with more downvotes than upvotes would earn nothing. This means that a controversial post can still pay reasonably well even if votes are 51 for and 49 against. In this case, a 51/49 split would pay similar to a 14/0 split.

```
Let V_p be the sum of the weighted likes on a post
Let F_p be the sum of the weighted dislikes on a post
Let R_p be the respect paid from the reward pool to a post's author
Let M be the shared reward pool balance
Let i be the post index
Let n be the number of posts
```

$$R_p = M \frac{V_p^2 - F_p^2}{\sum_{i=0}^{n} (V_i^2 - F_i^2)}$$

Posts, but not comments, qualify to receive likes for 24 hours after posting.

Vote Weight

While anyone can cast an opinion of whether the content contributes to the public good, only those who rank in the weekly meetings can contribute to the vote weight a post receives. This limitation prevents Sybil attacks and ensures voters are accountable. Each week a user's voting weight decays by 5% or 1 unit (whichever is greater) and each week a user can have their voting weight grow by their rank in the weekly meetings. 16.6% of the members receive a rank of 1, 16.6% a rank of 2, 16.6% a rank of 3, 16.6% a rank of 4, and 16.6% a rank of 5. 83% of all members have a rank from 1 to 5. 13.8% of the members have a rank from 6 to 11, 2.3% have a rank from 12 to 17, and .13% have a rank from 18 to 30.

This weekly ranking is averaged over 12 weeks to provide a more stable vote weight linked to an individual's average performance in weekly meetings.

Rate Limiting Posts

Each ƒractal has a limit on the rate of content creation, aka posts per day, to prevent spam and allow the curators/voters to discover and review. Therefore, there is a cost to post.

Think of posts like Bitcoin blocks. On average one post is made every 10 minutes and the difficulty is measured as a cost in ℝespect. If more than 7 posts per hour are flowing in, the cost goes up 5%. If less than 5 posts per hour come in, the cost goes down 5%. The cost will adjust up or down every 6 posts or every hour, whichever comes first. 50% of posting fees are contributed to the content reward pool and the other 50% are returned to the poster if their post receives more upvotes than downvotes. If a post receives more downvotes than upvotes then 100% of the fee is contributed to the reward pool.

This means that each poster is doing the economic calculus to determine whether they believe their content will garner enough upvotes to overcome the cost of submitting a post. This allows anyone on the internet to submit content and earn the ℝespect of a ƒractal.

Each ƒractal can choose their own rate limits depending upon their objectives.

Rate Limiting Votes

No one has the time to evaluate all content contributed and absent a rate limit, those who employ automated voting strategies will be able to cast more votes than those who do so manually. To provide some balance, users are allocated voting power which recharges to 100% linearly over 24 hours. Each time they vote they consume some of their voting power.

Total post vote weight is the sum of each voter's Voting Power Consumed times their Voting Weight. You could cast five "super votes" using 20% of your vote power or you could cast 20 regular votes consuming 5% each or you could cast 100 micro-votes using 1% of your voting power. Up and downvotes are weighted equally. You cannot apply more than 20% of your voting power on a single post. The user experience will be like Medium's long-clap where the longer you press the more power is applied.

Voting Abuse

Hive[10] experienced a problem where some voters would vote in ways intended to harm or harass those honestly contributing to the public good. They would sell their votes. They would always vote for their friends and downvote everyone else. In general, they would use their voting power to extract as much value for their personal benefit as possible. Fortunately, anyone engaging in this kind of voting behavior will likely find themselves ranking far lower in the weekly consensus meetings and therefore their voting power will be greatly curtailed. Furthermore, the cost to submit a post places a minimum quality expectation which means the "honest majority" can ensure that it is a loss-making endeavor to publish worthless content in an attempt to garner unearned votes.

[10] Hive.blog - a community fork of Steem

HODL ℝespect

Those who buy ℝespect are sponsoring one or more communities. When you make a long-term commitment to sponsor a community you can earn Sponsorship rewards. This takes the form of locking up ℝespect for 6 months and being given an increase in your ℝespect. A percentage of all respect allocated by the weekly consensus meetings is paid to a reward pool. If there are no weekly meetings then the sponsorship reward pool is not funded. This means that sponsorship rewards are directly proportional to the increase in the ℝespect supply.

