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Article

If Only the French Republicans Had Known This: The Week as a Social Fact

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Abstract: During the French Revolution and inspired by the Enlightenment, an attempt was made to replace the Gregorian calendar (which was based on 'irrational' overlapping cycles linked to religious celebrations) by the Republican calendar (which was based on 'rational' clearly nested cycles in accordance with the metric system). Although the starting point was an ideological and aesthetic expression of rationalism, this calendar also had to fulfill a coordinating and integrating function. Thus the calendric reform faced a tremendous challenge: re-creating a socio-temporal order. One of the crucial socio-temporal frameworks that guide daily behavior in Western societies is the 7-day cycle of the week. In the new calendar, the week was to be replaced by the 10-day cycle or the *décade*, which turned out the greatest stumbling block for calendar-reformation. Theoretically this is explained by the social nature of time and the 'second nature' of time reckoning, but the unawareness of a socially established weekly rhythm in our daily behavior is hard to illustrate. Today, however, society is full of traces of so-called 'big data' that humans leave behind. This paper uses 'big data' on re-charges of electronic keys to show that even though a 10-day re-charging cycle is proposed, a 7-day re-charging cycle will surface.

Keywords: social time; French Revolution; the week; calendric reform; big data

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1. Introduction

The year 1789: The French monarchy faces a financial crisis and the Etats Généraux is convened to tackle this problem. As opposed to the latest convention of the Etats Généraux in 1614, the bourgeoisie stirs its voice and as a result the delegation of this 'third class' (the clergy and the nobility form the first and second classes) is doubled. Additionally, it is invited to write down its displeasures in the 'cahier de doléances'. In the end, the bourgeoisie gets no response to its complaints and, as a counter reaction, it establishes the Assemblée Nationale and swears not to rest before a Constitution is implemented. When King Louis XVI disclaims the Assemblée Nationale, the storming of the Bastille on 14 July 1789 follows. Eventually the Assemblée Nationale is accepted, but by then rural communities have revolted against the clergy and the nobility. The dissatisfaction with the stabilisation of the revolution is the greatest among the lower strata of the population and, on 10 August 1792, the so-called Sansculottes storm the Tuileries and demand the execution of the king. This is the final break between the 'ancien régime' and the revolution. On 22 September 1792, the Convention proclaims the French Republic [1].

Besides all the turmoil, terror, and revolutionary radicalism that captivates France until Napoleon Bonaparte commits a coup on 9 November 1799, the French Revolution paved a path that enabled the ideas of the Enlightenment to come to fruition. The dissolution of the monarchy and the revolt against the clergy and nobility fitted within the enlightenment ideas of a societal reform using reason instead of tradition and faith, and obtained knowledge through scientific reasoning instead of superstition, intolerance, and abuse of power by Church and State. In fact, the French Republicans planned to change everything from the most foundational elements of a society, such as the organisation of the State and its laws, to the most ordinary things like replacing king, queen, and jack by 'égalité, liberté, and fraternité' in a deck of cards [2]. They strove for unity when reforming the metric system based on natural grounds only, that is, one ten-millionth of distance from North Pole to equator. And surely, a metre taken from the earth would be eternal and belong to everyone since the earth is eternal and belongs to all [3,4]. They strived for perfection when introducing the decimal system based on a perfect, rational symmetry of whole numbers and decimal places.[1]

One other reform of particular interest is the calendric reform. The introduction of a new system of time reckoning should not only illustrate the definitive break with the past and the introduction of a new era, but should also spread the revolutionary and republican ideas. However, whereas the metric reform and decimal system turned out to be successful and are still used widely today, the calendric reform lasted only 12 years, 2 months, and 27 days [5]. Today the reason for this failure is well known. In short, the republican calendar was incapable of creating a socio-temporal order in the same way the Gregorian calendar had done since 1582. Moreover, the adoption of the Gregorian calendar did not entail the establishment of a new social-temporal order, but it certainly (as opposed to the French

[1] They also argued that a decimal system, as opposed to the duodecimal system used at that time, was natural since one has 10 fingers and thus counting to 10 is a natural given. However, the ancient Babylonians already used their hands to calculate in the duodecimal system. If you leave out your thumbs and count the phalanges of the fingers of your left hand, you are not only able to count to 12 (or a dozen), but also to see that a quarter of a dozen equals 3 and half a dozen equals 6. Moreover, if you use the phalanges of the fingers of your right hand to keep track of every dozen counted on the left, you are able to count to 144, or 12 dozens, or a gross.

reform) did take into account honoured pagan traditions and social rhythms. Christian festivities, for example, were grafted on traditional customs: Easter coincided with spring rites, the Assumption of Mary coincided with harvest-rituals, Christmas with New Year celebrations, and so on. Indeed, even the names of the weekdays retained their etymological roots from Roman, Greek, and Germanic tradition.[2] Based on existing socio-temporal rhythms, the Gregorian calendar had become 'second nature' providing a context for daily life to the extent that deviations from this way of time reckoning came to feel unnatural and created a sense of disorders.[3]

Based on our theoretical knowledge on the social meaning of time and the importance of the week (of which the reformed décade yielded the biggest problems), we might label the ambitions of the French reformers as naïve. On the other hand, it is hard to show how deeply rooted such a familiar and natural feeling a 7-day cycle is. Obviously, no experimental or survey data for such a research question have been available. However, individuals in today's society more or less unconsciously leave behind many traces of data that might reveal hidden behavioural patterns (for example by using bank cards, discount cards, log data of internet usage, …) and it is only recently that academics are becoming aware of the potential to explore this so-called 'big data' ([6], p. 368).

