

VOLUME 1 | ISSUE 2 | SEPTEMBER 2026

PublicPast

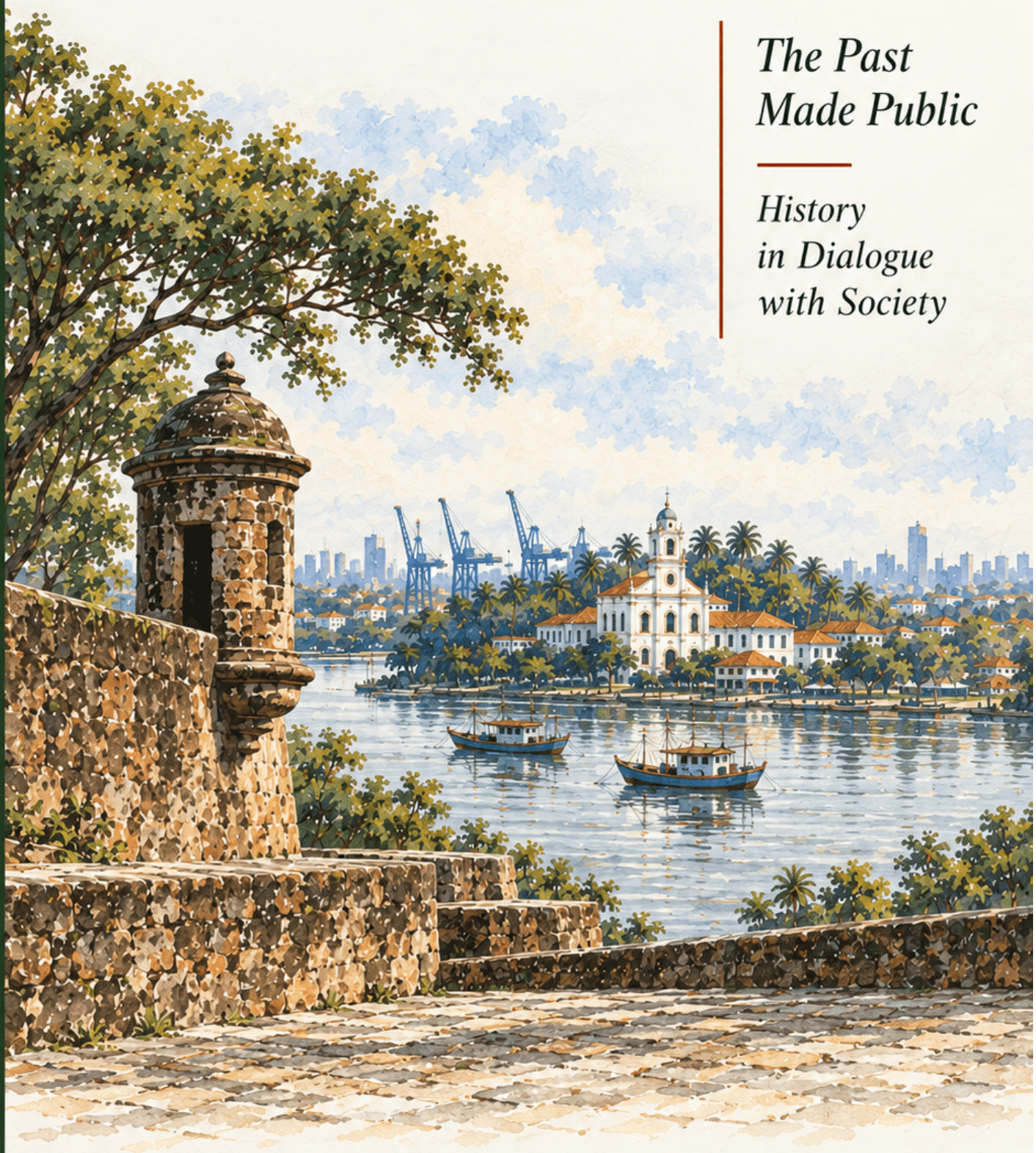
Journal of Public History

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History



PublicPast: Journal of Public History

Volume 1, Issue 2 | July–September 2026

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PUBLICPAST

JOURNAL OF PUBLIC HISTORY

PUBLICPAST IDENTIFIER (PPI)

v1i2/op/01<https://publicpast.org/ppi/v1i2/op/01>

EDITORIAL ARTICLE

The Past in Public: Who Owns, Tells, and Remembers History?

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📅 Published: 6 September 2026

📄 PPI: **v1i2/op/01**

🔗 DOI:
<https://doi.org/10.5281/zenodo.23079561>

🔗 Article URL:
<https://publicpast.org/ppi/v1i2/op/01>

ABSTRACT

There is a question that has grown more insistent with each passing decade, and it sits at the heart of what this journal intends to pursue: who, exactly, does public history belong to? The question is not merely academic. It is political, ethical, and deeply personal. It concerns the monuments that line our avenues, the museums that school children file through on rainy mornings, the community elders whose testimonies go unrecorded, and the algorithms that now decide which version of the past reaches us first. It concerns power, in other words, and the uneven distribution of the authority to narrate.

KEYWORDS

Public History • Memory Studies • Digital History • Oral History • Historiography • Artificial Intelligence



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Public history as a discipline emerged from a recognition that the past does not live only inside universities and archives. It circulates, gets contested, gets silenced, and gets revived in courtrooms, in newspapers, at heritage sites, and across kitchen tables. Historians who take this seriously have long argued that the production of historical knowledge is never a neutral act

(Frisch 1990, 68). To tell a history is to make choices: what to foreground, what to leave behind, whose voice counts as evidence, and whose memory counts as fact. These choices accumulate into a picture of the past that serves some communities and excludes others.

The problem is not new. What is new is the scale and speed at which these dynamics now operate. Digital platforms have made it possible for communities to produce, circulate, and defend their own historical narratives without institutional mediation (Rosenzweig 2011, 3). This is, in many respects, an extraordinary development. Oral traditions once confined to a village or a neighborhood can reach global audiences. Photographs, documents, and testimonies that official archives never thought to collect are being digitized and shared by the communities that created them. The past is, in this sense, more public than it has ever been.

Yet democratization and equity are not the same thing. The expansion of access to digital tools has not resolved the older asymmetries of who gets to speak with authority about the past. Platforms that appear open are governed by recommendation logics that reward familiarity and provoke engagement, often at the expense of nuance and complexity (Nieborg and Poell 2018, 4276). A viral post about a historical atrocity may reach more people than any peer-reviewed monograph, but reach alone tells us little about depth, accuracy, or the relationship to the communities most affected. The democratization of the past, if that is what we are witnessing, is partial, uneven, and contested.

This unevenness is perhaps nowhere more visible than in debates over monuments and memorialized landscapes. The wave of monument removals and recontextualizations that accelerated globally in 2020 brought into sharp relief the tension between official memory and community memory (Legg 2005, 476). Monuments are rarely neutral archives. They are arguments, cast in stone or bronze, about which lives shaped history and which did not. When communities demand the removal or alteration of figures they find offensive or exclusionary, they are not, as critics sometimes claim, erasing history. They are disputing whose version of history has been allowed to stand in the center of public space, often for generations, without question.

The stakes of these disputes are not merely symbolic. There is now substantial scholarship demonstrating that how a society chooses to remember its past has direct consequences for how it treats its most vulnerable members in the present (Torpey 2006, 44). Communities that have experienced historical violence, dispossession, or systematic exclusion from the historical record do not experience erasure as a historical abstraction. They live with its consequences, and they recognize, often more clearly than institutions do, the difference between acknowledgment and redress.

This brings us to a third set of questions that PublicPast intends to take seriously: the relationship between historians and the publics they study or serve. There is a long-standing

anxiety in the discipline about what happens when historians step outside the seminar room and into the public sphere. Some of this anxiety is legitimate. Historians have obligations to evidence and argument that do not disappear because the audience is larger. But much of it reflects a protectiveness about expertise that has not always served communities well. The historian who insists on the complexity of the past while a community is demanding accountability for the violence done to it is not always a voice for nuance. Sometimes that insistence is a way of deferring, or of avoiding, the demands that historical knowledge makes on the present.

Oral history and community-based historical practice have complicated this dynamic productively. The Oral History Association, among others, has spent decades developing ethical frameworks for research that takes seriously the historical agency of those who might otherwise appear only as subjects in someone else's account (Shopes 2011, 261). Feminist and postcolonial historians have argued even more fundamentally that the structures of academic knowledge production themselves reproduce the hierarchies they claim to study (Chakravarti 1993, 580). To ask whose history is public history is, in part, to ask whether academic historians are willing to give up some of their authority over what counts as historical knowledge.

The arrival of artificial intelligence adds a further dimension to these questions, one that this journal will follow closely. Large language models now generate historical content at a scale no human author or institution can match. They can summarize events, reconstruct contexts, and produce plausible-sounding historical narratives almost instantaneously. What they cannot do, at least not yet, is reproduce the relationship of accountability and community that the best public history requires. History is not only an account of what happened. It is a practice undertaken in relation to those who were there, those who remember, and those who are still living with the consequences. That relational dimension is precisely what algorithmic production tends to flatten or omit entirely.

None of this means that AI tools have no place in historical practice. They are already being used, productively and controversially, for archival search, translation, transcription, and pattern recognition across large textual corpora. But the question of who owns, tells, and remembers history cannot be outsourced to a language model. It remains a question about human relationships, political choices, and ethical commitments.

PublicPast begins from the conviction that public history matters, and that it matters differently to different communities and in different contexts. This journal will not pretend to resolve the tensions described above. It will, instead, try to create a space in which they can be examined rigorously, argued about openly, and brought into productive contact with the communities, institutions, and individuals who are navigating them every day. We are not interested in a public history that settles for transmission, in which the past is packaged and delivered to a waiting

audience. We are interested in a public history that is genuinely participatory, that takes seriously the complexity of memory, and that holds itself accountable to the communities whose histories it engages.

The question of whose history is public history has no clean answer. But the asking of it, consistently and without evasion, is one of the most important intellectual and political acts available to us. That is what this journal is for.

