Building Time vs 'Clock-Time': How to Inhabit the Earth in a Changing Climate

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Questions of time, and the role that buildings play in shaping different modes of temporal experience, prompts us to confront an uneasy – one might say paradoxical – set of relationships: 1) how buildings, their interiors and physical settings have historically served as receptacles of time; 2) how our enduring experience of building time has been gradually eroded by the impact of 'clock-time' on modern daily life (the different regimes of effective time-keeping that operate outside the ambit of buildings and often run counter to the background tempo of natural rhythms); and 3) how modern regimes of time-keeping are being overshadowed by the growing impact of the climate crisis on our sense of time.

These three ways of thinking or experiencing time today are typically examined in isolation; as if building time can be understood without consideration of the increasingly pervasive and intrusive regimes of time-keeping, or that our growing anxiety about unpredictable and extreme seasonal changes, and their effects on our sense of time, is also affecting how we inhabit buildings.

All three modes of temporal experience (actual or anticipated) inadvertently collide when considered in the context of the environment; how building time cannot be reduced to some abstract system of scheduled tasks, or indeed insulated from broader issues of environmental change and their impact on temporal experience. Instead, building time constitutes an integral part of human existence in the world. Dalibor Vesely offers us a different way of thinking about the environment that is instructive in this regard:

"Is it not true that our own bodies and our corporeal situation are in fact the environment of our feelings, imagination, thoughts and, ultimately, of the human world as a whole? An affirmative answer to these questions changes radically the conventional understanding of the environment as something external, as a surrounding world situated outside our personal experience."[1]

Implicit in Vesely's argument of an embodied environment is the role of time; how the natural rhythms of the 'surrounding' environment become consonant with the natural rhythms of our bodily environments. Buildings - historically at least – serve as the principal physical and environmental context, where our "corporeal situation" has helped to sustain this relationship. This is demonstrated for example in the timing of – and participation in – civic/religious rituals and ceremonies.

However, traditional notions of continuity of time, that once informed individual and collective experiences (whether transmitted through our memories or the cycle of the seasons), are being obscured or altered by the impact of accelerating technological change and environmental degradation. If we accept Vesely's premise of a single all-encompassing environment, both within and outside human corporeal existence, then the climate crisis is not just an 'external' problem that we have to manage, but rather pervades and influences everything including our very minds and bodies - of which our temporal rhythms and sense of time form an indelible part.

To better understand this "collision", and its implications on our existence in the modern technological world, we need to probe further these different modes and their often

circumstantial relationships. Understanding building time is best summarised in the following statement by David Leatherbarrow:

"Architectural design is essentially a kind of pre-timing or preparation for concurrency, a material and spatial groundwork for those times when natural rhythms and cultural habits can be precisely synchronized, though never for very long."[2]

Leatherbarrow refers to the "timely adjustments" in Eileen Gray's house, Tempe à Pailla, located in the south of France, to convey this notion of "concurrency" between natural rhythms and cultural habits. These adjustments involved careful attention to the path of the sun around the different faces of the house, with its perforated envelope of terraces, balconies and large window openings. This is demonstrated in Gray's solar-site-plan, whose notional point of rotation is centred on an "operable disk" (*le disque occultant*) that covers a ceiling oculus in the main bedroom.[3] Leatherbarrow explains how the disk was variously adjusted rather like a blinking human eye. By operating the mechanism Gray had sought to have "some measure of daytime darkness", whose varying intensity depended on the "position of the sun and drift of the clouds."[4] We could interpret this internal oculus, and its operable disk, as an imaginary 'solar-eclipse' instrument, whose adjustment within the ceiling (in response to external environmental factors) provides personal control of natural lighting levels within the room. Indeed, Leatherbarrow describes how the brightness of the room could be ameliorated by shifting the disk "sideways to eclipse some or all of the unwanted intensity."[5]

The location and purpose of this instrument should be seen in the context of the siting and orientation of the house, with its generous external spaces that allow periodic occupancy depending on the time of day, the changing seasons and fluctuations in the weather. Leatherbarrow calls Gray's reference to *Lever* and *Couchant* (sunrise and sunset), shown on the solar-site-plan (words incidentally that also convey human wakefulness and repose), as intended to signify "temporal or diurnal events not spatial or geographical points of reference."[6] The oculus becomes, in essence, the 'fulcrum' of the whole building and its setting that constitutes a constellation of places or situations for periodic occupancy. We are presented in this example (and others that Leatherbarrow examines in his book *Building Time*) of how concurrency with natural rhythms is but a momentary experience, and yet is central to how, when and where we dwell in buildings.

