

7 MAY NOT DURATION BE REPRESENTED AS DISTINCTLY AS SPACE? GEOGRAPHY AND THE VISUALIZATION OF TIME IN THE EARLY EIGHTEENTH CENTURY

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The eighteenth century saw the creation of the modern timeline, a diagrammatic representation of historical time that has since become ubiquitous. The present chapter identifies early examples of the genre and discusses their relationship to other forms of knowledge, analysing the artefacts themselves and the contemporary explanations published by their authors. It extends previous work on the influence of mechanical metaphors and models of cognition to focus here on the complementary influence of geography. Geography and chronology were presented as equal contributors to history from at least the sixteenth century, but what was new in the eighteenth was the proposition that chronology could itself become a kind of geography, offering the possibility of ‘cartographies of time’.¹ The chapter traces the changing relationship between the two disciplines, set in their cultural context.

Chronology before Chronographics

The development of *chronographics* – visual chronology – built on centuries of scholarship in historic chronology. As Grafton puts it, when Scaliger turned to chronology in the 1570s, intellectuals of very different kinds had long regarded it as a fascinating and important subject – as part of the core of civilization.² It is perhaps difficult now to imagine how significant chronology was to history. On the one hand historical dates seem now to be fixed with an accuracy sufficient for most purposes. On the other, we have given up trying to temporally locate large chunks of what was formerly thought to be history. Yet these mainly biblical accounts were the very sources whose location within history so motivated the early chronologists. If chronology seems something of a dead question in history,

it is of vital importance in the nearby fields of archaeology and palaeontology, where temporal sequence and interval are still keenly researched and debated.

A range of advantages was claimed for chronology, generally by contrast with history which was depicted as unstructured and anecdotal. While the English word *history* is now more or less free of the derogatory undertones of the word *story*, the words *histoire*, *storia*, *historia*, *geschiedenis* and *geschichte* in other languages can all still carry implications of unreliability. Chronology provided the structure and reliability that history lacked. The argument was even advanced that chronology deals in facts, without history's bias: Pointer, claiming authority from Gibson's *Life of Camden*, asserts, 'The short Hints and Strictures of this Kind (i.e. of Chronology) do very often set Things in a truer Light than regular Histories, which are but too commonly written to serve a Party, and so draw one insensibly out of the Right Way'.³ Bolingbroke, by contrast, was unusual in objecting to chronology's very lack of interpretation, and included chronological tables in his list of records that 'would be of no value in my sense because of no use towards our improvement in wisdom and virtue'.⁴ The apparent (and of course non-existent) neutrality of chronology that Pointer celebrated was the very thing Bolingbroke objected to.

Many of the claims made for chronology will be seen to lead into those made for chronographics. They emphasize the structuring of information, its explanatory power, vividness and memorability. Locke asserts that chronology allows persons and histories to be set in a framework 'ranked in their proper places', without which the past is 'only a jumble of matters of fact, confusedly heaped together'. Without 'that natural order' they are unable to work history's improving effects, to 'afford those observations which make a man the better and the abler for reading them'.⁵

Frequently the claims made employ visual metaphors: the eye and light are both repeatedly cited. The eye, in particular, will be seen to have a special role to play in the argument. Limiers, in an essay for Chatelain's seven-volume *Atlas Historique*, emphasizes form and method as the antidote to darkness and confusion:

L'Histoire est un récit de ce qui s'est passé en differens tems dans le Monde; & la Chronologie est l'arrangement de ces mêmes faits dans l'ordre & dans le tems où ils se sont passez. En sorte, que si la premiere fournit le sujet & la matiere à l'autre, la seconde donne la forme & la methode à ce qui, sans cela, ne seroit qu'un récit confus & tenebreux.⁶

(History is an account of what has passed at different times in the World; and Chronology is the arrangement of these same facts in the order and in the times when they occurred. So that, if the first provides subject and material to the other, the second gives form and method to that which, without it, would be an account merely confused and dark.)

Chesterfield, in a letter of 1739, invokes the image of eyes: 'Chronology and Geography are called the two eyes of History, because History can never be well understood without them.'⁷ Jackson claims that chronology vivifies history: it is as necessary as the soul is to the body, and it is an eye:

without Chronology History is lifeless, and no better than a dead Body without Sense or Understanding: and unless the Times of historical Narrations are in some measure ascertained, History will be little preferable to Romance ... Chronology therefore is altogether necessary to History, is the Eye by which we are able to trace the Footsteps of it up to the Beginning of its Existence, and of Time itself.⁸

Blair argues for the unifying, structuring effect of chronology and invokes the images of a lamp and an eye:

For the Series of Time, according to its proper Periods; the Interval of Occurrences; and Train and Coincidence of Events; must be drawn together into one Body, to make what is call'd, the Thread of History: without which, it is really nothing more, than a Bundle of Detached Fragments.

Memorability is a key virtue of such a framework:

they always appear, as if they were cover'd with a Cloud of Darkness, and make but an imperfect Impression on the Memory, till the Lamp of Historical Chronology has enlighten'd them ... It is not therefore, without good Reason, that Chronology, by Way of the Proverb, has been call'd, the Eye of History; because this Metaphor, expresses better than any other, how it opens a Light, upon the most dark, and complicated Revolutions of Mankind.⁹

These claims would continue long after the first modern chronologies appeared. Butler in 1799 was still asserting: 'To read history with much pleasure, and yet be without some knowledge of Chronology, is impossible. To be able to ascertain when an event happened is that which alone, in many cases, stamps importance on the fact itself'.¹⁰

