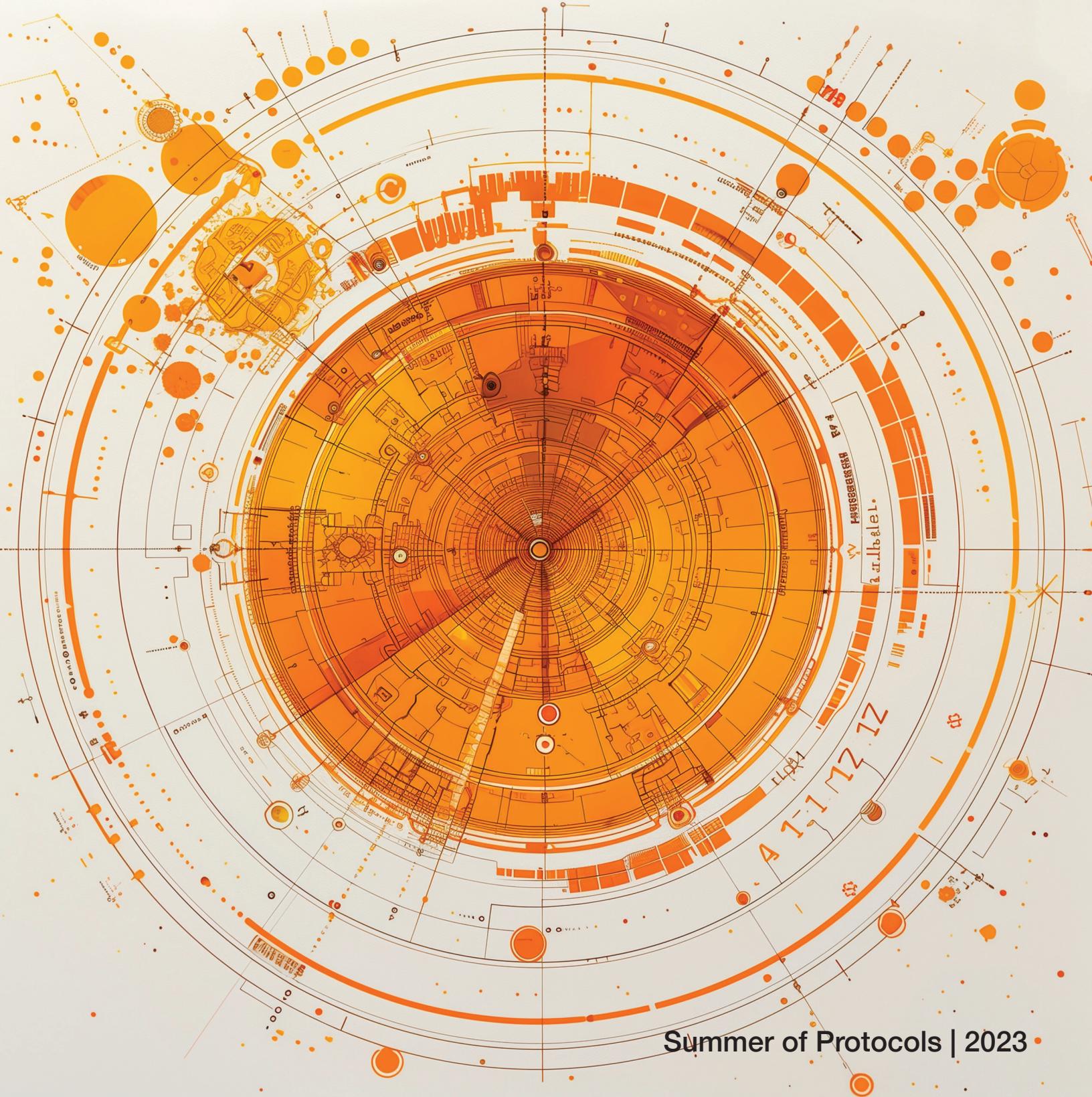


# Control and Consciousness of Time

Saffron Huang



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## The stakes of our freedom

The gods damn that man who first discovered the hours, and—yes—who first set up a sundial here, who's smashed the day into bits for poor me! You know, when I was a boy, my stomach was the only sundial, by far the best and truest.