In this paper we will explain the calendric reform (Section 2), elucidate on the social role of a calendar and, more specifically, of the week (Section 3), and illustrate the tenacity of a weekly rhythm by means of a contemporary example (Section 4). To do so, we will present big data on university personnel's rhythm in charging their electronic keys that allow us to quantitatively illustrate that even when allowed to switch to a 10-day rhythm, the familiar, internalised 7-day rhythm of the week prevails. We will draw some conclusions in Section 5.

2. Calendric Reform

Apart from the length of the year, which remained 12 months, the division of months, weeks, days, hours, and minutes in the calendar of the French revolutionists followed the rationale of the decimal system. Each month existed of 30 days or three décades of 10 days. Each day endured 10 hours, each hour 100 minutes, and each minute 100 seconds. The days were named as to their position in the décade: primidi, duodi, tridi, quartidi, quintidi, sextidi, septidi, octidi, nonidi and décadi. To keep up with the rotation of the earth around the sun, every year was complemented with five extra days that were called sanculottides which were reserved for ceremonial events. In a leap year, a sixth day was added. The names of the months were chosen in a way that reflected the rhythm and the weather conditions of the seasons. The autumn months (ending -aire) were vendémiaire (month of wine, 22 September~21 October), brumaire (month of fog, 22 October~20 November), and frimaire (month of cold, 21 November~20 December). The winter months (ending -ôse) were nivôse (month of snow,

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[2] Tuesday, Wednesday, Thursday, and Friday are named after the Anglo-Saxon pagan gods Thingus, Wodan, Donar, and Freya, who have nothing to do with Christian beliefs.

[3] The metrical reform was successful because it created unity. It came across with the multiplicity of measures (often named equally but with different calibres) and feudalism in which landlords used these different measures as they pleased to impose taxes on their serfs. Although the metrical reform was part of the Enlightenment, it was by no means an expression of French patriotism. And although the calendric reform was introduced as expression of rationalism, it had a symbolic meaning of introducing a new era [3].

21 December~19 January), pluviôse (month of rain, 20 January~18 February), and ventôse (month of wind, 19 February~20 March). The spring months (ending -al) were germinal (month of germ, 21 March~19 April), floréal (month of flowers, 20 April~19 May), and prairial (month of meadow, 20 May~18 June). And finally, the summer months (ending -idor) were messidor (month of harvest, 19 June~18 July), thermidor (month of heat, 19 July~17 August), and fructidor (month of fruit, 18 August~16 September). Note that we use the '~'-sign to indicate that the corresponding months of the Gregorian calendar are mere approximations. The moment the autumn equinox was observed in the Royal Observatory in Paris was decided to be the beginning of the year of the republican calendar. However, this observation fluctuates. Fortunately, in 1792 the autumn equinox was observed on 22 September, which coincided with the proclamation of the French Republic. This proclamation then served as the beginning of the era of the republican calendar, even though there was considerable debate as to whether this should be the starting point or it should be the storming of the Bastille [7].

The fact that a 'zero-point' of the calendar had to be chosen, immediately illustrates the symbolic character of a calendar. The new calendar had to break with the ancien régime and prelude a new era. Like the birth of Christ in the Gregorian calendar, a shared, distinctive event (*i.e.*, the proclamation of the Republic) was chosen and, although the construction of the calendar might initially was regarded as a product of enlightened reasoning, the function of the calendar principally was to communicate the patriotic thoughts of the French Republic. The initial proposal for the names of the months of the new calendar had nothing to do with creating a calendar that was an ideological and aesthetic expression of rationalism, but with telling the story of the revolution. Gilbert Romme, ranked among the Montagnards and seated in the Comité de l'instruction Publique, wrapped his proposal for the names of the months in an ingenious story (English names of the months are capitalised, French names of the months are italicised) ([5], our translation):