The Eye(s) of History

Goffart, Grafton, and Rosenberg and Grafton note the longevity of the eye metaphor, which has two forms.¹¹ In one variant, geography is the single eye of history. This is the formula favoured by Ortelius, whose opening 'Address to the Reader' of the *Theatrum Orbis Terrarum* invokes *Geographia quæ merito a quibusdam historiæ oculus appellata est* ('Geography, that is rightly called by some the eye of history'). He subsequently promoted this phrase to an epigraph on the title page of the later editions of the *Parergon*.¹² Rosenberg and Grafton suggest that Ortelius modified an earlier version that had referred to two eyes in order to favour geography, while Goffart, following Stegmann, suggests the opposite,

namely that Ortelius's phrase was adapted by the French Jesuit Joseph de Jouancy *c.* 1700 to include chronology as the other eye.¹³ However, he is certainly wrong about the date. Already in the early seventeenth century, Samuel Purchas was citing the 'two eyes' version, referencing Chytraeus who in 1563 had said: *Deinde sciant studiosi: duos velut oculos historiae esse, Locorum, & Temporum cognitionem, seu Topographiam, & Chronologiam* ('Then let students know: there are two as it were eyes of history, the knowledge of Places and of Times, or Topography and Chronology').¹⁴ Whether Chytraeus is the first source is uncertain, but it is perhaps significant that he does not call it a common saying, as many later writers do. Barbeau de La Bruyère's *Explication Générale de la Mappemonde Historique*, discussed below, suggests that the originator of the two eyes trope is Cicero, but there is no evidence for this, as Goffart also points out.¹⁵

The eye metaphor, with the various evocations of light and lamps banishing darkness, creates a powerful metaphorical prelude to the actual visualizations of history that were about to emerge, while the obsession with geography would be explored both textually and graphically.

Parallels and Metaphors of Geography

There was clearly a long tradition of endorsing geography and chronology as two vital aids to historiography. Purchas, quoted above, argued that without the 'so-much-neglected studie of Geographie', history is 'sicke of a half-dead palsie', and tells how he has joined together in his studies the history of time and of place.¹⁶ Locke pairs geography and chronology, requiring that the actions of mankind be located by both 'time and countries'.¹⁷ According to Arbuthnot 'Every body knows, that Chronology and Geography are indispensable preparations for History: a relation of matter of fact being a very lifeless insipid thing without the circumstances of time and place'.¹⁸ Gueudeville's *Dissertation sur l'Histoire Universelle* for Châtelain's atlas sets out an extended analogy between the exploration of near and distant times and that of near and distant places.¹⁹ The context is one in which even by 1788 the Association for Promoting the Discovery of the Interior Parts of Africa could still claim that, while most coasts were now known, much of Asia, a still larger portion of America, and almost the whole of Africa, was unvisited and unknown.²⁰ Appropriately in the Dutch mercantile context, Gueudeville even images history as the sea that supports international trade: 'Ne vous imaginez pas que cette Mer soit inutile, & qu'elle ne serve de rien pour le trafic. C'est par le moïen de l'Histoire que nous negocions avec les morts' (Do not imagine that this Sea has no use, and that it serves no purpose for trade. It is by means of History that we do business with the dead).²¹ As Ferguson notes, Barbeau-Dubourg, a key figure discussed below, seems likely to have been influenced by Gueudeville.²²

These authors refer to 'place' and 'countries'. But other authors suggest a more arithmetic approach, as though both time and space are being measured, as in navigation or cartography. Jackson complains that 'Without some fixed Chronological Æras and Epochs, to which historical Relations may be referred, we shall be in the same Confusion about them, as we should be in geographical Descriptions of Places, Countries, Cities, Rivers, etc. without having the Longitude and Latitude of them ascertained.'²³ This is at a time of great interest, and achievement, in the longitude problem. It reflects a changing approach to time, one in which it is regarded as having dimension analogous to space. This will have an effect on the kinds of chronographics created. To summarize an argument made more fully elsewhere, the eighteenth century saw a transition from time seen as comprising the accretion of events, to time seen as an entity in which events occupy locations in a uniform temporal continuum.²⁴ While there had been several tabular presentations of historic time on a uniform scale, most notably Helvicus's in 1609,²⁵ they did not treat time as a dimension as the eighteenth century would. Poole, in the context of calendar reform, refers to the earlier 'lumpish quality of time', 'an uneven succession of periods of different qualities, a cluster of high points and low, rather than a steady stream of being, while Feeney remarks how history was written without our present 'numerical grid'.²⁶ Contemporary writers wrote enthusiastically of the novel Newtonian shift to seeing time as a dimension. D'Alembert's article on chronology for the *Encyclopedie* opens with the quotation: *In tempore, dit Newton, quoad ordinem successionis, in spatio quoad ordinem situs locantur universa* ('All things, said Newton, are placed in time as to order of succession; and in space as to order of situation').²⁷ Descartes's diagrammatic image of number, applied by Newton to time, now seen as 'absolute, true, and mathematical', promoted an ontology of time as a dimension analogous to space, an additional coordinate for events, specified arithmetically.²⁸ The adoption of this organizing principle for time was reinforced by an enthusiasm among progressive thinkers for mechanical models of knowledge, set in the context of a visual culture that increasingly ascribed aesthetic value to regularity and uniformity.²⁹

If geometric coordinate systems afforded an ontology of time at this period – a sense that this is how time really is – geography provided its epistemology – a means of describing and communicating temporal concepts. This was done in terms of land, territory, geographic features and cartography, translating the geometry of space into the more amenable language of place. In this respect, the new mechanical approach converges with the tradition just noted – of pairing chronology and geography within the study of history – a tradition that was now reinvigorated by literal, visual mappings of time as though they were geographic extents. The remainder of the chapter charts the growing intrusion of

geographic and cartographic concepts into chronology as it turned into chronography, through the works and explanations of a small number of pioneers.

Martignoni: Hybrid Cartographies of Time and Space

Girolamo Andrea Martignoni (d. c.1743), Italian scholar and poet,³⁰ explored geographic analogies in graphical form. In 1718 he published a large engraved chart of history centred on the Roman Empire (Figure 7.1) and soon afterwards a substantial *Explication de la Carte Historique de France et de l'Angleterre* and *Spiegazione della Carta Istorica dell'Italia, e di Una Parte della Germania*.³¹ These contained sample portions of a still larger version of the same chart, apparently never produced in its entirety.