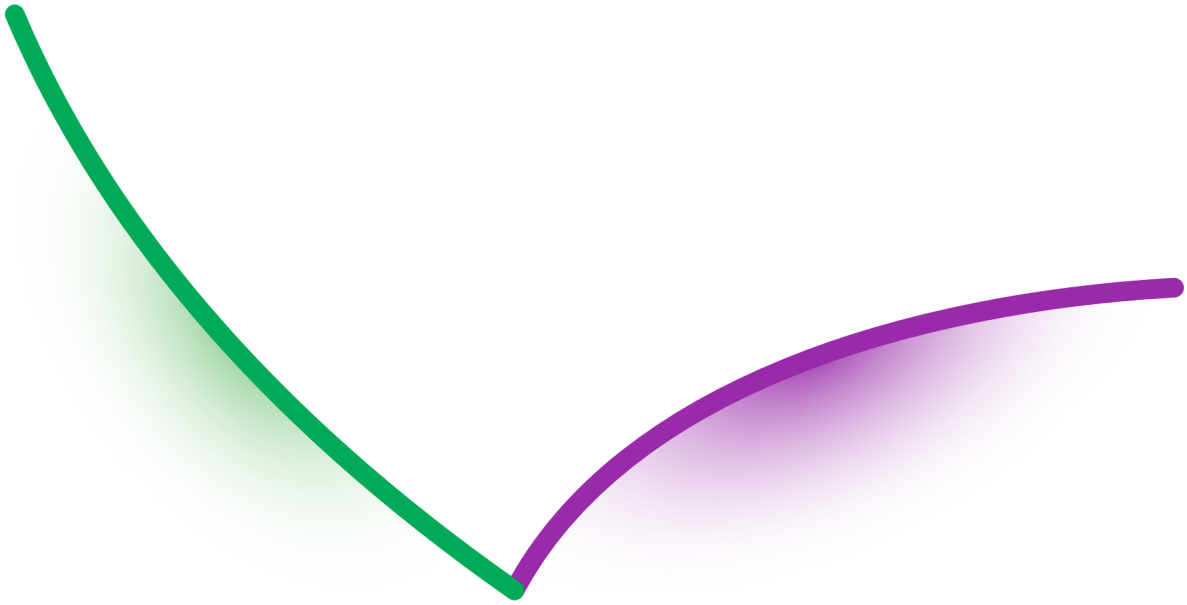
To calculate the amount of Respect earned for sponsoring a community, we allocate a percentage of the sponsorship pool proportional to the Respect locked up relative to the average amount of respect locked up in the past 6 months.

For example, if on average 900R has been contributed to sponsorship in the past 6 months and the sponsorship reward pool has 333R in its balance, then a new sponsorship of 100R would earn 333 * 100 / (900+100) which is 33R after 6 months.

The respect allocated to the sponsorship rewards after a weekly consensus meeting is distributed evenly over a 7 day period. This ensures a smooth adjustment and prevents any unfair advantage bots would gain from an instantaneous increase in the sponsorship reward pool.

Some of the principles guiding this design are that sponsors should always know the expected yield at the time they commit and that the rate of return should be established by market forces.

The person who invites a sponsor gets 5% of the reward. If there is no inviter, that 5% is returned to the pool. This creates incentives to invite people who will sponsor the community while providing no incentive to sponsor anonymously to avoid the 5% inviter reward.



Market Making Rewards

Each ƒractal has its own Respect token and there is value to being able to easily convert ℝespect in one community into ℝespect in another community. This requires some people to hold 𝕄utual ℝespect in two communities.

As the relative value of each ƒractal's ℝespect changes an automatic market maker can rebalance to maintain equal value of respect in two ƒractals.

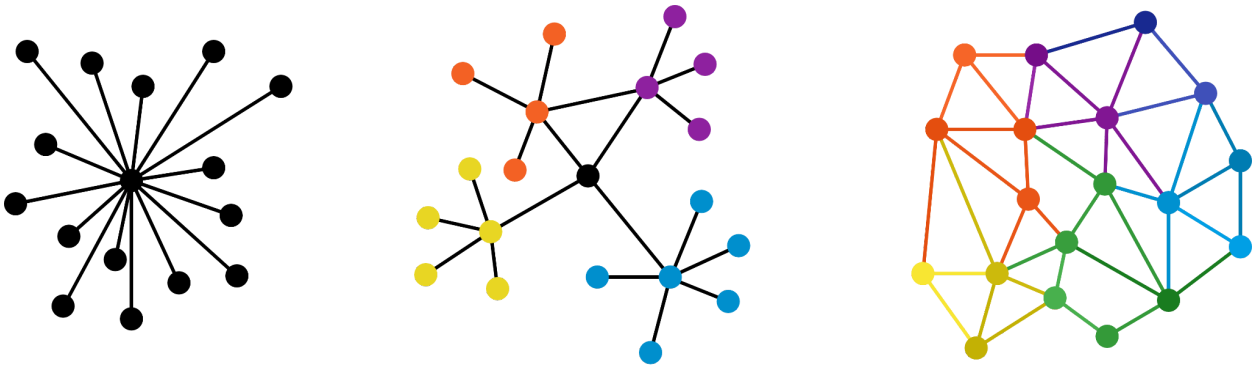
Bootstrapping the Market Maker
The Market Maker is a smart contract that allows anyone to bootstrap liquidity between two tokens by providing an initial deposit of both tokens in exchange for the initial allocation of Market Maker Tokens, which we call 𝕄utual ℝespect or 𝕄ℝ.

𝕄utual ℝespect Staking
Holders of 𝕄ℝ are able to convert to the underlying ℝespect tokens after a 144 hour delay. This delay gives market participants an opportunity to adjust to changes in liquidity and is there to future proof the market maker for more advanced leverage and option trading. The 144 hour delay also prevents abuse from those attempting to earn liquidity rewards by funding right before the liquidity reward is added and withdrawing right after.

