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## Metropolitan time: Reflections on the millenium, calendars, and Gregorian hegemony

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**Metropolitan Time**  
Reflections on the Millennium,  
Calendars, and Gregorian Hegemony

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# **METROPOLITAN TIME: Reflections on the Millennium, Calendars, and Gregorian Hegemony**

## **Abstract**

The "official" beginning of the new Millennium, bureaucratically correct on January 1, 2001, gives occasion to reconsider the meanings of that "divide in time" celebrated globally a while ago. A year into the new century, one is still hard put, in our part of the world, to find public utterances that do not in some way evoke the great watershed of "2000". Although the urgency has dwindled, the habit acquired during the decade or so of running up to the Millennium perseveres: everything that has a sense of time - the past, the present, the future - tends to be couched in terms of the great divide.

In this discussion paper, a wide range of issues related to the millennial turn as a major phenomenon in (Gregorian) macro-time is addressed, both at the level of chronology as a subject matter *in* social studies and at the level of chronology as an organizing feature *of* social studies of science and technology.

## **ZEIT DER METROPOLEN. Rückblicke auf die Jahrtausendwende, Kalender und die Gregorianische Hegemonie**

### **Zusammenfassung**

Der "offizielle" Beginn des neuen Jahrtausends, bürokratisch korrekt am 1. Januar 2001, gibt Anlass dazu, die Bedeutungen der grossen "Zeitenwende" noch einmal zu überdenken, die kürzlich weltweit gefeiert wurde. Ein Jahr nach dem Ereignis fällt es immer noch schwer, öffentliche Äußerungen zu finden, die nicht in der einen oder anderen Weise Bezug nehmen auf die Wasserscheide "2000". Die Dringlichkeit mag nachgelassen haben, aber die im Lauf des Countdown zum Millennium erworbene Gewohnheit hält an, alles und jedes, was mit einem Zeitsinn versehen ist, auf diese Wende zu beziehen.

In diesem Diskussionspapier wird eine breite Palette von Themen angesprochen, die mit dem Jahrtausendwechsel als einem überragenden Phänomen unserer Gregorianischen Zeitrechnung zu tun haben, sowohl auf der Ebene von Chronologien als Gegenständen *von* sozialwissenschaftlicher Forschung als auch auf der Ebene von Chronologien als organisierenden Medien *in* sozialwissenschaftlicher Forschung.

The "official" beginning of the new Millennium, bureaucratically correct on January 1, 2001, gives occasion to reconsider the meanings of that "divide in time" celebrated globally a while ago. A year into the new century, one is still hard put, in our part of the world, to find public utterances that do not in some way evoke the great watershed of "2000". Although the urgency has dwindled, the habit acquired during the decade or so of running up to the Millennium perseveres: everything that has a sense of time - the past, the present, the future - tends to be couched in terms of the great divide, be it personal-biographical or humankind-historical. In this discussion paper I will address a wide range of issues related to the millennial turn as a major phenomenon in (Gregorian) macro-time.<sup>1</sup>

The first two sections concentrate on calendars, understood as the basic infrastructures of the timescapes of civilizations.<sup>2</sup> The observations I bring in here concern the place - or non-place - of calendar science and technologies in social science. My argument is not about the origins of this or that *Zeitrechnung*, however, it is about the way *Zeitrechnungen* organize historical consciousness. In order to tell my story, I will start off by pointing to the scarcity of studies of chronologies in social studies (I). Next, some elementary considerations regarding the study of calendars are introduced, leading up to the cultural ramifications of celebrating the Bi-Millennium. At this moment in time, all discourses in which speakers of "modern languages" participated tended to be couched in terms of this event. The impressively successful calendric hegemony of the Gregorian time order became apparent. What does it mean that one supreme *Zeitrechnung* is being imposed on all civilizations of Earth? (II).

I will then change perspective from calendars *in* social studies of science and technology and turn to calendars *of* social studies of science and technology. Two authors, the historian of society Eric Hobsbawm and the historian of technology Thomas Hughes, are drawn upon to demonstrate how calendars organize the timescapes of social science too. In this context the "The End of Science"-discourse as a *fin-de-siècle* phenomenon in debates about science is touched upon (III). I will close with some reflections concerning the technical and symbolic workings of calendars like the Gregorian (IV).

## **I. Macro-Time and Calendars in Social Studies**

Chronological macro-time has been scarcely studied from a social science perspective.<sup>3</sup> Not that time and its orders has not been analyzed from broadly sociological perspectives, of course. A while ago, David Landes has presented a pioneering if ethnocentric attempt to write the cultural, economic and scientific-technological history of clocks.<sup>4</sup> Since then, studies of

<sup>1</sup> For an early appraisal of the meanings of the approaching Bi-Millennium see Joerges 1990, Diewald 1993.

<sup>2</sup> I use the term civilization along the lines of Huntington (1996) of course, although I do not share his mapping of the planet's civilizations (and therefore his battle plan). In any case, it is not very important for my argument at this point how many civilizations make up "world society".

I denote macro-time very extended and institutionally pervasive time-schemes, spanning decades/generations and civilizations.

<sup>4</sup> Landes 1983. Typically, Houston University College of Engineering's impressive project of documenting "machines that make our civilization run, and the people whose ingenuity created them," with its approximately 1500 episodes, has 46 entries dealing with clocks, and just 2 with the calendar (one on the problem of inserting leap seconds and one on the Bimillennium), although there is plenty of 2000-speak in many of the entries (see: <http://www.uh.edu/engines/engines.htm>).

time disciplines conventionally determined and organized with the help of clocks have been intensely researched in all kinds of cultural contexts, including the scientific-engineering. These time studies have - much like other fields of social and cultural studies in the past decades - produced their most interesting insights by going local (if not native). On the way, some rather doubtful theories about time frames being *essentially local-cultural*, in the sense of their trans-cultural incompatibility or un-translatability, were produced.<sup>5</sup>

On the other side of studying micro-timescapes, the largely unexplored white spot of all-inclusive *Zeitrechnungen* waits for study in a sociology-of-science and sociology-of-culture perspective.<sup>6</sup> No attempt comparable to Landes' has yet been made to open the field of calendrics to social studies.

One reason why *Zeitrechnungen* have scarcely been subjected to sociological analysis may be that chronology tends to be considered as distinct, almost external from the notion of social time. Luhmann for instance argues that the experience of temporal movement and change in itself does not yet constitute social time. Social time, he suggests, should be understood as "the interpretation of reality in view of a difference of past and future."<sup>7</sup> And he shows that the notion of an irreducible plurality of social time is well ingrained in sociological approaches to time since Merton, Sorokin and Gurvitch have laid the foundations.<sup>8</sup> Chronology, he argues, can then be understood as "standardized scheme of movement *and* time."<sup>9</sup> Luhmann, and I suspect the majority of time-sociologists, insists on this difference between chronology and time.

Luhmann then turns to the differences between modern (functionally differentiated) societies of the West and less complex societies with respect to the form the relation between future and past takes. He is not interested in the role chronologies play in this, although he has an interesting analogy:

Not time, as Aristotle thought, but chronology creates distance. Chronology functions as an evolutionary universal which combines very simple rules with highly complex functions -like money.<sup>10</sup>

Typically, Luhmann grants social time its plural status, but uses chronology in the abstract singular, not looking into the "very simple rules" making up this medium. Calendric issues are relegated to a footnote.<sup>11</sup> But history has seen an amazing variety of calendar systems. How simple are their rules and how do they serve their highly complex functions? The double intellectual challenge all working calendars present is indeed to understand how they negotiate the amazingly complicated astronomical (and in their wake arithmetical) problems *and*

<sup>5</sup> I remember an ethno-psychiatrist from the 1970s who did some action research in Vietnam and wrote at the time of the Tset-offensive that the Vietnamese language - admirably - did not have precise terms for today, tomorrow and other concepts obviously needed for any kind of effective warfare...

<sup>6</sup> There is, of course, since Joseph Justus Scaliger (*De emendatione temporum* 1538, *Thesaurus temporum* 1606), no dearth of work on calendars, and the approaching millennium has produced a deluge of publications, for instance Richard (1998) (instructive on the technicalities of calendar conversions, flat on history) or Duncan (1998) (a colourful historical account). Both authors, like practically everybody else writing on the subject, present their story in a strictly Judaeo-Christian perspective.

<sup>7</sup> Luhmann 1990, p. 124.

<sup>8</sup> In the meantime, a large philosophical and research literature dealing with temporality (as opposed to chronology) and its cultural construction/evolution has emerged (see Nowotny 1993, 1997).

<sup>9</sup> *Ibid.*, p. 124, emphasis Luhmann.

<sup>10</sup> *Ibid.*, p. 125.

<sup>11</sup> "The primary function of primitive chronology seems to be the integration of recurrent ecological changes and behavior-regulating social norms." (*Ibid.*, FN 18, p. 146.)

how various religious and other powerful traditions are affected by the solutions to these problems. This requires a perspective that combines science and technology studies with studies of the manifold uses of calendars in organizing social life.

Another reason for the dearth of studies in calendrical time may simply be that sociological classics have not articulated these issues, adopting naively the typically whiggish and entirely eurocentric historical timescapes of contemporary historians. Max Weber for instance, that great theoretician of rationalization by numbers (*Rechenhaftigkeit*), has never concerned himself with *Zeitrechnung*, except -marginally - in his studies of the economic ethics of world religions. Thus in his volume on *Konfuzianismus und Taoismus* he distinguishes the Eastern "chronomantical" orders - interested in the prediction of happy and unhappy dates and events - from Western "chronological" order.<sup>12</sup>

Apart from this, there is just one place in his monumental work in cultural history where Weber discusses calendric matters: in the volume on *Das antike Judentum*.<sup>13</sup> Here he observes that the institution of the *Sabbath* originates in the Babylonian moon cult. Whereas this day remained strictly coupled to the lunar cycle in Babylon (i.e., did not fall on every 7<sup>th</sup> day), in Israel the Sabbath was routinely counted as every 7<sup>th</sup> day, "disregarding the moon-phases," as Weber notes.<sup>14</sup> Weber's interpretation follows his overall rationality hypothesis: The Babylonian time order was determined by the "aristocratic (*vornehme*) astronomical knowledge of priests", to which economic interests remained subordinated. The change to a chronological time order in Israel results "simply from the stronger preponderance of agricultural interests and habits in Palestine, oriented to the local city markets." Peasants and city-dwellers had a vital interest in a regular recurrence of a market days: "the eventual imposition of a throughnumbered Sabbath is due to the emergence of a market economy."<sup>15</sup>

It is remarkable that Weber did not follow through this thought - that time orders became detached from their celestial foundations for mundane reasons and were based on some purely numerological procedures - in the direction of an analysis of the emergence and imposition of Western calendars. Consider that Weber's sociology of religions is based on a broad evaluation and absorption of the literature in the sciences and humanities of his time. It is quite puzzling, for that reason, that he did not peruse the broad literature on *Zeitrechnungen* available to him.<sup>16</sup> But Weber's disinterest in rational time orders is matched by Weber's many interpreters and exegetes. As far as I can see, nowhere in the very substantial secondary literature on Weber can leads be found to possibly implicit discussions of time orders in his *oeuvre*, and nowhere are reasons for Weber's disinterest explored.

One answer to this may lie in the circumstance that of course the catholic countries followed Gregorian papal orders much earlier than protestant ones. In Weber's logic of the Protestant ethic and the 'spirit' of capitalism, the Gregorian may not have been a proper candidate for the most rational calendar. Interestingly, England, the country that was first in the industrial revolution, reluctantly adopted continental Gregorian conventions long after most other countries in the Western world, although many of the aborted attempts at calendar reform in European history originated in England. But by 1582 England had parted company

<sup>12</sup> Weber, MWGA Bd. 19.

<sup>13</sup> Weber 1972.

<sup>14</sup> *Ibid.*, p. 160.

<sup>15</sup> *Ibid.*, p. 161.