Leatherbarrow's examination of building time, through modern built examples, assumes that these moments of concurrency between natural rhythms and cultural habits can be experienced directly, without distractions or 'external' interferences; that the example of Eileen Gray's house can somehow avoid pre-determined or invasive 'regimes' of time-keeping, characteristic of the modern age, which tend to lead to estrangement from the environment that exists around and within us. Understood especially in the context of our contemporary culture of mass communication, such an assumption is probably difficult to sustain. This is where we arrive at the second mode of temporal experience to be investigated in this paper, that concerns notions of 'clock-time'. Before the invention of clocks, diurnal time-keeping was commonly 'measured' using sun-dials that were often located in public places (on the walls of buildings or as free-standing monuments).[7] However, notions of time in the pre-modern world were never systematically calibrated or accurately recorded as a continuum. A more accessible (audible) way of communicating temporal succession was through the activities of bell-ringing in which religious festivals, civic events, judicial hearings and even commercial (mercantile) activities were timed with natural/cosmic cycles (daily and seasonal). Niall Atkinson's examination of what he calls an "acoustic regime" in early modern Florence demonstrates how different

sounds of bells made audible not just the occasion being announced but also their temporal scheduling.[8]

The advent however of more 'universal' systems for measuring time that accompanied chronometric technology in the late 18th and 19th centuries (as we see for example in the case of the Greenwich Meridian) also gave rise to different (sometimes inventive) ways of communicating time. In a detailed account from 1850 (quoted here by Allan Chapman) Charles Dickens describes the "Time Ball" at the Royal Observatory in Greenwich:

"Of the astronomical parts of the Observatory, it was the Time Department which Charles Dickens treated most thoroughly. In particular, the Time Ball (first installed……in 1833) captured his imagination. He describes the rituals for making the Ball ascend its pole, and the Assistant's 'practised hand upon the trigger, and a practised eye upon the face of the [clock] dial, and his release of the mechanism, at one o'clock to the tenth of a second, to make the Ball begin its five-second-long descent. The Ball's descent gave a time-signal to all shipping anchored along the Thames, and ensured the Merchant Navy captains could regulate their chronometers before sailing, and thereby add to the navigational safety of their voyages."[9]

At the moment when clock-time became global (and therefore universal), we witness a residue of ritual practices - albeit mechanically operated - to communicate temporal synchronisation as a regular public event (specifically for departing and returning merchant fleets); 'performed' in a celebrated location (the Royal Observatory) and overlooking one of the busiest shipping lanes at the time, the Thames River. In such a spectacle, time, place and building coalesce in ways that both echo (however distantly) older ritual traditions of cosmic time and exceed these traditions in their technological developments and geographical reach. It would be wrong however to assume in this spectacle of time-keeping that we are experiencing building time, in the way Leatherbarrow describes in the context of Eileen Gray's house in southern France. Instead, time becomes a matter of recording/measuring rather than of experiencing, and where building becomes effectively an instrument rather than a 'receptacle' for dwelling in time.

