The Common Calendar

Ivan Vendrov Yoeri Dassen Scott Fitsimones

{ivan,yoeri,scott}@calendar.org

We describe the Common Calendar, a system of assigning names to calendar dates leveraging smart contracts and Harberger taxation. Unlike the prevailing state-dominated and regionally-fragmented approach to naming dates, the Calendar is decentralized, global, and secure against manipulation. It is allocatively efficient: the entity that cares the most about a specific day is granted the right to name it. Finally, it is dynamic: as history progresses and preferences change, the Calendar updates to reflect them. These properties together make the Calendar a likely Schelling point for how dates are named for the foreseeable future.

> When Julius Caesar completed the destruction of Roman liberty, when he accepted perpetual dictatorship and had himself named Emperor, his first effort, as if to mark that disastrous epoch, was to reform the calendar. Now that France has been reborn, is it not an even more favorable time to propose a comparable change?
>
> M. de Lalande, as published in *Le Moniteur Universel*, May 17th 1790.

Why naming days matters

The system of assigning significance to calendar dates originates deep in human prehistory, and is now nearly universal. These special days or *holidays* synchronize the attention of the community to specific rituals, or to specific past events or people.

Holidays serve many social roles, one of the most important being community-building by reinforcing shared beliefs. This perpective, commonly associated with the work of Émile Durkheim, is summarized by Etzioni and Bloom (2004) as follows:

> Secular, routine, daily life [...] tends to weaken shared beliefs and social bonds and enhance centrifugal individualism. For societies to survive these centrifugal, individualistic tendencies, societies must continuously re-create themselves by shoring up commitments to one set of shared common beliefs and practices. [...] Holidays, in this context, are seen as especially strong boosters of commitments and bonds.

Holidays can serve this role either by directly enforcing shared beliefs and norms (*holidays of recommitment* like Easter or Independence Day), or, paradoxically, by temporarily suspending them (*holidays of tension management* like Mardi Gras or April Fools' Day).

Given the integrative role of holidays, there is a great deal at stake in what holidays a society celebrates. The conflict over whether the second Monday in October should be called Columbus Day or Indigenous Peoples' Day (Little, 2018) is really about whose perspective on the colonization of the Americas we as a society choose to remember. Similarly, efforts to designate September 26th as Petrov Day (Yudkowsky, 2007) to celebrate Lieutenant Colonel Stanislav Petrov's averting a nuclear war by refusing to follow protocol, are about creating societal recognition for ethical behavior over blind obedience and unreflectively following incentives.

Realizing the integrative power of holidays, authoritarian regimes often repress them in an effort to reshape their societies; examples include the Soviet Union banning Christmas as part of a comprehensive anti-religious program (Luzer, 2013), and the People's Republic of China's ban on gatherings to commemorate the anniversary of the 1989 Tiananmen Square massacre on June 4th (Davidson, 2021). Perhaps the most extreme attempt at rewriting society through its calendar was the French Rev-

olutionary or Republican Calendar. The revolutionaries rewrote the entire calendar from scratch, abolishing in a stroke all traditional holidays in their effort to destroy all vestiges of the old regime (Shaw, 2011). Names like Horse, Dung, Watering Can, and Sulfur were assigned to every calendar date by a central bureaucracy trying to control every aspect of its citizens' existence.

Having a secure global common calendar defends against manipulation by would-be totalitarians seeking to rewrite culture, and creates an unbreakable connection between individuals and the history and aspirations of humanity as a whole.

Implementation

For each of the 366 Gregorian calendar dates, an ERC-721 nonfungible token (Entriken et al., 2018) is minted on the Ethereum blockchain (Buterin, 2013). Each date token is associated with a name, stored as a UTF-8 string in the token smart contract. The token's owner can change at any time except during the date itself (in any timezone), so the name can never change in the middle of the day.