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NARRATIVE HISTORY

More Than Silk: How the Silk Road Carried Disease, Religion, and Technology Across Eurasia

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📅 Published: 12 September 2026

📄 PPI: **v1i2/nh/01**

🔗 DOI:

<https://doi.org/10.5281/zenodo.23081057>

🔗 Article URL:

<https://publicpast.org/ppi/v1i2/nh/01>

ABSTRACT

The Silk Road is popularly remembered as a conduit for luxury goods: bolts of silk, jars of spice, and porcelain packed into camel saddlebags moving between China and the Mediterranean. That picture is not wrong, but it is badly incomplete. The same roads, river crossings, oasis towns, and caravanserais that carried silk also carried things nobody had packed on purpose. Fleas riding on marmots and grain sacks carried *Yersinia pestis* out of the Central Asian steppe and, centuries later, into the crowded cities of Europe. Buddhist monks, Nestorian Christian missionaries, and Muslim traders carried scripture, liturgy, and law along the same routes their goods traveled, converting entire steppe confederations in the process. Papermaking, gunpowder, and printing moved from Chinese workshops into Islamic and then European hands, arguably reshaping the trajectory of world history more than any bolt of cloth ever did. This article draws on recent archaeological research, religious history, and the history of technology to argue that the Silk Road's deepest legacy was not commercial but infrastructural: it built a durable set of human and animal connections across Eurasia, and those connections carried whatever was capable of moving along them, wanted or not. The article closes by considering what this braided history of contagion, conversion, and invention suggests about how connectivity itself, rather than any single good, is the true unit of historical analysis.

KEYWORDS

[silk-road](#) • [world-history](#) • [medieval-history](#) • [history-of-disease](#) • [religious-history](#) • [history-of-technology](#)



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Introduction

When people hear the phrase "Silk Road," they tend to picture something specific and slightly romantic: a camel caravan crossing a desert at dusk, laden with Chinese silk bound for a Roman senator's household. That image is not entirely false. Silk did move west along these routes, and it was valuable enough that the German geographer Ferdinand von Richthofen coined the term *Seidenstraße* in 1877 to describe the network in the first place (Frankopan 2015). But the name has always been something of a historical accident. The Silk Road was never a single road, and silk was never the only thing, or the most consequential thing, moving along it.

What actually existed was a shifting mesh of overland caravan tracks, mountain passes, oasis towns, and maritime feeder routes connecting China, Central Asia, the Indian subcontinent, Persia, the Arab world, and the Mediterranean from roughly the second century BCE through the early modern period (Hansen 2012). Historians increasingly describe this system less as a road than as a network, one that was "a set of paths that split and reconnected across the steppes of Central Asia, almost like the blood vessels" of a living body (History.com 2025). That circulatory metaphor turns out to be more precise than it first appears, because a circulatory system carries not only nutrients but infection as well.

This article is organized around three things the Silk Road moved that were not silk: disease, religion, and technology. These three strands are usually studied separately, by epidemiologists, by religious historians, and by historians of science and technology respectively. Read together, however, they tell a single story about what long-distance connectivity actually does to human societies. A network built for the exchange of goods does not stay confined to goods. It becomes a channel for anything capable of hitching a ride, whether that is a flea, a translated scripture, or a technique for beating mulberry bark into paper. The Silk Road's true historical significance may lie less in what merchants intended to trade than in the unintended cargo that traveled alongside them.

1. The Silk Road as a System, Not a Road

Before turning to disease, religion, and technology individually, it is worth pausing on why the Silk Road was so effective at moving all three simultaneously. Part of the answer is structural. The overland Silk Road was not one continuous highway but a decentralized web of alternate

routes threading around the Taklamakan Desert, over the Pamir and Tian Shan mountain ranges, and through the oasis cities of Sogdiana (Samarkand, Bukhara, Merv) that functioned as relay points rather than endpoints (Whitfield 2015). Because multiple parallel paths existed, disruption on one route rarely closed the network as a whole; goods, people, and everything traveling with them simply rerouted.

The other part of the answer is political. Long stretches of Silk Road history correspond to periods when a single power, or a small number of cooperating powers, guaranteed safe passage across enormous distances. The most dramatic example is the Mongol Empire of the thirteenth and fourteenth centuries, whose unification of the steppe from Korea to Hungary produced what historians call the *Pax Mongolica*, a Mongol-enforced peace that lowered the cost and risk of transcontinental travel to a degree not seen before or, arguably, for centuries afterward (Richmond Fed 2025). The Mongols maintained a relay postal system known as the *yam*, issued safe-conduct passes to merchants, and reduced the tolls and predatory local powers that had previously taxed travelers at every turn (Albert Blog 2026a). Marco Polo's journey to Kublai Khan's court, and the considerably less celebrated journey of the Nestorian monk Rabban Bar Sauma from the Mongol capital toward Europe, were both made possible by this unusual thirteenth-century security guarantee (FasterCapital n.d.).

The Sogdians deserve particular attention, because they appear as the connective tissue running through nearly every strand of this history. Sogdiana, a region centered on modern Uzbekistan and Tajikistan, occupied the geographic hinge between the Mediterranean world, Persia, India, and China, and its merchants built one of the most successful diaspora trading networks in premodern history (Qalam Global 2025). Sogdian merchants were multilingual by necessity, and multilingual traders make useful missionaries, translators, and technicians almost as a byproduct of their commercial work. As recent scholarship on Sogdian trade networks observes, it is "surely no coincidence" that Buddhism, Manichaeism, and Nestorian Christianity spread most actively through Central Asia precisely during the periods when Sogdian merchant communities adopted those traditions (Qalam Global 2025). Trade networks and belief networks were, in practice, often the same network operating under different descriptions.

2. Pathogens on the Move: Disease and the Silk Road

2.1 The Silk Road as Vector

Historians of medicine have long suspected that Eurasian trade routes were responsible for carrying disease across enormous distances well before steamships and airplanes made pandemics a household concept. Mark Welford, a geographer whose 2018 book examines the spatial behavior of plague pandemics, argues that the Silk Road "allowed, possibly for the first" time, sustained transmission of diseases endemic to Central Asia out toward Europe (History.com

2025). The reasoning is not complicated once stated. Caravans traveling the Silk Road consisted of hundreds of animals and people moving slowly over months, camping repeatedly at caravanserais along the way (History Rise 2026). Rodents were drawn to these traveling communities by the food and shelter they represented, and rodents are the primary reservoir for *Yersinia pestis*, the bacterium responsible for plague (History Rise 2026).

2.2 The Justinianic Plague and the First Pandemic

The pattern predates the medieval period usually associated with the Silk Road. The Plague of Justinian, which struck the Byzantine Empire beginning in 541 CE, is now understood to have emerged from Central Asian rodent reservoirs and spread westward along trans-Eurasian trade routes (Springer Nature 2023). Genetic work on ancient *Y. pestis* strains has established that the lineages responsible for the Justinianic outbreak are distinct from, but ancestrally related to, the strains that would cause the far larger medieval pandemic roughly eight centuries later, suggesting that the Central Asian steppe functioned as a recurring source region rather than a single point of origin (Springer Nature 2023).

2.3 The Black Death and the Question of Origins

The most consequential episode is the Black Death, the second plague pandemic that struck Eurasia and North Africa between roughly 1346 and 1353, estimated to have killed more than fifty million people, a substantial fraction of the population then living along its route (Historic Mysteries 2023). For decades, the standard account held that the pandemic originated somewhere in the Central Asian steppe, most plausibly in what is now Mongolia or northwestern China, and traveled west via Mongol-controlled trade corridors before reaching Crimea, from which Genoese ships carried it into the Mediterranean (History Rise 2026).

This account has recently been given a firmer evidentiary foundation. In a landmark study published in *Nature*, Spyrou and colleagues (2022) analyzed ancient DNA extracted from individuals buried in two cemeteries in the Chüy Valley near Lake Issyk-Kul in modern Kyrgyzstan, at sites known as Kara-Djigach and Burana. Tombstone inscriptions at these sites, dated to 1338 and 1339, explicitly record "pestilence" as the cause of death for several individuals, a detail that had intrigued historians for over a century but which no one had been able to confirm genetically (Spyrou et al. 2022). The team recovered *Y. pestis* DNA from seven individuals and found that the strain present was a direct ancestor of the diversified lineages that would go on to cause the Black Death across the Golden Horde, the Ilkhanate, and Europe (Spyrou et al. 2022). This single Central Asian outbreak, occurring roughly seven years before the pandemic reached Crimea, appears to sit close to the genetic root of the entire medieval catastrophe.

The finding matters for a Silk Road narrative because of where the Chüy Valley sits. The cemeteries lie within what was then the Chagatai Khanate, a region that occupied the geographic heart of the Silk Road and served as the bridge connecting the Yuan dynasty in the east to the Ilkhanate and Golden Horde in the west (Spyrou et al. 2022; Hansen 2012). The same Mongol infrastructure that made transcontinental trade fast and safe, including the yam relay stations, the protected caravan routes, and the constant flow of merchants and their pack animals, also provided a localized rodent-borne disease with an unusually efficient path toward becoming a transcontinental pandemic (Frankopan 2015; Spyrou et al. 2022).

This account is not universally accepted. Some scholars have argued that the dating of plague genomes suggests the disease's presence in Central Asia may actually postdate the initial European outbreak rather than precede it, and point out that overland Silk Road trade had already been substantially disrupted by the 1330s and 1340s (Kausrud et al. 2010; Historic Mysteries 2023). There is also no surviving documentary evidence of a large-scale plague pandemic sweeping through the Yuan Empire itself, which is puzzling if the disease truly radiated outward from Mongol-controlled Central Asia (Welford 2018). The 2022 aDNA evidence has narrowed this debate considerably by anchoring an early, genetically confirmed outbreak to a specific Silk Road location and date, but the exact mechanism of westward transmission, whether by marmot, camel, flea-infested grain, or human traveler, remains a live question (Spyrou et al. 2022; Izdebski et al. 2022).

2.4 Climate, Rodents, and the Ecology of Transmission

A parallel line of research has examined why plague reservoirs in the Central Asian steppe became active spillover sources when they did. A 2010 study modeled the epidemiological history of plague in Central Asia across the preceding millennium and identified paleoclimatic conditions, rather than trade volume alone, as a key driver of active plague phases (Kausrud et al. 2010). A subsequent study proposed that fourteenth-century climate fluctuations caused a crash in the population of steppe rodents, particularly gerbils and marmots, which serve as natural hosts for *Y. pestis* (Historic Mysteries 2023). When a primary host population collapses, its fleas do not simply die; they seek new hosts, and traveling animals and the humans moving with them provided abundant, warm-blooded alternatives close at hand (Historic Mysteries 2023). A separate study examining palaeoecological data across Europe similarly found that land-use patterns shaped the spatial heterogeneity of mortality once the pandemic arrived, suggesting that ecology and trade infrastructure worked in concert rather than independently (Izdebski et al. 2022).

None of this required anyone to intend disease transmission. That is precisely the point. The Silk Road did not need a villain; it needed only density, duration, and reach: hundreds of animals and

people moving slowly together over months, doing so repeatedly, across a network broad enough to eventually touch every major population center in Eurasia. Camels themselves can contract and transmit *Y. pestis*, adding yet another layer to how efficiently pack animals carried the disease alongside cargo (Springer Nature 2023).

3. Faith Follows Trade: Religion Along the Silk Road

If disease is the darkest thing the Silk Road carried, religion is arguably the most transformative in terms of the cultural map of Asia that resulted. Three traditions in particular, Buddhism, Nestorian Christianity, and later Islam, used the same routes and the same merchant intermediaries that carried silk, paper, and spice.