<sup>16</sup> Basnizki for example references 8 texts on the Jewish calendar in 1908 (see Basnizki 1986, p. 56). Ginzel's standard 3-volume *Handbuch der mathematischen und technischen Chronologie. Das Zeitrechnungswesen der Völker* has extensive chapters on the time orders of Indians, China, Japan, Jews, Mohammedans, Egyptians and Romans - exactly the civilisations and religions Weber concentrated on (Ginzel 1906-1914).

with Rome and resisted innovations from continental Europe in a way that remains familiar. Besides, there was a strong French enlightenment tradition to resist the Gregorian calendar on account of its irrationality and missing decimal elegance.<sup>17</sup>

Be that as it may, post-classic sociologists seem to have experienced a certain post-modernist disdain with chronological issues, possibly in reaction against the powerful ceremonial facade of historical periodizations in "modernist" science. Foucault has expressed it well when he spoke, in order to call for more concern for place and space, of the great obsession of the nineteenth century, namely "history: with its themes of development and of suspension, of crisis and cycle, themes of the ever-accumulating past..." Our epoch, he claims, will perhaps be above all the epoch of space:

We are in the epoch of simultaneity,...of the near and far, of the side-by-side, of the dispersed. We are at a moment... when our experience of the world is less that of a long life developing through time than that of a network that connects points and intersects with its own skein...

And in another place he insists:

A whole history remains to be written of spaces - which would at the same time be the history of powers... - from the great strategies of geopolitics to the little tactics of the habitat,...from the classroom to the design of hospitals, passing via economic and political installations.<sup>18</sup>

But no-one seems to be able to resist the centennial and millennial calendrical frames and to think all these local and lateral events as having their *Eigenzeit* - a sense of historical time that needs not chronopolitically be reduced to one calendrical hegemony with its epitomical timemark, the year 2000. Note also that Foucault himself needs this timeframe to make his observation (or desire).

How then is macro-time made and managed and how are local times and global times, sacred times and mundane times reconciled and mutually articulated? Why have some "primitive" cultures been satisfied with calendars that just sort days into months (and why is "our" calendar used for this purpose, most of the time)? Why have others extended their chronological institutions to lunar or solar or lunar-solar years? Why have some cultures, past and present, remained fixated in ritualized old chronological systems, while others invested in highly politicized schemes of perfecting their chronologies? Why have some cultures chosen to subordinate astronomical reckoning to reckoning in terms of dynastic succession, economic expediency or religious (astrological) orthodoxy? What drives calendar reconstruction -science, technology, economics, politics, religion or some other thing?

## II. The Gregorian Timescape

"In our culture", small-scale time is usually accounted for with clocks, covering two halves of a day; large scale time is accounted for with the help calendars.<sup>19</sup> Some watches account for

<sup>17</sup> Maier 1991, p. 128, referring to the entry *ère* in the *Encyclopédie*.

<sup>18</sup> Foucault 1986, p. 22; 1980, p. 149.

<sup>19</sup> Focussing here on calendar-chronologies, and opposing them mostly to clock-chronologies (and denoting the times and events they organize macro-time and micro-time), leaves open the issue of how to categorize chronologies and their cultural uses more generally. For present purposes I operate with the much simplified notion that chronologies on either side of micro-time/macro-time, i.e. pico- and nano-chronologies on one side, geo- and astro-chronologies on the other, have mostly scientific uses and do not impinge on the "organization



both: they show local time in global time. Such calendar-watches are habitually taken to be meaningful only in innocent instrumental or symbolic senses (think of the watches with the sun and the moon). Of course, it has been shown that clocks are far from innocent in the way they have shaped the representations of time and the practices of timing, usually in contexts of social control and discipline spanning anything from working day through biography to historical epochs.

In the present context I want to point to the largest scale that has practical implications however, that is the clocks of the *longe durée*: calendars. How innocent is the fact that the calendar watches on sale at the *horlogiers* of Kurfürstendamm or the Rue St. Honoré or Fifth Avenue are cued to a time scale that is calibrated according to the *Gregorian standard* for years and begins with year 1 A.D. (or C.E.)? It is this calibration that allows us, since the Gregorian reform, to frame the past, the present and the future in terms of centuries and millennia before and after Christ.<sup>20</sup> Some Western nations have adopted this chronological scheme in the 20<sup>th</sup> century only, and many nations have other calendars written into their constitutions. In many cultures the Gregorian calendar coexists with other calendars.

### ***Some preliminary observations on time scales and calendrics***

Does one have to define "calendar"? Dictionaries will give you innocent information like: A calendar is a means of grouping days in ways convenient for regulating civil life and religious observances and for historical and scientific purposes. The word is derived from the Latin *calendarium*, meaning interest register, or account book, itself a derivation from *calendae* (or *kalendae*), the first day of the Roman month. Note that this etymology traces both astronomical and mundane meanings of the word. But of course there is much more to a science of calendar-chronologies: The general interest of calendrics as a scientific and technological field results from its strange and ineluctably awkward position in the canon of knowledge. It saddles the opposites of natural, formal, cultural, and theological sciences. For that reason, its epistemological status remains forever precarious or outright ideological.<sup>21</sup>

A strange scientific field in fact: it includes mathematicians and astronomers, astrologers, theologians, scholars in cultural studies, historians, scholars in legal studies, New Age gurus, and many more. The symbolisms of day and night, sun, moon, planets, stars and their conjunctions, changing seasons, equinoxes and eclipses, comings and goings of comets tie calendars to both religious experience and mundane know-how, science and mythology. Both our practical requirements (making contracts, calculating the right time) and our quests for deeper meaning (the quest for cosmologies) seem to contribute to an incontrovertible need to resort to *numerical regularity*. Distinct from time understood as movement in history, this gives us *chronologies* as a means to find order in a confusing and ever-changing world.

of historical consciousness". As McLellan/Dorn note: "Scholars customarily draw a sharp distinction between prehistory and history. Prehistory is taken to be the long era from the biological beginnings of humankind over 2 million years ago to the origins of civilization about 5,000 years ago in the first urban centers of the Near East. The transition to civilization and the advent of written records traditionally mark the commencement of history proper" (1998, p. 1).

<sup>20</sup> The Gregorian reform: Pope Gregory XIII had anno 1582 skipped ten days of the (then Julian) calendar in order to bring the Christian calendar in line with the astronomical situation. It seems that his astronomers made a mistake, though: the incongruities that had accumulated since Cesar's Roman time were only compensated back to around 320, one of the reasons why the Gregorian is no good in astronomical contexts. Astronomers today use a simple counting of days elapsed since noon, Monday, January 1, 4713 B.C. on the Julian calendar. The number of days elapsed is called the Julian day number or the Astronomical day number. Why this should be so I don't know...

<sup>21</sup> For an introduction in *Kalenderwissenschaft* see for instance Zemanek 1987.

As sorting devices for ordering events past, present and future, all calendars are somehow based on the three great natural cycles everybody observes and understands (and in this sense alone might be called an evolutionary universal). Expressed in Galilean terms: the earth circles the sun in a year, the moon circles the earth in a month, and the earth turns around itself in a day. The rest of the major calendric cycles - weeks<sup>22</sup>, seasons<sup>23</sup>, decades, centuries and millennia - are more difficult to map on astronomical or generally natural observations, although it has been tried of course. Looking at the world of time in terms of centuries and millennia especially turns out to be as far from "natural" as possible: it resulted from highly contingent historical struggles and culture wars.

In a nutshell, the problem arises from "God, the bad mathematician": calendars and their turning points cannot elegantly be anchored in nature and her harmonies. Repairing this defect is behind any calendar invention and interpretation. As Steven Jay Gould said in his chatty little book on the Millennium:

If God were Pythagoras in Galileo's universe, calendrics would never have become an intellectual subject at all. The relevant cycles for natural timekeeping would all be nice, crisp, easy multiples of each other - and any fool could simply count. We might have a year (earth around sun) with exactly ten months (moon around earth), and precisely one hundred days (earth around itself)... But God ... did not fashion a very regular universe after all. And we poor sods of his image are therefore condemned to struggle with calendrical questions till the cows come home, and Christ comes around again to inaugurate the millennium.<sup>24</sup>

The unpleasant truth: the regularities in nature are not numerical, God must have been a lousy mathematician when he created. The earth's rotations around itself and the sun, and the revolution of the moon cannot be expressed as even multiples of each other. Nature offers only fractionality to infinite decimal places here.<sup>25</sup> Many ingenious solutions have been devised for this problem, "ours" is the predominantly solar Gregorian calendar. Civilizations who opted for lunar calendars rather (Babylonian, Imperial China, Judaism) bring them in line with the solar year by alternating full and deficient months (30 or 29 days) and by inserting leap months every now and then, according to another rough astronomical regularity called the Metonic cycle.<sup>26</sup>

<sup>22</sup> Nobody seems to know for sure how the almost universal standard of the 7-day week evolved. The obvious reference to *Genesis* only begs the question: where does the *Genesis* have it from. The Babylonians already had the 7-day week (allegedly based on and named after the five planets then known plus the sun and the moon). It became a binding standard under the Romans, and later, worldwide, with the British Empire. In purely astronomical terms, the 7-day week makes little sense, except as an approximate marker of four moon phases.

<sup>23</sup> Again, 13 weeks approximately make up one season in our solar calendar.

<sup>24</sup> Gould 1997, p. 134.

<sup>25</sup> With years and days it is not so bad: only about a quarter day off the mark, which has given us the Gregorian calendar's leap year (requiring, if I have this correctly, its own correction by dropping the leap year every 100 years for a while, but another correction was due and 2000 has been a leap year after all...). So the solar year has 365 days, 5 hours, 48 minutes and 45.96768... seconds - what did He think? With the moon it is far worse: the moon travels around earth in 29.53059 days. The closest one can get from this to a "regular" solar year is dividing it into 12 lunations, which gives 354.367706 days, close to 11 days short of the solar year. So we have our 30./31. monthly alterations, plus the 29<sup>th</sup> of February every 4 years. There have been other solutions to this: both the Maya and the *Jacobins* came up with 12 months at 30 days plus 5 days at the end (which were considered unlucky by the Maya and turned into a big party by the French, with an added 6<sup>th</sup> day of feasts every four years...).

<sup>26</sup> After the Greek astronomer Meton, but the cycle was discovered independently at various times in human cultural history. The Metonic cycle denotes the shortest sequence of years that brings lunar and solar calendars into near-alignment: it runs 19 years and requires the insertion of one leap month in any 7 of these 19 years. The Jewish calendar for example inserts a 13<sup>th</sup> month of 30 days into the 3<sup>rd</sup>, 6<sup>th</sup>, 11<sup>th</sup>, 14<sup>th</sup>, 17<sup>th</sup> and 19<sup>th</sup> years

Apart from leap months and leap years, we are seldom reminded of the artificiality of our calendars, except if we partake in two or more different time orders. Thus, the negotiation of the Judaic and the Gregorian calendar in daily life must be known to everyone who celebrates Chanukah: it tends to slip back through the Gregorian calendar about 10 days every year, only to hop forward into late December just before slipping into November. It's the Metonic cycle. The Islamic calendar, also predominantly lunar, does not use the Metonic correction.<sup>27</sup> This is why *Ramadan* and other fixed dates keep moving back in our predominantly solar Gregorian calendar all the time. By the same token, "their" count of years runs away from "ours" - a thousand years are over 31 years plus a few weeks faster for a Moslem.<sup>28</sup>

But otherwise, few people apart from calendar specialists would be concerned with such matters if the Millennium, as a date fixed in time which almost nobody could ignore, had not drawn a measure of attention to the politics and pleasures of studying macro-time:

If we regard millennial passion in particular, and calendrical fascination in general, as driven by the pleasure of ordering and the joy of understanding, then this strange little subject - so often regarded as the province of drones or eccentrics, but surely not of grand or expansive thinkers - becomes a wonderful microcosm for everything that makes human beings so distinctive, so potentially noble, and often so actually funny.<sup>29</sup>

This seems, as Gould conceded himself, "a risibly inadequate stab at lyricism", but still: part of the fun is in the variety of solutions to an unsolvable problem and of the confusion resulting from having to live with several solutions at once. This pleasure may be diminishing in the long run, however, under the pressure of what I will call calendric hegemony.

### ***Fixing time the Gregorian way***

I will not even begin to try to dismantle the deep structure of the Gregorian calendar. Be it enough to point to some of the ways it is embedded in everything.

On the *most mundane level*, to which I shall return, it is embedded in all machinery around the world that uses electronic circuits. Every operation performed on or by humans as well as non-humans with the help of electronically controlled equipment using time-of-day markers is automatically geared to this structure.<sup>30</sup> Many of these operations have a legal aspect, that is they *must* be performed correctly. One cannot change one's birthday or the date of a credit line as one pleases without incurring trouble. Try to apply the Jewish calendar in

of a Metonic cycle.

