Lived time and space.

Thoughts on the limits of a spatio-temporal visualization.

Par Leif Scheuermann

The Time Machine.

When Frederic Kaplan presented his “Venice Time Machine” project at the TED^{X}CaFoscariU event[1] in Venice in June 2013, he started with a Google satellite image showing the world, stressing that the dimension of space, represented in Google’s maps, is dependent on the time of production of the satellite images. His idea was to include a temporal navigation and produce a “Google Maps of the past” in order “to travel not only in space but also through time”. He calls such a system a “Facebook of the past” or a “time machine”. *Via* mass digitisation, extrapolation and especially simulation, Kaplan seeks to build a huge information system that would include every aspect of the past on a spatio-temporal basis, visualized in Google Maps. With this system, it would be possible “to dive and reconstruct the Venice of a given year”.

But even if it were possible to create such a system, the following question arises : what kind of knowledge could be visualized and mediated by it ? To pursue this question, this paper will discuss the issue of physical space and experienced space as well as time and lived time.

Visualizing experienced Space.

One of the very basic problems in visualizing historical space is the fact that physical space and experienced space diverge widely. Even in Antiquity, it was well-known that the geographical distance between the city of Messina and the Italian peninsula was not great[2]. However, due to the wind and the sea currents, it was dangerous and often impossible to cross the strait, making the experienced distance far greater. But it is not only the natural environment that distorts, stretches or compresses experienced space : political, social, or religious conditions, for example, or even knowledge and ignorance respectively affect perception.

For example, until the middle of the 19th century, there was a strict separation between Barcelona and the surrounding towns, architecturally represented by the city walls. In the travel literature[3] of the time, the separation is also very clear : we find the city with its monuments surrounded by

beautiful gardens and small towns, which are visited by the locals on their Sunday outing. The actual geographical distance between the two places is less than 2 km as the crow flies and, when they were incorporated in 1897, they already formed in their extensions a unit.

The examples show that experienced space does not only depend on a physical position and extension. It is also a social process of production, that expresses itself through spatial practices, representations of space and representational spaces (Lefebvre 2001). To bring it to a more individual level, the experienced space “is product both of immediate sensation and of the memory of past experience, and it is used to interpret information and to guide action” (Lynch 1960, p. 4), and has therefore been highly influential in the course of history.

The exact geographical position and extension of historical spaces, as well as Michel de Certeau’s (1984) view from the 110th floor of the World Trade Center, or the bird’s-eye view of Google Maps are often misleading, because it’s the historical actor — individuals as well as groups — who produces the space *via* appropriation. A “Time Machine” has to take this into account. It has to leave the strict geographical dictate and widen its scope to the experienced historical space, for example by including sketches of mental maps and network graphs developed from various texts and images describing historical spaces. Such a system can be used to analyse the historical experienced space, but only to the extent of visualizing it. It can give us an image of experienced space, but not provide us with the space itself. Even the newest media reaches its limits here. Large information systems can provide us with the data needed for a detailed analysis of historical space, but it will not give us the possibility of reviving it. A reconstruction of the lived space, in which a nowadays user can dive into and experience, must impart for example the smell or the sound which also shapes the space, as well as the whole personal and cultural background of the historical actors, for example their religious experiences or their sense of time. This leads us to the second part of this paper, the handling of the temporal dimension.

Visualizing experienced time.

After having shown the general limits of the visualization of historical space, the second part of this paper discusses the limits of a visualization of time and temporality in a more technical way. Like space, time is subject to experience, which is also a product of sensual perception, social background and individual experiences. It is structured by natural rhythms, like night and day, the tide, the lunar phases and so on, but also by religion — the call of the muezzin, the Jewish Sabbath, the Christian calendar of saints —, by society or by cultural memory and, last but not

least, by individual behaviour, like the personal rituals that structure our days. More than this however, there is an individual sense of time which is incompatible with physical time[4]. Everybody knows the phenomenon : during an intensive experience, time goes by very quickly, while boring things seem to last ages.

Another characteristic of time is its processuality. Even the shortest event has a timespan, which means that everything has a beginning and an end. Beginnings and ends however are also events and have their own timespan. The argument shall not be overstressed, but it makes clear that a visualization of time always requires granularity. So what is the adequate degree of fineness for a historical visualization ? The problem is aggravated by the fact that historical data itself is often very vague. For example, many Roman dedication altars can only be dated to a century, which means that it's very likely that they were erected in this timespan, but totally unclear if it was at the beginning or the end of the century in question. Other buildings — like the dome of Cologne — have a very long construction time[5]. So what is the right granularity for a "Time Machine" ? How can long term events such as the building of a church be visualized at the same level as events with an uncertain temporal setting, like the erection of a monument, and very clearly limited events, like signing a contract of purchase or a conflagration ?

The idea of the "Time Machine" as well as in many other projects is to include a time slider, a tool that just filters the displayed object according to its position on a timeline. But this doesn't solve any of the problems. Even if it is possible to adjust the granularity of the slider — which means that the timespan of the filter is enlarged or reduced —, the problems of uncertainty and the processuality of the events remain unaffected. Frederic Kaplan counters the criticism of uncertainty with the idea of multiple maps in which all possible cases can be displayed. Again the question is : what help does it do ? Having indefinite versions of a setting can show us a scope of possibilities and can be a useful analytical tool, but this doesn't substitute the decision-making authority of the scholar — it gives no insight further in the past.

Coming back to the question of visualization of time and temporality, it became clear that a time slider is not a solution, because it cannot simulate or replace the fourth dimension, as it is static. Animations in contrast are dynamic, they include the fourth dimension. So a possible visualization could be the display of multiple animations of the temporal processes. But what time is to be taken as the basis of such an animation ? The problem of granularity is transformed into a question of appropriate speed.

Going a step further, absolute time, like physical or geographical space, gives no insight in the historical life world. Again it's the bird's-eye view and not the sight of time. As already mentioned above, every actor has its own speed, depending on individual sensual perception, social background and experiences. This speed changes regularly, for example as a consequence of the change of the length of day and night in the course of a year[6]. But it is not only natural rhythms that have an effect on the experienced the length of time. A very good example of the cultural impact on time is the Jewish Sabbath — a day during which no work is allowed. Referring to the slowing down of speed during times of idleness, it gets clear that this day of the week is experienced in a longer way than the others, which has to be taken into account in the visualization. The visualization reaches at last it limits when different actors with different rhythms and experiences interact with each other and have to be synchronized. The experienced time of one actor can be visualized in one animation as well as the time of several separated actors in multiple animations. The problem in doing so is the synchrony of multiple actors that are connected to each other.

The past, the machines and their users.

The intention of this paper was to sound out the limits of a computer-based visualization of the experienced and lived past. It has become clear that "objective" or physical time and space and lived dimensions differ from each other. For a proper visualization of the past, which still does not claim to be something like a "time machine", it is essential to transfer experiences into a form that can be processed by the computer, which is based on frequencies and therefore depends fundamentally on physical time. But even if this transformation were possible, secondary problems need to be solved. Every user of such a system has of course his/her own experienced time and space, which is also a product of sensual perception, social background and individual experiences. So there has to be a second transformation process from the physical time of the computer to the experienced dimensions of the user. This has to find its expression for example in the use of colours and symbols, or again in the speed of the animations, but this may not affect the first transformation. To ensure the sustainability and intercultural useability, the data has to be separated from its representation. At the same time, the data must be documented in a way that doesn't lose information[7]. This is the last challenge or limit for the visualization of historical space.