3.1 Buddhism's Long Migration East

Buddhism originated in northern India in the fifth century BCE, but it did not spread eastward under its own momentum. It moved because merchants moved, and because those merchants carried monks, texts, and relics alongside their goods. The transmission of Buddhism from India through Gandhara, in what is now northern Pakistan and southern Afghanistan, and onward into Central Asia and China is described by scholars as "perhaps the most significant" of all the cultural exchanges the Silk Road produced (Association for Asian Studies 2023).

The exact route and timeline remain debated. The *Book of the Later Han* preserves two different accounts of Buddhism's arrival in China, and historians have argued for decades over whether monks first arrived by the overland Silk Road or by southern maritime routes (Dharmapedia n.d.). The overland hypothesis, associated with the historian Tang Yongtong, holds that Buddhism moved eastward through Yuezhi territory and established itself at the Han capital of Luoyang, where Emperor Ming is traditionally credited with founding the White Horse Temple around 68 CE (Dharmapedia n.d.). The maritime hypothesis, favored by scholars including Liang Qichao and Paul Pelliot, locates Buddhism's earliest Chinese foothold in the south, around the Yangtze and Huai river region (Dharmapedia n.d.). More recent multidisciplinary work incorporating Gandharan Buddhist manuscripts has generally supported the overland route as the primary channel, though most scholars acknowledge that both routes likely contributed over time (Dharmapedia n.d.).

What is not disputed is who carried the religion once it began moving. Chinese records indicate that some of the earliest Buddhist arrivals in China were not missionaries from India, the faith's homeland, but Sogdian traders, the same merchant community that would later carry Christianity eastward as well (ResearchGate 2011). Xinru Liu's influential scholarship describes how the interweaving of the silk trade and Buddhist patronage created a durable economic relationship: monasteries needed donations, silk was valuable and portable, and merchants

seeking spiritual merit had every practical incentive to support Buddhist institutions along the routes they already traveled (Liu 1995).

By the time Chinese Buddhist pilgrims like Faxian in the early fifth century and Xuanzang in the seventh century made their own journeys westward, traveling to India to study at centers of Buddhist learning and bring back scripture, the religious traffic along the Silk Road had become genuinely bidirectional (Hansen 2012; Whitfield 2015). Xuanzang's seventeen-year pilgrimage, undertaken without official permission and later celebrated in Chinese literature, is one of the best-documented journeys of the premodern world precisely because the Silk Road by then supported not just merchants but scholars, translators, and religious institutions capable of housing and provisioning long-distance travelers (Whitfield 2015; Dharmapedia n.d.). Buddhist cave complexes such as the Mogao Caves near Dunhuang and the monumental Buddhas of Bamiyan in Afghanistan stand as physical evidence of how thoroughly Buddhist culture took root in the oasis towns that serviced Silk Road trade (Association for Asian Studies 2023).

3.2 Nestorian Christianity and the Sogdian Missionary-Merchant

The Church of the East, commonly known (somewhat pejoratively) as Nestorian Christianity after the fifth-century Patriarch Nestorius whose christological views placed it at odds with the Byzantine church, followed a strikingly similar path east (American Foundation for Syriac Studies 2014). Excommunicated from the mainstream Byzantine church, the Church of the East relocated its institutional center to Persia and from there expanded along the Silk Road into Central Asia (Silk Road Seattle n.d.).

Here again, Sogdian merchants proved decisive. Through commercial relationships with Persian traders, Sogdians began converting to Nestorian Christianity in significant numbers and, being multilingual by vocation, served as capable translators of Christian liturgical texts from Syriac, the church's official language, into Sogdian (Silk Road Seattle n.d.). A cache of Nestorian texts translated from Syriac into Sogdian, discovered in the Tarim Basin in the early twentieth century, provides direct material evidence of this translation work (Silk Road Seattle n.d.). By around 650 CE, Nestorian archbishoprics existed as far east as Samarkand and Kashgar, and Sogdian merchants working alongside Syrian missionaries had contributed to the conversion of nomadic Turkic tribes across the Central Asian steppe (Silk Road Seattle n.d.).

The scale of this missionary success is easy to underestimate today, given how thoroughly the Church of the East eventually receded from the historical map. Eastern Christian missionaries are credited with three separate mass conversions of Turkic peoples in Central Asia between the seventh and eleventh centuries (Smithsonian Folklife Festival n.d.). The faith reached China itself in 635 CE, when a missionary named Alopen arrived in the Tang capital of Chang'an (Facts and Details n.d.). According to the Nestorian Stele, a stone monument erected in Chang'an in 781 CE

with inscriptions in both Chinese and Syriac, the Tang emperor received Alopen favorably, approved of his teachings, and commanded that they be propagated throughout the empire (Facts and Details n.d.). Alopen subsequently translated scripture into Chinese for the imperial library and established churches and monasteries under direct imperial sanction (Facts and Details n.d.).

The Nestorian presence extended deep into the Mongol world as well. The Ongut, a Turkic tribe located along a branch of the Silk Road near the Chinese frontier, adopted Nestorian Christianity and later allied with Genghis Khan, rising to considerable prominence within the Mongol Empire under the Ongut khan Georgios in the late thirteenth century (TILNOTE 2024). One local tradition from Sogdiana, recorded in a later Christian source, even connects the faith directly to plague: residents afflicted by an outbreak were reportedly told by local Christians that worshipping the cross could avert the disaster, a claim that, whatever its medical standing, testifies to how intertwined disease and religious appeals to protection had become along these same corridors many centuries before the Black Death (ResearchGate 2024).

3.3 Manichaeism and the Later Arrival of Islam

Manichaeism, a dualist religion founded by the Persian prophet Mani in the third century CE, followed the same Sogdian-mediated path east and, remarkably, became the official state religion of the Uyghur Khaganate for roughly seventy years, a rare instance of a minority faith achieving formal state sponsorship anywhere along the Silk Road (Smithsonian Folklife Festival n.d.). It did not survive as an independent tradition much beyond that period, eventually absorbed or suppressed as other traditions gained dominance, though some of its ideas are thought to have persisted within surrounding religious systems (Smithsonian Folklife Festival n.d.).

Islam arrived comparatively late to the Central Asian portions of the Silk Road but ultimately proved the most durable of the region's imported faiths, becoming the majority religion across most of the corridor by the high medieval period (Smithsonian Folklife Festival n.d.). Its spread involved both conquest and gradual conversion; quantitative historical work on conversion patterns among Iranian and Central Asian elites indicates a slow demographic shift that peaked only in the tenth century, driven substantially by economic incentive and integration into Abbasid administrative structures rather than by rapid military imposition alone (Grokikipedia 2026a). The transition from a predominantly Buddhist Central Asia to a predominantly Muslim one was gradual and contested enough that recent scholarship treats it as a centuries-long process of religious layering rather than a single decisive conversion event (ResearchGate 2011).

4. Ideas Made Material: Technology Transfer Along the Silk Road

Religion and disease both moved as living or organic cargo: a monk, a merchant, a flea.

Technology moved differently, as knowledge embedded in captured artisans, traded manuscripts, and observed processes. The two most consequential technology transfers associated with the Silk Road are the westward spread of papermaking in the eighth century and the spread of gunpowder and printing during the thirteenth and fourteenth century Pax Mongolica.

4.1 Papermaking and the Battle of Talas

The traditional account of papermaking's transfer to the Islamic world centers on a single military engagement: the Battle of Talas, fought in July 751 CE near the Talas River in what is now northeastern Kyrgyzstan, between Tang dynasty forces under General Gao Xianzhi and Abbasid Caliphate forces under Ziyad ibn Salih (EBSCO Research Starters n.d.). The battle arose from a dynastic dispute in Tashkent and was decided in the Abbasids' favor after the defection of Tang's Turkic allies mid-battle (EBSCO Research Starters n.d.). China lost control of its Central Asian trade routes for roughly the next half century as a consequence (EBSCO Research Starters n.d.; Frankopan 2015).

According to the eleventh-century Persian historian al-Tha'ālibī, Chinese prisoners captured at Talas included skilled papermakers who, while living under Abbasid control, introduced paper manufacturing to Samarkand, from where the craft spread to Baghdad, Damascus, Cairo, and eventually to Morocco and Muslim Spain (Belt and Road Institute in Sweden 2023; EBSCO Research Starters n.d.). Paper gradually displaced the far more expensive papyrus and parchment across the Islamic world, with lasting consequences for record-keeping, scholarship, and the cost of book production (Belt and Road Institute in Sweden 2023).

It is worth noting that modern scholarship treats the prisoner-transfer story with considerably more skepticism than popular accounts usually allow. No contemporary Chinese source records the transfer of papermaking knowledge through prisoners of war, and no surviving Arabic account from the period confirms it (Belt and Road Institute in Sweden 2023; EBSCO Research Starters n.d.). Du Huan, a Chinese officer who was himself captured at Talas and later wrote an account of his captivity, records that Chinese prisoners practiced crafts such as silk weaving under Abbasid rule, but does not mention papermaking specifically (EBSCO Research Starters n.d.). The historian of Islamic paper Jonathan Bloom has argued that paper production likely reached Samarkand through ordinary commercial diffusion along the Silk Road, a process that may have predated or occurred independently of any prisoners taken at Talas (Grokikipedia 2026b). The battle may have become attached to the papermaking story after the fact because Chinese artisans were already a byword for skilled craftsmanship across the Islamic world, making them a convenient explanatory frame for a technology that was, in reality, diffusing more gradually through sustained trade contact (Grokikipedia 2026b; Frankopan 2015).

Whatever the precise mechanism, the outcome is not disputed. Paper technology moved from

China into the Islamic world in the second half of the eighth century and continued spreading west for centuries, eventually reaching Christian Europe by the twelfth and thirteenth centuries via Muslim Spain and Sicily. Cheap, durable, and far easier to produce than parchment, paper lowered the cost of copying texts substantially, expanding literacy, bureaucratic record-keeping, and the circulation of scholarship across the medieval Islamic world in ways that are difficult to overstate (Belt and Road Institute in Sweden 2023).

4.2 Gunpowder, Printing, and the Pax Mongolica

A second major wave of technology transfer occurred during the Pax Mongolica, when Mongol control over the bulk of the Eurasian landmass created conditions for technological diffusion on a scale not seen before. Chinese gunpowder technology, initially developed for fireworks and later weaponized into early cannons and hand cannons, spread westward into the Islamic world and from there into Europe during this period (Albert Blog 2026a). Chinese printing techniques, including woodblock printing and the use of printed paper currency by the Yuan dynasty, moved west along the same routes (Albert Blog 2026a).