> The French, tired and tormented after 14 centuries of oppression and troubled by the way corruption is rampant and facilitated by the Court, feel the need for a RE-BIRTH (Régénération, 7th month, 21 March to 19 April). Since the Court was out of money, she had to convene the French: REUNION (Réunion, 8th month, 20 April to 19 May). That reunion saves the French. They elect representatives whose courage irritates the tyrant. The representatives are threatened but unite at the TENNIS COURT (Jeu de Paume, 9th month, 20 May to 18 June) [...] under the protection of the people they swear to liberate them from the tyranny or die. The oath resounds throughout the French nation. Everywhere, one takes up arms: one wants to be free, the BASTILLE (la Bastille, 10th month, 19 June to 18 July) succumbs under the siege of an angry PEOPLE (Peuple, 11th month, 19 July to 17 August) [...] that becomes sovereign. The number of malicious people however, grows; there is betrayal; the Court performs a conspiracy and perjured representatives offer the interests of the nation to sinister intentions, but the MONTAGNE (la Montagne, 12th month, 18 August to 16 September) [...] remains loyal. She becomes the Olympus of France, surrounded by the people. In their name, the Convention proclaims the rights of the people, the Constitution, and the REPUBLIC (la République, 1st month, 22 September to 21 October). [...] UNITY (l'Unité, 2nd month, 22 October to 20 November), [...] FRATERNITY (la Fraternité, 3rd month, 21 November to 20 December) [...] form the powers of the French, and LIBERTY (la Liberté, 4th month, 21 December to 19 January) [...] by a sovereign act of JUSTICE (la Justice, 5th month, 20 January to 18 February) [...] beheaded the tyrant and unites itself forever with holy EQUALITY (l'Égalité, 6th month, 19 February to 20 March).

Whereas the reform of the metric system truly followed rational reasoning, the calendar could not escape a social function and symbolic meaning. Moreover, replacing a cycle (*i.e.*, the week) that had performed such a function for centuries and was purely contingent (not being based on any natural phenomena) would prove the most difficult issue. The question remains: why?

3. The Social Role of a Calendar and the Week

The resistance against the revolutionary calendar was in the first place related to the social nature of time and socio-temporal ordering of daily life. With the social nature of time we refer to the fact that time or a calendar, which is basically the ordering of time, is not 'empty'. A calendar, whether the Gregorian, Islamic, Judaic, Mayan, Republican, or any other, tells a story or a myth that creates solidarity. The Gregorian calendar tells the story of the Creation and the birth of Christ. Based on the story of Creation and the important moments of time in the life of Christ, it distinguishes between profane and sacred moments of time (e.g., weekdays *versus* weekend days, religious festivities) bringing order to people's life and, most importantly uniting people (e.g., in a faith community) [5]. The calendar, or time more generally, is thus ascribed three important social characteristics: it is a social construct (based on story telling), it is qualitatively differentiated (e.g., profane and sacred moments of time), and it is inter-subjective (e.g., shared by a group).

The first foundation of the perception of time as a social construct has been laid out by Émile Durkheim, stating that time is, what philosophers call, a 'category of understanding'; a general concept that exists because it is invested with an authority that individuals cannot set aside even if they wanted to. Therefore, Durkheim ascribes time a social origin and describes it as a necessary characteristic of society that 'could not abandon [this category] to the free choice of the individual without abandoning itself' ([8], p. 17). Apart from being abstract, the notion of the category of time is an impersonal set of indispensable guidelines that transcends the individual. 'It is not my time that is thus arranged; it is time in general, such as it is objectively thought of by everybody in a single civilisation' ([8], p. 10, original italics). This makes time a collective arrangement, originated from and bearing on social life.

The next important thought comes from Sorokin and Merton who distinguish social time from astronomical time [9]. The latter, mathematical time, is 'empty', flows evenly and uniformly, and is infinitely divisible (*i.e.*, the Newtonian characteristic of time). Social time, in contrast, is qualitatively differentiated and does not flow evenly and uniformly. It uses social phenomena as points of reference, making any calendric reference insignificant unless it is transformed into social time (for example D-Day expresses far more than the astronomical equivalent of 6 June 1944). The social phenomena used are inherent to the group in a way that the social life of the group is reflected in their temporal expressions. These conceptions of time eventually become more generalised and serve as mechanisms for the coordination of social life [10,11]. Therefore, 'a homogeneity of social beats and pulsations of activity makes unnecessary astronomical frames of reference' [9] and the main reason we use astronomical observations for our calendar is to have general points of reference [8].

To this; the idea of inter-subjective temporality is added [8,12,13]. Without an inter-subjective character of time shared by at least two persons; it will be impossible to have meaningful coordination of social action because expectations and standards are not possible [14].

In addition, it should be mentioned that time is often assigned a fourth characteristic, namely that of being a scarce commodity, a conception of time that is often associated with the work of Max Weber who emphasised the rationalisation of time in the West. In the modern social organisation of time, time is considered as a characteristic of the Spirit of Capitalism with an orientation to its scarcity (and its convertibility into money) [15]. Something which Moore made more explicit by stating that in the long run 'it is [only] man's mortality that makes time the ultimate scarce resource' and that, with regard to the scarcity of time, it is 'the finite length of cycles that constrains activity and makes allocation and priorities essential' ([16], p. 6).