Martignoni's *Explication* is long, repetitive and pedantic. His chart, however, is adventurous. He explains: 'Je me propose par une nouvelle invention, de faire voir en abrégé dans une Carte, toute l'Histoire principale de l'Empire Romain & des Provinces qui l'ont composé, depuis l'origine de Rome jusqu'à tout le Siècle XVII de Jesus-Christ' (I propose, by means of a new invention, to make visible in summary form in a Chart all of the important History of the Roman Empire and the Provinces of which it was composed, from the origin of Rome down to the end of the seventeenth century of Jesus Christ).³² Inventors of graphic chronologies would generally claim that their design was unprecedented; in Martignoni's case it is probably true.

Martignoni's design is circular. At the centre lies the Roman Empire, represented by a topographic map within a smaller circle. From the inner circle to the perimeter, the design is calibrated with a series of concentric rings representing the boundaries of centuries – the 'lignes séculaires'. The whole chart is bisected horizontally by a double-ruled line that separates time before Christ above from time after Christ below. Six radial axes pass through the central zone, each representing a nation or region of Europe, but these axes are not merely diagrammatic. As Martignoni explains:

There are six Rivers in the Upper Part, which progress towards the Centre of the Design by means of six ... Lines, and which before arriving at the Centre, unite their waters in a single circular Sea. These six rivers represent, ... the British Isles, part of Germany, Italy, France, Spain, and that part of Turkey, now in Asia, Africa and Europe, that was subject to the Romans. The circular Sea formed by their union represents the Roman Empire as constituted by these parts.

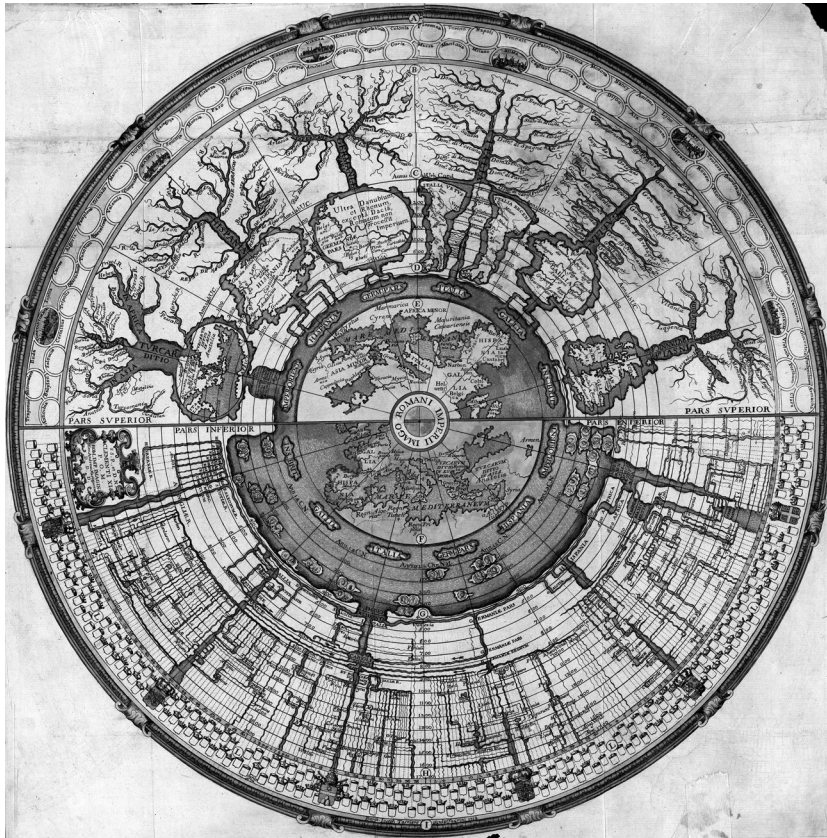


Figure 7.1: Girolamo Andrea Martignoni, 1718. Chart of the Roman Empire. 56cm x 57cm. Collection / Photo: Cartographic Institute of Catalonia (Creative Commons BY-NC-ND 3.0).

There are some remarkable features to Martignoni's chart, which combines standard topographical cartography with temporal, metaphorical mapping. The uncertainties (and perhaps indiscipline) of the pre-Roman world are represented by rivers of time that are meandering and fed by many tributaries expressing the domains, provinces and towns of which the larger regions are composed. Once the six rivers emerge from the Roman 'sea' and improbably continue each to trace their respective axes towards the lower perimeter (representing the present day), each river has been formalized and generally straightened (perhaps canalized, Romanized) and more closely resembles a traditional genealogy, partly because the pre-Roman emphasis on territories is replaced by an emphasis on great families (Figure 7.2).

In the upper part, a striking feature is that the metaphorical rivers of time 'widen and take on the form of Lakes, in which one sees, like so many Islands, the modern Geography of each Country'. Within the lake for Italy there is a split, so that it 'forms two small Lakes, in which are shown the ancient geography of Italy, and the modern', so the topography of Italy uniquely appears twice.

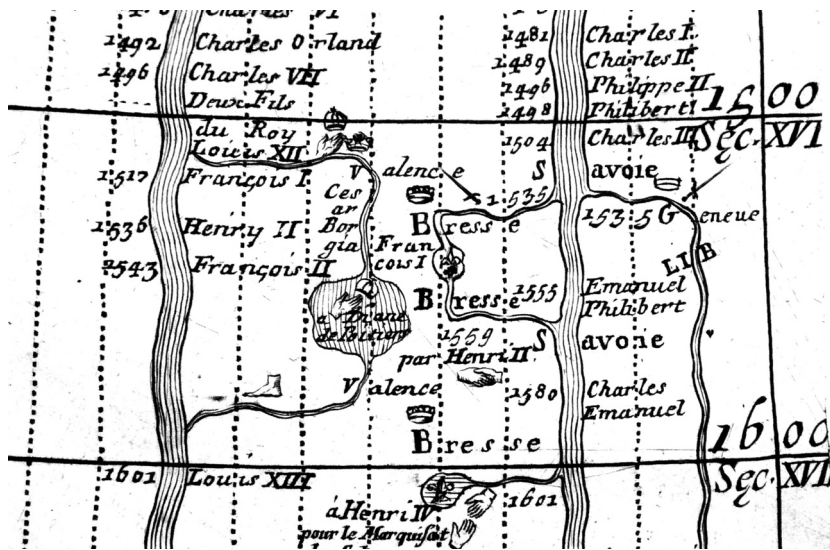


Figure 7.2: Girolamo Andrea Martignoni, 1721. Fold-out chart in *Explication de la Carte Historique de France et de l'Angleterre* (detail). Photo: Stephen Boyd Davis. Collection: Wren Library, by kind permission of the Master and Fellows of Trinity College, Cambridge.