—Plautus

When Roman war hero Valerius Maximus Messalla brought back a sundial from Catania after capturing the city in 263 BC, the crowds cheered—but this symbolic triumph over the Sicilian city soon became an ironic triumph over the lives of Roman citizens. The foreign timekeeping device, installed in the Roman Forum, heralded many more that were soon erected across Rome. People resisted the new technology—criticizing them, as the playwright Plautus did with reference to the superior timekeeping of his stomach, and calling for them to be torn down with crowbars. According to David Rooney—a horologist who shows how timekeeping has shaped our lives and society in the book *About Time*—the sundials stood for Rome’s ruling classes.<sup>1</sup>

## Social protocols

Social protocols are codified procedures that coordinate human behavior; the habits and rituals of an individual are excluded. Timekeeping is a device-mediated social protocol—various forms of timekeeping, supported by different tools, dictate how one may mark or tell time. In ancient times, shadows commonly denoted temporality: Aristophanes’ play *Assembly of Women* features a woman who asks her husband to return when his shadow reaches ten feet. Today, our timekeeping is based mostly on constructed standards of seconds, minutes, and hours, not accessible natural phenomena. Our modern infrastructure of precise clockware based on the oscillations of atoms

and crystals enables people to show up for work at the same time, give directions, align on temporal measurements, and coordinate distributed software systems.

How does timekeeping affect our lives and are some forms of timekeeping better than others? All protocols constrain—the Catania sundial made this fact obvious to the Roman citizens. In her essay, *Dangerous Protocols*, Nadia Asparouhova writes about how protocols have the potential to both liberate us and control us because nobody in particular is responsible for a protocol that has been widely adopted, especially once it has become rigid and is understood in literal ways. Specific protocols are good when they reduce friction and liberate us from unnecessary decisions and bad when they no longer fulfill the typical participant’s desires. They become especially bad if people are trapped within them, with no option but to follow them.<sup>2</sup>

Here’s a hypothesis: good protocols constrain *in order to* liberate or enable. Whether a protocol leads to an overall sense of liberation or enablement must be subjectively defined: if most who participate in the protocol feel that it is worth it in net liberty, we could say that this protocol has achieved the status of good. Good protocols liberate in the same way disciplined habits and routines can liberate artists. As Gustave Flaubert once advised with reference to his own remote, disciplined lifestyle:

Be settled in your life and as ordinary as the bourgeois, in order to be fierce and original in your works.<sup>3</sup>

Good rituals can liberate the individual—in the case of the artist—by helping them coordinate their actions towards their creative goals. Protocols are not just about constraints that are necessarily enforced

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2. Nadia Asparahouva, “Dangerous Protocols,” Summer of Protocols, 2023. [summerofprotocols.com/research/dangerous-protocols](https://summerofprotocols.com/research/dangerous-protocols)
  3. M. Leona Godin, “Flaubert’s Rule for Artists: Be Regular? Settled? Ordinary as a Bourgeois? Essay 28 of #52essays2017,” October 9, 2017, accessed September 2, 2023. [drmlgodin.com/2017/10/flaubert-rule-artists-regular-settled-ordinary-bourgeois-essay-28-52essays2017/](https://drmlgodin.com/2017/10/flaubert-rule-artists-regular-settled-ordinary-bourgeois-essay-28-52essays2017/)

1. David Rooney, *About Time: A History of Civilization in Twelve Clocks* (New York: W.W. Norton, 2021) p. 13.

at the cost of creativity and liberty; they can generate creativity and liberty, if well-designed and implemented.

It's not just that some actions become automated and are therefore able to be ignored in favor of other, more prioritized actions. Actions are not so independent of each other. For a writer, making coffee at a particular time or beginning their work by first reading the previous day's pages is not about automating an action such that one can think about other things—rather, it's about creating a predictable foundation for thinking that springs out of the way one does specific procedural actions. The overall creative benefit should be judged not by analyzing the specific actions in isolation, but by whether the writer feels the routine has provided a useful framing and context for their work.

With social protocols, what one does affects others and vice versa. You are unlikely to make an individual choice on what language to communicate with, how to read time, or whether to abide by the monetary exchange protocols in your society (bartering is little accepted these days). We are in a ongoing dialogue about the net benefit of various protocols not only with each other, but with people from the past and in the future. With respect to any given protocol, the stakes of our freedom exist at both individual and collective scales—hopelessly entangled with other freedoms and the freedoms of others and with the unknown counterfactuals of history.