<sup>27</sup> Iran is the only country in the Middle East that uses the 'Islamic solar calendar' which originated before the beginning of the Persian Empire (550 B.C.). After the conversion of the vast majority of Iranians to Islam, the ancient Iranian calendar was adjusted to begin with the year of Prophet Muhammad's immigration to Medina (the *hijrah*), equivalent to A.D. 622 in the Gregorian calendar. To convert from the Islamic solar calendar to the Gregorian, 621 or 622 years, depending on the time of year, are added to the Iranian year. (For example, the Iranian year 1361 began on March 21, 1982, and ended on March 20, 1983). *Noh-ruz* (New Year's Day) falls on March 21, the vernal equinox. For religious observances, Iranians use the Arabic lunar calendar.

<sup>28</sup> In their terms, in ours only 30 something years; have your pick and legitimize it... The Islamic calendar will define its own millennium some time ahead: Muharram 2000 will be in January - February 2562 A.D.

<sup>29</sup> Gould, op. cit. p. 158.

<sup>30</sup> Basically, all operations addressing the time-variable programmed (or worse: hard-wired) into a computer's operating system plus those geared to other clocks in other applications a computer uses. The operating system UNIX, used in most computers since the 1970s, for instance has a time variable expressed in a 32 bit number - this is basically a counter of seconds which started running sometime in 1969. It will be "full" in 2038 and then go to 0 and start again (I was told by somebody). So the Y2K problem/bug will be with us for a while.

these matters.<sup>31</sup> At the *most ceremonial level* the calendar serves to organize historical memory and future vision. Every commemoration of past events, whether in pride or in grief, comes in the numbers the Gregorian count provides and sets in perspectives.<sup>32</sup> Many of these occasions again *must* be observed by every respected member of a group or people, at the peril of losing their communal identity: think of all the anniversaries, from one's own to one's nation's which one performs or participates in the life-long work of identity building.

In-between the mundane and the ceremonial we have, among many other layers, the entire gamut of territorial, property and inheritance rights on all scales that are codified or contested in calendric terms. Again, this regards personal, national or corporate time-dependent contracts on various chronological scales.

All this applies for any elaborate calendar, and it would be (and is) cumbersome and costly to convert all calendrical references from one *Zeitrechnung* into another. But with the advent of computer networks, it is in principle quite unproblematic to switch calendric markers or maintain some double reckoning at will. The problem lies with the translations of meanings that are not *in the numbers* - in the sense that everyone who can count can see them - but nevertheless are so strongly coupled to the numbers (or more precisely: a position relative to a numerological scheme) as to need them for their evocation, or, the other way around, as to get lost when numbers are switched.<sup>33</sup> This can be demonstrated for all the levels of the time scale - hours<sup>34</sup>, days<sup>35</sup>, weeks<sup>36</sup>, months, years, decades, centuries, millennia...

Here I am interested in scales from years upwards. Years are structured by recurring dates related to recurring rituals - religious, political, personal/local... In some dates, all of these participate, Easter for instance. (Beyond this, Easter in a way epitomizes the millennial puzzle, because it sets the stage for Christ's second coming which has always been debated in terms of the Millennium.<sup>37</sup>) At the time the Gregorian calendar was introduced, the yearly cycle was predominantly shaped by the liturgical calendar which has no significant event corresponding with the turn of the Year. New year festivities were rather played down as pagan. This began to change with the growing importance of a more secular reckoning of decades and centuries.

Reckoning in decades and centuries too seems to be a feature of most calendars - the practice of periodizing history along a scale of magic round numbers is not unique to

<sup>31</sup> A little anecdote in this context: The German magazine *Öko-Test*, which performs environmental impact assessments on consumer goods, tested condoms in 1999. One brand was found to have no date of expiration stamped on. The magazine wrote to the Taiwanese producer who complied in sending dated specimens, but with a date (in Chinese characters?, I don't know and didn't bother to research the case at this point) that did not make any Gregorian sense. The brand was excluded from the test.

<sup>32</sup> A number in itself marks nothing of course, as Niclas Luhmann has shown, using the example of "Europe before the potato" and "Europe after the potato". In order to make a historical event meaningful, one always has to mark two points in time, or three events... (Luhmann 1986).

<sup>33</sup> Any number of calendar converters can be found on the Internet, for example the CalMaster 2000, which gives dates, holidays, astronomical information and calendar conversions for any of 19 different calendar systems. The different calendars include key historical milestones, holidays, saints days and religious Christian, Jewish, Islamic, Chinese, Japanese, etc. feasts (<http://www.zephyrs.com/cal2001.htm>).

Five to Twelve, High Noon...

<sup>35</sup> Lucky Friday, The 13th...

<sup>36</sup> First Advent, recurring weekly festivals...

<sup>37</sup> I have never understood the complexities of the Easter-riddle. The debate on the problems of calculating the correct dates for Easter fills libraries, because in determining Easter one somehow has to reconcile both great cosmic cycles, the lunar *and* the solar, both maddeningly fractional: Easter falls on the Sunday after the first full moon after the vernal equinox.

Western calendars. But the practice of routinely representing past and future events in terms of decades and centuries, and of publicly celebrating the turning points, seems to be closely linked to the growing supremacy of the Gregorian time order.<sup>38</sup> According to Peter Stearns, the Harvard/Carnegie Mellon social historian, the use of century designations became routine after 1600 only. The first time the end of an old and the advent of a new century excited much public rhetoric and celebration was 1700. Since then a considerable culture of centennial celebrations and *fin-de-siècle/debut-de-siècle* framing of historical downs and ups has emerged. Contemporary historiography operates mightily with the figure of centuries. More obviously meaningful turning points like the French revolution or WW II are often aligned with centennial schemes, and not the other way around.

The "triumph of the century" (Stearns) since 1700 surely reflects many cultural shifts. The best cue here may be the word - *siede* - itself: "secular" change (in the sense of "this-worldly" used since the 13<sup>th</sup> century), the moving away from tradition in all spheres of life, had become the predominant sense of history for intellectuals and political leaders in Europe. Both rapid change and the stabilization (*Verstetigung*) of its driving forces in "modern" institutions, especially science and commerce, contributed to a growing need to fix definite units of past and, especially, future history. Forward looking long range calendars became, maybe for the first time, as important as reckoning in terms of great past events. The trading of events (with past dates attached) for dates (looking for future events), which has been so characteristic of the recent turn-of-the-Millennium rhetoric, became feasible only when literacy and the use of printed calendars and almanacs became common since the 17<sup>th</sup> century.

But the spread of calendars and almanacs also triggered millennialist movements, as opposed to secular thinking and historical attitude. In this sense, reckoning in terms of millennia also is very much a form that came with the Christian calendars. Although millennialist thinking can be found in Islam or Old Chinese *Zeitrechnungen* too, it is not strongly linked to their calendars. It is more messianistic/apocalyptic than millenarian in terms of calendric date. Presumably, numerological millennialism is particularly strong in Western civilization because of its deep biblical roots: "A thousand years is but one day in the eyes of God". God created the Universe in 7 days. His creation recapitulates divine history. History will be fulfilled after 7000 years therefore. (We have now entered the third day...). This is the original connection of the Millennium as a Judeo-Christian construct and the calendar meaning of 1000,2000,3000...

The turn of the second Millennium A.D., or C.E. for common era, has occasioned a considerable amount of studies on the first Millennium.<sup>39</sup> Interestingly, the year 1000 seems to have been much of a non-event, according to Stearns at least: at the time, most people still counted their time in the 15-year tax-cycles of the Constantinian Calendar and simply were not aware it occurred. It was largely invented in retrospect.<sup>40</sup> Nevertheless, the 16<sup>th</sup> century

<sup>38</sup> A long and uneven process, Protestant countries lagging behind catholic ones. Sweden, for instance, has a curious history: It decided to make a gradual change from the Julian to the Gregorian calendar. By dropping every leap year from 1700 through 1740 the eleven superfluous days would be omitted and from 1 Mar 1740 they would be synchronous with the Gregorian calendar. So 1700 which should have been a leap year in the Julian calendar was not a leap year in Sweden. However, by mistake it seems 1704 and 1708 became leap years. This left Sweden out of synchronization with both the Julian and the Gregorian world, so they decided to go back to the Julian calendar. In order to do this, they inserted an extra day in 1712, making that year a double leap year. So in 1712, February had 30 days in Sweden. Later, in 1753, Sweden changed to the Gregorian calendar by dropping 11 days like everyone else.

<sup>39</sup> And quite a bit of millennial lore. For instance that people in Europe - when they took to the mountains to await the Second Coming and Christ did not come - adapted to the fact and shifted the Second Coming from Christmas to Easter, as it were, taking to the mountains again thirty years later...

<sup>40</sup> See Stearns 1997.

saw a surge of dated apocalyptic prophecies, mostly with Nostradamus.<sup>41</sup> These died away soon, even though on the cultural fringes, and especially in the United States, messianic/apocalyptic movements never quite vanished. With the second turn of a Millennium prophetic apocalyptic strands, combined with millennialism cultivated by secular future gurus a la Toffler or Naisbit, have gained renewed force.

### *The three strands of the Millennium Craze*

The big calendars of high cultures operate on a days into weeks/into months/into years/into decades-into-centuries (or at least dynastic periods)/into millennia basis. As Lepenies has pointed out for the Gregorian period (and as could probably be shown for other great calendar schemes too (although he makes this contingent on making *precise* the notion of 'century'), the metaphors of age and aging, anthropomorphically taken from the yearly cycles of human existence, are powerfully at work in thinking about centuries and millennia too, with variously optimistic or pessimistic results as to future cycles.<sup>42</sup> The magic of "round numbers" is apparent in all these cycles and the way followers of the Gregorian have experienced the Bi-Millennium mirrors the meanings conventionally attributed to (simplifying to three cycles) yearly, centennial and millennial markers and turns.

*Years* are full of recurring life-time events, both secular and religious. The year-cycle is very old and quite universal, although most calendars will place the beginning of a new year somewhere around Easter. Celebrating the New Year at the beginning of January slowly came with the Gregorian calendar.

*Centuries* are historical-calendrical and secular. Europe went secular-calendrical after 1200, and definitely since the last three centuries. Apocalyptic strands were preserved and are being revived. Associating them with a thousand years in a calendar is again an achievement of the Gregorian calendar.<sup>43</sup>

*Millennia* are messianic/apocalyptic and religious in a broad sense. A new apocalyptic millennialism came with New Age, in combination with a mystification of the Maya calendar whose turning point in 2012 was easily synchronized with the Gregorian 2000 (what's 12 years in view of the New Age?). Messianism has great traditions outside Christianity in Judaism and Islam, but at least in Islam it did not acquire millennialistic character. On the other hand, centuries did not become important units of ordering time in calendars of other civilizations.

The Bi-Millennium powerfully *fused* these three strands in organizing history around the round numbers of the Gregorian calendar. This fusion of yearly reckoning, centennial periodization and oftentimes millennialistic/messianic distinctions of millennial eras in bi-millennial rhetoric made for the cultural interest of the event. But can it be shown to have had any definite effects on the course of history? In an earlier paper on the dynamics of the Millennium<sup>44</sup> I had hypothesized that, despite its essential arbitrariness, this great date in search for great meanings would set off *great projects* in search of legitimations that would otherwise not be engaged with. Ten years ago, the potential economic and cultural effects of 2000 seemed worth watching, even advocating. But most of the large-scale projects that were indeed designed over the past decade have become shelved or diminished, not so much for

<sup>41</sup> Who combined his accurate forecast of a solar eclipse on July 31<sup>st</sup> 1999 (Julian reckoning, corresponding to August 11<sup>th</sup> 1999 Gregorian) with the prophecy of terrible occurrences.

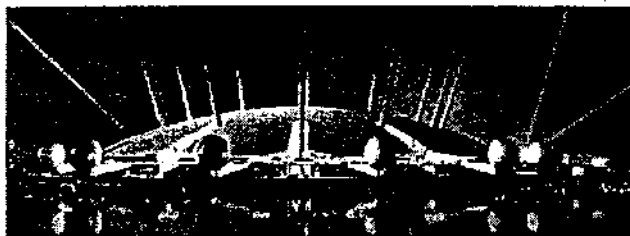
<sup>42</sup> Lepenies 1999.

<sup>43</sup> Islamic apocalypticism was not closely linked to millennialism. See Arjomand 1998.

<sup>44</sup> Joerges 1990.

lack of money but for lack of time. This was true, for instance, for the grand projects that were on the plate in Rome, the mother of all 2000 metaphors and stories. Or in England where the London Dome was indeed built but bankrupted before the new Millennium gathered momentum...