The mixing of topographic and metaphorical maps creates problems both graphically and textually. Graphically, the cartographic depiction of the Roman Empire in the lower half of the central circle is inverted, rotated in the upper half, in order to ensure that the radial axes continue to pass through the correct countries in both halves. Textually, the use of the river metaphor creates its own problems. When we read of 'des Fleuves principaux de l'Angleterre et de la France' we might imagine that geographic rivers are being discussed, but it transpires that these 'principal rivers' are the metaphorical rivers of time for the two countries.

Despite these problems, there are some imaginative aspects to Martignoni's approach. He claims that there are three different ways of interrogating his chart, all facilitated by its being visual rather than textual. These are: by tracing the six principal axes, the *Lignes Principales*, belonging to nations through events and successions; by following centuries using the *Lignes Séculaires*; and by using the *Lignes Particulieres*, additional radial dotted lines that allow the reader to

trace back the history of major families from miniature representations of their arms on the lower periphery. Distinctive events are marked using a vocabulary of small symbols to stand for *Guerre, Confisque, Mariage*, and so forth, explained in a table inserted as a cartouche. Finally, Martignoni proposes that the complete circular chart may be mounted on a central pivot and rotated, making a kind of giant volvelle. Presumably the reader would thus acquire an oblique, perspectival view, looking along an axis from the present towards the past, or even from the past towards the present.

Martignoni's chart shares many of the graphic techniques of standard topographical maps, and it is somewhat surprising to find that his engraver, Tasnière of Turin, seems otherwise to have been engaged mainly on pictorial rather than cartographic engraving. Subsequent inventors would often propose graphical treatments based on rivers and streams of time, apparently unaware of this remarkable antecedent.

Before leaving Martignoni, it is worth noting that part of his argument – and this would become a standard claim for chronographics – consists in claiming that the use of his chart is enjoyable: 'Pour ce qui regarde la Fin de cet Ouvrage, elle n'a été autre, que de représenter un moyen facile pour apprendre l'Histoire; d'une manière qui puisse faire plaisir à l'esprit, & soulager la mémoire' ('As to my Purpose in this Work, it has been nothing other than to provide an easy means of learning History, in a manner that pleases the Mind and relieves the Memory'); again, 'mon Idée, qui a été de joindre le proffit avec la facilité & le plaisir' ('my Idea, which is to join profit with facility and with pleasure'). The notion of visual presentation providing not just a more effective, but a more enjoyable, encounter with history will be seen to recur in later authors and can be regarded as a primary motivation for chronographic invention.

Lenglet du Fresnoy: The Eyes as much as the Mind

Another standard selling point for chronographics is what Martignoni calls 'faire voir en abrégé' – to make visible in summary form – so that large amounts of data that would otherwise be encountered serially in paragraphs or tables can be encompassed in a single glance. A major, if much criticized, figure in historiography, the Abbé Nicolas Lenglet du Fresnoy (1674–1755), made a similar claim for his graphically simple tables engraved and printed on four sheets to form a single large diagram, the 'Tables Chronologiques'³³ of 1729: 'Je n'avance par trop en disant que c'est une méthode que je présente autant aux yeux qu'à l'esprit' (It is not too much for me to claim that this is a method that I present as much to the eyes as to the intellect).³⁴

Naissance de Caath fils de Levi .
..... d'Amram fils de Caath .
..... d'Aaron fils d'Amram .
..... de Moÿse fils d'Amram .

*Sortie d'Égypte, après laquelle les Isra-
 élites restent dans le desert..... 40. a.*
Josué gouverne..... 14. a.
Caleb et les Anciens { 12. a.
Anarchie après leur mort { 12. a.
I.^{re} Servitude sous Chusan-Rasathaim . 8. a.
Othoniel I.^{er} Juge..... 40. a.
II.^e Servitude sous Eglon..... 18. a.
Aod II.^e Juge..... 80. a.
III.^e Servitude sous Tabin..... 20. a.

*Comme il y a différentes Suppu-
 tations sur le temps écoulé depuis la
 sortie d'Égypte jusqu'au Temple bâti;
 voicy les principales.*

	d'Usserius	Tournemine	Serrarius
	40. a.	40. a.	40. a.
	17. a.	14. a.	Josué..... 26. a.
	21. a.	10. a.	anciens..... 41. a.
	8. a.	8. a.	anarchie..... 18. a.
	62. a.	40. a.	2040. Maris..... 8. a.
	18. a.	18. a.	1996. Siphoc..... 40. a.
	20. a.	80. a.	1983. Anonay..... 18. a.
	20. a.	20. a.	1969. Phuro..... 80. a.
			1964. Amuta..... 20. a.

2262. Thyosri
 2250. Thinill
 2242. Semph
 2224. Chuter
 2217. Mauro
 2205. Choma
 2194. Anchuu
 2174. Penthe
 2118. Stame
 2095. Sistosi
 2040. Maris
 1996. Siphoc
 1983. Anonay
 1969. Phuro
 1964. Amuta

Figure 7.3: Abbé Nicholas Lenglet du Fresnoy, 1729. *Tables Chronologiques de l'Histoire Universelle* (detail). The chart deliberately draws attention to the problems of chronology. Collection / Photo: British Library © The British Library Board, 747.c.22 (2).