Whilst the falling ball at the Royal Observatory portends later developments in modern clock technology, it is demonstrably different from the understanding of time in the digital age, with our mobile (placeless) technologies of communication and time-keeping. As our 'measurements' of time (synchronised with cosmic/diurnal cycles) become ever more accurate and reduced to quantitative data, time itself is being denuded of experiential content and therefore a context (building) where meaningful and memorable situations can flourish. In essence, we never have sufficient time to achieve objectives in our crammed daily schedules, that seem in any case unreceptive – or even closed - to the 'slow' embodied environment that Vesely describes. Magnified by the impact of speed on our lives (through different modes of travel and instant online communication), experiencing time today, according to Paul Virilio and Reinhart Kostelleck, has the effect of being 'compressed'.[10] In the context of building, moreover, Marvin Trachtenberg argues that time has become effectively emptied of duration – hence 'out-of-time' - through the streamlining and acceleration of design and building practices.[11]

Alongside the reduction of time to an endless regime of productivity, which Jenny Odell describes as the dominance of the 'Corporate Clock', a parallel and more troubling temporal shift is taking place that forms the third part of this investigation.[12] According to Bill McKibben, it is sometimes assumed in our modern world that whilst culture is *in time*, nature somehow is not; that changes to the earth (the gradual accretions of geological epochs) are so slow that they cannot be comprehended in any meaningful way within the time-frame of human

existence. This view however is being quickly challenged by the impact of runaway climate change on the earth, which we are witnessing before our very eyes.[13] Besides the rapidly deteriorating state of the planet's biodiversity (arguable the most visible - and arresting - 'measure' of shifting time-frames in the natural world), there is also growing evidence that the increasing prevalence of extreme seismic activity across the globe is partly caused by climate change; hence geological time itself is showing signs of reactionary convulsions.[14] The extent to which the earth itself is succumbing to human induced changes to natural rhythms – what Odell calls a "collapsing climate clock" - is best demonstrated by the impact of the earth's melting ice-caps.[15] Put simply, humanity's enduring belief in the permanence and regularity of the cycles of heavenly bodies, the basis of belief-systems and modern clock time, is no longer tenable; the acceleration of melting ice, that is giving rise to the movement of vast quantities of ocean waters from the poles to the equator, is actually altering the motion and tilt of the earth, changing (however minutely) the duration of day and night.[16]

This unprecedented phenomenon has necessitated a recalibration of atomic clocks which, whilst largely irrelevant to the timing of our daily routines or rituals, is impacting on the 'corporate clock' with its increasing reliance on milli-second processes in global finance. Even when we ponder the implications of this earthly/celestial adjustment in the context of building time, as in the example of Leatherbarrow's examination of the Eileen Gray's *disque occultant* and solar-site-plan, we are confronted with an altogether different reality of an irreversible and destabilising transformation of the climate (and therefore of time) that will leave a deep imprint on how and where we live on this earth in the future.

Faced with this reality of time adjustments, due to changes in the earth's rotation, combined with our personal experience of erratic weather patterns, is our changing climate actually influencing our perception of time, and by implication building time? Recent research by psychologists and sociologists have identified in contemporary society a tendency towards "a stronger future time orientation.....associated with thinking about environmental problems."[17] We could describe this futural – anticipatory - orientation of temporal thinking as an indication of increasing anxiety, or dread, of what will unfold in the future. Can we assume therefore that the concurrency that Leatherbarrow describes may become in the near future psychologically (and scientifically) 'conditioned' by this growing anxiety; that predicted environmental changes may somehow be 'built into' the very fabric of dwelling, in ways that didn't exist in the past?[18] Timothy Morton goes further by arguing that even feeling a rain drop falling on one's head is actually experiencing the effects of climate change in 'real-time', even if we don't immediately realise it.[19]

Whilst the regimes of clock-time are relentlessly uniform and linear, the accelerating changes manifested in our natural environment are becoming more erratic and unpredictable. It may come as no surprise that the invention of 'clock time' in the modern age has been a contributory factor to this environmental crisis:

""……..the clock can tell me whether I am late for work, [but] it cannot tell me whether it is too late to mitigate runaway climate change."…..these two seemingly unbridgeable realms of experience – individual time pressure and climate dread – share a set of deep roots, and they have more in common than just fear.....the origins of the clock, calendar, and spreadsheet are inseparable from the history of extraction, whether of resources from the earth or of labor time from people"[20]

Hence, the insulating effects of clock-time on our experiences of the natural environment, especially in the technological age - have helped perpetuate our exploitation of the earth; that the continuum of linear time, and its emphasis on human progress, effectively reinforces the perception of an endless supply of natural resources (without the latter there isn't the former). Whilst we could construe from these 'parallel' modes of temporal acceleration – between scientific/technological advancement and runaway (human induced) climate change – a convergence that would ultimately lead to experiencing the *same* time (no longer 'natural'), I would like to propose a different scenario that offers a way forward for living in an increasingly uncertain future.