This makes it difficult to judge protocol merit in practice, especially for—as is the focus of this essay—protocols as far down the civilizational stack as timekeeping. Were the timekeeping protocols enabled by the pilfered sundial good? While Roman citizens despised them, others made delighted use of them for astrological purposes.<sup>4</sup> It's difficult to assess “good” at most stages of a protocol's

development. A protocol in the early stages of its social implementation and integration, like any social change, is more salient and can generate resistance, in part because people generally don't like change. As it becomes more internalized and integrated into society, the protocol changes the consciousness of people. There is no ground-truth sentiment to measure goodness by.

While there is no easy, stable foundation of sentiment to judge protocols by, one can track *how* sentiment and experience change, to try to understand the impact of a protocol. Alfred North Whitehead said,

civilization advances by extending the number of operations we can perform without thinking about them.<sup>5</sup>

But, just like individual routines, protocols like timekeeping are often not about automation or at least not *merely* about automation; they are also about providing a particular context from which behavior springs. They affect both what becomes unconscious and what becomes conscious, and how they relate. The rest of this essay will explore how various timekeeping protocols and the devices they are intertwined with have done so.

## Horological politics

The visible imposition of time has very often been a deliberate means of exerting control over lives. Sometimes, this display of control is meant to achieve a sense of security through projecting order in chaotic times. The world's oldest known surviving mechanical clock was installed in medieval Chioggia, soon after a war between Genoa and Venice that left the main piazza blood-stained and the economy devastated. The city council invested what little money it had in a clock tower, as a sign of order for their citizens. In general,

4. Meghan Bartels, “Early Tech Adopters in Ancient Rome Had Portable Sundials,” *Smithsonian Magazine*, February 20, 2017, (accessed August 26, 2023). [www.smithsonianmag.com/innovation/early-tech-adopters-ancient-rome-had-portable-sundials-180962225](http://www.smithsonianmag.com/innovation/early-tech-adopters-ancient-rome-had-portable-sundials-180962225)

5. Alfred North Whitehead, *An Introduction to Mathematics* (Oxford: Oxford University Press, 1911), ch. 5.

public clock towers have always been used to project political power.<sup>6</sup>

By instilling temporal order, public clock towers also aim to instill a sense of civic order.

This civic order can generate a sense of comfort—or not, depending on which people are controlling time for which people's attention.

Within days of invading, colonists in Africa's Cape of Good Hope instilled a militarized time signal: the firing of a hilltop cannon everyday at noon.<sup>7</sup> Phenomenologically, a cannon is experienced very differently from a clock tower: associated with war and death, the boom of a cannon carries for miles. Symbolically, it conveys a different message from a local timepiece for a city's citizens; it asserts control in hopes of unsettling people, rather than reassuring. Every day, the British cannon reverberated clearly in the ears of rival imperial settlers and the indigenous African people and continues to make Cape Town visitors anxious to this day.

Something very similar played out after the bloodshed of India's First War of Independence, when the British Raj embarked on a construction project that included tall and very loud bell-rung clock towers. It has been said,

if the clock was an avatar of Western time,  
the bell was its amplifier.<sup>8</sup>

The bell-rung clock tower administers a reminder of order, and who can enforce it, to eyes and ears far and wide. The British's horological supremacy at the height of the empire—London was the center of the clock industry—helped them both to justify (via a sense of technological superiority) and to assert their colonial dominance. More than one hundred clock towers were built in India during the colonial period.

The British imposition of time was oppressive to the people it was imposed on. We have

the example of the Australian Indigenous people who had their own timekeeping systems and who resisted and ignored colonial clock faces for a long time,<sup>9</sup> imperially imposed time protocols did finally constrain the unwilling participants with no liberation—telling them to follow protocol and obey their rulers.

### The rise of temperance

The British themselves, of course, had very different, even morally righteous views about their own timekeeping. The moral culture of time has been shaped by the harmonious partnership between timekeeping and faith: calendars and prayer rituals feature prominently in the Islamic, Christian, Jewish, Sikh, and other faiths, and adherence to such rituals often constitutes a key sign of devotion.