Lenglet had a reputation for criticizing other authors³⁵ and his critical attitude is borne out also by his visualization. Rather than using his diagram to simplify chronology, he uses it to draw attention to its notorious difficulties. Rather than forcing his dates into a single chronology, he uses the chart to display in parallel columns the key points of difference, such as those between Usher, de Tournemine and Serrarius (Figure 7.3). Most people, he explains, because they are informed by the reading of a single book that presents them with only one opinion and one system, imagine that there is no other.³⁶ Rival dating schemes appear at several points in the chart. An English reviewer in 1729 appreciated the attempt, remarking how the tables, 'exhibit to us in one *point de vue* the different Systems of Chronology, in which the Learned are divided,' and, 'In these Tables, all the Facts and Events recorded in History, are still distinctly refer'd to these several Systems and different Calculations [...]: A thing never before attempted in this way, tho' extremely wanted.'³⁷

Du Fresnoy eschews the usual pairing of geography and chronology for a triad of subjects: geography, the knowledge of manners and customs, and chronology. Geography is clearly of exceptional importance: twenty pages of his first chapter are devoted to its necessity for the historian. He is emphatic that it would be vain to attempt to write history without an exact knowledge of geography. Like Gueudeville quoted above, Lenglet believes in beginning with the familiar, then extending to the unknown, arguing that it is useless in the early stages of study to overwhelm a reader with obscure and confused information.

Deep study of geography, such as would enable readers to construct their own charts, is not required. On the contrary, the appeal of geography as a starting point and foundation is that it is easy and pleasing: 'simple & plus propre à satisfaire les yeux qu'à fatiguer la mémoire' (simple and more apt to please the eyes than to tire the memory). Geography also offers a variety that makes it preferable to others forms of knowledge: 'Extrêmement diversifiée, elle plaît beaucoup plus qu'elle ne fatigue' (Extremely varied, it pleases considerably more than it tires).³⁸

The Abbé's method of learning geography exploits the visual through his advocacy both of maps and of vivid mental images. He argues that the way to study geography is to read some introductory texts, but also to place on maps, and in the memory, the places mentioned. 'Les yeux agissent alors beaucoup plus que l'esprit' (the eyes thus do more of the work than the mind).³⁹ Despite the relative visual conservatism of his chronological tables, he makes the claims that we have come to expect, with impact and memorability again to the fore:

cette methode, qui porte la lumiere à l'esprit par le moyen des yeux & de l'imagination, qui se trouve comme fixée par l'arrangement que l'on introduit dans ces sortes de Tables.

(this method, that gives light to the mind by means of the eyes and by imagining, which is, as it were, made permanent by the arrangement introduced in such Tables.)⁴⁰

Barbeau de la Bruyère: Dimensions of Time and Space

Despite the claims made for the visual aspect of the *Tables Chronologiques*, they were followed posthumously in the Abbé's œuvre by the far less interesting *Tablettes Chronologiques*, simple chronological lists in which Jean-Louis Barbeau de la Bruyère (1710–1781) had a hand, producing editions after Lenglet's death in 1763 and 1778.⁴¹ However the lessons of the Abbé's visualization were not lost on Barbeau, for in 1750 he produced his own remarkable chronographic diagram. Described in a short obituary as 'un savant trop peu connu' (a scholar too little known) Barbeau was, we are told, the son of a wood merchant, who from the age of five exhibited a prodigious memory and – like Lenglet – was described as *une bibliothèque vivante* (a walking library). He was apparently unable to fully develop his talents as a result of working on other authors' publications to make a living. But in 1750 he produced 'une Mappemonde historique, carte ingénieuse & vraiment nouvelle, où il a su réunir en un seul système la géographie, la chronologie & l'histoire' (a historical world-map, an ingenious and truly new chart in which he knew how to unite, within a single system, geography, chronology and history).⁴²

We have some insight into Barbeau's early encounters with geography. Originally attracted to the church, his tastes shifted to geography and history in

Holland, which he first visited in 1735, spending over fifteen years there.⁴³ From there he brought to Paris several fine charts that were of great use to ‘M. Bouache de l’academie des sciences’ (Philippe Buache, 1700–1773), and he was allegedly the author of the most erudite parts of that geographer and cartographer’s works.⁴⁴ He is said to have lived with Buache for about twenty-three years, which would have given him ample opportunity to observe many aspects of cartography.⁴⁵ Buache was a member by marriage of the Delisle cartographic dynasty,⁴⁶ chief hydrographer to the state, premier géographe du roi, and a defender of map-making against the twin pressures of cost cutting and plagiarism.

Although Barbeau’s design is entitled *Mappemonde*, it is not an ordinary map and indeed his *Explication* immediately asserts, in the Lenglet manner, that it is essential first of all to know the size and disposition of the various states found on our globe, for which, unsurprisingly, he recommends consulting the geographic maps of Delisle and Buache.⁴⁷ In what sense then, is this a *mappemonde*? The meaning of the term at the time was a map of the entire globe as hemispheres presented in two adjoined circles. It was used metaphorically by d’Alembert in the *Discours Préliminaire* to describe the knowledge structure of the *Encyclopédie*, emphasizing its systematic organization and completeness.⁴⁸ But as Barbeau makes clear, his own *mappemonde* really is a geographic map; in one dimension, at least. While Lenglet had organized his *Tables Chronologiques* in columns without much sense of geographic proximity, Barbeau tries as far as possible to ensure that countries that adjoin in geographic reality are also adjacent as columns, and uses the width of each column to denote the size of the territory: ‘La largeur marque son étendue, & la hauteur sa durée’ (The width shows its extent, and the height its duration).⁴⁹

Martignoni and Barbeau arrived at very different designs from apparently similar premises. Each wanted to combine topography with chronology, and each harnessed the cartographic techniques available at the time (Barbeau used as his engraver Desbruslins, who had engraved the maps for du Fresnoy’s *Méthode* and the plates for the *Tables Chronologiques*, and who often worked for Delisle and Buache). Where Martignoni adopted the more pictorial aspects of cartography, Barbeau preferred its symbolic codes. These included variation of typefaces to express scale and importance of territory – an important aspect of many chronological designs,⁵⁰ the use of solid colour and coloured inlining to distinguish empires and related lesser states or to show sacred territories before and after Christ, and the use of different kinds of boundary lines to express different relations between adjoining graphic blocks, whether considered geographically across the chart or temporally down it (Figure 7.4). A vocabulary of different line styles for boundaries had developed in the topographic maps of the preceding two centuries,⁵¹ and no doubt Barbeau had studied both finished maps and the arts of cartographic engravers in his time *chez* Buache.