### The new millennium starts in Greenwich, England



It looks then as if the *economic* mobilization the year 2000 effected was largely exhausted in big parties - splash economics, as it were - with one possible exception. There was a lot of talk and activity around the Y2K problem, the fact that most of the world's computers' clocks were programmed on a two-digit scale for the year. Since it was difficult, costly and time-consuming to locate and reprogram all these clocks, and since many computers - nobody knew how many and which - were expected to turn to the year 00 in 2000, the only potentially long-range economic effect of the year 2000 may have occurred in connection with the economics of this endemic programming error. This must have been in itself a very mixed economic blessing, composed of the cost to correct the error, the cost of new machinery where the computers seemed incorrigible, the cost of more or less fatal accidents as a consequence of the error, the benefit of learning from the error, the benefit of innovation in computer-technology the error might have spawned off, and so on. In any case, it was an economic effect not based on a great project, it came *by default*.

Potential long-range *cultural* effects of 2000 seemed to me to merit interest in close connection with 2000 projects and programs.<sup>45</sup> All of these, whether they have been realized or not, finalized in time or not, came with characteristic symbolisms celebrating and propagating particular versions of communal, national or global (future) history. So, in the sense that a quasi-universal discourse of ending something and beginning anew orientated the projec(tion)s of many public spokespeople and thereby presumably conditioned the world-views of many more ordinary people, one might have expected ubiquitous cultural effects of the millennial turn that carry a long way into the future. Be that as it may, it would have been hard to research and as far as I know nobody was interested in funding such research.

### *Metropolitan Time, or: Calendric Hegemony*

And yet, the ominous date 2000 may have been of more intrinsic cultural interest. Imagine yourself a self-respecting post-colonial public intellectual<sup>46</sup>, educated and fully conversant in the traditions of your own non-Western (you would see it in fact as pre-Western) culture, sad or disturbed about the spiritual havoc created by Western civilization. And imagine that you

<sup>45</sup> I am not talking here about the many variants of a more or less apocalyptic millennialism which might be considered of cultural significance in a New Age vein.

<sup>46</sup> Predictably, I will be told here by some that the notion of an intellectual is culture-bound to Western civilization and does not make sense in the "fundamentalist" cultural situations I picture here. I will not deal with this injection.

were annoyed by the way the politicians in your own society, your intellectual interlocutors (if any) in other societies, the media you are exposed to daily (and of course your bank, your TV-program and your computer) continuously pushed on you the upcoming Turn of the Millennium as a major historic marker. Would you not have been tempted very strongly to use this date (and the parties that you couldn't avoid anyway) as a platform for raising a few issues in cultural politics?

You would understand, after all, that the fixation of the birth of Christ as year 1 of the Christian era, a process beginning sometime in 526 A.D. of their counting, was, at the time, introduced only for purposes of forward reckoning, the years B.C. still be counted *ab urbe condita*. Christian time was to follow a different count from Roman time. Eventually this resulted in the imposition on the West of the Gregorian time order in 1582, and in due time on your own civilization. All this was of course set in motion by a clash of civilizations in the first place: the desperate attempt of the "Western" Pope to regain some legal supremacy over Eastern Christendom.

The Christian emperors had retreated to Constantinopolis, the West had been taken over by the heathen Germans and Goths. The Pope in Rome availed himself of a smooth public intellectual, Dionysius Exiguus, who in 526 A.D. (at that time year so and so after Diocletian, the prosecutor of Christians) fixed the Easter dates for the next hundred years to come, thus allowing the pope to successfully arbitrate in the Easter controversy in the East -every Eastern diocese used another Easter date. The same public intellectual then had the idea that it was inappropriate for Christians to count their years after "the godless emperor" Diocletian and persuaded his Pope to institute the birth of Christ as year 1...<sup>47</sup> The new calendar was then, right from its beginnings, the outcome of a cultural confrontation, a means to manage and legitimize political meanings.

Would you not be tempted to take the opportunity of 2000 to make the case that the Millennium craze is just that?

### *Local Calendars/Global Calendars and the Colonization of Time*

By placing the mark 2000 on just about everything in public life, establishing as it were a black hole in time from whose attraction no event coming into its vicinity before or after would ever escape, the Gregorian calendar has become paramount in the symbolic representations of the affairs of humankind. There was, in particular, one symbolism in innumerable 2000-projects that tied in with the calendric hegemony of Western Time: the image of "One Mankind, One Planet, One Fate" which came with many programs couched in 2000 terms. The icon of the globe/earth/planet was probably the most common visual element in texts evoking the grand event:



<sup>47</sup> Bodmann 1992, p. 178f. We know now, that the little monk got it quite wrong, relying on a mix of assumptions about the age and date of birth of Christ which are considered off the mark, according to present informed guesses, by 4 to 7 years. We are already farther into the next Millennium after Christ. Lepenies (1999) for instance dates the birth as August 30, 0002 B.C.



The 2000 UN conference on cities, to give only one example, was called *Urban 21*. Like the one before in Istanbul 1997, called *Habitat*, the problems of urbanization and life in "the city" were very strongly coupled to issues of global ecology and the future of modern civilization, that is the future of mankind at large. The life of the myriads of city dwellers from the Bronx to the favelas of Sao Paulo or the shanty towns of New Mexico and their equivalents (?) in Cairo, Timbuktu, Lhasa, Vladivostok, Heyderabad, Kyoto (you name it) was symbolically aligned to the great watershed before 2000/after 2000. But while these dates are packed with meanings for most who did the talking at Urban 21, one may assume that (beyond a short moment on the evening of Dec. 31, 1999) they were quite meaningless for those who do the living in these cities.

In other words, the alignment of local histories with global 2000-history may not have made much sense for those who do not speak and think and dream English or Russian or Spanish in these cities. Because (disregarding the deracinated for the moment) people outside the Western sphere have their own calendars.<sup>48</sup> All these calendars are filled with their own symbolisms for the representation and legitimation of the daily practices of those following them. They deal with their problems at hand by relating them to overarching periodizations, memorials and turning points, much like everybody does in every culture. Only theirs are different ones, more or less unrelated and incapable of assimilation to code 2000.

It may seem that, beyond historical issues of how it all came about, the Gregorian order seems inconsequential: people just take it for granted, it has been in effect for a long time and nobody apart from some calendar experts has a conceivable interest in changing it. But then again this may not be the case. Generally speaking, I can think of four constellations where things become more complicated.

The first constellation is when two or more *Zeitrechnungen* present in a cultural sphere *compete* in the regulation of the same process and a person or a group has to negotiate which one should apply to which element. As a Russian-orthodox Serb living in catholic Croatia one has to negotiate ceremonial time quite a bit around Christmas and Epiphany. The second is when a reigning *Zeitrechnung* is contested and *revolutionized* by some groups within a society in order re-write its history. If one were a Jacobean in 1794 one would live in year 2 of the First French Republic which attempted to erase all memory of the *ancien régime*.<sup>49</sup> The third constellation is when a dominant and basically uncontested time order is considered to be partially impractical and in need of *reform*. The fourth is when one *Zeitrechnung* is imposed from the outside on a cultural sphere whose *Eigenzeit* and its symbolic codes are

<sup>48</sup> On January 1, 2000 (Gregorian), Mayans would have written: 12.19.6.15.0, French revolutionaries: *Décade II, Duodi de Nivôse de l'Année 208 de la Révolution*, Muslims in Kairo wrote: 24 Ramadan 1420, Muslims in Iran: 11 Dey 1378, some Jews: 23 Teveth 5760, businessmen following the proposed ISO-standard: 6 of week 52 of 1999, Ethiopians: 23 Takhsas 1993, Copts: 22 Kiyahk 1716, Old-style-Chinese: Cycle 78, year 16, month 11, day 25, and so on and so forth.

<sup>49</sup> Revolutionary change almost as a rule is accompanied by attempts to overthrow reigning calendars. Stalin tried it, the SS tried it, Chomenei tried it. The *Jacobin* Revolution of 1793-94 was the Year 2 of the Revolution (Year 1 having begun with the establishment of the First French Republic in September 1792). Of course the memory lingered, and was mightily refreshed at the occasion of the French bicentennial a few years ago, not the least by historians who erased versions a la Michelet. Interestingly, the Jacobins instituted two commissions in 1792, one for the total revision of the metrologies of space and mass, one for the revision of time-metrology, including calendar-chronology. While the first was perfectly successful and has given us the standards of measuring space until today, the chronological revolution was undone by Napoleon, never having captured peoples imagination, or undone their religious imagination. The reason why the decimalization of space measurement succeeded may have been that restructuring space was loosely coupled to religious representations, whereas chronology was intimately linked to religious life (Michel Vovelle in Reichardt/Schmitt 1988, p. 66). Accordingly, the shortlived revolutionary calendar only took root in metropolitan areas and larger cities (Meinzer 1988, 23ff).

very different from the hegemonic calendar. If one were a non-assimilated Jew in Eastern Europe a while ago one resented the alienating pressure of the Christian calendar *hegemonically* imposed on one's working life and one's possibility to openly perform one's own memorial events.

The time-zone constellations of *competition, revolution, reform* and *hegemony* set up different questions as to the relationship between *Eigenzeiten* and *Fremdzeiten*, own time and other's time. I suggest that, while elements of all these constellations can be found in people's time management at all times in all places<sup>50</sup>, the four situations combine today in a more dramatic fashion in the time management of people *outside the Western civilization*. I also suggest that in this context the now receding event - the turn of the Millennium - may indeed have had interesting and potentially far-reaching cultural significances, despite its many absurd and short-lived side-effects.

*Code 2000 was/is metropolitan*. The term echoes of course the old *dependencia*-theorists and third-worldists who attributed underdevelopment to the economic relationships between center and periphery, both in a global view and in a fractal view of ever-repeated center-periphery asymmetries as one moved down the scale from global society to the last village. This is thoroughly out of fashion in most post-colonial theories today, and the globe has indeed become far too perplexing to understand economic matters in these terms.<sup>51</sup> But World time and the Western calendar might be the most successful metropolitan hegemony ever in precisely this sense. Successful because, obviously, it was not a burden but a resource for those new in power, no matter at which level. The survival, and in some circumstances revival of competing *Zeitrechnungen* it part and parcel of this: it served to assuage and manage the cultural irritations that came with joining the post-colonial global order or disorder.

The invasion of codified time-orders outside the Western World by the Western order goes on and is carried forward by all kinds of fully legitimate institutions within non-Western societies. The seemingly most unobtrusive institutions are probably media entertainment and computerized economic operations - TV-time and bank time is Western Time. But the same holds for most other time-regulated activities requiring link-up with international communication networks. If there is one colonial achievement that splendidly survives the age of colonization and imperialism, it is the world-wide implantation of the Gregorian calendar.

### ***Resistance from Within and from Without***

The reign of the Gregorian has not gone unchallenged in its proper domain. A glorious feat of resistance against the United Gregorian Calendar Experts & Scholars was of course that everyone has celebrated the Event at New Year's eve 1999, although according to the calendar the new Millennium begins on New Year's eve 2000: the first year of the new age is 2001, because the monk failed to account for the year 0 at the time. On the other hand, the same scholastic calendar scientists who keep pointing this out, will also tell us that the Millennium already started in 1997 (or such), because Gregory and his astronomers mis-dated the birth of Christ by an uncertain number of years. We were all duped and missed the "true" turn...

A peculiar sort of resistance comes from calendar historians too. A German group of historiographers claims that roughly 300 years of the middle ages between 700 and 1000 A.D. are fake: they never happened and we are "really" now somewhere in the late 1600s.

<sup>50</sup> See Nowotny's *Eigenzeit* (1993).

<sup>51</sup> Larrain 1989.

Their favorite hypothesis is that in the struggle between papal and imperial forces (represented by Carl the Great whose myth was also invented for the purpose after the fact...) the great millenarian deception was performed by Rome in order to maintain the legitimate bases of the ecclesiastical reign after it came under attack by more worldly regimes...<sup>52</sup>

In a more serious vein, the reform of the Gregorian Calendar was and is on the agenda of diverse groups and interests. Big global business was never pleased with it. In the 1920s, Eastman propagated a calendar based on Comte's positivistic calendar reform scheme (the so-called Cotsworth calendar).<sup>53</sup> ISO (the International Organization for Standardization) has not sanctioned an alternative to the Gregorian Calendar currently used by most of the world. But it has provided standard notations for recording Gregorian dates, one of which dispenses with months.<sup>54</sup> Global reform was discussed in 1954: the 'World Calendar', considered at the time by the UN, had the 365th day as dateless and weekless, but wasn't adopted. Similarly, the US congress has considered a 'perpetual' calendar, which aligned the first day of the four, annual quarters to always fall on a Monday.