The hourglass was invented in fourteenth century Christian Europe and it liberated and enabled people in various utilitarian ways. Hourglasses were common timers in early factories, to help workers know when enough heat had been applied to metal.<sup>10</sup> Hourglasses helped monks ration their collective time, coordinating hours for communal prayer versus other tasks like copying books. Mariners turned to hourglasses for navigation since they were more accurate and dependable than the water clocks they replaced which were vulnerable to condensation and affected by the ship's motion.

Around the same time, time and time-keeping became equated religiously with temperance, the civic virtue elevated beyond the others: fortitude, justice, prudence, and magnanimity were subsumed to temperance,<sup>11</sup> which was even compared to Christ.<sup>12</sup> To be careful and disciplined with the time you are given was the highest virtue. Clocks

9. Joe Zadeh, "The Tyranny of Time." *Noema*, June 3, 2021. [www.noemamag.com/the-tyranny-of-time](http://www.noemamag.com/the-tyranny-of-time)

10. T & K Young, "Hourglass History," n.d., accessed September 3, 2023. [www.tkyoung.com/history.html](http://www.tkyoung.com/history.html)

11. Rooney, p. 44.

12. Henry Suso, *Wisdom's Watch Upon the Hours*, trans. Heinrich Seuse (Washington, D.C.: Catholic University of America Press Press, 1994).

6. Rooney, p. 21.

7. Rooney, p. 23.

8. Giordano Nanni, "Introduction," in *The Colonisation of Time: Ritual, Routine and Resistance in the British Empire* (Manchester: Manchester University Press, 2013), pp. 1–24. [doi.org/10.7765/9781526118394.00010](https://doi.org/10.7765/9781526118394.00010)

were to be obeyed and control became a moral matter.

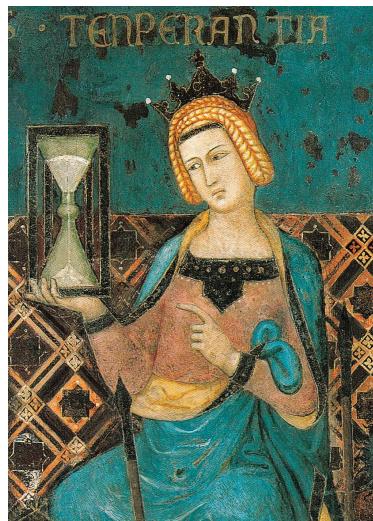
When I was young, my perennially late mother had the digital clock on the car dashboard set five minutes ahead of time. Where others saw the time as 7:57, she saw that it was 8:02. She needed to personalize her awareness of time to better obey the protocol that the rest of the world followed. She was a mother who worked seven days a week and who always spoke of her lateness with guilt mixed with resignation. I knew she struggled with being on time, but I hated the car clock; it felt like a moral failure to have to create such an explicit signal—a five-minute gap between your real and your ideal self—and even more so because it never worked. She was, still, always late. Everyone got used to subtracting five minutes from the visible time on the dashboard, and her complicated mixture of emotions around the ability to be on time continued.

Lewis Mumford, Werner Sombart, G.G. Coulton, and other scholars have all described the medieval Benedictine monks as “perhaps the original founders of modern capitalism,” given their incredibly regular, bell-punctuated schedules and their general fervor for the disciplined rationing of time.<sup>13</sup> Many people, including my mother, still subscribe to the same moral and sometimes punitive culture of temperance, now applied to secular capitalist pursuits.

The womanly figure of temperance was, in the medieval ages, depicted with whatever timekeeping device was state-of-the-art at the time: hourglasses, and then mechanical clocks. When people started wearing watches, the universe itself became analogized to a watch, built by a watchmaker<sup>14</sup> God. In this way, the evolution of timekeeping not only marked technological progress and enabled people to do new things, but also shaped our moral and spiritual understanding of the very fabric of existence.

13. Lewis Mumford, *Technics and Civilization* (London: Routledge & Kegan Paul, 1934). [archive.org/details/in.ernet.dli.2015.49974](http://archive.org/details/in.ernet.dli.2015.49974)

14. [en.wikipedia.org/wiki/Watchmaker\\_analogy](https://en.wikipedia.org/wiki/Watchmaker_analogy)



Ambrogio Lorenzetti, *Temperance holding an hourglass*, 1338

[commons.wikimedia.org/wiki/File:Ambrogio\\_Lorenzetti\\_002-detail-Temperance.jpg](https://commons.wikimedia.org/wiki/File:Ambrogio_Lorenzetti_002-detail-Temperance.jpg)

The elevation of temperance reveals how timekeeping protocols and devices transcend their utilitarian functions, changing the beliefs and values of those who participate and acquire intrinsic value. The changing context and consciousness around what timekeeping signifies complicates any straightforward assessment of its overall impact, especially for those who have come to orient their lives around the ticking hands of the clock.