𝕄ℝ is also a token which can be transferred and traded so people can provide liquidity without actually giving up their own liquidity. This allows the creation of 𝕄utual 𝕄utual ℝespect (𝕄𝕄ℝ).

Distributed Liquidity

There are many different models for providing liquidity. Traditionally, exchanges utilize a centralized approach where all tokens are traded against a common currency. To convert from currency A to currency C you must flow through currency B. With an automated market maker this would look like all ƒractals linked to one central ƒractal which everyone is exposed to. The central ƒractal inherits disproportionate economic control over the value of the other ƒractals.



Centralized Decentralized Distributed

A decentralized approach looks like multiple centralized exchanges utilizing a number of fiat currencies. Under this approach the majority of liquidity still flows through central hubs. The "hub" currencies have far more economic power than the "spoke" currencies.

Distributed Approach

A distributed approach looks like a mesh blanket where every token is directly trading against many other tokens. There are always multiple paths for converting from one currency to another. When the value of one currency rises it pulls up the value of everything else connected to it both directly and indirectly.

A distributed approach most closely mirrors the relational structures between people which are part of multiple ƒractals. It also mirrors how people are organized geographically. You can view it like a network of roads connecting cities. This distributed approach maximizes the autonomy of each ƒractal by freeing them from dependence upon any single hub currency.

Left to their own devices, people tend to take the easiest path. The easy path results in the centralized currency providing liquidity to all other currencies. It is easy because it has the fewest number of "lines" where each line represents an automatic market maker. To get from point A to point B you always go through the hub, which makes decisions about how to convert easier.

There is also an element of the "rich get richer" as liquidity attracts liquidity. If ƒractals are not careful they will all end up subject to the governance of a single powerful currency. Therefore, ƒractally needs to provide a structure that ensures liquidity forms in a distributed manner. The system also needs to ensure that ƒractals don't attempt to provide liquidity to all other ƒractals: a fully connected mesh. The fully connected mesh has the most lines and is the least efficient.

ƒractally encourages the creation of economic bridges (market makers) among the ƒractals by subsidizing liquidity. Each ƒractal must choose which peers to subsidize. If things were "negotiated" then both sides of the economic bridge would likely provide similar subsidies for liquidity. This "balanced subsidy" would tend toward a fully connected mesh as there is no need to "favor" one bridge over another. The biggest ƒractals would be connected to almost everyone and liquidity would be too low over any single bridge.

One way to prevent a fully connected mesh is to limit the number of peer ƒractals that any single ƒractal sponsors liquidity with. For example, each ƒractal could be limited to six to twelve peers. This limit would likely result in clusters of highly connected ƒractals loosely connected to other clusters because most ƒractals would seek reciprocal subsidy relationships with their peers. Furthermore, we want a system that disincentives the formation of closed circles.

Rank-Order Liquidity Subsidies

ƒractally will allocate liquidity subsidies to those who hold 𝕄utual ℝespect in two communities in a manner similar to the weekly meetings. The members will rank-sort the most valuable peer ƒractals and then distribute ℝespect according to the Fibonacci sequence.

Members of a ƒractal vote on which market makers to subsidize and their votes are weighted by their 20 week average *ranking* in the weekly meetings. The liquidity subsidies are then divided among the top 12 market makers by Fibonacci. The following table shows the percentage of liquidity rewards allocated according to vote rank:

Rank	Fibonacci Shares	Percent
1	377	38.3%
2	233	23.7%
3	144	14.6%
4	89	9.0%
5	55	5.6%
6	34	3.5%
7	21	2.1%
8	13	1.3%
9	8	0.8%

Rank	Fibonacci Shares	Percent
10	5	0.5%
11	3	0.3%
12	2	0.2%

Traditional Network Provided Liquidity

This creates a major difference from prior implementations of Network Provided Liquidity where the network funds the pools directly. The result is an amplification of the liquidity provided. Consider the difference between the network seeding the Market Maker with a one-time injection vs. the network subsidizing market participants who provide funds to the Market Maker.

In the traditional approach, a DAO/DAC would auction off tokens to fund a market maker. In the ƒractally approach, the network provides added incentive to market participants who provide liquidity. This multiplies the liquidity, minimizes downside risks, and prevents one community from having a treasury of another community's tokens which could be stolen or mismanaged.

The easiest way to understand the difference is by analogy. Suppose you have an income of $1,000 per month and want to buy a house without a loan. In this case you must live in a very small house and grow it over time. Now suppose you took that same $1,000 per month and used it to pay rent. Now you could afford to live in a house worth hundreds of thousands of dollars immediately. More importantly, you are not responsible for maintaining the house.

Likewise, a community that buys equity in their market maker at $1,000 per month takes a long time to build up liquidity; however, that same community that opts to pay $1,000 per month to rent liquidity can have an order of magnitude more liquidity immediately.