The scope of what moved during the Pax Mongolica extended well beyond weapons and printing presses. Paper money, bills of exchange, deposit banking practices, and insurance mechanisms all migrated westward during this period, reshaping European commercial practice in ways that predate the Renaissance commercial revolution usually credited with these innovations (itakehistory 2022). Compass technology, developed in China for geomantic and later navigational purposes, likewise moved west during this era (Ancient War History n.d.). Medical knowledge flowed in both directions: under Mongol patronage, Muslim physicians gained access to Chinese pharmacological knowledge, while Chinese doctors in turn encountered surgical techniques from the Middle East (Richmond Fed 2025).

The Mongol court itself functioned as something like a technological and intellectual clearinghouse. Cities like Samarkand, already significant from the earlier era of papermaking diffusion, became repositories where craftsmen, scholars, and travelers from across the empire exchanged techniques as readily as goods (itakehistory 2022). Islamic mathematics and astronomy spread into East Asia and Africa during this same period, while Chinese administrative and printing techniques moved in the opposite direction, producing a wide set of developments spanning economy, medicine, agriculture, astronomy, and historiography that extended into North Africa as well (Richmond Fed 2025; itakehistory 2022).

None of this exchange was uncomplicated or purely beneficial. The same Mongol conquests that opened trade routes also destroyed the Abbasid Caliphate's capital at Baghdad in 1258, killing an enormous number of people and devastating irrigation infrastructure that took centuries to rebuild (Albert Blog 2026b). And the same infrastructure that carried gunpowder, paper money,

and astronomical instruments west also carried the Black Death, sometimes described as the single most consequential piece of cargo the Pax Mongolica ever transported (Albert Blog 2026b). Increased long-distance trade facilitated the transmission of deadly disease as readily as it facilitated the transmission of useful knowledge, a point economic historians of the Mongol trade system make explicit (Richmond Fed 2025).

5. A Common Mechanism: Merchants, Networks, and Unintended Cargo

Having traced disease, religion, and technology separately, it is worth stepping back to notice how similar their mechanisms of transmission actually were. In each case, the primary agents of transmission were not specialists dedicated to that particular kind of movement. Disease did not spread because anyone was trying to spread it; it spread because rodents followed food, fleas followed rodents, and both traveled inside caravans carrying silk and grain. Religion did not spread primarily through organized missionary campaigns, at least not initially; it spread because merchants, particularly the Sogdians, needed multilingual, cross-culturally credible networks of trust to do business across enormous distances, and religious affiliation turned out to be one of the most effective ways of building that trust (Qalam Global 2025). Technology did not move because inventors deliberately exported their inventions; papermaking likely diffused through ordinary commercial contact whether or not the Talas prisoners were involved, and gunpowder and printing spread west largely because the Mongol state's administrative needs, for currency, for communication, for military advantage, created strong incentives to adopt whatever worked, regardless of its origin (Grokopedia 2026b; Albert Blog 2026a).

This is the deeper lesson the Silk Road offers historians of connectivity more generally. A trade network is not a pipe carrying a single substance from point A to point B. It is closer to an ecosystem, one in which the same infrastructure, roads, waystations, multilingual intermediaries, and political guarantees of safe passage, can be exploited by radically different kinds of cargo simultaneously. Silk moved because someone wanted to sell it. Plague moved because fleas do not care what humans want. Buddhism and Christianity moved because merchant communities found practical advantage in adopting them. Paper, gunpowder, and the compass moved because once a technique exists anywhere within a connected network, it tends, eventually, to appear everywhere within that network. The Silk Road did not choose what to carry. It simply made carrying, of any kind, dramatically easier than it had been before.

Conclusion

The phrase "Silk Road" persists because it is evocative and because silk genuinely mattered, both economically and symbolically, to the network's Mediterranean end. But treating silk as the main story obscures more than it reveals. The same roads that carried silk carried the bacterium that

killed a substantial fraction of fourteenth-century Eurasia's population, a transmission event now anchored with unusual precision to a set of cemeteries in the Chüy Valley of modern Kyrgyzstan (Spyrou et al. 2022). Those roads carried Buddhism from Gandhara to the Chinese court and, centuries later, Nestorian Christianity from Persia to the same court, both faiths transmitted disproportionately by the same class of multilingual Sogdian merchants who also happened to be moving cargo (Silk Road Seattle n.d.; ResearchGate 2011). And those roads carried the techniques of papermaking, gunpowder manufacture, and printing from Chinese workshops into the Islamic world and eventually into Europe, technologies that would go on to shape the Renaissance, the Reformation, and the trajectory of European warfare in ways far exceeding anything silk itself ever accomplished (Belt and Road Institute in Sweden 2023; Albert Blog 2026a).

What unites these three strands is not coincidence but structure. Wherever a durable, protected, sufficiently trafficked connection exists between distant societies, that connection will eventually carry more than whatever it was originally built to carry. The Silk Road's builders, insofar as any single group can be credited with constructing something this decentralized, were interested in trade, not in epidemiology, theology, or the history of technology. But the corridor they created did not distinguish between silk and spores, between merchandise and missionaries, between commodities and codices. It carried all of it, together, for over a thousand years, and in doing so it shaped the medieval and early modern world far more profoundly than any single good the caravans ever carried on purpose.

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RESEARCH ARTICLE

Steel Tracks, Extracted Wealth: Railways and the Political Economy of Colonialism in Asia and Africa

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📅 Published: 21 September 2026

📄 PPI: **v1i2/ra/01**

🔗 DOI:

<https://doi.org/10.5281/zenodo.23077352>

🔗 Article URL:

<https://publicpast.org/ppi/v1i2/ra/01>

ABSTRACT

This article examines the role of railways in the political economy of colonialism across Asia and Africa, arguing that colonial rail infrastructure was designed primarily as an instrument of resource extraction rather than as a mechanism for integrated regional development. Drawing on economic history scholarship concerned with British India, East Africa, Central Africa, and southern Africa, the article traces four interlocking dimensions of colonial railway systems: their spatial orientation toward coastal ports rather than interior connectivity; the financial arrangements that transferred fiscal risk onto colonised populations while delivering returns to metropolitan investors; the restructuring of agricultural land use toward export monocultures; and the organised movement of coerced and indentured labour along rail corridors. The article further contends that the developmental asymmetries produced by these systems were not incidental byproducts of otherwise neutral infrastructure, but structural outcomes of an imperial economic logic. Evidence drawn from famines in late nineteenth-century India, the labour regimes of southern African mining, and the post-independence persistence of colonial transport geographies in Ghana and elsewhere supports this contention. The article concludes that reading colonial-era railway maps as records of extraction rather than as evidence of modernisation offers a more historically accurate framework for understanding the infrastructural inheritances that continue to shape economic geography across the Global South.

KEYWORDS

Colonial railways • Extraction economy • British India • Infrastructure • Africa • Uneven development



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Introduction

When people picture the railway age, they often imagine steam engines knitting nations together, shrinking distances, and opening up opportunity. That image is not wrong, exactly, but it is incomplete. In the colonial world, from British India to the Congo Free State, railways were built for a very different purpose than those that crisscrossed Europe or the American Midwest. They were constructed to move cotton, coal, rubber, and soldiers rather than to connect communities to each other. Understanding this distinction is essential to grasping why the economic legacies of colonial railways continue to shape Asia and Africa today.

Tracks That Pointed One Way

The first thing to notice about colonial railway maps is their shape. Rather than forming a web linking cities and regions to one another, most colonial lines ran like spokes toward a single hub: a port. In India, lines built by companies such as the East India Railway and the Great Indian Peninsula Railway fanned out from Calcutta, Bombay, and Madras into the interior, but rarely connected interior regions directly to each other without looping back through a coastal terminus. As Hurd (1975, 263) has shown, this radial configuration reflected the administrative and commercial priorities of the colonial state rather than the transport needs of Indian society. The same pattern repeated across Africa. The Uganda Railway, completed in 1901, ran from the port of Mombasa inland to Lake Victoria, built explicitly to move goods and administrative control into the interior and to extract resources outward. The Congo's rail lines existed largely to bypass unnavigable stretches of the river system so that rubber and ivory could reach the Atlantic (Frankema and Woltjer 2021, 4).

This hub-and-spoke design was not an accident of engineering. It reflected the underlying economic logic of colonialism: raw materials out, manufactured goods in, and very little concern for how colonised populations might benefit from lateral movement or regional trade. A farmer in central India might have found it easier to ship grain to London than to a market two hundred miles away in a different direction.

The Finance Behind the Iron

Colonial railways were rarely paid for out of colonial treasuries alone. In India, the British government offered private companies a guaranteed rate of return, typically around five percent, regardless of whether a given line turned a profit. This guarantee system meant that Indian taxpayers effectively underwrote the risk while British shareholders collected steady dividends. Dadabhai Naoroji, one of the earliest Indian nationalist economists, pointed to this arrangement as a clear mechanism of what he called the "drain of wealth," whereby money flowed out of India regardless of local economic conditions (Naoroji 1901, 31-34). Scholars such as Utsa Patnaik have since quantified the broader dimensions of this transfer, arguing that the extraction of surplus through financial instruments including railway guarantees was structurally embedded in the colonial fiscal order (Patnaik 2017, 4-5).

In Africa, financing often came through a combination of metropolitan government funds, forced labour, and taxation designed to compel Africans into the cash economy. Hut taxes and poll taxes, payable only in colonial currency, pushed subsistence farmers into wage labour or cash-crop cultivation simply to meet their tax obligations. Railways then made it feasible to move those crops, whether cocoa in the Gold Coast or groundnuts in Senegal, to the coast for export. As Frankema and van Waijenburg (2012, 899) argue, the tax system and rail infrastructure worked together as a single apparatus of compulsion, reshaping African labour regimes in ways that persisted long after formal colonialism ended.

Cash Crops and the Reordering of Land

Once a railway reached a region, land use in that region often changed within a generation. Areas that had grown diverse subsistence crops shifted toward whatever commodity fetched the best export price: cotton in parts of Egypt and Uganda, jute in Bengal, groundnuts in West Africa, coffee in the highlands of Kenya. This specialisation made colonial economies extraordinarily vulnerable to price fluctuations on markets they had no control over. When cotton prices in Liverpool fell, a farmer in the Nile Delta felt it just as sharply as a trader in London, except without any of the accumulated capital to absorb the shock.

The tragic irony is that this same infrastructure, built in the name of economic development, coexisted with some of the worst famines of the modern era. British India experienced devastating famines in the late nineteenth century even as railways theoretically made it possible to move grain from surplus regions to deficit ones. In practice, grain often moved toward ports for export rather than toward starving districts, because the market logic of the system rewarded whoever could pay, not whoever needed food most. Davis (2001, 26-29) argued that railways became instruments for extracting food out of famine zones just as efficiently as they extracted

export crops in ordinary years. The spatial infrastructure of extraction was, in other words, indifferent to humanitarian need.