So we can conclude that a calendar in fact is a social arrangement limited by its cyclical perception; it is a reflection of the social life of a group and a product of social interaction that expresses the social experience of time. In that sense we might interpret a calendar, or the ordering of time, as sacred, since, according to Durkheim, the 'sacred' is an experience, something which is hard to explain but clear to all for whom it is familiar [8]. In other words, the experience of time as an ordering principle is like 'second nature' to us [17].

From this perspective, the naming of the months in line with the French Revolution was not such a strange idea, at least not because the origin of the new era was signified by the proclamation of the Republic. The rejection of this proposition and the adoption of the calendar of symmetric and rational ordering with numbered days and names based on the perception of nature is often interpreted in the light of de-Christianisation and as a catalyst in the process of secularisation of society [18], although not unanimous. Elchardus, for example, argues that if we consider the Gregorian calendar as sacred; as the ostentation of religious practices that follow a certain order and logic, we might consider the Republican calendar likewise [5]. As we will discuss in the next section, its *décadi*'s and its cyclic revolutionary festivities (e.g., the *sansculottides*) also aim to establish profane and sacred moments of time that serve as an ordering principle for daily life.

A Special Case of Social Time: The Week

Probably the best example of such a cyclical, collective arrangement of time or conventionally determined time reckoning that serves as a socio-temporal context for social activity, is the establishment of the week, for several reasons. First, the week is synonymous with seven days and, although liable to some minor astrological influence, motivated by the divine temporal pattern of God's creation of the universe as described in the Judaic tradition. Although, the origin of the week is also often placed at the market-cycle of early agricultural societies, at which point we should mention that the duration of such a cycle correlated with the shelf life of the products traded [19,20].

Second, as Sorokin and Merton argue, the week as a social construct of time reckoning is inherent to the society or culture that uses it, and, therefore, unknown to other cultures such as the Mesoamerican culture that uses a vegesimal system or the Baha'i week-calendar that is based on their mystic number of 19 [9,20]. Consequently, a shared temporal order has the social function of serving both as an inner-group unifier and as an inter-group separator [21].

Third, of all units of time reckoning (*i.e.*, months, days, hours, minutes …) the week is the only one that does not (necessarily) start over at the beginning of a new year, implying that it is a truly social convention set up to provide us with a convenient cycle between the month and the day [20]. Put

differently, 'across this ordered system runs that intruder the week, consisting indeed of a fixed number of complete days, but paying no regard to months or years' ([19], p. 2).

Fourth, and subsequent to the previous point, every day derives its meaning from its position in the weekly cycle. Obviously, we remember days because something happens on one or more of them, because in experiencing time we culturally differentiate the seven days of the week. Even if we were to loose count in the course of the week, Sunday, for example, is unmistakable, because the majority of the people do not work, shops are closed, and highways are quiet. 'But if nothing happens [that characterises each day] it is very doubtful whether a week-sequence could maintain, much less establish, itself' ([19], p. 63).

This 'inequality' of days is crucial for the rhythm of the week. The week has a social rhythm unlikely to be found in any natural cycle: on Monday the workweek starts, Wednesday signals 'half time', Friday preludes the weekend (e.g., TGIF: Thank God It's Friday) which starts hereafter, and on Sunday night we realise the days of rest are over and we have to go 'back to business' the next day. The idea of this social course of the week that reaches its climax on Sunday and starts all over again on Monday illustrates an important, although paradoxical, characteristic of cyclical time reckoning. It gives humans the feeling of hope and refreshment since a new week full of possibilities and opportunities starts [22].

Although this weekly rhythm of days seems to be highly associated with most common contemporary work schedules (wherein with the emergence of the five-day work week Wednesday truly has become the day 'half-way') and although work in the 18th century probably relied more on seasonal fluctuations than on weekly ones, this does not mean that no meaningful weekly rhythm existed that time. Religious practices, for example, gave meaning to days like Sunday as a day of rest and churchgoing or Friday as a day on which Christians were forbidden to eat meat. Also other practices, like weekly market days or laundry days, contributed to a weekly rhythm.

With the week we, therefore, have created an artificial cycle to structure activities and social behaviour, which, once more, emphasises the social nature of time and the importance of the week as a social convention that has become a deeply rooted cycle that is at the origin of social (inter)action. We live by the week. It helps us to coordinate social life by creating expectations of the social behaviour of others with whom we can attune our own behaviour. And simply because everybody does so, social life presents itself in a collective rhythm.

The question thus is: had the French Republicans with their *décade* created a worthy alternative for the week? Following the argument of Elchardus, the French reformers were well aware of the sacred meaning and functioning of a calendar. It was a way to desacralize the old order of the Church but at the same time it was a way to sacralise a new order [5]. Just like the Gregorian calendar, the republican calendar aimed to give rhythm to social life, and just like Sundays were celebrated in the 7-day week, the décadi had to be celebrated in the 10-day décade. They thus did distinguish profane from sacred matters, try to bring people together, and describe the 'order of things'. (This is nicely illustrated by the proposal that every décadi all French should sing at the same time.) In 1798 several laws were passed to create a culte décaire: a ruling for strict compliance to the republican calendar, a ruling making the décadi a mandatory day of rest, and a ruling assigning particular proceedings and mandatory games to the décadi [23]. There is no further narrated evidence that the French Republicans attempted to give some meaning to any other days of the *décade*, which would effectively leave nine

days 'meaningless'. However, one may doubt if even then they would have succeeded in imposing this new calendar to the people of France.