The other significant effect is that the ƒractals transfer the price volatility risk to market participants in exchange for a "fixed cost". The ƒractals recognize the market participants for the ongoing real value of having liquidity between two currencies and don't need to worry about managing or liquidating community-owned 𝕄utual ℝespect.

This means that both sides of the liquidity partnership between the ƒractals have no ongoing interest in the market maker and may choose to increase or decrease their contribution to the liquidity providers independently. In fact, it allows unilateral liquidity subsidies. This makes for a smooth transition when a parent ƒractal wants to kick a child ƒractal out of the nest once it is mature enough. It allows either party to remove subsidies without disrupting the market maker. It frees both ƒractals from having to make rapid decisions with respect to pulling liquidity in the event the counterparty adopts an exploitive monetary policy.

Both ƒractals only risk the recurring daily inflation rather than a large pool of funds. Meanwhile, if the market sees a ƒractal proposing changes to their monetary policy, it will react to rapidly adjust the price and/or liquidate their ℳℝ tokens. This prevents large communities from having to rapidly respond in order to protect a "community treasury".

Recruitment Rewards

A community is only as effective as its members; therefore, the most critical component of success is for a community to recruit the most passionate and competent contributors it can find. To provide this incentive, all community members earn a commission equal to 5% of any ℝespect earned by the people they invite.

So if you recruit Joe and Joe earns 55 ℝespect in his first weekly meeting, then you would earn 2.75 ℝespect and the person who recruited you would earn 0.13 ℝespect. If Joe never earns anything, then no Recruitment incentives are paid to you. If the people you recruit don't show up or aren't producing you have an incentive to encourage them to contribute.

Recruitment is ƒractal, meaning that you also earn a share of other people's recruitment rewards. Whether someone is earning respect by consensus meetings, teams, staking, or recruitment, you get a cut for bringing them to the community. That said, you must attend the weekly meeting and reach consensus to qualify. Any recruitment rewards earned the week after you miss a meeting are burned.

Community Size Limits

Corruption in any governance system grows as the number of people involved increases. Small towns are generally safer than large cities. Dunbar[11] discovered that there are natural limits to how many people we can recognize and maintain a relationship with. For this reason, it is critical to limit the size of a ƒractally community.

Each community is limited to 7,776 members; therefore, invitations are rationed. In order to qualify to invite someone you must have attended the most recent weekly meeting. Each member can invite at most 6 people per week. Once a ƒractal reaches more than 1296 members in a weekly meeting it isn't possible for everyone to invite 6 people. At this point everyone is given 5 invites and some of the top ranked individuals are given 6.

By the time a community reaches 3,888 weekly active members, each member is only allocated 1 invitation per week. Once the community reaches 5,000 weekly active members only the top 2,776 contributors are allocated the power to invite a single person each. When a community reaches 7,000, only the top 776 (11%) can invite someone. When a community

[11] Robin Dunbar https://en.wikipedia.org/wiki/Robin_Dunbar

reaches 7,775 members, only the most valuable contributor over the past 20 weeks is granted the power to invite someone.

Each invitation represents an opportunity for the Inviter to earn ℝespect and so the inviter is incentivized to use it wisely. That said, invitations don't accumulate and unused invitations will eventually be reallocated as the community grows or you stop attending weekly meetings. Therefore, you want to invite the most productive people possible as quickly as possible. There is nothing to be gained by inviting someone who won't earn ℝespect.

Extended Community

The community size limit applies only to the governance (teams, weekly consensus, and social media voting) and not to the ownership of a community's Respect tokens, posting, HODLing, and market making. In theory a billion people could use the currency of a community governed by 7776 people. This is like the boards of the top 500 companies, the United States congress and senate combined. Collectively these top 7776 leadership positions have de facto governance control over an economy.

This extended community of token holders can earn Respect by staking, market making, and posting. If they lose respect for a community's ability to govern itself, then they simply sell their respect and "vote with their feet/wallet". With hundreds or thousands of ƒractals, everyone will have an opportunity to govern in their "local" community and an opportunity to participate in any number of Extended communities.

Pruning Community Size

Since the community size is capped and invitations are limited, there is a need to remove people. A person can either actively resign or they will automatically be considered to have resigned after 12 weeks without attending a weekly meeting. Additionally, the council may opt to evict a member who is harming the community.

Once a community reaches 7,000 weekly active members, the automatic resignation timeout will be reduced to missing 6 consecutive meetings. This raises the bar to favor more active contributors.

Anyone who resigned or was removed for inactivity will require a new invite to rejoin. Therefore, the original inviter loses claim to their recruitment rewards and the new rewards are assigned to the new inviter.

Anyone who is evicted by the council for harming the community will require council approval to rejoin. When they rejoin, there are no Inviter Rewards (no Recruitment Incentives).

Fractal Growth of Community

Any community that reaches 7,000 members should seriously consider sponsoring a new community (ƒractal) aligned with the same goals. This new community would have new kind of ℝespect and the two communities could be linked by automatic market maker liquidity.