Labour, Migration, and Social Disruption

Building thousands of miles of track required enormous labour forces, and colonial administrations rarely relied on voluntary, well-compensated work. Indentured and forced labour built lines across British India, French Indochina, and much of colonial Africa. The construction of the Uganda Railway famously relied on indentured workers brought from British India, many of whom remained afterward, permanently altering the demographic composition of East Africa in ways still visible today in Kenya's South Asian communities (Mangat 1969, 52-53).

Railways also triggered new patterns of internal migration. Once a rail line existed, it became easier for colonial administrations to move labour toward mines, plantations, and construction sites. In southern Africa, rail networks linked directly to the gold and diamond mines of the Witwatersrand, and the movement of migrant labour along these routes reorganised entire societies, pulling men away from agricultural villages and into a wage economy controlled by mining companies. As van Onselen (1976, 128) has documented, family structures, land tenure arrangements, and local political authority all bent under this new gravitational pull, producing social dislocations whose consequences extended well beyond the era of formal colonial rule.

Uneven Development, Then and Now

Perhaps the most lasting legacy of colonial railways is the uneven development pattern they inscribed onto the landscape. Regions that happened to sit along profitable extraction routes received infrastructure investment, however self-interested in its intent, while regions with no exportable commodity were simply bypassed. This is a major reason why, decades after independence, transportation networks across much of Africa and South Asia remain oriented toward old colonial ports rather than toward regional integration. As Jedwab and Moradi (2016, 32) have shown through quantitative analysis of Ghanaian railway data, post-independence economic geography continues to bear the structural imprint of colonial infrastructure decisions made without any regard for long-run indigenous development.

Gauge differences tell a quieter version of the same story. Colonial powers often used incompatible track widths between neighbouring territories, sometimes deliberately, to prevent rival powers from exploiting each other's rail networks for military or commercial advantage (Chaves, Engerman, and Robinson 2014, 195). The result is a patchwork that still complicates cross-border rail transport in parts of Africa and South Asia, a literal engineering constraint inherited from decisions made for reasons that had nothing to do with the needs of the populations who now live along those tracks.

Conclusion

None of this means railways brought no benefit whatsoever. They did enable faster communication, some degree of urbanisation, and eventually became platforms that nationalist movements themselves used to organise and travel. Mahatma Gandhi's well-documented third-class train journeys across India were only possible because of a network built for entirely different purposes (Guha 2006, 131). Infrastructure, once built, can outlive the intentions behind it and be repurposed by those it was never designed to serve.

But it would be a mistake to read colonial railways simply as gifts of modernisation that colonised societies were fortunate to receive. They were tools of extraction first, designed around the needs of imperial economies, financed in ways that transferred risk and reward unevenly, and built by populations who had little say in the matter. The tracks that remain today, some still running the exact routes laid down in the nineteenth century, are a material record of that history. Reading a colonial-era railway map is, in a real sense, reading a map of who that economy was built to serve.

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PUBLICPAST

JOURNAL OF PUBLIC HISTORY

PUBLICPAST IDENTIFIER (PPI)

v1i2/op/02<https://publicpast.org/ppi/v1i2/op/02>

EDITORIAL ARTICLE

Who Tells the Past? Public History and the Historian in the Age of AI

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📅 Published: 24 September 2026

📄 PPI: **v1i2/op/02**

🔗 DOI:

<https://doi.org/10.5281/zenodo.23079610>

🔗 Article URL:

<https://publicpast.org/ppi/v1i2/op/02>

ABSTRACT

A young student today can meet the past without ever opening a history book. A search engine supplies the first answer and a short video the first narrative, while a platform decides what appears next. Increasingly, the first "historian" a student talks to may be an artificial intelligence system. The shift looks ordinary, yet it raises a question that historians now have to answer. Who tells us the past when the historian is no longer the only interpreter of history?

KEYWORDS

Public History • Artificial Intelligence • Digital Archives • Historical Methodology • Algorithmic Literacy



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H HISTORA
PUBLICATIONS

Public History has always concerned the relationship between historical knowledge and wider society. Museums, monuments, archives, exhibitions, documentaries, oral histories, heritage walks and community projects have all made room for the past in public life. What has changed in recent years is the scale and speed of that relationship, and the degree to which technology now mediates it.

For historians, AI is becoming more than a research tool. It is turning into part of the environment in which people encounter, interpret and remember the past. That asks us to think past the familiar question of whether AI will replace historians. The larger question is what happens to historical authority, memory and public engagement when algorithms increasingly mediate access to the past.

From the archive to the algorithm

The archive has never been a neutral repository of the past. Institutions, resources, political circumstances and cultural priorities have always shaped what is preserved, catalogued, described and made accessible. Digitisation has widened access to these collections enormously, and AI now promises to widen it further.

AI can transcribe manuscripts, recognise handwriting, extract information from large collections, translate texts, generate metadata and identify patterns across extensive archival corpora. Recent research points to its potential to make historically significant digital records more accessible, while also raising questions about appraisal, preservation, transparency and professional responsibility.

That is a real opportunity, but it brings a complication. What exists in an archive is not necessarily what becomes visible in the digital public sphere. A document may be digitised and still be hard to discover, and a source in a regional language may be poorly represented in an AI system. A community archive may lack the resources for digitisation on a large scale, while a historical narrative with substantial algorithmic visibility may come to seem more authoritative simply because it is more accessible.

The problem, then, is no longer only archival exclusion. It is increasingly a question of algorithmic visibility.

The democratisation of history

Public History should not belong only to professional historians and cultural institutions. Communities hold memories, photographs, songs, family archives, oral traditions, ritual practices and local knowledge, along with relationships to landscapes, that may never have entered a formal archive. Digital technologies have given them new ways to document and circulate this knowledge.

Research on community-generated digital cultural heritage shows how technological tools can help communities create, connect and manage their own archives. Work of this kind suggests that digital heritage becomes more participatory when communities take an active part in producing and curating their historical records, and are not merely represented by institutions.

That matters most in societies with rich oral and vernacular traditions.

In India, historical consciousness has never lived only in written archives. It has also travelled through oral narratives, devotional traditions, folk performances, regional literature, songs, material culture, pilgrimage landscapes and community memory.

The challenge for digital Public History goes beyond digitising the archive. We have to ask whose archive we are digitising and whose memories are being preserved. Which languages are represented? Which communities have the technological capacity to make their histories visible? Questions like these make AI a matter of historical responsibility as well as technological innovation.

When information becomes historical knowledge

Yuval Noah Harari observes in *Nexus* that "information is not the same as truth." The idea reaches well beyond his book, and it is hardly new to historians. Source criticism has always required us to distinguish evidence from assertion, testimony from interpretation and documentation from memory.

What has changed is how quickly information can be assembled and presented as a coherent narrative. A generative AI system can produce a persuasive account of a historical event within seconds. Its prose may be fluent, its structure logical and its confidence considerable, but fluency does not establish historical credibility.

The historian asks different questions. Who produced the source, in what circumstances and for what purpose? What does it reveal, and what does it conceal? What other evidence confirms or contradicts it, and what assumptions shape its interpretation? These questions stay central even when the first encounter with the material comes through an AI system, and the growing use of AI makes them matter more, not less.

The problem of instant history

Part of the appeal of generative AI is that it can give an immediate answer to almost any question. History is rarely immediate. Historical knowledge is built from fragments such as documents, inscriptions, artefacts, memories, photographs, testimonies and competing interpretations, and much of the historian's work lies in negotiating those fragments rather than removing their complexity.

Recent scholarship has warned about the pull of "instant history", the expectation that AI systems can provide immediate historical answers without users engaging sufficiently with the evidentiary processes through which historical knowledge is constructed.

Here Public History faces a real tension. Public engagement requires accessibility, while historical scholarship requires complexity. Making historical knowledge inaccessible in the name of expertise is not the answer, and neither is simplifying it until every difficult question has an instant answer. The task is to build forms of Public History that are accessible without becoming simplistic and participatory without abandoning evidence.

The historian is not disappearing

Recent scholarship has begun to challenge the idea that AI's growing capacity automatically means the decline of professional historians. Chris Campbell's 2025 discussion in the *Transactions of the Royal Historical Society*, for instance, points to a tension. Defending historical expertise should not require historians to retreat into academic elitism or to ignore the diverse forms through which history reaches the public.

A historian's authority should not depend on holding a monopoly over historical information. It should depend on having the skills to evaluate, contextualise, interpret and communicate historical evidence responsibly.

The historian of the digital age may increasingly work as a curator who identifies significant sources, a contextualiser who places information in its historical circumstances and a verifier who tests claims against evidence. The same historian has to interpret complexity and competing meanings, mediate between scholarship and communities, and understand, as a digital humanist, the technologies through which historical knowledge now circulates.

Research on collaboration between humans and machines in historical work points the same way. AI can assist with analysis on a large scale, while human interpretation remains necessary for meaningful historical understanding.

The future is unlikely to be a simple choice between historian and machine. The more useful question is how historians can use machines without surrendering historical judgment to them.

From history about communities to history with communities

The communication of history has often followed a linear model, running from historian to institution to public. Digital Public History can make that relationship more participatory, with exchange in both directions among historian, community, archive, technology and public. Communities need not remain objects of historical representation. They can take part in documentation, interpretation and preservation.

A family photograph can join a local digital archive, an oral history can be made searchable, and a folk song can be preserved alongside its linguistic and cultural context. A community's

relationship with a landscape can become part of a heritage record. AI can assist with some of these processes, but technology should not determine the meaning of the knowledge it helps preserve.

The distinction is sharpest for Indigenous and local knowledge systems. Digital preservation offers new ways to safeguard vulnerable forms of knowledge, but it can also detach knowledge from the communities, contexts and practices that give it meaning. Preservation should mean more than capturing data. It should also mean keeping context, provenance, ownership and community agency intact.

The Indian question

For India, the conversation has a further dimension. The country has great linguistic, cultural and regional diversity, and historical knowledge sits in Sanskrit and Persian manuscripts, literature in regional languages, oral traditions, folk songs, temple records, family collections, inscriptions, archaeological remains and living cultural practices. Digitisation, however, is uneven. The historical record available to an AI system is not necessarily representative of the record that exists.

If computational systems learn mainly from what has already been digitised, historical visibility can reproduce existing archival inequalities. The result may be a paradox. The technology capable of democratising history may repeat the exclusions of the archive unless the archive itself becomes more diverse.

Recent scholarship on AI and historical research in postcolonial contexts similarly identifies the marginalisation of Indigenous languages and the digital divide as obstacles, alongside the possibilities of preservation and democratisation. For Indian Public History, the future of AI cannot be separated from multilingualism, community archives, local histories and knowledge diversity.

Toward algorithmic historical literacy

This shift also changes what the history classroom is responsible for. Students increasingly need to learn to read an AI-generated historical narrative critically as well as a primary source.