As the Millennium approached, a great number of rationalizing calendar reform schemes were put forward. There was another initiative to have the UN vote in a more "rational" New Millennium Calendar. Here is a bit of the rhetoric from last year's website propagating it:

Today, economic, political & cultural globalization appears substantial. However in several years, at the current rate of change, conditions of today may, in retrospect, then appear relatively primitive. Standardized systems are critical to such development, which in turn is critical to realization of great potential benefits. The calendar is a vital fundament of all infrastructure. But, one country has just returned to the lunar calendar, in 1998; world-wide, a number of systems still coexist at this time. Our current Gregorian regime is patently not worthy of being a standard, with ever shifting day/dates and variable months, underpinned by a far from optimal week-system...

The proponents of the New Millennium Calendar keep arguing their case for a clean-up:

Many major enterprises cannot, effectively, use today's calendar for planning; in practice using notional 28 or 30 day months instead. Planners, like all of us, cope with the awkward vagaries knowing no other system; much as business coped without fax/modems for a hundred years- despite their predating telephony. Calendar reform was last on the UN agenda to facilitate business and government planning, then fixing just four days of the year, the first of each quarter to fall on a Monday. But ALL 365 days of the proposed nmc year are perfectly fixed.<sup>55</sup>

<sup>52</sup> See Illig 1996.

<sup>53</sup> My birthday in Comte's Positivist Calendar is Gutenberg 20, for instance.

<sup>54</sup> The ISO dating-by-weeks notations can be found in the technical standard referred to as ISO 8601. Dating by weeks is common in European countries; and it is becoming increasingly more common world-wide. All 52 or 53 weeks of the year receive a number, and days of the week are numbered 1 through 7, beginning with Monday. So a typical week date notation in accordance with ISO 8601 would look like this: 1995-W03-6. That notation indicates the sixth day of the third week of 1995. The "W" in the notation is optional, but the "0" should precede week numbers less than 10. All week numbers have two digits. The ISO Week Date of the day I began research on this essay (27.08.1998) was: 1998-W35-3. It was week 35 of year 1998, day 3 of the week, and day 238 of the year. One can convert any day in the Proleptic (that is backward corrected) Gregorian Calendar with a little programmed machine under <http://ecuvax.cis.ecu.edu/~pymccart/isowdcal.html>.

<sup>55</sup> <http://website.lineone.net/~spx/index-page3.html> (17.12.2000).

Now, with the proposed NMC system, complete rational symmetry at last. Monday, from Norse 'Monandaeg' or "moon's day", symbolizes the lunar connection of the old Gregorian system, who's lunatic features end with it (there are no Mondays in the six day NMC week).

Another scheme, with links to public intellectuals like Chomsky, was called the ABC (A Bioregional Calendar), propagating by the following rhetoric:

At present human society is dominated by a single calendar system. This is a reflection of a culture of dominance permeating humane society. A Bioregional Calendar (ABC) is an alternative that provides humanity with the ability to organize while encouraging autonomous cultural expression.

In this proposal, A.D./B.C. was meant to be substituted by a new Year Zero in 1945 (Gregorian), and designated B.H./A.H. (before Hiroshima/after Hiroshima). The ABC-calendar advanced a syncretistic symbolism supporting multiculturalist aspirations. Yet another scheme, The Global Era Calendar, put forward in Oregon in the name of humanity, converted 2000 into Year 0 and added leap year adjustments supporting globalist values. Richard Landes, Professor of Medieval History at Boston University, is said to have called the calendar "a gem" and a "call to mindfulness."

Most of these schemes have been somehow addressed to the United Nations, all of them are meant to simplify, rationalize and un-enculture/re-enculture a Gregorian calendar considered both messy and encumbered with historical ballast. They can be considered rationalist-universalist cults: they assume a superior rationality of the Gregorian calendar as compared to other chronological schemes that have been worked out in other cultures, but look for more perfection and less cultural bias (except for the obsession with rationalizing and perfecting of course).<sup>56</sup> In a Weberian vein, the task of a sociology of calendars would be to point out the ways in which the Gregorian calendar incorporates more of the criteria of occidental Rationality than alternative calendars and for that reason has managed to put the reckoning of macro-time into a global iron cage.

In what sense could the Gregorian be said to be more rational than Non-Western calendars? According to the mediaevalist Hans Maier, the Gregorian calendar is the only one that has a zero point, thus allowing the projection and the retrojection of time-intervals in *both* directions, the future and the past, indefinitely. All other great calendars take as their base some foundational date, like the Roman *ab urbe condita* or the biblical day of creation.<sup>57</sup> As Maier notes,

(i)t is one of the ironies of history that the same *Zeitrechnung* which moved Christ into the center of time finally succeeded in the age of enlightenment - that is in a time which began to break with many Christian traditions. But the practical advantages of a chronological

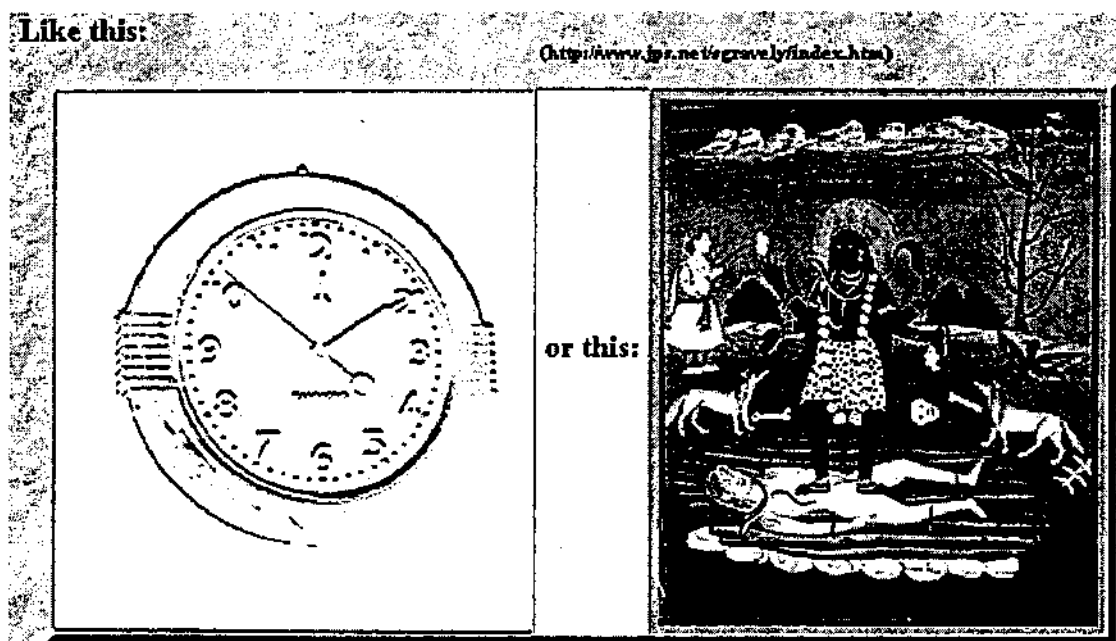
<sup>56</sup> The drive for perfecting the Gregorian calendar is fed by rapid advances in the perfection of the second, which used to be defined astronomically, representing a standard movement in the sky, but has long since been dissociated from its heavenly context by the European introduction of mechanical clocks, and lately by atomic clocks. The standard today is the caesium standard, and fractions of seconds can be calculated and, especially, used for calibrating machinery, to many points after the comma. Working up one's way from the continuously improved second to other units of time and then to standard chronologies produces more and more imperfections in the calibration of the machines called calendars. These remain ineluctantly (it seems) tied up with models of the skies, i.e. astronomical calculation. The intellectual challenges this creates for the astro-time schemes mentioned above are beyond my understanding. As to the challenges it creates for more mundane requirements to synchronise valid calendars with new, caesium-based time-standards for global computer-networks requiring exact calibration of same-time in whatever time-zone of world-time they operate: I haven't worked out those.

<sup>57</sup> Which proved useless even *within* one civilization because at Gregor's time estimates of the date differed by about 3000 year and around A.D. 1750, 200 competing ways of dating the creation had accumulated (Maier 1992, p. 42).

reckoning from a fixed point could not be denied even by critics of Christendom and the Gregorian era.<sup>58</sup>

In other words, the seemingly christocentric base A.D./B.C. of the Gregorian makes this calendar the best candidate for a scheme acceptable to everybody on "rational" grounds: because, as many internal reform schemes show, the zero-point is arbitrary, we could decide to exchange A.D./B.C. by, say, A.H./B.H. without disturbing the chronology as such, whereas agreeing on a global *ab urbe condita* seems utterly hopeless. Whose City?

What then about *resistance from without*, in the eyes of the Other (or the internalized Other)? The hegemony of the Western time zone, the magic reinforcement this dominant frame receives from its major time-mark 2000, the unassailability it has achieved outside its context of origin and cultivation are truly remarkable historic processes. And because this is so, one would expect dissenting voices. If I were moderately fundamentalist Non-Western public intellectual... Looking into this issue as the Millennium approached, my problem was that I didn't know any such intellectuals personally and that they didn't publish or talk in the media I had access to. At the time, most people I told of my hypothesis - that somewhere out there some people would seriously question the significance of the Bi-Millennium for their worlds - refused out of hand the notion that this might happen on any scale that would make it interesting in terms of longer-range cultural effects. They may have been right, and in this case Samuel Huntington should really not be so worried.



On the other hand, even if such voices existed, our chances to hear them would not be good, because (to put it in shorthand) they would not argue in English. In fact, the situation must be expected to be more complicated: In Arabic literature, for instance, there are today books that are written in Arabic for translation into foreign language. These books are not successful with the local connoisseurs, it seems. The books in Arabic they prefer are written in a genre which is difficult to translate and has no local connoisseurs over here. Also, paradoxically, it may be too early, because the accumulated effect of the Bi-Millennium beyond the Big Party is still to come.

<sup>58</sup> Maier 1991, p. 42.

The Internet, this quasi-global amplifier of preferably undisciplined murmurs from any conceivable debate that attracts people with computers, is the first medium one would have turned to in order to find out more (even if it is dominated completely by English, followed by Hebrew and a few other European languages). Probing the Internet in 1999 first of all pointed to a phenomenon which was very much to be expected from general Millennium-theory: that the Grand Event had amazing synchronizing power. Web sites devoted to empathetic development aid and world-improvement, and (less surprisingly) esoteric web sites, draped their programs in millennial language. The great date was exploited to underline and dramatize whatever message for the future was transmitted, and all kinds of apocalyptic/messianic urges naturally fed on the Millennium. Islamic web sites too couched indigenous messianic messages in millennialistic terms. Also to be found were attempts to reinterpret the religious and secular meanings of Christmas and New Year in terms of fixed dates and seasons in non-Gregorian calendars.<sup>59</sup>

These were signs of consent rather than dissent. Careful distancing, like adding C.E. (common era) to B.C./A.D.-dating in learned and p.c. discourses, remained token reverences to a time order one cannot refuse. As far as I could see, overt problematization was absent from the Internet.<sup>60</sup> Also, pointing to the hegemonic element could easily be refuted by pointing to some alleged, computer-based universal time regime:

The critique of the eurocentrism and christocentrism of the present Millennium-panic - a worldend-final definitely following European rules - does not capture the point, though, because in the age of the Internet, the microchips and global networking of computers have long since shaped an ecumenical time regime, whose universality on our planet has no historical precedent.<sup>61</sup>

However, Lepenies seems to me to disregard here that the planet is not "our's" and that, in his own words, "(i)n view of this 'long' twentieth century [referring to a long Schumpeterian century couched in economic terms as opposed to Hobsbawm's short political century, B.J.], the globally increasing inequality represents the central problem of our time." Today this inequality can best be measured by differential access to the computer-matrix.

### ***Hegemony, Competition, Revolution, Reform?***

All in all, the experience of the Millennium's turn has demonstrated splendidly that the Gregorian is well in place on a planetary scale. It has demonstrated that there are many ways of living with two or more other calendars, even if negotiating them has its irritations. There may have been attempts here and there to contest it, but they remained largely symbolic. As, presumably, with space travel in the future: there will be a need to establish interplanetary calendars, but they will for a long time remain merely technical. The Gregorian will then for

<sup>59</sup> Stearns mentions an effort of "Muslim fundamentalist to limit revelry on January 1"(1996, p.14), typically based on reports of an English Iranian newspaper (personal communication). - Texts produced by "indigenous" historians competing with Western historiography might be revealing here. I have been told for instance that one Turkish historian routinely (or pointedly) gives alternative Western and "own" dates and periods for arranging her material, But I have not yet looked into this.