Governance

So far, we have looked at part of the process of allocating a community budget, but some actions require global consensus. Things such as updating community guidelines or the community smart contract need to be decided by the people as a whole.

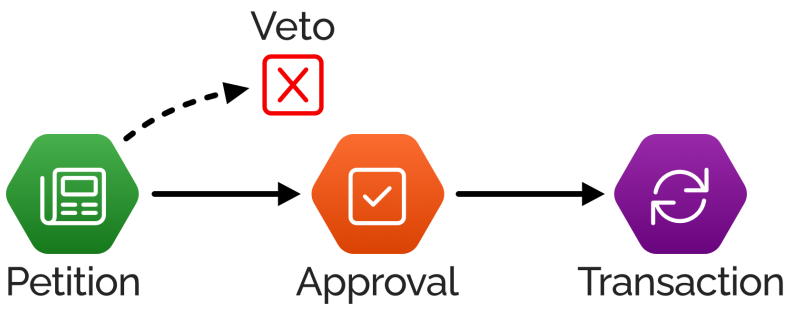
Council

The ƒractally community is governed by a Council comprised of the Team Leaders from the top 12 teams as measured by total ℝespect earned over the past 20 weeks. Each Team consists of 4 to 12 people and larger Teams have a slight advantage over smaller teams because they have more members participating in weekly meetings. Each Team elects a leader with the approval of at least ⅔ of the team members. A Team can change its leader at any time.

Up to 144 people from the top 12 teams are involved in selecting the 12 members of the Council and the Council has the power to take any action involving the "owner authority" of the smart contract with approval of 8 of 12 Council members. That said, all actions taken by the Council have a 24-hour review process during which the 12 Teams can change their Team Leader and thereby invalidate the vote of the prior Team Leader.

How a Bill becomes a Law

The *community's will* is expressed via a smart contract. A "bill" is any proposed transaction that requires the owner authority of the ƒractal's smart contract. We call bills "Petitions." This means upgrading the community contract is initiated through a Petition. It means that transferring ℝespect sent to the community could be initiated via a Petition. It means making a post, staking in a decentralized exchange, or any other action that a blockchain account can take, could be via a Petition. Fining users, evicting users, recovering accounts, etc., are all actions that could require the community authority to execute.



In addition to a proposed transaction to authorize, a Petition is accompanied by a blog post that explains the intent of the transaction and makes the case for why the community should take the action. Community members can then interact with it like any other social media content (liking, commenting, etc.).

Here are some examples of what the council can do:

1. Upgrade the community smart contract
2. Update the community guidelines
3. Charge a fine to community members violating guidelines
4. Evict a community member
5. Allocate a budget
6. Make a statement on behalf of the community
7. Resolve a dispute
8. Recover an account
9. Appoint representatives to other communities

Community Veto

Certain actions, such as upgrading the community smart contract, require extra protections to protect the people from the Council and even the top 12 teams. These actions should be reviewed by all. In this case, the action requires a 21-day delay and can be vetoed by 8 of the top 12 teams by total team income in the most recent week's meeting.

Normally the council is composed of the top teams based on a 20 week average; however, for the purpose of vetoing the 8/12 of the top teams from the most recent week is all that is needed. This means that if any community member doesn't like the change proposed by the current council, they can rank people and teams opposed to the action higher. This creates an effective referendum where everyone in the community can reach a consensus to block the incumbent (20 week average) council from acting.

Bootstrapping a ƒractal

Each ƒractal is its own smart contract and anyone can create a ƒractal by deploying the smart contract. Once deployed, the founder starts inviting members. A new ƒractal will require a user interface and fractally.com would need to know about the account. Therefore, to create a new ƒractal, you fill out a form on fractally.com and we will deploy the contract and add it to our index. All ƒractals hosting via fractally.com would need to use a contract known and approved by ƒractally to be compatible with our user interface.

Once a ƒractal contract is deployed, its founder has complete control over membership and parameters until he explicitly yields control to its community governing Council. At this point, the community governance process takes over and it can choose if and how to express ℝespect for its members. If control is never yielded, then a community can always "clone" itself and leave the founder behind.

While this is the "easy" approach, all code from fractally.com is open source and can be self-hosted by others. This ensures that all ƒractals are free from dependence on ƒractally.com if they so choose.

Is ℝespect a Security?

We are not lawyers and the following should not be taken as legal advice. In our opinion, ℝespect is not a contract and confers no rights, obligations, or fiduciary duties among the parties who create, buy, sell, own, or have owned the ℝespect. ℝespect is an opinion expressed by the community and distributed according to community consensus as a non-binding, voluntary recognition of community members for their contributions. ℝespect is a subjective expression of the relative degree of contribution of each member to a community. It is only awarded after a contribution and never for a promise to do something. ℝespect has no value beyond the perceived value of those who choose to buy and sell it.