Martignoni had stressed the three methods by which different kinds of users could interrogate his diagram, and Barbeau similarly remarks that, if so desired, one may follow one column of his *mappemonde* from the earliest times down to the present, trace lines of descent such as that of the Bourbons, or see synchronous events at a particular moment such as the birth of Christ. In addition he explains that colour enables related parts of the diagram that are spatially separated to be symbolically connected. A point of great importance to Barbeau is completeness, 'une notion complete de l'Histoire Universelle' (a complete idea of Universal History), disparaging the majority of books which carry such a name yet fail to mention several of the peoples referenced in the *mappemonde*, or even of some of the great empires. He reinforces his claim in the opening rubric on the chart itself, using the familiar notion of the all-encompassing glance: 'On voit ici du premier coup d'oeil, non seulement la suite des principales Monarchies ... depuis la Dispersion des Hommes après le Déluge jusqu'à present. On a sous un même point de vûe, l'état du Monde entier' (Here can be seen at first glance, not just the succession of the principal monarchies ... from the dispersion of men after the great Flood to the present day. Within that same view can be seen the entire World...).⁵²

With his six radial axes and embedded topographies, Martignoni is an innovator whose designs seem, in retrospect, to lead nowhere. In some ways, his design would be more appropriately named after the medieval *mappamundi* than was Barbeau's *mappemonde*, placing the heart of the Roman Empire and Christ's birth at the centre of a world set within circular bounds, mixing topographic and metaphorical imagery, and with a reckless approach to modern conceptions of 'correct' orientation to the compass. It is worth noting Gaudio's observation in relation to Matthew Paris, that Paris's maps might be described as 'histories' rather than as 'geographies', and that the *mappamundi* was in its time referred to as a *historia* rather than in strictly geographical terms.⁵³

By contrast, Barbeau's chart looks strikingly modern, stripping away the pictorial aspects of cartography and adopting a pared-down, mechanical series of graphical codes that anticipate the quantitative visualizations of the next century and even the data visualizations of our own time. In common with them, every point on the surface has a meaning, as it does in a modern 'tree-map':⁵⁴ each point inhabits a coordinate space defined by place (across the chart) and time (down).

Barbeau's *Explication* concludes with the startling claim that his map may give to man a view of all ages similar to that enjoyed by God:

Seroit-ce trop dire, que Dieu qui s'appelle dans les Ecritures, Consector Seculorum (Ecclesiastiq. XXXVI. 19.) & qui a créé l'Homme à sa ressemblance (Genes. 1. 26.) le met en état par ce Plan, & autres semblables, de voir d'un coup-d'oeil tous les Siècles passés, comme présents devant lui?

(Would it be too much to suggest, that God who is called in Scripture, Conspector Seculorum, [‘the beholder of all ages’ in the Latin Vulgate] (Ecclesiasticus. XXXVI. 19.) and who has created Man in His image (Genesis. I. 26.), enables Man by this Plan, and others like it, to see at one glance all the Centuries that have passed, as though present before him?)⁵⁵

Barbeau claims to be the first to devise such a diagram: ‘sans qu’on ait pensé jusqu’à présent à donner un plan de l’Histoire, où ses deux yeux (la Géographie & la Chronologie) se voient pour l’éclairer & en diriger l’étude’ (not that anyone until now has thought to present a map of History, where its two eyes (Geography and Chronology) come together so as to enlighten and direct our studies). So far as our present knowledge extends, Barbeau’s claim of originality in mapping location and time against two axes seems to be correct.

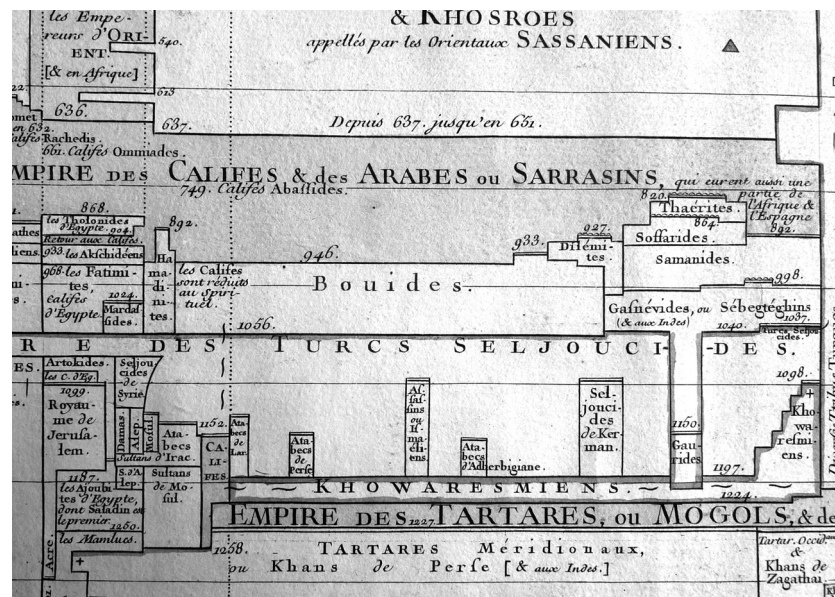


Figure 7.4: Jean-Louis Barbeau de la Bruyere, 1750. *Mappemonde Historique* (detail). Photo: Stephen Boyd Davis. Collection: Bibliothèque Municipale de Dijon (12990, Fonds Ancien).