Ensuring Allocative Efficiency

As a system for naming dates, using standard NFTs poses a number of problems. Like any other property right, token ownership confers a monopoly to the owner, who can charge arbitrarily high prices for it. Even if there is an entity who values the token (and associated naming rights) much more than the owner, there owner might not sell due to the *holdout problem* - the owner pays no cost for squatting on the token indefinitely, waiting for it to appreciate in value. Additionally, private keys can be lost, leading to a date becoming effectively ownerless, its name never changeable without a hard fork in the calendar protocol.

Both these problems are addressed elegantly by the Harberger Tax (Posner and Weyl, 2017), also known as the Common Ownership Self-Assessed Tax, a property tax regime in which the owner publicly declares a self-assessed price at which they

would be forced to sell, and pays a fraction of this price in taxes every year. The tax prevents the owner from overpricing the asset, while the forced sale provision prevents underpricing to evade taxes. Together they ensure allocative efficiency: the token is owned by the entity that values it most at any point in time, provided the tax rate is set equal to the *turnover rate*, or the probability that the person who values the asset higher changes in a given a year. Unfortunately, there is no extant market in calendar dates, so we have no data on valuation to help determine the turnover rate. If we examine how often holidays seem to change we encounter something like a log-normal distribution: many holidays last only for a few decades, while a few have survived for millenia, though usually in highly modified form. We opt for a simple heuristic and target a turnover rate of once per century, which implies setting the tax rate to 1% annually.

Harberger Tax Contract Implementation

To ensure liquidity, we calculate the tax near-continuously, in increments of 1 second. To save transaction fees, the tax is collected lazily: the owner of the date token prepays by putting ETH in a separate "deposit" account, and can withdraw everything except the accumulated tax at any time. If someone else buys the token, the deposit is refunded to the previous owner. If the accumulated tax ever exceeds the amount in the deposit account, the token goes into *default*, the ownership of the date is returned to the parent smart contract and the price is set to zero, ensuring the date rapidly returns to circulation.

In order to be maximally compatible with other contracts that manage NFTs, we split the implementation into two smart contracts: the *Date Token* contract which simply issues tokens for each date using the ERC721 standard, and the *Calendar Steward* contract which coordinates the rest of the system, including setting names, prices, collecting taxes, and managing deposit accounts.

Tax distribution

Where should the collected tax revenue go? If and when the Calendar becomes the consensus calendar of humanity, the revenue it generates should be directed towards goods that benefit everyone. At this moment, when humanity's long-term future is under existential threat (Ord, 2020; Bostrom and Cirkovic, 2011; Russell, 2019), we believe the revenue ought to be used to help mitigate these threats. Since the calendar is ultimately commonly owned by all of humanity, it is appropriate that the vast majority of the revenue go towards safeguarding humanity's future.

In the short term, to create incentives for the Calendar's creation and wide adoption, it's important to reward the project's developers and backers. We will follow an exponentially decaying reward schedule, with at most $(0.9)^n$ of the tax revenue in the nth year after launch going to developers and backers. Additionally, 1% of the revenue will be earmarked for maintaining the Calendar as an institution (e.g migrating the smart contract, maintaining `calendar.org`). We commit to spending all the remaining revenue (9% in the first year, 64% in the tenth year, 98.5% in the fiftieth year and so on) on safeguarding the future of humanity. Since we are not qualified to decide the best use of these funds, we will delegate the decision to a nonprofit foundation or a DAO. The exact decision mechanism will be designed in consultation with experts on existential risk and organizational design, and launched at most 3 years after the launch of the Calendar itself.

FAQ

Why build on the Gregorian Calendar?

We had to build on something, and the Gregorian Calendar is the de facto international standard. The closest we have to an internationally recognized standard for representing dates is ISO 8601, which is also based on the Gregorian Calendar.

If I own a date token, why do I have to pay a tax?