No one is entitled to receive ℝespect for any services provided to the community. Furthermore, the community, at its sole discretion, may freeze or reallocate ℝespect at any time for any reason. This means that all ℝespect is actually owned by the community and confers no property rights to the holder. They are a measure of reputation assigned to each person, and that reputation is subject to change at the sole opinion of the community. Changes to the ℝespect smart contract are governed by the community and not by ƒractally LLC. If someone decides to buy ℝespect, it should be done so as a gift to the community for the services it has already performed and not based upon any expectation of the community, or anyone else, to perform any services or confer any benefit to you in the future. If you decide to sell ℝespect, you agree to inform the buyer that any value received in exchange for the ℝespect in the future is a gift and that there are no rights or obligations conferred from the seller or any other party to the buyer. ℝespect does not represent a

partnership interest and no individual is authorized to speak on behalf of a ƒractal or other ℝespect holders.

ℝespect confers no voting rights nor any other power to the holder.

ƒractals are not a collective investment fund because no money or other assets are pooled and there are no standing investment managers. All tokens are created and distributed to active participants according to the judgment of those participants and not according to ƒractally LLC.

Aragon Comparison

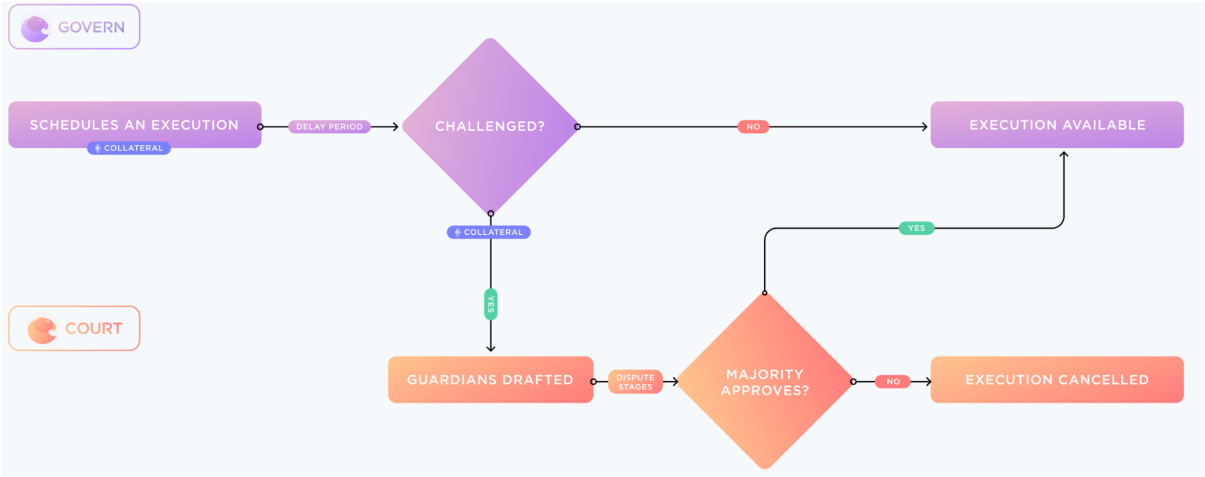
Aragon[12] is an organization that produces tools that help communities bootstrap and operate their own "decentralized autonomous organizations". Much of the content on their website sounds similar to what ƒractally is doing. So let's do a deep dive into the fundamental similarities and differences between a fractally DAO (aka a ƒractal) and an Aragon DAO.

Aragon impressed us with their thoroughness and philosophy of freedom. For the sake of this comparison, we're going to ignore the critical technical challenges presented by Aragon building on Ethereum. I'm also going to ignore the elements of centralization created by technical dependencies on critical infrastructure and the centralized safe guards with veto power they put in place. Most of these are implementation details that don't impact the merits of their proposed governance structures.

Optimistic Governance

One of the unique and thought-provoking elements of Aragon's design is optimistic governance. Under this model, all proposals are passed by default, without any voting, unless the proposal is challenged in Aragon's court. The theory, as far as we can tell, is that anyone who proposes an action that lacks community consensus is in potential jeopardy.

[12] https://aragon.org/



Aside from an initial fee sufficient to cover transactional costs, it is not clear to us how this process prevents proposals from being spammed. They claim "unparalleled high-speed decision making"; however, we think it is worthwhile to take a closer look at the meaning of these words before taking them at face value.

In the optimistic case, where there is no challenge, then the speed of governance is only limited by the built-in time delay during which challenges may be submitted. The "decision" was either unilaterally made in an "instant" or, more likely, the decision-making process is actually opaque, occurring out-of-band and out of sight (off the blockchain). The Aragon DAOs merely track the outcome of the decision-making process and allow people to challenge the reported outcome.

In theory, it would be extremely risky to propose something that you didn't already have a strong reason to believe was supported by a majority. This is why Aragon allows signaling proposals where people vote in a *non-binding* way to measure community opinion.

If we assume this governance process was utilized in a polarized Red vs Blue community, then chances are 99% of all proposals would end up signaling with 45-55% support with no clear majority. The real process for making a decision could therefore be arbitrarily long, if not deadlocked.