They should ask where a claim came from, whether the source can be verified, what evidence supports it and what evidence contradicts it. They should ask which voices are missing, whether a complex historical process has been reduced to a simple narrative, whether an interpretation is being presented as established fact, and what assumptions may have entered the answer through the underlying data.

This could be called *algorithmic historical literacy*. It extends conventional historical literacy and does not replace it. Source criticism now has to work at two levels, because students must interrogate the historical source and, increasingly, the technological system through which that source reaches them.

The new responsibility of the historian

AI gives historians an occasion to reconsider what Public History is ultimately for. Taking academic history to a larger audience is only part of it. The rest is enabling people to develop meaningful, critical and informed relationships with the past.

That means leaving the confines of the archive while keeping its discipline, engaging with communities while holding to scholarly standards, and using technology without assuming that technical sophistication amounts to historical understanding. It also means recognising that historical knowledge is more than information. It is memory, identity, context, evidence and interpretation.

The historian is no longer necessarily the only person who can tell the story. The historian remains responsible, though, for asking difficult questions about how that story was constructed.

Conclusion

The most important question artificial intelligence raises may not be whether machines can write history, since they can. It is who will determine which histories become visible, which memories are preserved, which sources are trusted and which narratives enter public consciousness.

The answer cannot be left entirely to archives, institutions, platforms or algorithms. Nor should historians respond by trying to reclaim a monopoly over historical knowledge. The more productive path lies between these positions, and on it the historian of the digital age can act as a critical mediator between evidence and memory, technology and community, and scholarship and the public.

AI may help us find more sources, process larger collections and reach wider audiences. It cannot remove the ethical responsibility of deciding what should be preserved, how it should be contextualised and whose voice should be heard.

Public History should ask less whether AI can replace the historian and more whether historians can help society use AI without losing its capacity to question the past. An algorithm may generate an answer. The historian's responsibility is to teach us to ask where that story came from, whose memory it represents, what evidence sustains it and what has been left out.

Perhaps that is the historian's purpose in the age of AI, less to tell the past than to help the public learn to question the stories through which the past reaches them.

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EDITORIAL ARTICLE

The Goddess Who Wouldn't Retire: Marshall's Mother-Goddess Label from Colonial Archaeology to the UPSC Coaching Notes

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📅 Published: 28 September 2026

📄 PPI: **v1i2/op/03**

🔗 DOI:
<https://doi.org/10.5281/zenodo.23079690>

🔗 Article URL:
<https://publicpast.org/ppi/v1i2/op/03>

ABSTRACT

Somewhere in India today, a civil services aspirant is underlining a line in their notes: "The Indus Valley people worshipped a Mother Goddess." The sentence sits comfortably next to facts about drainage systems and granaries, presented with the same air of settled certainty. It will likely appear, in some form, on an answer sheet this year. What the aspirant is unlikely to know is that this "fact" is a nearly century old interpretive guess, one that the discipline of archaeology itself has long since been complicated, qualified, and in many cases abandoned. This editorial is about that gap, between what historians and archaeologists now understand about the Indus Valley Civilization, and what continues to circulate as unquestioned truth in India's civic and educational institutions.

KEYWORDS

Indus Valley Civilization • Mother Goddess • Public History • UPSC Historiography



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The Origin Point

The claim originates with Sir John Marshall, director general of the Archaeological Survey of India, in his 1931 report on the excavations at Mohenjo-daro (Marshall, 1931). Confronted with numerous small terracotta figurines of standing women, often bearing elaborate headdresses and jewellery, Marshall proposed that these represented a "Mother Goddess," and that the civilization practised a fertility cult centred on her worship. His reasoning drew heavily on comparative frameworks fashionable in early twentieth century scholarship, particularly the idea, popularised in studies of the Mediterranean and Near East, that agrarian societies universally venerated a female fertility deity. Marshall read the Indus figurines through this lens, treating formal resemblance, a female figure, exaggerated body features, as sufficient evidence of cultic function and belief.

It was, by the standards of the time, a plausible inference. It was also, crucially, an inference, not a demonstrated fact. Marshall had no accompanying textual evidence, no clear ritual context for most of the figurines, and no certainty that the objects served religious rather than domestic, decorative, or entirely unrelated purposes. Yet the label stuck, and it stuck hard, because it offered a tidy, legible narrative for a civilization that otherwise resisted easy interpretation.

The Scholarly Correction

In the decades since, archaeologists working on the Indus Valley have substantially revised this picture. Possehl (2002), in his survey of Indus civilization studies, cautioned against reading singular religious meaning into a diverse and formally inconsistent body of terracotta figurines, noting that their find contexts rarely support the idea of organised goddess worship. Kenoyer (1998) has similarly urged restraint, pointing out that assuming cultic function from form alone risks projecting later, better documented religious traditions backward onto a civilization whose belief systems remain, in the absence of a deciphered script, largely opaque to us.

Parallel to this archaeological recalibration, gender historians have interrogated the assumptions embedded in the "Mother Goddess" framework itself. The reflexive equation of female figurines with fertility worship rests on essentialist ideas about womanhood, reproduction, and the sacred, ideas that scholars such as Chakravarti (2006) have shown to be projections of later patriarchal and colonial frameworks rather than secure readings of ancient evidence. The current scholarly consensus, to the extent one exists, is not a rejection of any religious significance for these figurines, but a plurality of possible interpretations, domestic ritual, apotropaic use, or something not yet legible to us, held with appropriate uncertainty (Possehl, 2002). What was once presented as fact is now, at best, one hypothesis among several.

The Afterlife in Public Education

None of this scholarly recalibration appears to have meaningfully reached the textbooks and coaching material that shape how millions of Indian students encounter the Indus Valley Civilization. NCERT texts (e.g., NCERT, 2007) and the vast ecosystem of UPSC preparation material continue to present the Mother Goddess theory as an established finding, often as a single bullet point requiring no further scrutiny. The uncertainty that responsible archaeologists now build into their accounts, the hedges, the alternative readings, the acknowledgment of limits, is entirely absent. What remains is Marshall's original, confident claim, stripped of its historiographical context and repeated as civic knowledge.

This is not a marginal case of textbook lag. It is a structural feature of how public history operates in India, where the sheer scale and competitiveness of the examination system rewards memorisable certainty over interpretive nuance. A coaching note has no room for "possibly" or "one interpretation among several." It has room for a fact, and so a decades old inference is flattened into one.

Why This Gap Matters

The persistence of the Mother Goddess label matters for reasons that go beyond antiquarian correctness. First, it models a flawed relationship to evidence itself, teaching aspirants that archaeological interpretation is settled and singular, when the discipline's own practice involves debate, revision, and acknowledged uncertainty (Kenoyer, 1998). A student trained to reproduce inherited conclusions rather than engage with method is poorly served by any historical education, however factually accurate the details.

Second, the label carries an unexamined gendered assumption into civic knowledge at scale. Presenting ancient female imagery as self evidently religious and reproductive naturalises a narrow, essentialist view of womanhood as inherently tied to fertility and the sacred, a view gender historians have worked hard to unsettle (Chakravarti, 2006). When this passes into public education unchallenged, it does quiet ideological work under the guise of neutral fact.

Third, and most directly relevant to the concerns of public history, this case illustrates a broader disconnect between the sites where historical knowledge is produced and revised, university departments, peer reviewed journals, archaeological reports, and the sites where that knowledge is actually consumed by the public, textbooks, coaching centres, competitive examinations. Public historians have tended to focus their interventions on museums, memorials, and heritage sites. The examination and coaching ecosystem, despite shaping the historical consciousness of millions of young Indians every year, remains comparatively under-examined as a site of public history in its own right.

Marshall's Mother Goddess has had a long institutional life, considerably longer than the archaeological confidence that once supported her. She persists not because the evidence for her worship has strengthened, but because the infrastructure of civic education has no mechanism for retiring outdated interpretations once they have been absorbed into the curriculum. The task facing public historians is not merely to correct this one label, though that correction is overdue. It is to ask what other colonial era inferences, quietly reproduced across generations of coaching notes and textbook editions, are still awaiting the same scrutiny.

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RESEARCH ARTICLE

When the World Learned to Think in Time: The Invention of the Modern Clock and the Making of Modern Life, c. 1300-1900

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📅 Published: 29 September 2026

📄 PPI: **v1i2/ra/02**

🔗 DOI:
<https://doi.org/10.5281/zenodo.23079403>

🔗 Article URL:
<https://publicpast.org/ppi/v1i2/ra/02>

ABSTRACT

The modern world is closely related to the precise measurement of time. Everyday activities revolve around clocks, schedules and timetables across the globe. The article focuses on the history of timekeeping in Europe from the appearance of early mechanical clocks in the late Middle Ages to the standardization of time in the nineteenth century. The mechanical clock became important because it was gradually integrated into everyday urban life. It influenced commerce, transport, work, and individual behaviour. The article focuses on different temporal arrangements that were made before the rise of mechanized clocks. It describes how public clocks and timekeeping became more widespread throughout European cities. It also discusses the increasing economic relevance of strict time division and regulation. The article highlights innovations that made individuals responsible for measuring time as a new phenomenon that required society to think about regulating time on a larger scale. It concludes that modernity involved a fundamental change in temporal organization and a revaluation of the role of time measurement in societies.

KEYWORDS

Mechanical clocks • Temporal discipline • Punctuality • Railway time • Personal watch • Standardisation of time



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Introduction

A day is unlikely to go by without someone looking at the clock. Whether it be starting work at a designated time, catching the train or having an appointment. Time dictates many aspects of our lives, and our lives are dictated by time. Our lives are measured out in seconds, minutes and hours and with the advent of digital technology. The time is always visible. However, the notion that our lives should be measured and controlled by discrete, measurable units of time is a relatively modern innovation. In the pre-modern world, time was measured out in different ways according to the needs and desires of the individual. Mechanical clocks did not bring time-keeping to societies where it had previously been absent. It rather changed and enhanced ways of measuring time which had previously been available.

The development of mechanical clocks in late medieval Europe was an important innovation which led to clocks becoming increasingly common from the fourteenth century onwards. These were to be found in both monasteries and in the wider world. The public clocks and bells enabled ordinary people to mark the passing of time. Time became something that could be seen as well as measured. Also clock became a means by which the temporal could be regulated. However, it is important to understand that the significance of the clock was not the technology itself but rather the social changes which occurred as a result of it. As Gerhard Dohrn-van Rossum notes, the development of clocks was strongly linked to the emergence of new understandings of time in European society (Dohrn-van Rossum 1996). Paul Glennie and Nigel Thrift argue against seeing the evolution of time as a purely technological progression, highlighting the multiple ways in which individuals engaged with clocks and other temporal measurements (Glennie and Thrift 2009).