### Device consciousness

The ways in which we protocolize marking and telling time are intertwined with clocks, calendars, and the other devices that shape and are shaped by the protocols. Precise regularization of time, and by extension people’s lives, became more prized the more it became materially possible, partly because achieving ever-more dependable, reusable, accurate, and easily constructed time-measurement devices has been a historical source of pride. This shows how our views of the protocol are colored by how we view the devices—and how our experiences of the devices also color our experience of the protocol itself.

Some devices dole out time as discrete intervals, such as metronomes, quartz

watches with ticking second hands, or the British cannon in Cape Town that fires at noon. Other devices create a more continuous experience of time—hourglasses, candle clocks, or wristwatches with sweeping second hands. The sweeping second hand or the sinking candle wax may pass through regularly-spaced interval markers, but they are more able to bring the continuity of each interval into one's consciousness.

The hourglass is particularly interesting, since unlike most other methods of measuring time, it presents the present as between the past (sand collected in the bottom bulb) and the future (sand yet to flow through the neck). Compared to sundials, which calibrate a moment in time against an external reference point, this method creates a conscious experience that more naturally measures the duration of time. As a unique enduring symbol of impermanence and finitude, the “sands of time” is a metaphor for the shortness of human life. Hourglasses have been depicted on pirate flags (to menace viewers) and on gravestones, and placed in English coffins.<sup>15</sup>

Incense has been used for timekeeping in China and Japan for centuries, constituting a different, olfactory way of experiencing time. Lighting a stick of incense when welcoming someone at the door is a gentle way to signal that one has (or has not yet) overstayed their welcome. The more intricate incense clock originated in China in the Song Dynasty. One stencils powdered incense into a maze-like structure and lights the end; the various twists and turns in the maze mark intervals of hours.<sup>16</sup> Incense of different scents can be laid at different parts of the path—perhaps thyme or sandalwood—to keep time using one's nose. Instead of fixed, discrete markers of time, an incense clock allows people to associate intervals with scents, in a customizable manner.

15. Thomas Ewbank, *A Descriptive and Historical Account of Hydraulic and Other Machines for Raising Water, Ancient and Modern: With Observations on Various Subjects Connected with the Mechanic Arts, Including the Progressive Development of the Steam Engine*. In Five Books (New York: Scribner, Armstrong & Co., 1876).
16. Science Museum, *A Chinese incense clock that tells the time with smell*, 2019. [www.youtube.com/watch?v=FnPQM6-paew](https://www.youtube.com/watch?v=FnPQM6-paew)

One specific incense clock design was the Hundred Gradations Incense Seal featured in the *Hsin Tsuan Hsiang-P'u*.<sup>17</sup> This design has no stopping point: the maze is one long, complicated loop. The user lights the flame at whichever hour marking is appropriate (assuming they have a way to synchronize the start hour). There were twelve hours in a day; even-numbered hours were *yin*—which were considered more passive, introverted hours—and odd-numbered hours were *yang*—more active, extroverted hours. Activities recommended for *yin* hours included introspection, meditation, and rest. *Yang* hours were preferred for more active tasks.

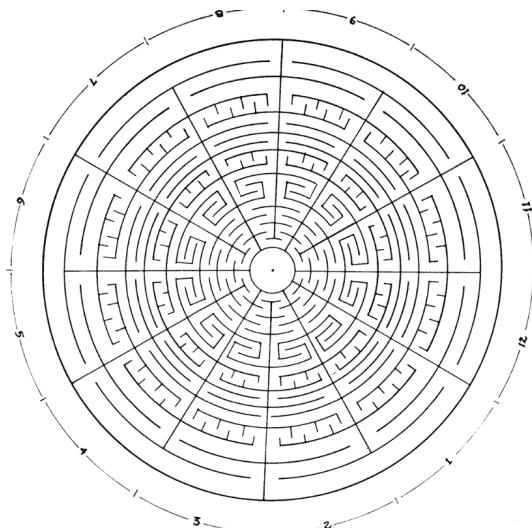


FIG. 3. Diagram of hundred gradations incense seal with explanatory notations added.