As we demonstrated time or a calendar in general, and the week more particularly, have a coordinating and integrating function in daily life. The Gregorian calendar based on dominant religious practices had already done so since 1582 and not without success. In fact, facing the ever-increasing complexity (or civilisation) of societies, this calendar fulfilled its function so well that it has become a regulating mechanism with a large coercive force ([17], pp. 15, 22, 88ff.). In other words, time or a calendar is a characteristic of the social order of a society [10] and since it is 'relatively independent of every specific human being, but not of human beings as societies or mankind' ([17], p. 87), over the years, time in all its forms has appeared to us as natural given, while in fact it is a learned 'second nature' or 'social habitus'([17], p. 102).[4]

This familiar, internalised, 'second nature' character of the week was the massive burden the French Republicans had to overcome when trying to establish their calendric reform. Partially because a calendar creates a feeling of belonging together, symbolising a shared history, paving the way for people coming together by distinguishing profane times from sacred times, and enhancing living together by creating expectations about each other's daily activities. Partially because people are used to the 7-day rhythm and the week and the sequence of days that make up this week are the socio-temporal frameworks of everyday life. It is not that the republican calendar did not anticipate these functions. On the contrary, we mentioned that their new calendar had to symbolise the beginning of a new era, had to create a new sacred order or cult décaire, and had to improve expectations of daily activities because it is based on a rational, numerical system. The problem was, that the new expression of these similar functions its old expression in an aspect where it hardly had access to: the social habits of people; a deep-rooted mental structure producing a type of behaviour of which we are hardly aware that it is coloured by our social habits [24]. And the embeddedness of our perceptions, thoughts, and dynamism in this scheme of habits turns out to be so strong, that the French revolutionists were engaged in trying to overthrow an impossibly high wall.[5]

4. Illustration from 'Big Data'

If we leap forward a mere 200 years, we will find ourselves in a society that is 'assembling data on massive amounts of its behaviours'. Groves terms this type of data 'organic' because they are a 'now-natural feature' of contemporary societies [6]. Most of these data relate to patterns of behaviour of which one is often not consciously aware and many of these patterns are associated with the cyclical

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[4] According to Elias this is largely due to dualistic conception of time in science: Einstein's perception of 'physical or natural time' as a set of invariant variables on the one hand, and 'social time' as a regulator of social events on the other. The former is seen as 'true time' and the latter as an 'arbitrary convention', whereas Elias argues that time is a combination of both. 'From their first attempts to reckon time, people could not but act within and as part of the natural universe' ([17], p. 55). However, in societies that are regulated so drastically by time, adults seem to forget that they had to learn 'time' and consider time as self-evident ([17], p. 105).

[5] Note that the French have not been the only ones that tried to reform the calendar. During the Soviet Revolution, the Russians attempted to reform the calendar twice. Nevertheless, neither the continuous 5-day workweek *nepreryvka* nor the 6-day *chestidnevka* managed to replace the deeply rooted seven-day cycle [18,20].

rhythms of our calendar. As we argued above, the week is such a rooted, invisible yet stringent rhythm and if the French Republicans had lived today, they could have exploited these kind of data to reveal these patterns and see what they were bound to change.

One example of organic or big data that might have been of considerable interest to the French revolutionaries are the data behind the personal, electronic keys that go together with the electrical cylinders of the locks of all offices, meeting rooms, and storage rooms at our university. In order to function, an electronic key need to be recharged every now and then at one of the twenty charging points on the campus of our university. Every 'charge' is registered to the nearest second and the factory default for the 'expiration' of a charge is 10 days. If, after 10 days, the key is not recharged, it does not function anymore until it is recharged anew. However, based on the above insights on the nature of social time, we might argue that hardly anyone will do so, because of the unusual sequence of charging days this will create. If one charges a key on Monday, the next charge will be on Wednesday next week, on Saturday the week after that, and so on. This sequence poses two problems already. Firstly, Saturday is not a working day and, secondly, Wednesday is the day par excellence on which employees with flexible working conditions work at home. Therefore, we expect that most of the employees will recharge their electronic key at a fixed day of the week or, in other words, every seven days.