Two charts remain for consideration: those of Jacques Barbeau-Dubourg (1709–1779) and of Joseph Priestley (1733–1804). Both reflect a further incursion of mechanical thinking at the expense of geographical models and metaphors. Yet the influence of such metaphors is still present in the textual explanations of their designs, and Barbeau-Dubourg advances the strongest argument so far that

chronography is a kind of cartography, together with reasons why this should be so.

Barbeu-Dubourg: Arithmetical Mapping and Geographical Envy

Barbeu-Dubourg was a doctor, botanist and philologist, a friend of Bolingbroke and Franklin, who ultimately lost his wealth in an ideologically committed effort to support the American Revolution.⁵⁶ Like Barbeau, Barbeu-Dubourg aimed for completeness. His chart begins with the creation and ends at the present day. Barbeau had applied a series of decreasing scales as he moved further back in time (and up the sheet), so that the same distance on paper represented 100, 200, then 250, and finally 500 years. This is an effective strategy, creating a kind of perspective where more distant time occupies less space; convenient also in that, by the nature of historic evidence, one usually has more data for recent times. However, Barbeu-Dubourg had no truck with this, with the result that his chart – in which time is now laid out horizontally⁵⁷ – is 16.5m long, and the leftmost parts are almost devoid of content. His chart is made of 35 sheets printed from copper engravings glued together to form a continuous scroll. It was optionally available mounted in a ‘machine’, a scrolling device with handles, priced at 15 or 18 *livres*, which is extensively described in the article he contributed to the *Encyclopédie*.⁵⁸ The scroll is divided into horizontal bands representing regions and kingdoms, with below them an extra band for memorable events (eg, ‘découverte du Mysysipe’ (discovery of the Mississippi), c. 1679) and another for notable individuals (e.g., ‘Colbert’, c.1660) (Figure 7.5). To allow for the wealth of data for recent times, and the lack of it in earlier periods – God, Adam, Eve, Cain and Abel are the only items on the entire first sheet – the bands are tapered from an overall height that is a third of the depth of the sheet at the beginning, to the full depth at the end.

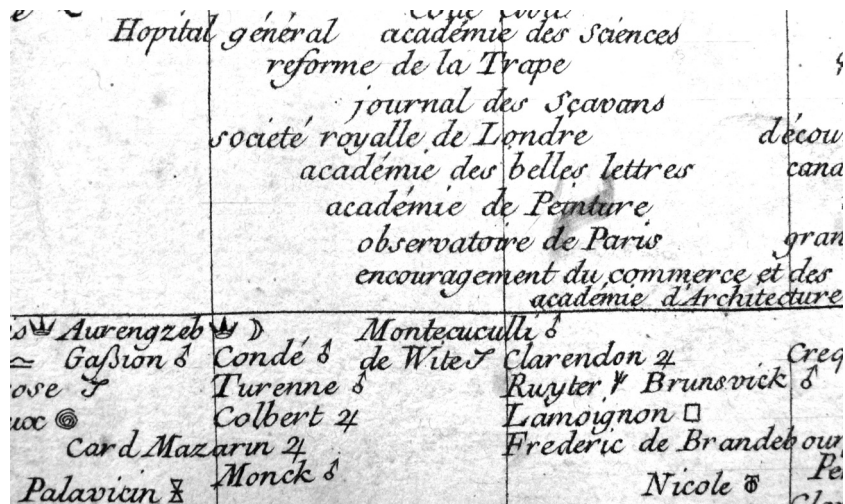


Figure 7.5. Jacques Barbeau-Dubourg, 1753. *Chronography or Depiction of Time* (detail). Photo: Stephen Boyd Davis. Collection: Rare Book Division, Department of Rare Books and Special Collections, Princeton University Library.

It is to geography that Barbeau-Dubourg turns in arguing for his constant scale: in geography, countries are typically depicted on separate sheets at different scales, 'la variété presque infinie de ces échelles ne laisse pas que d'embrouiller beaucoup, & de causer bien de la peine, au moins aux commençans' (the almost endless variety of these scales cannot fail to confuse greatly, causing much distress, at least for the novice). By contrast, charts of time can and should be at one single scale, a constant representation of the years. Here is something new: Barbeau-Dubourg argues not that his *chronographie* is a mere companion to geography, is like geography, or is equal to geography, but that it is superior to it:

De là vient que l'on appelle communément la Chronologie & la Géographie les yeux de l'Histoire. Il y a cependant entre les deux une différence très-remarquable: c'est que l'une est un accessoire important à l'Histoire, l'autre lui est absolument essentielle; la Géographie l'orne, l'éclaircit; la Chronologie en constitue le fond même & la base.

(Thus Chronology and Geography are often termed the eyes of History. However, there is between these two a very remarkable difference: namely that while one is an important adjunct to History, the other is absolutely essential; Geography embellishes History and illuminates it; Chronology is its very bedrock and foundation).⁵⁹

Again:

La Géographie a pour objet l'étendue de la terre; la Chronologie pour objet la succession du tems. La durée ne peut-elle pas être imitée & représentée aussi sensiblement,

aussi distinctement que l'espace, & les intervalles n'en peuvent-ils pas être également comptés par des degrés?

(Geography has as its object the extent of the earth; Chronology has as its object the succession of time. May not duration be imitated and represented as effectively to the senses, as distinctly as space, and may not intervals of time be as easily counted in degrees?).

It is ironic that geographic space is described as being easy to measure. He must surely have been aware of the *expéditions géodésiques* of Maupertuis and la Condamine in the 1730s and the extraordinary difficulties they had encountered.

Barbeu-Dubourg offers another argument that making maps of time is superior to making maps of the globe: projection of the spherical globe onto a sheet of paper involves distortion, while no such distortion occurs when mapping time. Here we see absolute certainty, both that time is uniform and linear, and that visual representation should map these properties directly.