A helpful reference in exploring this 'alternative' scenario can be found in the relationship between the terms *chronos* and *kairos*; two ways of understanding time in the ancient Greek world. Whilst the former more typically corresponds to our understanding of linear time, as sequential and continuous, the latter conveys something rather different; "opportune timing or "seizing the time.""[21] How fluctuations (rather than regularities) of time are experienced and recognised are further underscored by the second meaning of the word in the ancient Greek world, namely our readiness to deal with the weather.[22] The notion of timeliness of human decision-making and actions, and its corresponding relationship to environmental factors, in many ways echoes Leatherbarrow's notion of concurrency between cultural habits and natural rhythms. However, *kairos* was also associated with the art of rhetoric, in which opportune moments for speech were also deemed to be the 'right time' for resolution (reconciling conflict or dispute).[23] This threefold meaning of *kairos* - timeliness, weather/environment and resolution - offers an instructive way of thinking about the relationship between building time, clock-time and the accelerating climate crisis.

Beyond the reduction of carbon foot-prints and the application of sustainability agendas that have come to dominate the building industry today, architecture remains a critically important physical and theoretical context for comprehending the scope and implications of the climate crisis, not just as a scientific/technological challenge but also as a way of shaping different ways of living in time in the future. To illustrate this I refer to the traditions of Shinto religion and its continuing influence on contemporary Japanese society. In a culture that has long adhered (rigidly) to clock-time, with its expectations of productivity and unbending loyalty to corporate life, something is changing in Japan today that may offer us a helpful framework for exploring the relationships between these different temporalities. On the front line of the climate crisis, Japan has witnessed the most extreme and destructive changes to its climate, through record high temperatures, tropical cyclones and landslides, not to mention tsunamis. At the same time, the country is implementing a new 'post-growth' socio-economic model, with housing as its main focus, to create a more inclusive and egalitarian society, with an ecological agenda at its heart. With the significant impact of an ageing population and a stagnating economy, the model of continuous economic growth, which western capitalism has long advocated (with all its repercussions on finite natural resources), is seen as no longer viable. This is being gradually replaced by a slower pace of change and adjustment, involving incremental stages of economic distribution and social interaction.[24]

From a socio-economic standpoint, this ambitious initiative could be seen to form part of a more general cultural transformation in Japan that draws on both deep traditions and new innovative thinking, responsive in different ways to the environmental crisis. In the tradition of Shinto shrines, that are periodically demolished and ritually rebuilt, time is always understood as provisional and momentary (never absolute and continuous), much like the ancient Greek

idea of *kairos* . An increasingly important part of Shinto religious practice today in Japan involves observing – and predicting – weather patterns. We see this demonstrated in the Kisho Jinja Weather Shrine in Tokyo, where the Shinto priest is also a certified weather forecaster.[25] At the same time as maintaining and ritually renewing the shrine, the priest also periodically prays for more stable weather, an activity that has attracted increasing numbers in recent years of participants/worshippers (both young and old) seeking respite and shelter (within the tranquillity of the temple compound) from both their own strict regimes of work and from the increasingly volatile and unpredictable climate. The fragile and 'provisional' nature of the Shinto temple (a counterpoint to strategies of resilience in building) in many ways reinforces the delicate balance between building time, shifting (fluctuating) environmental time and the 'encircling' urban regimes defined by clock-time. As Leatherbarrow states: 'durability granted to architecture does not occur despite but because of change. Locations……are always only intermittently advantageous.'[26]