*KEY To Diagram of the “Hundred Notch Seal-Character Aromatic”*

1. <i>Wu</i> . . . . .	Horse . . . . .	11:00 A.M.– 1:00 P.M. (Yang)
2. <i>Wei</i> . . . . .	Sheep . . . . .	1:00 P.M.– 3:00 P.M. (Yin)
3. <i>Shen</i> . . . . .	Monkey . . . . .	3:00 P.M.– 5:00 P.M. (Yang)
4. <i>Yu</i> . . . . .	Cock . . . . .	5:00 P.M.– 7:00 P.M. (Yin)
5. <i>Hsü</i> . . . . .	Dog . . . . .	7:00 P.M.– 9:00 P.M. (Yang)
6. <i>Hai</i> . . . . .	Boar or Pig . . . . .	9:00 P.M.– 11:00 P.M. (Yin)
7. <i>Tzu</i> . . . . .	Rat . . . . .	11:00 P.M.– 1:00 A.M. (Yang)
8. <i>Ch'ou</i> . . . . .	Ox . . . . .	1:00 A.M.– 3:00 A.M. (Yin)
9. <i>Yin</i> . . . . .	Tiger . . . . .	3:00 A.M.– 5:00 A.M. (Yang)
10. <i>Mao</i> . . . . .	Hare or Rabbit . . . . .	5:00 A.M.– 7:00 A.M. (Yin)
11. <i>Ch'en</i> . . . . .	Dragon . . . . .	7:00 A.M.– 9:00 A.M. (Yang)
12. <i>SSu</i> . . . . .	Snake . . . . .	9:00 A.M.– 11:00 A.M. (Yin)

*The Hundred Gradations Incense Seal*<sup>18</sup>

17. Silvio A. Bedini, “The Scent of Time. A Study of the Use of Fire and Incense for Time Measurement in Oriental Countries,” *Transactions of the American Philosophical Society* 53, no. 5 (1963), p. 1–51. doi: [org/10.2307/1005923](https://doi.org/10.2307/1005923) and [www.google.com/books/edition/The\\_Scent\\_of\\_Time/RY8pAQAAQAAJ](https://www.google.com/books/edition/The_Scent_of_Time/RY8pAQAAQAAJ)
18. From Silvio A. Bedini, *Scent of Time. A Study of the Use of Fire and Incense for Time Measurement in Oriental Countries* (Philadelphia: American Philosophical

On the seal, the incense trail moves inwards during the *yin* hours, creating a shrinking feeling; it moves outwards in the *yang* hours, creating a growing feeling.

The knotted cord was commonly used as a time alarm amongst the poorest Chinese. This was a cord made from punk—dry decayed wood—knotted at intervals. A military sentry on night duty would wedge the punk cord between his bare toes, with the correct knot-lengths sticking out, and ignite it at the start of the watch. If the cord burned down to the skin and the sentry had indeed fallen asleep, he would awaken—and perhaps the rest of the barracks too—with a yelp.<sup>19</sup>

The example of the knotted cord shows how material circumstances shape which devices one picks up, and therefore the specifics of the time-telling protocol one adopts. Incense-based devices leveraged slow-burning fire to create a phenomenology of time that involved ongoing scent, smoke, and sometimes a sharp jolt of pain. It was an accessible protocol: a Jesuit missionary to China in the 1660s observed how accurate and inexpensive incense clocks were compared to mechanical clocks.<sup>20</sup> While clocks and watches today are cheap, at the time they were not. The noon-day gun in Cape Town had real utility for this reason; pocket watches were scarce and inaccurate and required their wearers to remember to wind them—ultimately, people did come to rely on the daily blast. The cannon distributed time to many and those people were also expected to distribute “gun time” when traveling to other cities. Time is not only kept; to be widely followed, it must also be distributed. The materiality of timekeeping infrastructure determines what and how the protocol is carried out, and what is brought to the fore of one’s consciousness and what is overlooked.