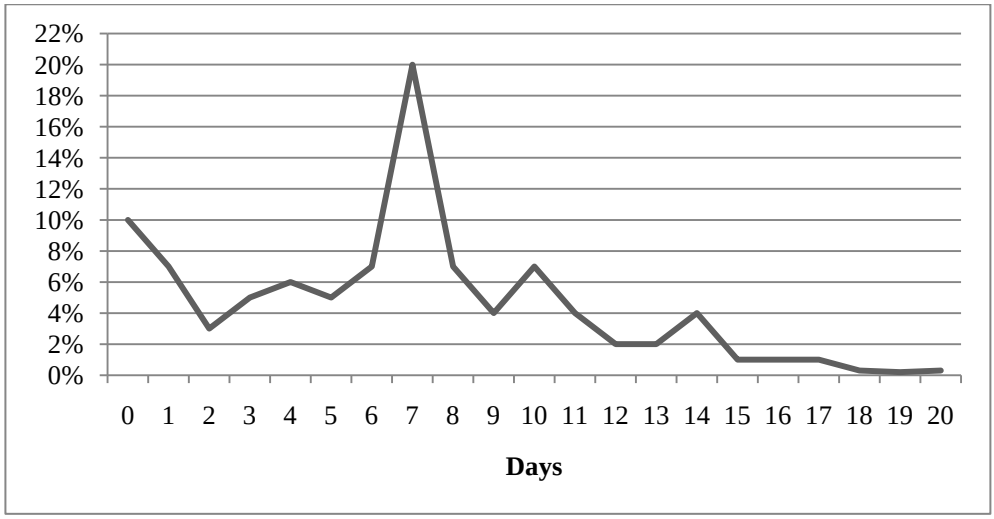
At a first glance this coincidence of the default charging cycle of 10 days and our hypothesis of the actual charging cycle of 7 days with the opposition of the 10-day *décade* and the 7-day *week* might seem accidental. Nothing is less true. The factory default of charging a key every 10 days is chosen on a rational number of the decimal system which was at the basis of their Republican calendar. However, we hypothesize that the data of each of the charging points will reveal a much higher percentage of weekly charges than of such 'décade-ly' charges. Nonetheless, as we will discuss below, some limitations to (the use of) this kind of organic data will prohibit us from putting forward testable hypotheses that will ultimately evidence that the French stood no chance. Although we might argue that the personnel of our university does consists of a sufficient heterogeneous group since it includes academics, technical staff, security, cleaning, and maintenance personnel, one conceptual limitation is that we would test the adoption of a 10-day cycle within the context of a 7-day cycle, which, of course, is different from replacing one context by the other like the French aimed to do. However, what we will do is analyse these data to demonstrate how they can be used to reveal hidden rhythms in contemporary daily life that will quantitatively illustrate the theoretical outline of the social role of calendars and, more particularly, the week.

One other limitation that is not conceptual in its nature but holds for all organic data is touched upon by Robert Groves in his keynote speech at the 2013 NTTS Conference (New Techniques and Technologies for Statistics) in Brussels, Belgium, where he admitted that the accessibility to organic data often poses problems, of which one directly relates privacy [25]. We faced the same problem when requesting the data of the electronic charging points. We were allowed the unique key number, the dates and time each key was charged, and the charging point where it was charged, but by no means were we allowed access to the personal information linked to the key number. This is unfortunate in a sense that it does not allow us to make some selection, for example, on the function of employment. We might argue that administrative personnel, support staff, and researchers have much

more regular schedules than professors (who have to teach, attend meetings, speak at seminars and conferences, and so on) and thus are less likely to have a regular re-charging rhythm of any kind.

To delimit the data to some extent, we selected the date range of the previous academic year (1 September 2011 until 30 June 2012) and, to have some indication that keys are used throughout the whole academic year, withheld only those keys that are charged at least every month during the selected period. We merged the charges of all charging points, because everyone can charge their key everywhere (and thus not necessarily only at the charging point in the building they work). The final data consist of 60,765 charges of 1073 keys and an average of 57 recharges per key. Next, we calculated for every key the number of days between two consecutive charges and for each key calculated the percentage of occurrence of each of the different number of days between two charges. The aggregated mean results are presented in Figure 1.

Figure 1. Percentages distribution of days between consecutive charges of electronic keys.



At first we thought it to be a striking finding that on average 10 per cent of someone's charges happens every day, but when contacting the technical service people of our university, we learned that there are a number of master keys that circulate and which require a daily recharge. We asked for a list of ID's of these master keys to filter them out of the analysis, but since support staff and surveillance almost are the only ones using master keys this touched too much on privacy issues and therefore our request was denied. However, this would not change Figure 1 radically; it would only lower the peak at 0 days.