Aragon Court

This is the real "voting" process whereby "guardians" (jurors) are randomly selected **proportional to how many tokens** they have staked. The jurors are anonymized to mitigate collusion and are asked to predict what a plurality of the other jurors will vote. There are penalties for being in a minority. This means that jurors are not voting their opinion on the matter, they are tapping the wisdom of the crowds in an attempt to provide an independent guess of the opinion of the other jurors.

This is a situation where "appearance of consensus" is "consensus". Unfortunately, people are extremely prone to thinking one thing privately and publicly stating what they believe is "socially acceptable". This tendency is discussed in "Blueprint: The evolutionary basis of a good society" by Nicholas Chritakis.

As a result, the jurors will tend to go with the politically correct answer rather than what people really think. There is nothing in this process that incentivizes jurors to vote their hearts; therefore, there is nothing in the process that actually facilitates consensus building.

Pareto Problems

The Pareto principle applies to the distribution of wealth, power, and skill. This means that on average 20% of the people have 80% of the tokens. Pareto is also fractal, so 4% of the people have 64% of the tokens and 1% have 51%. It is equally true that not all rich token holders will want to participate as a juror - they have other things to do with their time than risking their money to play a variant of Family Feud (e.g. guessing public opinion). That said, enjoyment of "gambling" and Family Feud is also Pareto distributed.

Those who want to play this game to win are likely to publish their opinions and votes on public forums. Even if no one knows who the "jurors" are or what their actual vote is, this external signaling (combined with proof of tokens staked) gives everyone involved a high probability of how the actual guardians will vote. Voting against this side poll would be extremely high risk.

I predict that the long-term outcome of this process would be equivalent to a vote of the top 1% of the Family Feud-loving gamblers.

Of course, the "rules" of an Aragon DAO are subjective and people could attempt to outlaw publishing any evidence of "juror" opinion. This idea seems to be at odds with their non-binding polling solution. Let's assume that there is a cryptographic technical means to prevent potential "jurors" from revealing how much they stake and what their opinion is. In this case, the only rational move for a juror is to look at the most recent public opinion poll as a Schelling point.[13]

Under these assumptions, the "jury" may just be a complex proxy or oracle for the outcome of a traditional voting process. For small communities of people who know each other well enough to "predict" how others would vote, then the optimistic governance process may have some advantages, but I doubt this could scale well beyond a dozen people due to the limits of Dunbar.

[13] Schelling Point - was introduced by the American economist Thomas Schelling in his book The Strategy of Conflict (1960) - Wikipedia

The Tragedy of the Commons

The other challenge I see with this approach is that an attacker has clear benefits if they can get a proposal passed that benefits them at the expense of the DAO. Meanwhile, the remaining DAO members have a vastly different risk-reward payoff. Let's suppose an attacker risks 1 token and gets a reward of 100 if the proposal passes. If there are 100 members in the community, then the cost to each individual is 1 if the proposal passes.

There is a cost to challenge a proposal in Aragon court, this means the defenders individually have a risk-reward payoff of 1:1 vs the attacker of 1:100. The defender is therefore performing an altruistic action by challenging the proposal on behalf of the community.

Rational Ignorance

Note that the defenders must pay a cost to review all proposals good or bad in order to determine whether or not to challenge them in Aragon Court. Presumably "someone" will notice a potential attack, however, everyone will tend to assume that "someone else" is paying attention. The end result is that the community will end up paying someone to review everything full time because the rewards from detecting the occasional bad proposal do not cover the costs of reviewing all of the good proposals.

Attempts to pay big bounties via socialized costs create an opportunity for people to intentionally submit a bad proposal only to report it themselves.

Bottom line, the community will need to hire watchmen and then come up with a process to guard the watchmen. Afterall, the watchmen have the full power to let anything pass while everyone else remains rationally ignorant.

In summary, the process described by Aragon is not a consensus-building process. It is at best a lossy Oracle for an unspecified consensus-building process.

ƒractally Consensus Building

The principles behind ƒractally are outlined in the book, "*More Equal Animals - The subtle art of true democracy".* The core idea is to define a process to measure the wisdom of the crowds. Voting is simply an attempt to measure public opinion; however, all voting systems create a meta-game where people vote strategically instead of honestly. This combined with Pareto distributed media influence and Pareto distributed wealth and tendency to favor forming political parties or oligarchic control. Furthermore, voting assumes all voters are actually informed and educated; however, rational ignorance rules the day.

Rational ignorance is when the cost of learning knowledge exceeds the value of obtaining said knowledge. In typical voting systems, your vote is unlikely to change the outcome so it has relatively little value, but the cost to learn what is needed to vote wisely is high.

ƒractally solves the rational ignorance and Sybil attack problems by randomly assigning people to groups of 6 people. These 6 people must reach a 4 of 6 consensus or everyone in the group loses. Each group is essentially a random sample of community opinion and there are potentially 1000's of groups in the initial round.

The Bottom Line

ƒractally is a consensus-building process that is not token or wealth-weighted and is resistant to Sybil attacks. Meanwhile, Aragon is a consensus-predicting oracle that is only as good as the unstated, ill-defined, or adhoc off-chain consensus-building process.