Society, 1963). Courtesy of HathiTrust. [babel.hathitrust.org/cgi/pt?id=mdp.39076006361401&seq=14](http://babel.hathitrust.org/cgi/pt?id=mdp.39076006361401&seq=14)

19. Silvio A. Bedini, “Time Measurement with Incense in Japan With Sticks and Coils,” 2002. [web.archive.org/web/20160308214700/http://japanese-incense.com/time.htm](http://web.archive.org/web/20160308214700/http://japanese-incense.com/time.htm)

20. Amelia Soth, “Keeping Time with Incense Clocks,” *JSTOR Daily*, August 25, 2022. [daily.jstor.org/keeping-time-with-incense-clocks/](https://www.jstor.org/keeping-time-with-incense-clocks/)

## Decisions for this era

At some point in Western history, clock time became more regular than, and increasingly separated from, the rhythms of nature. This was seen as a good thing: Joe Zadeh writes in *Noema* that British imperialists in southeastern Australia saw the timekeeping practices of indigenous societies as unpredictable and irrational. This perspective prevailed, despite the sophistication of indigenous methods which relied on the moon, stars, rains, flowering, and tides to determine distance, calendar dates, and the availability of food and resources.<sup>21</sup>

Incredibly precise and widespread time-keeping has been very enabling for modern society—it underpins GPS, computers, and other complex coordination activities. I have a whole system of calendar invites, alarms, and standing agreements that allow me to expect that a busy work and social schedule will happen with minimal thinking on my part. When Google Maps tells me I can leave in one minute and still catch my train, I trust in the software, navigation, and railway systems—and the clockwork underlying all of them—to get where I need to go.

But perhaps we could evolve a multiplicity of differentiated timekeeping systems for different ends, rather than sticking to this one for all our activities. Zadeh makes the case that clock time, and the culture it supports, is casting us off from nature’s rhythms, from the climate crisis, and from the rhythms of our own bodies. It is ironic that humans throughout the ages became sophisticated enough to track time through nature (sundials, incense, water clocks), in part to be more responsive to nature itself. But at some point, many of us decided to use our technological prowess not to follow nature more precisely, but to bypass it altogether. Or rather, to bypass the nature that life-forms like us can experience or feel, instead mooring our time to the imperceptible regularities of the atom. Clock-time makes natural time unconscious,

21. Zadeh.

not in a way where we follow it more readily, but in a way where we barely follow it at all.

Partly, this is because as we come to depend less on nature. We create protocols that codify that lack of dependence, self-perpetuating that estrangement from nature. We pay less attention to what is outside the protocol; we view our clocks less as maps of some territory, and more as the territory itself. We direct our prized technological sophistication towards keeping out the elements—temperature fluctuations, humidity, quantum gravity effects—from our expensive atomic clocks so that we can track homogenous, perfectly regular intervals ever-better. Although we could, we do not direct it towards being more responsive to those elements and the changes they herald. Perhaps these pursuits are not mutually exclusive, but the culture that leads to the former is not likely to also endorse the latter.

The timekeeping protocols followed in the West derive from history, and contain various traces of the Roman conquests, the Middle Ages and the eighteenth century British empire. As time passes, there are new contexts they are set against, and contexts that they have created. We adjudicate them against new loci of control and consciousness. This evaluation extends beyond geopolitical control and religious self-control to include more recently secular capitalist self-control and a particular sense of control over nature. Ironically, this latter form steers us towards *abandoning* control over nature. These protocols have filled our minds with artificial regularity, which has come to displace nature in our consciousness.

Modern industrial society is built on minutes, hours and seconds, defined regularly and mathematically—and it has entirely shaped our patterns of comprehension. And

even so, we strain against it. The increasing protests against the clock suggest that our timekeeping protocols must evolve again—to become more liberatory and enabling, to constrain differently.

Timekeeping has always been a matter of exerting control, but that control can be in service of chaos or order, oppression or liberation. It is a daunting task to imagine or build a world that goes beyond the timekeeping protocols we know and are attached to. Encountering little-known examples like incense clocks, which created a very different material relationship to time, helps us imagine the past—and in turn, helps us imagine future ways of timekeeping.