One feels Barbeu-Dubourg has some compulsion to deprecate geography, even as he uses it repeatedly to justify his design. Perhaps this is a kind of envy. Geography had been well served by visual material since at least the days of Ortelius and Mercator, and by the eighteenth century a wealth of striking and desirable objects had been produced, including maps, globes and other adornments to a learned gentleman's collection. Barbeu-Dubourg is writing within a long tradition when he comments on the dullness, by contrast, of chronology:

c'est une étude sèche, laborieuse, ingrate, elle n'offre à l'esprit que des dates rebutantes, une prodigieuse multitude de nombres, qui chargent la mémoire, s'y entassent avec peine & lui échappent facilement.

(it is a dry form of study, laborious, unforgiving, offering nothing to the mind but repellent dates, a prodigious accumulation of numbers which burden the memory, are difficult to lodge in the mind and escape thence all too easily).⁶⁰

Locke had distinguished between the value of chronology as a framework and the interminable arguments over dates, warning that 'all that learned Noise and Dust of the Chronologist is wholly to be avoided'. Lenglet had remarked on 'la sécheresse qui se trouve dans cette étude' (the dryness to be found in this kind of study) and the English reviewer of Barbeau had commented on 'those whose misfortune it has been to spend their lives in such dry searches'.⁶¹ In arguing the case for visualization, Barbeu-Dubourg contrasts chronology, which is 'une science de mémoire si froide, si stérile, si insipide' (a science of memory so cold, so sterile, so insipid), with his *chronographie*, modelled on the visual charms of geography: 'où tous les événemens mémorables frappent tellement les sens, s'arrangent si aisément dans la mémoire, & s'y impriment si fortement, qu'on s'instruit presque machinalement & sans trop y songer' (where memorable

events so strike the senses, organize themselves so effortlessly in the memory, and are imprinted there so strongly, that we learn almost automatically, hardly needing to think what we do).⁶²

Both Barbeau-Dubourg and his younger contemporary in England, Joseph Priestley, who published a similar document though on a much smaller scale in 1764, were at pains to explain their novel design. Both men, aware of one another's work through their mutual friendship with Benjamin Franklin⁶³ (Barbeau-Dubourg 1768), had developed designs which were devoid of figurative metaphor, comprising only lines, dots, labels and, in the Frenchman's case, small graphic icons to represent the distinguishing characteristics of individual notables, a technique used also by Martignoni and by Châtelain. Yet despite the graphical austerity of their designs, when it came to describing them in words, both men resorted to metaphors of geography.

Priestley: Rivers of Time

While Barbeau-Dubourg seems to have been the first to plot historical time mechanically and arithmetically, it was Joseph Priestley, theologian, dissenter, natural philosopher and radical, who first represented duration by a printed line to represent each life, in his double-folio chart. He wrote a twenty-five page booklet describing the *Chart of Biography*.⁶⁴ A subtle account, it presents an argument for the analogy between time and a graphic line, and frequently invokes the image of mechanism. His design is an 'ocular demonstration' of Newtonian time. Priestley is adamant, like Barbeau-Dubourg, that only a uniform, mechanical timescale will do. In his account of his own later *New Chart of History* of 1769 Priestley criticizes Barbeau's chart, which he had probably seen in its pirated version by Jeffreys from 1750, and particularly objects to the non-linear timescale.⁶⁵ Yet despite his mechanical, mathematical impulse, Priestley also appeals to geographic analogy. In particular, he invokes rivers, citing their lack of beginning and end, likening the lives of men to 'so many small straws swimming on the surface'. Priestley approved of rivers: for him, universities were pools of stagnant water compared with the dissenting academies 'like rivers which taking their natural course fertilize a whole country'.⁶⁶ The biographical chart itself bears the motto *fluminis ritu feruntur* (carried along like a river), evoking Horace's advice to Maecenas to maintain his position as the world flows around him like a river.⁶⁷ However, of all the chronographers discussed here, Priestley is the least beholden to geography.

Divergence

Barbeau-Dubourg and Priestley have freed themselves of all trace of geography in their diagrams, but not in their explanations. What would happen next? Two contrary tendencies can be discerned. The emergence of quantitative graph-

ics such as Playfair's 'lineal arithmetic' in the 1780s would continue the purist approach, shorn of visual metaphor.⁶⁸ But in historiography, the very neutrality of these mechanical approaches seemed to some to diminish their ability to tell a story. Many abandoned the abstemious mechanical plotting of time for richer visual forms. So, as Rosenberg points out, when in 1804 Strass published his chart *Strom der Zeiten* (Stream of Time) with its numerous meandering rivers representing the fate through time of the various states and powers, he specifically objected to the flatness and neutrality of Priestley's view, and its uniform or 'equisecular' timescale. He favoured a highly authored, hand-drawn grouping and linking of currents and tributaries in the stream of time. His English translator William Bell announced the 'new' idea of representing time as a stream or river. As Rosenberg and Grafton point out, if Martignoni's work offered one of the first systematic visualizations of the stream of time metaphor, it was far from the last.⁶⁹

With chronographics subsequently pursuing two paths – the mechanical-mathematical and the metaphorical-geographical – the eighteenth century can be seen as a key moment at the birth of modern visualization, when circumstances conjoined to create a particular geographically inspired visual form. Beneath all lay a linear, uniform ontology of time, derived from Descartes and Newton, which made historic time seem more analogous to dimension and space than ever before. There was also the strong prior tradition of pairing chronology and geography as the two necessary aids to history expressed in the visual metaphor of two eyes. Initially these eyes had been two distinct if complementary aspects, but now there was a need for a congenial epistemology, a means of talking about time as space: this made geographic metaphors for time particularly appealing. Finally, all around lay the desirable visual achievements of cartography in the form of instruments, globes, charts and atlases. Expertise, materials and production systems already existed within the cartographic profession and associated trades, just waiting to be adapted to the domain of historical time.

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5. 'Six pictures, four of animals and two of foreign plants; depicted live by my painter', U. Aldrovandi, *Ulisse Aldrovandi e la Toscana: Carteggio e Testimonianze Documentarie*,

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