<sup>58</sup> "As Muslims, we consider the Moon calendar for historical events and religious activities. Muslims do not know and do not recognize the Sun (or Western) calendar for many major historical events in Islam", says one of my correspondents, Sultan Al-Harbi for the Muslim Students Association of USC. And Jerome C. Glenn, a spokesperson of the many millennium/calendar lists on the net, says flatly: "The only ones who have brought this issue (non-Western protest) to our attention are people in Christian countries like you," indicating that the Other is mostly an internalized instance.

<sup>61</sup> Lepenies, op. cit., p.7.

a long time to come be the main chronological currency to which other currencies tend to be coupled unilaterally. TV stations and banks will make sure of it.

But this is precisely what hegemony means. The Gregorian calendar comes with all kinds of recurring fixed dates whose meanings are not empty, from Sundays, to Christmas and New Year eves to turns of centuries and millennia. The meanings of these are variable but not entirely changeable. They can be mapped, trans-scribed onto other time-charts, but not without changing the meanings previously inscribed into them. The trans-scribed meanings will change too, relative to the time of origin, but there will be little or no traffic of meaning in the other direction.

### III. Calendars of Science Studies

What I have called above a "calendric hegemony" of the Gregorian *Zeitrechnung* - in the sense of its imposing a particular periodization on cultures with their own *Eigenzeiten* and calendars - applies to the periodizations and chronologies of the sciences and of science studies, too. In a broad sense, all sciences use periodizations in structuring and comparing their narratives and the history of their narratives.<sup>62</sup> Depending on how students of science & technology choose to construct the historicity of their objects of study (i.e., other sciences, and thereby also the historicity of the objects of scientific and technological knowledge), different timescapes organize their narratives.

No wonder then that the sense of an ending and of a beginning which the turn of the Millennium infused into everything was hard to escape in science & technology studies too.<sup>63</sup> And of course, towards the end of the 20<sup>th</sup> century, the history of science was massively written as synchronic history: the ups and downs and progressions of science being aligned with grand history of ideas and political history which in turn is inexorably tied up with our *Zeitrechnung* and its symbolic codes. In the following I will draw on two examples - one from social history open to science/society issues, one from the history of technology - in order to show how certain centennial and millenary interpretations have impregnated the history of science & technology "in the 20th century."

#### *Science in the Short 20th Century*

Eric Hobsbawm has given a rare account of 20th century science, in the penultimate chapter of his "Age of Extremes", before he looked "Towards the Millennium" in his final chapter.<sup>64</sup>

<sup>62</sup> Not all specialties dealing with historical processes argue on a calendric scale: paleontologists don't usually, nor do neuropsychologists or laboratory-ethnomethodologists. But at least in their self-representations *as* sciences, in writing their own history, they always do.

<sup>63</sup> To the extent that they address change of any kind. Granted, social studies of science and technology, as represented for instance in the volumes of the *Yearbook for the Sociology of the Sciences*, tend to be rather a-historical. Of course, there will always be a historical subtext, but I venture that few of these studies explicitly relate scientific/technological change to social history, let alone refer to the work of social historians. As to the strictly history-of-science & technology literature, I feel that in addition to traditional internalist approaches there is a preponderance of studies relating scientific/technological change to *cultural* history (as opposed to social and political history).

<sup>64</sup> Hobsbawm 1995. For present purposes one may assume that Hobsbawm's reading of the history of science and technology in the 20th century and his way of relating it to other parts of the story is not at all untypical for contemporary social historians. (With the exception of his emphasis on environmental problems, perhaps, although he does not enter into a "history of the environment.")

How did he represent science (and for that matter technology - he calls the chapter "Sorcerers and Apprentices", where the apprentices are the non-scientific users of science)?

Hobsbawm chose two epigrams for his chapter. One by Levi-strauss who said in 1988 that there is still a place for philosophy in today's world, but that science has changed the rules of the game for good, "it has revolutionized the rules by which the intellect operates." The other is by Margaret Jacobs who pointed out that

the standard text in gas dynamics written by his author while on a Guggenheim fellowship has been described by him as having had its form dictated by the needs of industry. Within this framework, confirming Einstein's theory of general relativity came to be seen as a critical step toward improving 'ballistic missile accuracy by accounting for minute gravitational effects'. Increasingly, post-war physics narrowed its concentration into those areas thought to have military applications.

Science between Philosophy and War. Hobsbawm seemed to signal right from the outset, that the world-changing powers of the sciences will be framed on the one hand as intellectual history, the history of ideas one might say; on the other as the history of the dominance of nations, as political history.<sup>66</sup> And he ended his analysis on a skeptical and (I think) ironic note: The "world-changing powers" to which the scientists held the key in the twentieth century, protected them, for these powers

appeared to depend on allowing an otherwise incomprehensible and privileged elite - incomprehensible, until late in the century, even in its relative lack of interest in the external signs of wealth and power - to go its own way.

For this reason, all nations adopted relatively non-interfering science policies. But governments are not interested in scientific truth, continues Hobsbawm. They are interested in the instrumental potential and the symbolic uses of science, that is, national prestige, "in which the pursuit of Nobel prizes preceded that of Olympic medals and still remains more highly valued."

Such were the foundations on which the triumphant structures of scientific research and theory were erected, by which the twentieth century will be remembered as an age of human progress and not primarily human tragedy.<sup>67</sup>

A curious gloss indeed on Mertonian and older notions of the autonomous constitution of scientific institutions.

In between such beginnings and endings Hobsbawm has a highly nuanced story. In the social history of science, as pictured by Hobsbawm, the sciences play three crucial roles: they are considered a major force in societal development, thanks to their splendid if politically opportune autonomy; they are seen, in particular, to drive economic development, both production and consumption; and they are seen as jeopardizing the human environment. Not surprising, of course, but the interesting thing is the specification of the mechanisms that make for science's relations with overall history, economic change, and the natural

<sup>65</sup> Margaret Jacobs, 1993, pp. 66-7.

<sup>66</sup> Not as a matter of social history in the continental sense, e.g. Weberian themes such as the *Rationalisierung der Lebensführung* or *Säkularisierung der Weltanschauung* or science as a major erosive force in the decline of religious and authoritarian institutions, as *Ersatzreligion* or even - closer to the heart of contemporary social historians - as changing irreversibly the character of work.

<sup>67</sup> Op. cit. p. 557

<sup>68</sup> In a similar fashion, T. J. Clark (1998), for instance, has synchronized, in opposition to formalistic theories, modernistic art in the 20<sup>th</sup> century to social and political history. His century, like Hobsbawm's, is a short one, ending the modernistic episode in 1989 with the fall of the Berlin wall...



environment.<sup>68</sup> The fundamental narrative of both the history of science and social history tends here to remain the history of nations and empires. In the 20th century this is the struggle between democratic nations and fascist/communist regimes. The resulting frame is "the short twentieth century" 1914/18 - 1989/90. Twentieth century history of science and technology is synchronized with the overall chronological scheme of Hobsbawm's history of the short century. This is the basic plot, and the drama of science is staged as a drama of world-historic struggles for supremacy.

May it be added, that there are more than a few twists. First of all, the scientists did not know what they were used for. Hobsbawm talks about a basic paradox "the historian of the century must grapple" with, namely that no period since Galileo's recantation has been more dependent on scientists, and yet no period has been less at ease with them. He does not resolve this one, but leaves us with a sibylline prophecy: the twentieth century will be remembered, thanks to science, not as the age of human tragedy but of human advance... More importantly, however, Hobsbawm's story is impressively nuanced and belies, all in all, the world-historic simplification. Read closely, the events marking various turns in the development of science and technology do not correspond too well with grand political history.

Hobsbawm presents science and technology as very important, but nevertheless as a subsystem whose history can be looked at separately, only to demonstrate its synchronicity with a social history which is in turn linked to the great politico-ideological changes of the century. Science is almost exclusively treated separately from the rest of the story, the interrelation of science (as distinguished from technology - *nota bene* production technology, not the technology of science) with social history is added after the fact of writing down the social history of the autonomy of science... A peculiar mix of externalist and internalist interpretations.

### ***Technology in the American Century***

Similarly, the historian of technology Thomas Hughes has set out the basic narrative of the development of large technical systems in stages that are variously synchronized with a centennial historical frame, allowing for ordering and making sense of events across many systems and system types. Over the years, one can discern three forms of periodization in Hughes' work.

The first, developed in "Networks of Power," reconstructing (energy-)time from 1870 to 1930, had three stages. The three steps, which Hughes had established studying the American, British and German electricity generation and distribution systems, comprise "invention and development"; "innovation and competition"; "consolidation and rationalization": a script for a clearly upward and outward reaching movement resulting, if successfully played out, in mature large technical systems of high momentum in postwar Western economies. In an evolutionary metaphor, most historians and sociologists of technical systems following Hughes have posited an orderly, directed (if not always planned and sometimes crisis-prone) trajectory from small (young) and local to large (old) and national systems.<sup>69</sup> Here we have, in many of the stories told in the literature on large technical systems, for the last time, harking back to the eras of heroic system-builders of the *Gründerzeit* and of enthusiastic post-war reconstruction, interpretations of system development as the story of an inventive beginning, a tempestuous development and a stable state of maturity.

But this form of periodization proved not entirely defensible. Hughes gradually developed it further in his second big study on the development of 'large-scale technological'

<sup>69</sup> Hughes 1983.

systems, published 1989. "American Genesis: A Century of Invention and Technological Enthusiasm" leads up into the 1970s. Around the same time, Renate Mayntz published her "On the Development of Technical Infrastructural Systems", concluding that at least in continental European nations

...the evident affinity between centralized government...ruling principles and the organizational imperatives of communication and transportation network technologies probably played an important role: This has encouraged both government interest in the development of these LTS and, conversely, their development into large monopoly organizations.

She goes on to argue that the historical specificity of this congruency may have brought the heyday of large technical systems organized on a strictly centralized, network basis, but may towards the end of the century be drawing to a close. Both as a result of technical developments, which are less dependent upon the traditional network set-up and can thus be more de-centrally organized, and because the predominance of hierarchical social orders are possibly disappearing.<sup>70</sup>

Mayntz and Hughes abandon here the stage model and its implicit success story in favor of a story of the rise and fall of large technical systems, in tune with the American self-interpretations of decline so characteristic of the Eighties. The structural-analytical concept of the "momentum" of large technical systems following the electrical pattern yields to a parable of cyclical generation and decay. Now Hughes sees Large Technical Systems as culturally threatened, obsolete and doomed to extinction by the counterculture emerging in the 1970s, with its vision of a decentralized, soft technology. He was impressed that

substantial thinkers among the counterculture elite identified large-scale systems as a salient negative aspect of contemporary culture. Herbert Marcuse, Paul Goodman, and Theodore Roszak are cases in point. Oppressive technological - not political - systems were their major concern.

And he maintains that out of the counterculture came post-modern thinking as well, especially in architecture. "In part, post-modern architecture is a counter response to the order and control of large-scale modern systems."<sup>71</sup>

As a consequence, Hughes has tended since to concentrate on "younger" systems like "management systems" and the technically hybrid telematic systems of the more recent past. At the same time, he seems now to interpret "older" systems resembling grid-based energy systems as "modern" and the non-gridbased, hybrid project-, management- and information-systems of the 1970s and 1980s as "post-modern."<sup>72</sup> The secular metaphor has also been adjusted; the implied epochs are now distinguished into a modern era, beginning approximately with the last turn-of-the-century, and a post-modern era, drawing, it seems to me, on a pervasive and persuasive *fin-de-siècle* rhetoric.<sup>73</sup>

<sup>70</sup> Mayntz 1988, p. 275f.

<sup>71</sup> 1997, p. 187.

<sup>72</sup> Hughes 1998.

<sup>73</sup> Be it said that this division of the history of large technical systems into modern and post-modern exemplars loses some of its persuasive force because the old systems rhetoric survives in part: the thinking of systems in terms of complex causal interrelationships and control has not been abandoned, although it doesn't quite fit into a postmodernist rhetoric of uncontrollable contingency and self-organization. For a more extended treatment see Joerges 1994.

### *The End of Science - fin-de-siècle and millennialism in science studies*

Toward the end of Hobsbawm's "short twentieth century" and Hughes's "American century," the idea to take distance and to look anew at science and technology has led to various attempts to place science & technology research in a broader framework of historical concerns. A "sense of an ending" (Frank Kermode), the notion that something irrevocable had happened to good old modern (enlightenment) science took hold of much writing about science. True, the idea of "the end of history" which has had a short half-life in the late 1980s had already become largely history itself; still, an overwhelming sense that science and technology are part of a wider historical sweep best described as the end of an era was widespread.