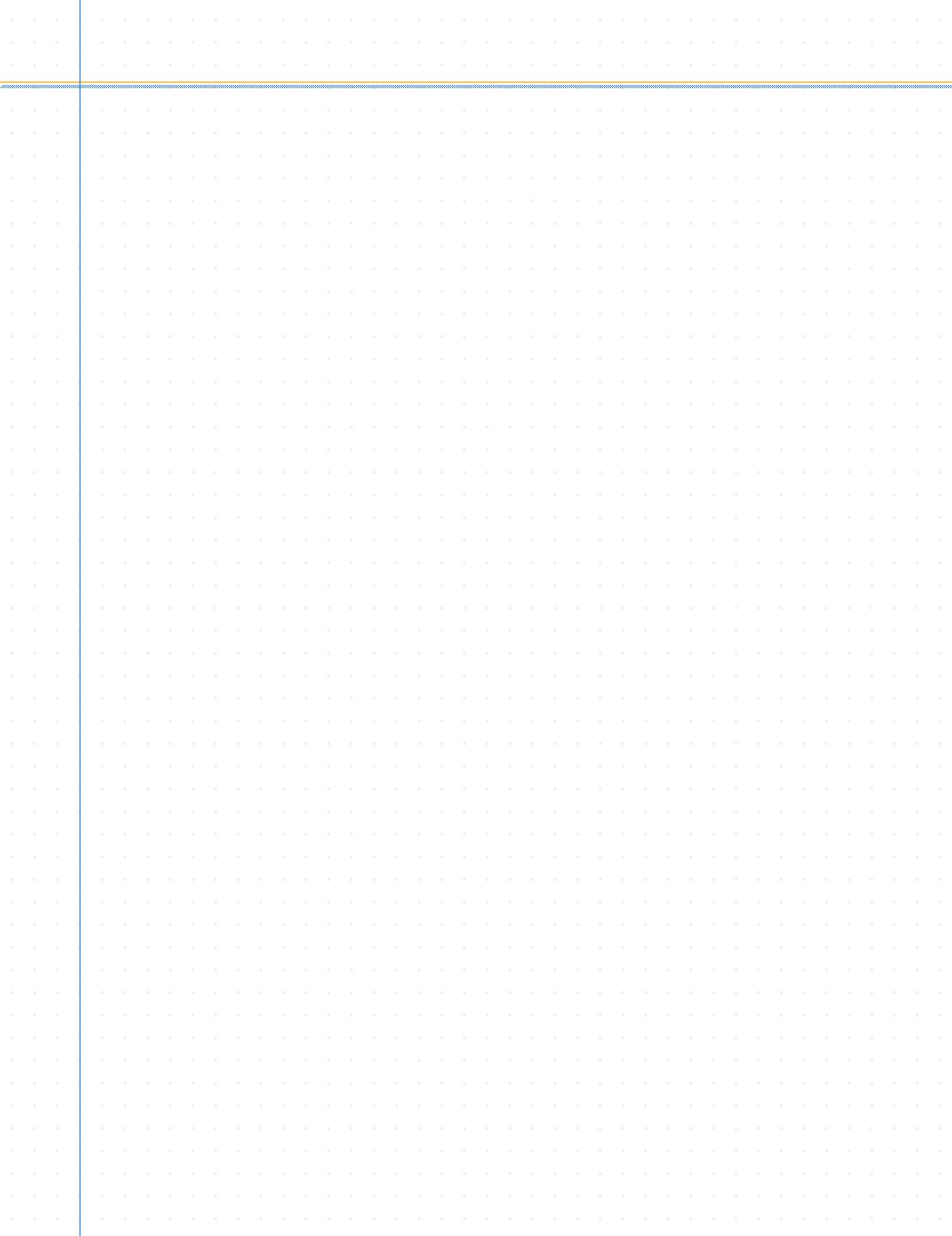
Designing new protocols and protocol devices involves considering their impact on our conscious experience, values, and freedom. There are lessons to be learned from timekeeping. For example, materiality affects experience; who leads the charge affects how the results impact everyone else. And if we succeed at evolving a protocol with the right liberatory constraints in the right places, the risk we take is that—being never quite moored to anything more stable—it changes us somehow, once again.

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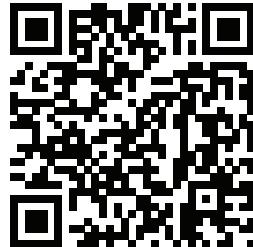
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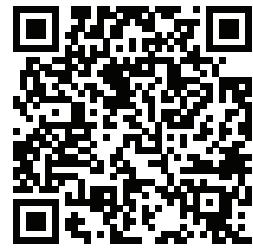
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