The ƒractally process can build a community-wide consensus on almost any complex topic in a matter of hours, if necessary.

I predict that in the future, Aragon "Guardians" may end up referencing a ƒractal's consensus as their Schelling point.

I'm extremely excited by the amount of work that has gone into Aragon and the spirit of the community. It is my hope that together Aragon and ƒractally can discover and realize truly effective and scalable decentralized governance processes.

ƒractally LLC

ƒractally LLC creates and publishes an open-source web interface with no warranty of any kind. This open-source user interface may be hosted by anyone in the ƒractally community. ƒractally LLC makes no promises to provide a hosted solution and may terminate its hosting services at any time. ƒractally LLC does not have possession of user keys and cannot recover accounts nor manage the membership in communities, instead ƒractally LLC's software will empower communities to recover accounts on behalf of their members.

ƒractally LLC will produce open-source reference smart contracts that communities may choose to adopt via approval of their Councils.

ƒractally LLC is a team of developers that provide services to ƒractally communities. We produce open source software that allows anyone to host an interface to ƒractally. All data hosted by ƒractally LLC is derived from the blockchain and IPFS. ƒractally LLC facilitates video calls, records the calls, and publishes them to IPFS.

No one, at any time, shall interpret any public statements, including this paper, made by any shareholder, director, executive, officer, or employee of fractally or its contractors as a binding commitment to do anything to raise the value of the Respect of any fractal or any other crypto-currency token.

fractally is committed to providing tools that empower people to reach consensus and produce collaborative value.

Glossary of Terms

Autonomous	Self-directing, self-governing, self-sovereign; not subject to outside governance.
Consensus	The accepted agreement among a group of people
Council	A group consisting of the team leads of the top 12 teams averaged over the past 20 weeks.
Currency	A medium of verbal or intellectual expression
DAO	A Decentralized Autonomous Organization is a transparent organization that leverages smart contracts to reach consensus. A DAO is sovereign over its consensus state, has no secrets, and holds no external property.
Democracy	Rule by all of the people as opposed to rule by some of the people over others.
Earn, Earning	To come to be duly worthy of or entitled or suited to
Escrow Account	Account which receives all income from the network and which can be liquidated at 5% per week.
Fibonacci sequence	A sequence of numbers in which each number in the sequence is equal to the sum of two numbers before it
ƒractal	A community with its own independent currency (Respect) and governance with up to 7,776 members governed by a Council. A group or community with its own smart contract, respect, and governance process
Fractal Democracy	A democracy of democracies or a democracy of Fractals where consensus is reached in randomly selected small groups which promote a member to higher levels where the process is repeated in a ƒractal manner.
ƒractally	The brand of the service provided by ƒractally LLC, as opposed to lower case fractally which means "in a ƒractal manner".
ƒractally Democracy	A democratic community (ƒractal) that follows the methods presented in this paper.
ƒractally LLC	A team of developers that provide services to ƒractals. ƒractally produces open source software that allows anyone to host an interface to ƒractally data. All data hosted by ƒractally LLC is derived from a blockchain and IPFS. ƒractally LLC facilitates video conferences, records the meetings, and publishes them to IPFS.
HODL	A term derived from a misspelling of "hold", in the context of buying and holding Bitcoin and other cryptocurrencies. It's also commonly come to stand for "Hold On for Dear Life"

Incumbent Advantage	For most political offices, the incumbent often has more name recognition due to their previous work in the office. Incumbents also have easier access to campaign finance, as well as government resources (such as the franking privilege) that can be indirectly used to boost the incumbent's re-election campaign.
Market Maker	Offers to buy and sell two currencies according to the Bancor algorithm
Mutual Respect (MR)	Market Maker Token that controls a percent of the assets allocated to the automatic market maker algorithm.
Prime Fractal	The original Fractal whose mission is to grow more Fractals.
Petition	a proposed blockchain transaction requiring authority of community contract combined with a blog post and comment sections that describes the purpose and rationale of a transaction.
Rational Ignorance	Intentionally choosing to remain uninformed on a topic because the cost of acquiring the information is greater than the estimated potential benefits.
Recruitment Rewards	Respect earned for inviting users to ƒractal
ℝespect	In its plural usage, refers collectively to the currencies of multiple Fractals In its singular usage, refers abstractly to the symbol of an attribution of a generic Fractal
Smart Contract	A smart contract is a transparent, deterministic, algorithm governing how a community allocates property rights based upon signed statements of its members.
Sponsor, sponsoring	Someone who buys or holds Respect of a ƒractal
Sponsorship Rewards	Respect earned for committing to hold Respect for 6 months
Sybil	a fake account
Pareto distribution	A power-law probability distribution that is used in the description of social, quality control, scientific, geophysical, actuarial, and many other types of observable phenomena. The Pareto principle or "80-20 rule" stating that 80% of outcomes are due to 20% of causes was named in honor of Vilfredo Pareto.
Wisdom of the Crowds	the collective opinion of a group of individuals rather than that of a single expert when relevant information is distributed among the population and gathered from independent sources.