The End of Science thesis came in many guises: completeness, insolvability, disinterest, de-institutionalization, uselessness, perversion.<sup>74</sup> John Horgan, for example, a former *American Scientific* science writer, had in the 1990s hailed the end of science because, he claimed, prominent practitioners from all kinds of fields have told him that all important problems in science have been solved (except for TOE, and that would be settled soon, too). Remaining problems are said to be unsolvable.<sup>75</sup> Horgan's point was adopted by epistemo-logical ironists who claimed that scientific theories were not believed any more by their proponents to be capable of validation and that decisions as to their validity were not arrived at by controlled experiment but *via* aesthetic considerations.

Whatever one made of such claims, in the 1990s, received public representations of Science clearly were progressively at odds with much current scientific practice and emerging unofficial representations from within and without. One way of interpreting this was that practice had run away from its venerable symbolic facades. Representing the scientific enterprise could for a long time play a self-referential game, without much reference to what scientists did, but not forever. A crisis of reference occurred because one had to realize that official concepts for science and technology didn't fit anymore; holding fast to old representations and institutional forms made the thing itself, i.e., actual research practice, vanish. Another way of interpreting it worked in the opposite direction: emerging representations of science and technology urgently needed to be translated into corresponding practice. The way science and technology was still being done badly lagged behind. Again, the thing itself was missing behind its ceremonial facades. This view seems to me behind much of "mode 2" discussions.<sup>76</sup>

Whichever way: assuming that this powerful movement, the *Aufklärung*, has ever happened (and who am I to say it hasn't), some analysts also began, towards the end of the century, to see that the enlightenment process had to be, and indeed was, rewritten the same way the processes of the division of labor and the processes of the advance of high science & technology had to be rewritten. The implication was that it had happened slightly differently than we were taught in school all along - and that it would probably continue for a while to do so. Part of it was that it seemed hazardous to prophesize how it would go on, in this new millennium, after the great divide in historical time. No way of knowing, not because times had become so turbulent in the 20<sup>th</sup> century but because they always were. In this sense, no

<sup>74</sup> Elvee 1992.

<sup>75</sup> Horgan 1996, see also McGinn 1996, Mittelstraß 1998 (on the philosophical issues), Schick 1997 (on some scientist's philosophical naivete), Maddox 1998 (against Horgan).

<sup>76</sup> See Gibbons et al. 1994. This influential position is reflected in many public discourses outside science studies, no doubt because of its smart if implicit usage of end-of/beginning-of eras rhetoric, see for example the "Report on prospects for European science and technology policy in the 21st century" of the Committee on Research, Technological Development and Energy at the European Parliament (A4-0376/96, 18 November 1996).

end of science, or at least no epochal rupture but rather haphazard continuity.

The story of scientific and technological advances in the 20<sup>th</sup> century, as told by Hobsbawm or Hughes and others, was quite straightforward: through the successful application of science and technology as solution to social (including military) problems more problems were created worldwide than solved. The public facades and legitimations of science (including its claims to state support) did not allow for admission of this outcome. Consequently, the facades crumbled. New hypocrisies were wanted and were missing badly, new practices looked for their proper hypocrisies. For analyses of science and technology primarily interested in the performance of the facades, this made look science and technology indeed entering into a deep crisis, if not vanishing. If and when the assumed reference out there had changed to a degree of becoming obviously non-functional and even illegitimate - for instance because scientists' spokesmen themselves had largely changed their language - science & technology studies tended to observe a crisis of science & technology that was in fact a crisis of science & technology studies.

The plausibility of the crisis image owed much to a particular framing of the question then. The history of science and technology, much like social history at large for that matter, continues to be framed as part of enlightenment history, and enlightened history. But, to borrow a phrase: we need here to "rethink, not un-think" the enlightenment (Elkana), and science and technology studies have a prominent role to play in this project. In this sense, wholesale talk about the ultimate crisis and in a way the end of modern science at the eve of the century was unproductive. Notions of radical ruptures in science and technology tended to be devoid of specific analyses of scientists' practices.

In sum: the debates around the themes of crisis, rupture and "the end of science" could hardly have occurred outside a *fin-de-siècle/fin-de-millennium* framework. As Diana Relke justly put it at the time:

The End of Science belongs to a rapidly growing body of fin-de-millennium literature that feeds our need to attach meaning to the meaningless calendrical fact that the end of the second millennium is nigh. Horgan, one of the most eloquent science journalists in the business, pursues the thesis that science is doomed because all the Big Questions have been answered - all, that is, except the biggest one, the imminent answer to which will ring down the final curtain on the scientific enterprise.

If today we feel that science has lost its boundaries, that the project of a universalistic science has been abandoned in many places, that scientific and research institutions have lost autonomy and public authority, that the course of scientific advance has become unpredictable and so forth, then this may not be attributable so much to epochal ruptures and turns in the history of science but to a lucky turn in science studies: We begin to understand that on-going science and technology always had uncertain boundaries, precarious autonomy/authority, unpredictable outcomes, localized jurisdictions, multiple and shifting time-frames, and so forth.

Yet, just as toward the end of the 19<sup>th</sup> century *fin-de-siècle* rhetoric did, *fin-de-millennium* rhetoric *a fortiori* represented, at the end of the 20<sup>th</sup>, a sort of chronological *Kampfbegriff* used by ideological camps in order to "influence with their politics of time the politics of their times."<sup>78</sup> The same for science policy?

<sup>77</sup> Relke 1998, p. 23.

<sup>78</sup> Lepenies 1999, p. 7.

### *Heroic Periodization*

Scholars in the history of both science and technology tend to impose on these fields the heterodox timescapes of grand history. In the face of such heroically periodizing stances, a wealth of social studies of science & technology of the 1980s/1990s have produced much evidence for highly contingent (indirect, mediated) links between the tides and ebbs of science and technology and great politics respectively. Hobsbawm's and Hughes' monumental pictures do not agree too well, I feel, with the views cultivated in much of recent empirical work on science and technology. Apart from the fact that these studies rarely relate their subjects to social history in the standard meaning of the term, the periods and turning points identified in this work correspond little with overall historical phasing.

In turn, an important reason why historians tend to disregard social studies of science and technology may be that their respective periodization schemes differ. Hobsbawm and other historians relate loosely linked social developments to grand epochal changes in world history, in the relations of nations. Wars and the rise and fall of political regimes mark the phases and periods of things. Of course there are good reasons for this. Economic change is more or less closely linked to grand history, and military politics no doubt have major impacts on the ways of science and technology. Yet this seems to me to be grossly overdone. The development of the stuff of particle physics or microbiology is not, even by externalists, seen as something related to big politics, or rarely so. (The fact that the findings are couched in terms of possible military applications does not prove the contrary.) If, in other words, the social history of this century were rewritten as a detailed social history of science, technology, work and the environment, the links between overall great history and social history would be loosened. One would discover more synchronization between scientific-technical movements and social history and less synchronization with political history, for instance, and wholesale heroic periodizations would lose much of their meaning.<sup>79</sup>

On a much larger scale, the history of the "war of civilizations" also tends to be written heroically and inscribed into the timescapes of its winners and survivors. With the exception of William McNeill, all contributors to the recent *Oxford History of the Twentieth Century* write basically European history, innocently draped in Gregorian clothes. But even McNeill has to put the mythical observer from Mars in the same eurocentric-centennial timeframe:

An intelligent visitor from outer space, observing the earth as a whole in 1900 and again a hundred years later, would surely find the increase in human numbers and urbanization, together with associated alterations in the planet's array of other life forms, the most remarkable change of the century.<sup>80</sup>

<sup>79</sup> This is of course at the heart of the controversy whether scientific-technological development could be understood as strongly coupled to military history. The notion that the Internet must be understood in terms of its early military genealogy is a current example. - Interestingly, Steven Weinberg, who contributes the chapter 'The Expansion of Physics' to the *Oxford History of the Twentieth Century*, in refusing to frame change in physics in terms of political periods and events, ends up with not much more than a list of names and dates: chronological time has no historical time here, except that he finds it impossible not to go way back into the 19<sup>th</sup> century to explain what happened in the 20<sup>th</sup> (Weinberg 1998).

<sup>80</sup> McNeill 1998. For a wonderful history of the periodizations and chronologies in the history of philosophy, mother of all social and cultural studies, up until the *Neuzeit* see Daniel Garber's and Michael Ayer's *The Cambridge History of 17<sup>th</sup> Century Philosophy* (1998).

#### IV. Calendars as Big Time Machines

Langdon Winner, the American philosopher and sociologist of technology, begins his much-quoted essay *Do Artifacts Have Politics?* with the observation that certain details of form in our landscapes - bridges, streets and roads - habitually are taken to be meaningless, "and yet power relations are literally built into them" by design.<sup>81</sup> With this he leads up to his often retold story about Robert Moses' low bridges on Long Island, New York, through which he is said to have prevented the poor and the black from frequenting Long Island beaches. While the parables of bridges and similar small-scale, massively tangible artifacts serve didactic purposes better than analytical ones, Winner's approach extends to large-scale intangible artifacts, for instance zoning laws and *their* technologies.<sup>82</sup> Not only landscapes, *timescapes* too have their zoning devices and indeed zoning laws. In drawing attention to the large-scale *timescape* of grand historical periodizations and turning points, and the calendars that are used to chart them, I have in fact asked a Winnerian question: Do calendars have politics?

Calendars and the time zones they set up can be seen as large-scale intangible, yet powerful cultural artifacts for the management of historical meaning.<sup>83</sup> Adopting Winner's approach for chronological artifacts as embodying political *designs*, however, would be like saying that the building of hours into clocks *ipso facto* forced people who use them to do certain things and prevented them from doing something else, *and* that this is why clocks are built this way. The argument sounds more exotic than it is - many control theorists in social studies of technology have in fact advanced similar theses. Applied to the Gregorian calendar this would translate into: Living in this *Zeitrechnung* ipso facto forces us to organize our memories in a certain way and prevents us from organizing them differently. And there must be political reasons for this - if not literally somebody, which would be too tall a claim, then some more comprehensive historical designs must be at work here.

The argument from design seems to me too simple and unnecessarily conspiratorial. Looking at calendars and the time zones they support as large-scale cultural artifacts for the management of historical meaning rather leads back to the initial question: What drives calendar construction and reconstruction - science, technology, economics, politics, religion -or some other thing? All of the former, obviously. It took a lot of scientific and technical expertise, artistic and literary imagination, economic and political interest and ingenuity, religious and philosophical teachings and propaganda to establishing the Gregorian calendar and any other big time machine.<sup>84</sup> The Gregorian, like any other calendar, is therefore filled to the brim with historic meanings and legitimation claims, and the Millennium has epitomized many of these. Turning the argument around in a way, however, one should not forget that the Gregorian *Zeitrechnung* is, like all *Zeitrechnungen*, quite meaningless in itself. At the least, there are many Gregorian calendars. U.S. Christmas is not like German Christmas, the symbolisms of sun and moon which still govern the experiences and emotions of many people are different in Latin and in Nordic cultural spheres, the Millennium means something else for Mr. Bush, Mr. Putin and Mr. Arafat or Mr. Chamenei, or whoever will have replaced them in

<sup>81</sup> Winner 1980, p. 123.

<sup>82</sup> Among others the entire apparatus of spatial mapping and planning, and the technologies of restructuring spatial form. For a critique of Winner's design theory see my *Do Politics have Artifacts?* (Joerges 1999).

<sup>83</sup> In characterizing them as intangible I certainly don't mean to say that they are not rooted in all kinds of tangible artifacts; the point is that beyond their paper-form these systems of artifacts remain largely invisible and virtually unknown to anybody in their entirety.