The relationship between clock time and modernity has proved a fascinating historical debate. For earlier historians, the increasing use of clock time was seen as an oppressive force which dictated the way in which people lived their lives. E. P. Thompson famously stated that the rise of industrial capitalism was strongly linked to the development of “time-discipline,” as people’s working hours became more strictly regulated by the clock than before (Thompson 1967). However, later historians have proven that many elements of time discipline and regular working patterns pre-dated the industrial factory system. Mark Hailwood’s work on rural England provides an illustration of the extent to which some people were already aware of clock time and regular working patterns in the sixteenth and seventeenth centuries (Hailwood 2020). The emergence of modern time discipline was not an immediate or inevitable process driven solely by

industrialisation.

The historical significance of the mechanical clock was that it represented the increasing extent to which society as a whole engaged with measured time. From the fourteenth to the nineteenth centuries, time which had previously been seen as a largely abstract concept became increasingly integrated into aspects of everyday life. Time became a factor which influenced commercial activity, the regulation of workplaces and personal interactions, transport and the wider organisation of society. The introduction of public clocks enabled people to co-ordinate their activities, while the wearing of watches increasingly meant that time was an intimate part of individuals' lives. Industrial workplaces were highly regulated and disciplined, and the development of the railways eventually led to the establishment of standardised time across different areas. By the nineteenth century, being punctual was not just a practical necessity but a social and moral requirement.

2. Before the Clock: A World of Multiple Times

The genesis of the mechanical clock is conceptually interesting only because of its relationship to alternative methods of organizing and experiencing time. Medieval Europeans did not live in a world without time. Instead, they lived with multiple times. The sun, the seasons, the agricultural year, saints' days, and patterns of work and rest all marked a rhythm of events. Days were divided not necessarily into equal units of time but into segments defined by specific occurrences. Evenings began and ended at specific moments like prayers, bells, markets, and the completion of particular tasks (Dohrn-van Rossum 1996, 19-47; Glennie and Thrift 2009, 22-28).

Religious institutions were among the most important sources of medieval temporal structure. Monks followed defined sequences of rituals, and bells marked particular events for the wider community. The hours defined the day, but these hours did not follow the modern pattern of sixty equal minutes. Medieval divisions of time were often variable, and daylight and dark were apportioned into different numbers of hours depending on the time of year. Dohrn-van Rossum therefore warns against reading too much of an early modern clock in the medieval monastic day. The ordering principles of event and organization were often more important than the precise segmentation of equal measures of time (Dohrn-van Rossum 1996, 48-80). Bells could therefore organize collective rhythms without requiring anyone to think in terms of modern, equal measures of time.

Time also took on different meanings in different commercial and civic contexts in medieval Europe. Jacques Le Goff's distinction between "Church time" and "merchant time" illustrated the ways in which time for trade could involve duration and calculation, credit and debt and profit. At the same time, Church teachings often linked time to God, who lived outside of chronological experience. The two perspectives were different but were not necessarily incompatible (Le Goff

1960; Le Goff 1980, 29-42). Le Goff's argument became one of the most influential accounts of medieval temporal culture, but later scholarship has complicated this view by illustrating the ways in which both religious and commercial clocks were part of a wider system.

The complexity of medieval temporal culture should not be underestimated. Agriculture followed seasonal patterns, communities gathered and dispersed at particular moments in the year, monasteries marked events with specific rituals. Bells and other public signals organized urban life. Glennie and Thrift's research on England and Wales demonstrates how clock time and "natural time" were often combined in medieval daily life. And this coexistence lasted well into the early modern period (Glennie and Thrift 2009, 22-64). Their work therefore indicates that the appearance of mechanical clocks did not automatically lead to a change in the way that ordinary people experienced time.

The sophistication of pre-modern timekeeping was also apparent in non-vernacular domains. Astronomers, mathematicians, and other learned professionals were well aware of the complexities of tracking the heavens and the planet. The history of timekeeping therefore involves a series of increasingly sophisticated technologies. Sundials, water clocks, mechanical devices, astrolabes, calendars, bells, and clocks were all part of the development. Different technologies were important at different stages, but none dominated overall temporal organization (Dohrn-van Rossum 1996, 81-119).

What changed with the mechanical clock was the capacity to measure and share specific regularities of time with greater consistency. The clock does not mark out a fundamental change in the human experience of time but a shift in the ways that regularities of time could be measured and shared with wider audiences. It is therefore essential to distinguish between different temporal regimes. The clock is not necessarily substituting a "natural" time for a "mechanical" one. But it is joining different sequences and gradually transforming them by introducing regular, measurable hours as publicly accessible signals (Glennie and Thrift 2009, 22-64).

3. When Time Became Visible: The Mechanical Clock and the Medieval City

The mechanical clock gained its historical place not only for its ability to measure time but for its visibility within the spaces in which people lived and worked. Mechanical clock technology was developed within a European environment already familiar with sundials, water clocks, astronomical instruments, and systems of timekeeping which followed religious time. What made the mechanical clock different from these was its ability to produce a regular sequence of movements via a mechanical escapement. It was also able to translate this into audible or visible signals. Its significance therefore was not only its technical precision but the possibility of maintaining a continuous, autonomous rhythm of measured time (Dohrn-van Rossum 1996,

119-164; Landes 2000, 50-72).

Some of the earliest sophisticated examples show the intellectual aspirations of medieval horological technology. Richard of Wallingford, the fourteenth century abbot of St Albans, designed an elaborate astronomical clock and described its making in his *Tractatus Horologii Astronomici*. His ambition to combine mechanical calculation with astronomical observation shows that medieval clockmaking was closely connected to mathematical and scientific knowledge rather than being merely a pragmatic response to the needs of merchants or workers (North 2005, 159-178). Similarly, Giovanni de' Dondi's *Astrarium*, constructed in the fourteenth century, was an extraordinary attempt to combine mechanical movement with the representation of celestial phenomena. Such instruments reveal that the early history of mechanical clocks was intertwined with the intellectual culture of astronomy and the desire to model the ordered movements of the heavens through mechanical means (Dohrn-van Rossum 1996, 145-164).

Large public clocks were installed around the cities of Europe during the fourteenth century, often attached to prominent civic or ecclesiastical buildings. The clock tower transformed measured time into a public spectacle. A community did no longer have to rely solely on the observation of individual sun or the varying signals of religious institutions. The mechanical device itself could offer a regular and increasingly standardised temporal signal (Landes 2000, 63-79).

The surviving clock mechanisms associated with Salisbury and Wells offer important material evidence. The clock in Salisbury Cathedral dates from the late fourteenth century, and the clock of Wells dated from approximately the same century. They demonstrate the sophistication of early mechanical horology. Their mechanisms were designed primarily to strike the hours rather than to display time in the form of the familiar modern clock face. This is an important point, for the earliest public mechanical clocks should not simply be seen as the medieval equivalent of contemporary clocks. Their social function often relied on sound as much as the visual spectacle. The striking of a bell could announce a temporal signal within an urban environment (Dohrn-van Rossum 1996, 164-189).

The sound of the clock expanded the reach of measured time. A clock located in a tower did not require everyone to have a timepiece. Instead of that its bell could be heard by people who engaged in different occupations and lived at different distances from the heart of the community. Time became something which could be collectively encountered. This marked the transformation from private or specialised forms of temporal knowledge towards a more broadly shared temporal reference (Glennie and Thrift 2009, 65-94).

The placing of clocks in prominent urban locations also gave time a civic dimension. Municipal authorities, churches, guilds, and other institutions could have an interest in controlling or

maintaining public timekeeping. The clock was associated with the organisation of the urban activity and the authority of institutions able to construct, finance, maintain and regulate it. Its presence within the urban landscape therefore signalled an increase of institutionalisation of measured time (Dohrn-van Rossum 1996, 190–216).

This however should not be conceived of as an immediate replacement of older temporal practices. The bells continued to communicate religious events and agriculture related timings. people remained reliant on daylight and local custom. Mechanical clocks were gradually added to an existing temporal landscape. As Glennie and Thrift demonstrate, clock time and other forms of time keeping could co-exist for centuries with their importance varying according to occupation, location, wealth and social circumstance (Glennie and Thrift 2009, 95–125). The medieval clock therefore is a crucial step in the history of modernity as it transformed the visibility and authority of measured time. It transformed time from something primarily experienced with recurring natural and social events into something which could increasingly be represented by a machine.

4. From Bells to Business: Time Enters Economic Life

The rise of mechanical clocks in European towns did not immediately create a society of punctuality. As commerce grew in the late medieval and early modern periods, time increasingly took on an economic dimension: it could be apportioned, calculated, anticipated, and, ultimately, valued.

Merchants had long been in possession of sophisticated means of calculating time, without needing mechanical clocks. The long-distance nature of trade meant that information concerning seasons, travel times, market days, tides, and religious holidays were all vital to determining a merchant's activity. The letters and commercial records of Italian trading centres demonstrate a world in which merchants kept meticulous records of dates, journeys, payments, and expected deliveries. The surviving correspondence of merchants like Francesco Datini demonstrates the degree to which commerce depended on the management of temporal intervals. Datini's huge archive of letters, account books, and business records from late fourteenth-century Prato demonstrate the degree to which merchants coordinated transactions across great distances. It constantly referred to dates, departures, arrivals, payments and deadlines (Origo 1957, 34–57).

The rise of commercial capitalism resulted in the clock becoming part of an economic culture in which time was already increasingly valuable. The Italian merchant culture developed sophisticated systems of calculation about interest, exchange rates, quantities, and dates, which created an intellectual environment in which duration could be considered as a measurable economic variable (Goetzmann 2005, 19–41). The clock provided another tool by which this wider culture of calculation could be expressed in terms of the organisation of daily activity.

Urban institutions were also implicated in this process. Markets were increasingly organised around particular times and places. The workshops and commercial establishments developed regular opening, closing, and production schedules. The regulation of urban activity was far from uniform, and different occupations operated at different rhythms. The availability of public temporal signals allowed activities which had previously been coordinated through custom or knowledge to be increasingly synchronised. The public clock was part of the infrastructure of commercial urban life.

The relationship between time and value became most apparent in the shifting attitudes towards waiting and delay. A delayed shipment could affect an entire chain of transactions for a merchant. The lengthening of time could dictate financial outcomes for a creditor, and the journey time of a travelling trader could determine his costs and opportunities. Time increasingly took on an economic vocabulary. It could be "saved", "lost", "spent" or "wasted", terms which would become increasingly familiar in the modern economic culture.

This transformation cannot be seen as evidence that Europeans suddenly discovered the economic value of time. Commercial societies had always been reliant on calculation about time, but what changed was the degree to which institutions and individuals were able to coordinate activity on the basis of more regular and visible measures. The history of early modern commerce therefore demonstrates the distinction between valuing time and measuring time. The former was always present, but the latter was gradually refined and became more socially widespread.