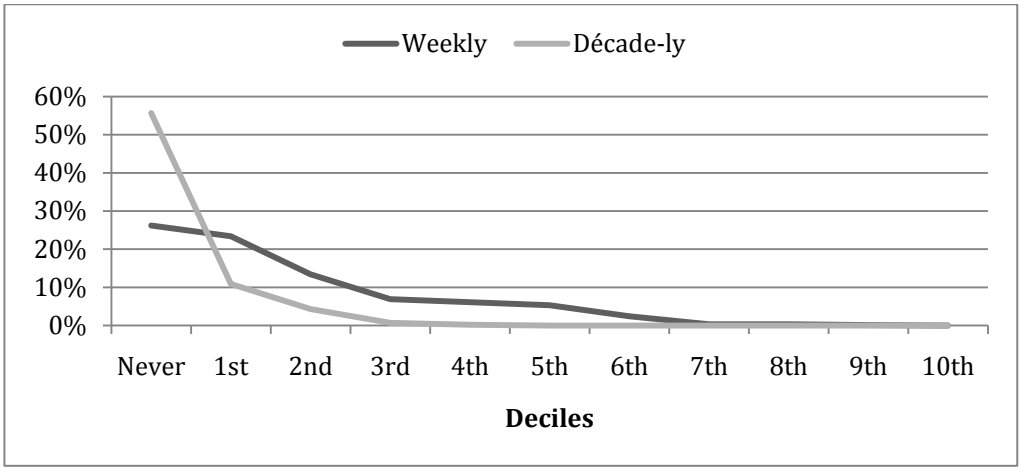
Notwithstanding this, the high peak of the weekly charges (every 7 days) is evidently apparent. Of all recharges someone makes during the academic year of 2011–2012, on average almost 20 per cent is done on a weekly basis. This is in sharp contrast with the average of 6.9 per cent of charges done on a 'décade-ly' basis,[6] which we think are mainly due to 'forced recharges' because the previous charge has expired after 10 days.

These percentages are aggregated means and do not tell us whether there are people truly dedicated to the 7-day or 10-day cycle. Therefore Figure 2 shows the percentage of people per decile of the share

[6] Note that in line with the historical narrative of the French calendric reform, we will use the word 'décade-ly' to indicate charges that are done using the default of every 10 days.

of 7-day or 10-day charges in their total number of charges. We mention the people that never charged their key by an interval of 7 or 10 days separately. We then see that over half of the employees at our university has never recharged their key with an interval of 10 days, compared to a quarter who has never recharged their key with an interval of 7 days. Moreover, recharging one's key 'décade-ly' seems to happen more 'accidentally' than 'deliberately', since another 10 per cent of the people are situated in the first decile. This means that of their recharges at most 1 out of 10 recharges is done with an interval of 10 days. Another 5 per cent falls in the second decile and then the percentages get negligible. The distribution in deciles for the weekly charges is not as pronounced as we expected. Although recharging keys on a weekly basis does not seem that 'incidental' compared to 'décade-ly' recharges, only 6 per cent of the employees at our university fall within the 5th decile meaning that at most half of their recharges is done on a weekly basis.

Figure 2. Distribution in deciles of keys charged weekly and 'décade-ly'.

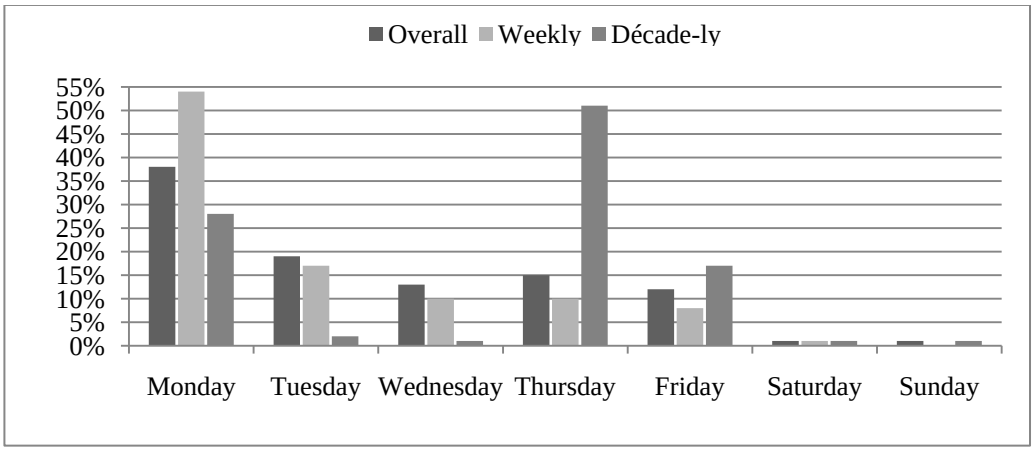


Nevertheless, the fact that the downward slope of the black line is much less steep that the grey line in Figure 2 in combination with the clear 7-day peak found in Figure 1 indicates that the ordering principle of the weekly cycle is revealed in the charging habits of the employees of our university. For an ordering principle of the décade-like rhythm there is hardly any evidence.