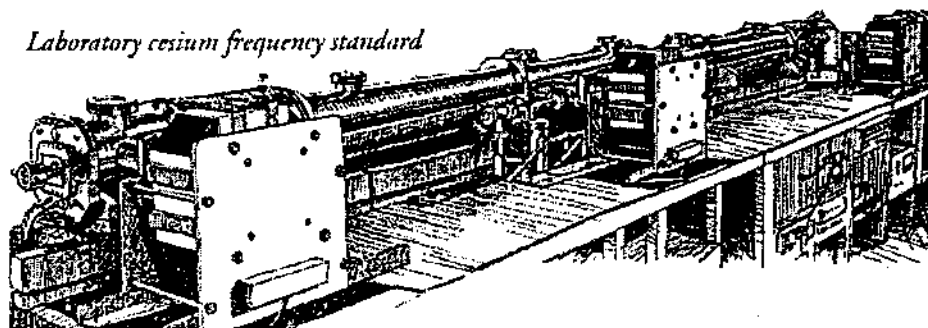
<sup>84</sup> For very good overviews see Maier 1991, Stearns 1997.

the coming Millennium.<sup>85</sup>

This is precisely the reason why the Gregorian calendar cannot be changed at will, and why revolutionary attempts to erase history by exchanging calendars must fail. Historical meanings require for their institutionalizations calendars. In this trivial sense, calendars have historical meanings. But their power does not reside in their formal properties, the cycles and counts and round numbers they come with. Their meaning is delegated meaning.

And that leads to "the other thing", the other thing being the opportunity opened up for translation and re-inscription by clever standardization. As far as I can see, no one in social studies of science and technology has studied calendars and similar chronologies in this perspective. Looking at calendars in terms of a sociology of large technical systems, one must beware then to fall into the traps of technology studies. Especially: the power of calendars is not inherent. Their formal properties constrain nothing. It is the authorized meanings that count, and calendars like the Gregorian, with their far from simple rules, are capable, for that reason, to support many meanings.

It remains to be seen whether the radical secularization brought to modern chronology via the "perfection of the second" will eventually, for many technical and economic purposes, somehow replace Gregorian World-Time. Only some properly standardized chronological scheme, based all the way up on the cesium standard, i.e., a scheme dispensing with heavy social symbolisms (except alas the symbolisms or formal perfection), could one day affect its institutional integrity, precarious as it may have been all along. But historically, advances in standardization have always and everywhere tended to occasion veritable explosions of new cultural forms.



In many European languages, the words for telling (his)stories and for counting can be traced to the same root.<sup>86</sup> For that reason, chronologies may never be entirely dissociated from *narrative* knowledge and self-knowledge - and there is maybe no other one. Foucault's vision, that around A.D. 1967 19<sup>th</sup> century obsession with timing will be giving way to spacing or *heterotopia*, might indeed apply to timescapes too: *heterochronia* may be a permanent feature of the timeorders of a globalizing society.

<sup>85</sup> The day Clinton's impeachment trial came to an end on CNN, President Chamenei almost unnoticed gave a remarkable speech at the UN, asserting, seemingly for the entire Islamic world, a new readiness to reconcile East and West. And then he called for a "dialogue of civilizations" at the turn of the Millennium, a Millennium that has no meaning in Islam. Was it politeness, was it a reassertion of the Iranian *Sonderweg* with its own pre-islamic lunar-solar calendar, was it another sign of the Gregorian heterodoxy? I don't know. In any case, around the same time President Arafat named a Millennium-minister for Palestine, in fact a tourist minister to exploit the event in view of the pilgrim-tourists expected to flood the Holy Land.

<sup>86</sup> Pointing out that the Latin *computare* is very close to *confer*, *contar*, *raccontare*, *to tell* and so on, Arno Borst notes that "the less educated (*Nichtgelehrten*) of Europe have linked the telling of stories and the counting of time" (Borst 1991, p.41, quoted after Maier 1991, p. 125.) In German the very word for storytelling - *erzählen* - contains the word number (*Zahl*).

Overarching time orders established through calendars make for the translatability of local time orders; they also bring parts of the cultural material of local orders into their always and by necessity more standardized and expert-based realms. They therefore - although they are progressively de-secularized and proceduralized scientifically - will also always remain subject to various kinds of *Ideologieverdacht*: accused of colonizing cultural and political intent and/or effect. "Ideology is the other side of chronology".<sup>87</sup> This is why - even if the celebration of the Millennium has not (as far as we know) given much occasion for deep cultural irritations in parts of the world predominantly living in timescapes other than the Gregorian - this may well not be the last word.

<sup>87</sup> Lepenies 1999, p. 7.



## Literature

- Arjomand, Said Amir, 'Islamic Apocalypticism in the Classic Period', in B. McGinn (ed.), *Encyclopedia of Apocalypticism*, New York: Continuum 1998, vol. 2, 238-283.
- Basnizki, Ludwig, *Der jüdische Kalender. Entstehung und Aufbau*. Königstein/Ts.: Jüdischer Verlag 1986.
- Bodmann, Gertrud, *Jahreszahlen und Weltalter. Zeit- und Raumvorstellungen im Mittelalter*, Frankfurt a.M.: Campus 1992.
- Borst, Arno, *Computus. Zeit und Zahl in der Geschichte Europas*, Kleine kulturwissenschaftliche Bibliothek, 28 Berlin: Wagenbach 1991, letzte überarbeitete Ausgabe dtv 1999.
- Clark, T. J., *Farewell to an Idea. Episodes from a history of modernism*, Yale University Press 1998.
- Diewald, Martin (1990), Das Jahr 2000 - ein Thema für die Sozialberichterstattung? *Zeitschrift für Soziologie*, 4, 278-291.
- Elvee, Richard Q. (ed.), *The End of Science?: Attack and Defense* (The Nobel Conference Series), University Press of America 1992.
- Foucault, Michel, 'The Eye of Power' and 'Questions on Geography', in C. Gordon (ed.), *Power/Knowledge: Selected Interviews and Other Writings 1972-1977*, New York: Pantheon 1980.
- Foucault, Michel, 'Of Other Spaces', *Diacritics*, 16, 1986, 22-27.
- Gibbons, Michael, Camille Limoge, Helga Nowotny, Simon Schwartzman and Peter Scott., *The New Production of Knowledge : The Dynamics of Science and Research in Contemporary Societies*, Sage, London 1994.
- Ginzler, Friedrich Karl, *Handbuch der mathematischen und technischen Chronologie. Das Zeitrechnungswesen der Völker*, 3. Bd., Leipzig 1906-1914.
- Gould, Stephen Jay, *Questioning the Millennium: A Rationalist's Guide to a Precisely Arbitrary Countdown*. London: Cape 1997.
- Hobsbawm, Eric, *The Age of Extremes: The Short 20<sup>th</sup> Century 1914-1991*. London: Abacus Edition, Little, Brown and Co. 1995.
- Horgan, John, *The End of Science: Facing the Limits of Knowledge in the Twilight of the Scientific Age*, Helix Books 1996 (Deutsch: *An den Grenzen des Wissens. Siegeszug und Dilemma der Naturwissenschaften*. München: Luchterhand 1997).
- Hughes, Thomas P., *American Genesis. A Century of Invention and Technological Enthusiasm*, New York: Viking 1989 (Deutsch: *Die Erfindung Amerikas. Der technologische Aufstieg der USA seit 1870*. München: Beck 1991).
- Hughes, Thomas P., *Networks of Power*, Baltimore/London: Johns Hopkins University Press 1983. Hughes, Thomas P., *Rescuing Prometheus*, Pantheon: New York 1998.
- Huntington, Samuel P., *The Clash of Civilizations and the Remaking of World Order*. Simon & Schuster 1996.
- Illig, Heribert, *Das erfundene Mittelalter. Die größte Zeitfälschung der Geschichte*. Düsseldorf: Econ 1996.
- Joerges, Bernward, "Global 2000" - Social science, ecology, and the Bimillennium'. *Futures* (January/February), 1990, 3-20.
- Joerges, Bernward, 'Do Politics Have Artefacts?', *Social Studies of Science*, 29 (3), 1999, 411-31.
- Joerges, Bernward, 'Ein Zeitalter der Energie', in Wolfgang Zapf und Meinolf Dierkes (Hg.), *Institutionenvergleich und Institutionendynamik*, WZB-Jahrbuch 1994, Berlin: edition sigma 1994, 106-133.
- Landes, David S., *Revolution in Time: Clocks and the Making of the Modern World*, Cambridge, MA: Harvard UP 1983.
- Larrain, Jorge, *Theories of Development: Capitalism, Colonialism and Dependency*. Polity Press 1989.
- Lepenes, Wolf, 'Das Altern unseres Jahrhunderts', *Tagesspiegel*, 19. Juni 1999, 7.

- Luhmann, Niklas, 'Das Problem der Epochenbildung und die Evolutionstheorie', in Hans Ulrich Gumbrecht und Ursula Link-Heer (Hg.), *Epochenschwellen und Epochenstrukturen im Diskurs der Literatur- und Sprachtheorie*, Frankfurt a.M.: Suhrkamp 1986, 11-33.
- Luhmann, Niklas, 'Die Zukunft kann nicht beginnen: Temporalstrukturen der modernen Gesellschaft', in Peter Sloterdijk (ed.), *Vor der Jahrtausendwende: Berichte zur Lage der Zukunft*, Frankfurt: Suhrkamp 1990, 119-49.
- Maddox, John, *What Remains to Be Discovered: Mapping the Secrets of the Universe, the Origin of Life, and the Future of the Human Race*, Macmillan 1998.
- Maier, Hans, *Die Christliche Zeitrechnung*, Freiburg: Herder 1991.
- Mayntz, Renate, 'Große Technische Systeme und ihre gesellschaftstheoretische Bedeutung', *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 45 (1), 1993, 97-108.
- Mc Neill, William, 'Demography and Urbanization', in Howard, Michael and W. Roger Louis (eds.), *The Oxford History of the Twentieth Century*, Oxford: Oxford University Press 1998.
- McClellan III, James E. and Harold Dorn, *Science And Technology In World History: An Introduction*, Baltimore: Johns Hopkins 1998.
- McGinn, Colin, *Die Grenzen vernünftigen Fragens. Grundprobleme der Philosophie*. Stuttgart: Klett-Cotta 1996
- Meinzer, Michael, *Der Französische Revolutionskalender (1772 - 1805). Planung, Durchführung und Scheitern einer neuen Zeitrechnung*, 1991.
- Mittelstraß, Jürgen, Das Udenkbare denken. Über den Umgang mit dem Udenkbaren und Unvorstellbaren in der Wissenschaft, preprint 105, Max-Planck-Gesellschaft für Wissenschaftsgeschichte, Berlin 1998.
- Nowotny, Helga, *Eigenzeit*, Frankfurt am Main: Suhrkamp 1993.
- Nowotny, Helga, *Time; The Modern and Postmodern Experience*. Polity Press & Blackwell 1997.
- Nowotny, Helga, 'Times of Complexity', in J.T. Fraser, Marlene P. Soulsby, Alexander J. Argyros (eds.), *Time, Order, Chaos*, International Universities Press 1998, 91-107.
- Nowotny, Helga, 'Umwelt, Zeit, Komplexität: Auf dem Weg zur Endsoziologie', in Andreas Dieckmann und Carlo Jaeger (eds.), *Umweltsoziologie*, Opladen: Westdeutscher Verlag 1996, 149-63.
- Oliver, Anne-Marie and Paul Steinberg, The Politics of Apocalypse in the Underground Media of the Islamic Resistance Movement (HAMAS), A Position Paper for the Center for Millennial Studies. <http://www.mille.org/template.htm> (28 August 1998).
- Reichardt, Rolf and Eberhard Schmitt (eds.), *Die Französische Revolution als Bruch des gesellschaftlichen Bewußtseins*, 1988.
- Relke, Diana M. A., 'In Celebration of Doomsday: The End of Science and the Beginning of Equity', *Vox*, No. 23 (February), 1998.
- Schick, Theodore, 'The end of science?', *Skeptical Inquirer*, March/April 1997, 36-39. Schwartz, Hillel, <http://www.igc.apc.org/millennium/papers/change.html>, 1996.
- Stearns, Peter N., *World History: Patterns of Change and Continuity*, 2nd edition. New York: Harper Collins College Publishers: Westview 1996.
- Weber, Max, *Gesammelte Aufsätze zur Religionssoziologie, Die Wirtschaftsethik der Weltreligionen, III: Das antike Judentum*, Mohr/Siebeck: Tübingen 1972
- Weber, Max, Max Weber Gesamtausgabe, Band 19, *Die Wirtschaftsethik der Weltreligionen: Taoismus und Konfuzianismus*.
- Weinberg, Steven, 'The Expansion of Physics', in Howard, Michael and W. Roger Louis (eds.), *The Oxford History of the Twentieth Century*, Oxford: Oxford University Press 1998.
- Winner, Langdon, 1980, 'Do Artifacts Have Politics?', *Daedalus*, 109, 121-136.
- Zemanek, Heinz, *Kalender und Chronologie. Bekanntes und Unbekanntes aus der Kalenderwissenschaft*. München/Wien 1987<sup>4</sup>.