Besides the technical answer (it ensures allocative efficiency), there is an intuitive answer: by naming a day you are taking up space in humanity's shared consciousness; humanity has limited collective attention, and you occupying some part of it for any unit of time imposes costs on humanity (they are attending to the name you chose over all other possibilities) which you should pay for. If we let people own date names outright, they would be entitled to a permanent slice of humanity's attention going forward which is arbitrary and unfair, and would never be seen as legitimate by the eyes of the global community.

Won't rich people buy all the dates?

Maybe in the short term due to coordination problems, but in the long term we expect DAOs using public good funding mechanisms like quadratic funding (Buterin et al., 2018) will outcompete any individual bidders, simply because named dates, being a social coordination tool, are much more valuable to communities than to individuals. Because these funding mechanisms are still new and relatively untried, we did not want to commit to any particular one, instead focusing on making the Calendar simple and composable with any future mechanisms that may be invented.

Even with public good funding solved, there will be major unfairnesses remaining, because resources and access to Ethereum are unequally distributed across the global community. We are solving the problem of making naming as fair as possible *given the current distribution of resources*; achieving a more equitable distribution of resources via charity or a global universal basic income are complementary with our aims.

We should note that the current method of naming days is extremely unequal. Naming is currently dominated by states - i.e. reflects the will of the governing class, bureaucrats, financial and media elites over the majority of people. The Calendar brings in the interests of people not well represented or aligned with existing states.

Moreover, for historical reasons English-speaking countries dominate the naming of dates, whereas the Calendar is language- and location-agnostic by design. Finally, by creating an open and efficient mechanism for changing the names of dates, the Calendar ensures that the preferences of the ever-increasing diverse population of the planet will be continuously reflected in the way dates are named.

Acknowledgments

We're deeply grateful to Jeremy Nixon and Rochelle Shen for introducing us to each other, and to the broader Genesis House community for providing an incredible environment for personal and intellectual growth—we couldn't have done this without you!

References

Bostrom, N. and Cirkovic, M. M. (2011). *Global catastrophic risks*. Oxford University Press.

Buterin, V. (2013). Ethereum: A next-generation smart contract and decentralized application platform. https://github.com/ethereum/wiki/wiki/White-Paper.

Buterin, V., Hitzig, Z., and Weyl, E. G. (2018). Liberal radicalism: a flexible design for philanthropic matching funds. *Available at SSRN 3243656*.

Davidson, H. (2021). 'mourn june 4 in your own way': Tiananmen square events vanish amid crackdowns and covid | tiananmen square protests 1989 | the guardian. https://www.theguardian.com/world/2021/jun/03/tiananmen-june-4-events-china-hong-kong-taiwan-macao-crackdown-covid. (Accessed on 06/04/2021).

Entriken, W., Shirley, D., Evans, J., and Sachs, N. (2018). Eip-721: Erc-721 non-fungible token standard. https://eips.ethereum.org/EIPS/eip-721.

Etzioni, A. and Bloom, J. (2004). *We are what we celebrate: Understanding holidays and rituals*. NYU Press.

Little, B. (2018). What is indigenous peoples' day? - history. https://www.history.com/news/goodbye-columbus-hello-indigenous-peoples-day. (Accessed on 06/04/2021).

Luzer, D. (2013). What a real war on christmas looks like - pacific standard. https://psmag.com/social-justice/whats-real-war-christmas-look-like-70524. (Accessed on 06/04/2021).

Ord, T. (2020). *The precipice: existential risk and the future of humanity*. Hachette Books.

Posner, E. A. and Weyl, E. G. (2017). Property Is Only Another Name for Monopoly. *Journal of Legal Analysis*, 9(1):51–123.

Russell, S. (2019). *Human compatible: Artificial intelligence and the problem of control*. Penguin.

Shaw, M. J. (2011). *Time and the French Revolution: the republican calendar, 1789-Year xiv*, volume 78. Boydell & Brewer Ltd.

Yudkowsky, E. (2007). 9/26 is petrov day. https://www.lesswrong.com/posts/QtyKq4BDyuJ3tysoK/9-26-is-petrov-day. (Accessed on 06/07/2021).