Next, we are interested in how this 7-day cycle presents itself. From the above description of the week, we might argue that people are not so much devoted to seven days itself, but to the social rhythm of the week that starts on Monday and ends on Sunday. Therefore, we expect most charges to be made on Mondays and we expect this to be more pronounced if we take into account only charges that are made on a weekly basis. The results in Figure 3 clearly illustrate this point. On average over 35 per cent of all charges are made on a Monday and this figure rises to almost 55 per cent if we were to count only for weekly charges. We also added the percentage distribution of charging days only for the 'décade-ly' charges and find that over a quarter of all charges is done on a Monday and another 50 per cent on Thursday. The explanation for this, we think, goes as follows: someone charges his keys on Monday. Next Monday he does not or forgets to recharge his key for some reason and on Thursday of that same week—ten days after his re-charge—he finds himself standing in front of his locked office door and realises that his key has 'expired' and thus necessarily need to be charged.

The results of Figure 3 can be interpreted in two ways. On the one hand, they provide further evidence that people do live by the week, but not because it is has the 'arbitrary' length of 7 days, but because it is a delineated cycle with a clear beginning and a clear end. Therefore, on the other hand, the French might have succeeded in launching their *décade* if the *primidi* (the first day) functioned as a true beginning and the celebration of the *décadi* as a true end of it. Once again, however, the French based their cycle on rationality without recourse, whereas the weekly cycle had already become a 'rite' following the story telling in the Judeo-Christian tradition.[7] Although we should mention here that the beginning of the week differs with religious tradition and that Figure 3 actually depicts the beginning of the workweek. In principle the Jews start their week on Saturday with the Sabbath whereas the Christians, in an attempt to distinguish from the Judaic tradition, start their week on Sunday with the Lord's Day. The Islamists, for the same reason, have chosen Friday as their holy day [21]. Anyhow, since rites serve to awaken sentiments, to create a shared past, and to include the individual in the group [8] they create values and habits that are not easily overthrown.

Figure 3. Percentage distribution of days on which charges are made.



5. Conclusions

This paper contains two stories that at first glance are miles and literally centuries apart: the calendric reform of the French Republicans and the use of big data to reveal behavioural patterns. As we made clear, both stories have something similar to tell. We explained the initiative of the revolutionaries to replace the Gregorian calendar by a symmetric, rational motivated one. We argued that they recognised the socio-temporal ordering principal of the calendar for daily life and therefore included the *décade* (as replacement of the week), the *décadi*-celebrations (as replacement of the Sunday), and the *sansculottides* (as the New Year festivities). Despite all this, we used the arguments of the social nature of time to reveal what the French Republicans had overlooked: a calendar with its underlying cyclical rhythms—of which the week is one of the most important—is a social fact. It is a tacit though sturdy context within which daily life is integrated and coordinated. Replacing such a fundamental context of daily life was far too ambitious; especially when considering that such a context is not imposed on us by a tangible authority. It is there, and precisely *because* it is there, we act

[7] Exodus, 20:8–10.

in conformity, hence reproducing its existence. This endows the socio-temporal context with a familiarity that makes it 'second-nature' to us.

Another example might serve as an illustration of its steadfastness: the adoption of daylight saving time. Yearly switching one hour back and forth often causes consternation and to many this switch is like jetlag. The reason for this is precisely because time is a social fact and that we shift the context instead of the activities. Instead of shifting our activities, hence having lunch at one o'clock in 'winter time' and noon in 'summer time', we shift the whole context and thus we always get hungry at noon, whether we live by 'summer time' or 'winter time'. The exact same thing happened with choosing the start of the week in various religious traditions mentioned in the previous section.

Our adherence to the social factuality of time, and our grip on the socio-temporal context to coordinate and give meaning to our daily life, is illustrated by the story of the calendric reform and the use of big data.

It is the latter that enables us to uncover the hidden behavioural patterns of daily life, or in other words, the influence of certain contexts. We used data of charging electronic keys at our university. Although the factory default permits recharging these keys every 10 days, it turns out that a 'recharging-rhythm' that concurs with the weekly cycle clearly stands out. Some of them might knowingly do so because they are used to 'schedule' events weekly (e.g., like the collection of household waste, visits to the gym, doing groceries, ...), others might be less aware of it and simply do so because, for example, every Monday resembles the start of a new (work)week and charging their key is part of that. In any case, the analyses illustrate what many scholars have theorised as a social factuality of time: it is the metronome of daily life in such subtle ways that we hardly realise that it is us humans that impose this temporal rhythm on ourselves by continuously and unwittingly conforming to this rhythm. We do not live by a natural rhythm, but by a social convention of temporal cycles that are learned, internalised, and in the end become 'second nature'.

Although we are aware of the flaws that are present in these types of data, such as limited information or withholding information due to privacy issues, and the unrepeatability of a given historical, cultural and social context, we demonstrated its usefulness to uncover (socio-temporal) structures. Many other traces of data that we leave behind might reveal similar results, for instance: cards' data from gym-memberships, grocery store discounts, libraries, petrol stations, logging times of online computer games or online banking, and so on. All these types of data are 'automatic auxiliaries to everyday behaviour' ([6], p. 870) and thus might reveal the (un)varied temporal rhythms of different activities that are unconsciously imposed on us and to which we unknowingly conform.

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Conflicts of Interest

The authors declare no conflict of interest.

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