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[1] Dalibor Vesely, 'The Relation of Religion and Science'. In Dalibor Vesely, *The Latent World of Architecture: Selected Essays* (London: Routledge, 2023), 89-101 (96-97).
[2] David Leatherbarrow, *Building Time: Architecture, Event, and Experience* (London: Bloomsbury Visual Arts, 2021), 48.
[3] Ibid., 33.
[4] Ibid., 34.
[5] Ibid., 32.
[6] Ibid., 35.
[7] A notable example is the famous *Solarium Augusti* (or *Horologium Augusti*) which was built in the Campus Martius in ancient Rome and constructed in 10 BC.
[8] Niall Atkinson, *The Noisy Renaissance: Sound, Architecture, and Florentine Urban Life* (University Park, PA: Pennsylvania State University Press, 2016)
[9] Allan Chapman, 'The Observer Observed: Charles Dickens at the Royal Observatory in 1850'. *The Antiquarian Astronomer*, Issue 2 (Dec.2005), 9-20 (11-12).
[10] Paul Virilio, *The Aesthetics of Disappearance* (New York: Semiotext, 1991),104-105. Reinhart Koselleck describes temporal acceleration in the modern world as a "perspectival concept", in which time is "foreshortened". *Sediments of Time: On Possible Histories* (Stanford, CA: Stanford University Press, 2018), 90.
[11] Marvin Trachtenberg, *Building-in-Time from Giotto to Alberti and Modern Oblivion* (New Haven: Yale University Press, 2010).
[12] Jenny Odell, *Saving Time: Discovering a Life Beyond the Clock* (London: Vintage, 2024)
[13] McKibben, Bill, 'Worried? Us?'. *Granta,* 83 (Autumn, 2003), 7-12. Quoted in Michelle Bastian, 'Fatally Confused: Telling the time in the midst of ecological crises'. *Journal of Environmental Philosophy*, Vol. 9, No. 1 (Spring 2012), 23-48 (24).
[14] Bill McGuire, *Waking the Giant: How a changing climate triggers earthquakes, tsunamis, and volcanoes* (Oxford: Oxford University Press, 2012)
[15] Odell, xvi
[16] https://www.theguardian.com/environment/article/2024/jul/15/climate-crisis-making-days-longer-study (Accessed 18/10/2024); Patrizia Tavella and Jerry X. Mitrovica, 'Melting ice solves leap-second problem — for now,' *Nature,* 628 (2024), 273-274. https://doi.org/10.1038/d41586-024-00850-x.
[17] Sabine Pahl, Stephen Sheppard, Christine Boomsma and Christopher Groves, 'Perceptions of time in relation to climate change'. *WIREs Climate Change*, Vol.5, 375 (May/June, 2014), 1-14 (2).
[18] This issue is already evidenced by the increasing emphasis on resilient strategies in the building industry, that assume, at the outset, imminent or future environmental threats.
[19] Timothy Morton, *Ecology without Nature* (Cambridge, MASS: Harvard University Press, 2009).
[20] Odell, *Saving Time*, xvi.
[21] Ibid., xvii.
[22] Harald Haarmann, *Kairos: Human Responses to the Flow of Time in the Dynamic Processes of Western Civilisation* (Berlin: Georg Olms Verlag, 2023).

[23] E. C. White, *Kaironomia: on the will to invent* (Ithaca and London: Cornell University Press, 1987)
[24] Carsten Herrmann-Pillath, 'At the crossroads: Japan on the way towards post-Capitalism? Reflections on an ongoing discourse among Japanese scholars.' Unpublished article accessed from Researchgate: https://www.researchgate.net/profile/Carsten-Herrmann-Pillath/publication/344471575_At_the_crossroads_Japan_on_the_way_towards_post-capitalism_Reflections_on_an_ongoing_discourse_among_Japanese_scholars/links/5f7ae3c5a6fdcc0086573a5c/At-the-crossroads-Japan-on-the-way-towards-post-capitalism-Reflections-on-an-ongoing-discourse-among-Japanese-scholars.pdf
(Accessed on 19/10/2024).
[25] https://www.theguardian.com/world/article/2024/aug/23/japan-kisho-jinja-weather-shinto-shrine-tokyo (Accessed on 18/10/2024)
[26] Leatherbarrow, *Building Time*, 48.