The seventeenth century saw further changes through the growth of portable watches and clocks. The process of measuring time gradually left behind large, public mechanisms, and became increasingly associated with private possession. Portable watches remained expensive and socially restricted for most of the century. Their existence represented a conceptual innovation in which measured time could accompany an individual, rather than be fixed to a church tower or civic building (Landes 1983, 1-14). The temporal order of the city could increasingly be re-produced, in miniature form.

The significance of this development becomes clearer when it is placed alongside the changes in forms of work. A workshop, merchant house, office, or commercial establishment, could increasingly structure activity around recurring temporal expectations. Time became the channel through which economic activity occurred and an element which could also be organised as part of that activity.

5. The clock at work: time discipline and the industrial world

The introduction of the clock in the workplace has fundamentally altered the relationship between people and time. Prior to industrialization, time was to a large extent dependent on the

work, the weather, the season, and domestic and communal routines. The factory allowed employers to organize thousands of workers on a regular schedule. The clock became a tool for measuring, recording, and regulating working hours.

EP Thompson's classic study of industrial capitalism is preoccupied with the shift from "task to time" for the reason that the factory began to value regular attendance more than the ability to produce a certain amount of goods during working hours. In other words, the worker was expected to work regularly rather than to simply finish a particular task (Thompson 1967, 56-97). The introduction of the clock in the workplace made the worker adhere to a strict schedule. It appears that the shift to "time" was not always to the advantage of the worker.

The earliest factory regulations at John Crowley's ironworks around 1700 stipulated specific times for commencement of work, meals and resumption of work. A special person had to be appointed to ensure the clock was working correctly and to ring the bell at the beginning and the end of the shift. In fact, the regulation of working time and the attendant discipline long preceded the Industrial Revolution proper and contributed to the rise of what we now know as time discipline (Thompson 1967, 80-81). Accordingly, the clock became an object of contention between workers and employers. The testimony of workers from the 19th century illustrate that the clock could be manipulated for the benefit of the master:

A further source of complaint was the practice by which clocks were mysteriously "slowed down" or "speeded up" at the master's pleasure. Consequently, the clock was in some cases actually a subject of dispute, for if the working day was artificially prolonged, workers could hardly be blamed for trying to restore their rights (Thompson 1967, 88-90). The state intervened in the regulation of working time in order to define a legal framework within which both masters and workers had to operate.

The factory legislation in Britain increasingly intervened in the regulation of working time, stipulating the number of hours for which a worker could be employed. It required the time of the working day to be publicly displayed. For example, the Factory Act of 1847 limited the working hours of women and young persons. The act intensified the regulation of working time and the inspection of factories. By the 1850s, the measurement and registration of working time had become a public issue as factory clocks were now subject to state control (Thompson 1967, 90-92).

According to the study by Douglas Reid, "Saint Monday" continued to be a popular unofficial holiday among workers, despite the increased discipline enforced by the factory owners (Reid 1976, 76-101). In other words, despite the clock, many workers still continued to exercise their own authority over time. The same conclusion may be drawn from the study by Anne Murphy concerning the Bank of England. Prior to the emergence of the modern factory, Bank of England

was already implementing strict rules and monitoring its employees' clock-watching behavior. As Murphy points out, the regulation of working hours does not necessarily correspond to actual working hours, for they could still be manipulated in practice (Murphy 2017, 99-132). Glennie and Thrift conclude that the historical process leading to the clock dominating over other ways of measuring time should not be thought of as the imposition of clock time on a timeless society. It rather should be seen as the interaction between various temporal orders, one of which was the clock (Glennie and Thrift 1996, 275-303).

The cultural history of clock time is equally interesting. The concept of punctuality ceased to be merely a virtue of the individual but rather became a value fraught with moral connotations. Being on time meant being a respectable and honest person, whereas being late meant being dishonest and unreliable. The clock became an integral part of the individual's moral code. Kevin Birth's recent study of industrial time keeps the nuance inherent in Thompson's account. He agrees that the rise of capitalist factory production accounts for the shift to clock time, he emphasizes that in different contexts, time was measured differently and that other ways of regulating social life existed alongside the clock (Birth 2022, 373-394). It is not the physical presence of the clock that changed fundamentally in the 19th century, but rather the social structure, within which the clock gained unprecedented power and influenced various aspects of social life.

6. Watches, Railways and the Synchronisation of Modern Life

By the nineteenth century time has become increasingly portable. Time became something that could be worn, carried, and consulted in private in the form of the pocket watch . This development was especially significant in a period in which modernity produced a highly mobile society in which commercialization, urbanization, and industrialization all required that individuals fit their activities to those of an ever-growing number of others. As Alexis McCrossen's study of nineteenth-century America demonstrates, the pocket watch made it possible for individuals to personify public time . They could carry around a miniature version of the clock tower (Mcrossen 2013, 63-88).

As nineteenth-century America entered the watchmaking age, personal possession of a timepiece became increasingly associated with punctuality. This development connected personal timekeeping to the broader shift in which time became disciplined. The association between owning a watch and the responsibility to be punctual was especially strong for those who relied on being punctual to earn a living. The same development explains the popularity of pocket watches. Their very presence made individuals aware of their punctuality and their membership in an increasingly punctual society. The rise of the watchmaking industry in the nineteenth century confirms this interpretation (Donze 2026).

The development of the railway system gave a new dimension to the art of personal timekeeping. Prior to the emergence of railways, the difference between one town's time and another's was of little consequence. The local clock tower was a useful reference for individuals who needed to arrive somewhere at a particular hour. A journey between two neighboring villages could take hours or days, and the half-hour difference between two adjacent towns was of only marginal concern to travelers. However, as railroads came to link entire nations together, the relationship between distance and time became more relevant than ever. Trains could now transport passengers and cargo between two points in a matter of hours making the local differences in time increasingly difficult to navigate.

The first timetables offer an especially useful perspective on the temporal organization of early railways. George Bradshaw's railway guides were among the first to provide departing and arrival times for the rail routes of his day. Bradshaw's *Railway Companion* appeared in 1840, several years before the establishment of standard railway time. It provides a useful insight into how local timekeeping traditions shaped the early timetable. The guide was later expanded and updated, becoming a comprehensive guide to the railway system of Britain (London Museum 1840). Bradshaw's timekeeping practices were not unique to him as most railway timetables in Britain followed a similar pattern. The guide's tables for the Great Western Railway (GWR) and the London and North Western Railway (LNWR) demonstrate how time measurement slowly came to transform from a parochial practice into a tool of synchronization.

The GWR's 1841 timetable explicitly notes the differences between London Time and the local times of other stations along the route, with the difference increasing in direct proportion to the distance away from London (Network Rail 2020). This shift demonstrated how punctuality was becoming an increasingly important aspect of modern life. Missing a train was not merely a matter of arriving at a destination slightly later than expected. A train was bound to a strict schedule, and its departure time rarely accommodated individual delays. The train's timetable therefore represented a new kind of temporal order.

Mike Esbester has demonstrated that the railway timetable was a unique innovation that transformed both contemporary attitudes toward time and the methods of its measurement. As the railway system became ever more complex, its timetables became more detailed and difficult to navigate. The emerging conventions of railway timekeeping thus anticipated modern innovations in information design, serving as an early example of informational design intended to facilitate the reader's understanding of a complicated system (Esbester 2009). However, the development of standard time also raised new questions about how time should be measured in the first place.

The observatories provided an essential source of temporal stability at a crucial moment in the

development of standardized timekeeping. As the telegraph provided an efficient means of long-distance communication, observatories found new practical applications for their research. The Royal Observatory at Greenwich especially benefited from the telegraph's capacity to relay information over long distances. Therefore the time signals sent by the observatory to other institutions became crucial to the development of standard time. The synchronization of the timetable to the astronomical clock was subsequently adopted by railway companies across Britain. Such an approach demonstrates the extent to which time measurement and keeping were integral to the larger project of modernization. The collaboration between the Royal Observatory, telegraph companies, and railway firms makes it clear that timekeeping did not take place in isolation: rather, the synchronization of Britain's clocks was part of a wider process that made communication and transportation easier (Higgitt 2019).

Standard time had already begun to encroach upon local measurements of time by the 1850s. However the distinction between railway time and legal time remained a crucial consideration for many. Although the majority of Britain's railway companies had adopted London Time, local mean time remained in use for many other purposes. As a result, the difference between railway time and legal time persisted for several decades. The Statutes (Definition of Time) Act of 1880 saw Parliament legalize the standard time. It stipulated that the acts of Parliament, legal documents, and other official documents would be measured according to Greenwich Mean Time (Great Britain 1880).

The shift from personal to standard time demonstrates the significance of the clock in modern history. The pocket watch made individuals increasingly aware of their own time. The railway made individuals increasingly aware of the time of others. The establishment of standard time finally made individuals servants to time, as legal timekeeping practices increasingly relied on highly precise measurements of time. The world of the late nineteenth century was therefore becoming increasingly synchronized. The development of modern timekeeping practices was not primarily driven by an abstract desire to pursue precision for its own sake. The advances in this domain were largely the result of individuals' desire to participate in wider commercial, social, and administrative systems that required standardized measurements of time.

Conclusion: When Time Became a Way of Life

The history of the mechanical clock is in fact a history of new ways for people to relate to time. The medieval Europeans did not live in a timeless world but structured their days around the sun, seasons, agriculture, religion, bells and routine. What changed in the late middle ages and afterwards was the capacity to make one particular kind of time to measurable and counted value which is visible and powerful in everyday life.

The mechanical clock was an essential part of this process but its historical role cannot be

reduced to a simple technological revolution. Public clocks were integrated into existing temporal orders complementing religious and natural cycles rather than replacing them. They gained importance as cities, commerce, the workplace and later transport networks, needed more precise temporal organisation. The history of time was not a history of the shift from "natural time" to "clock time", but rather extended the sphere of influence of measured and regularised time.

Industrialisation created new pressures for the measurement of labour and the clock became an instrument for regulating, recording and contesting working hours. The fact that workers often regulated their own working hours and followed traditional seasonal patterns. The modern approach to time was a product of the interactions between technology, institutions, economic actors and everyday practices.

The nineteenth century witnessed this shift being applied to a broader set of activities. With the introduction of the pocket watch, temporal responsibility was transferred to individuals. The railway timetable created an unprecedented need for coordinating events across space. The railway network was a distributed system, its stations located all over the country and requiring a shared understanding of time for efficient operation. This meant that railway companies were among the first to adopt a common measure for time (Greenwich Mean Time) and it became the standard everywhere else soon after.

This explains why punctuality is now such a ubiquitous demand in modern societies. The appointment, the timetable, the shift, the deadline, the class hour, the flight departure and the digital calendar all rest on the assumption of time being divisible and measurable. The modern world became accustomed to measuring time and organised life around measured time. The clock became powerful because institutions and individuals invested in its divisions and measures. It is therefore an instructive history of the modernity to realise how time shifted from being a regular pattern in nature into a distributed system regulating work, commerce, transport and individual behaviour.

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