4

Seasons change, so do we: heterogeneous temporalities, algorithmic frames and subjective time in geomedia

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The frozen circumstances of space only come alive when the melody of time is played.
(Thrift, 1977: 448)

Introduction

As distinct from the moving image, it has been argued that the purpose of maps is to codify spatial knowledge in stagnant form by affording a firm coupling of standardised cartographic signs. Bruno Latour treats the map as an archetypal ‘immutable mobile’, or more precisely as an ‘immutable and combinable mobile’ (Latour, 1986; 1987; 2009), by which he terms a (graphic) thing/vehicle that is the outcome of scientific knowledge accumulation, the translation of this knowledge into a sign system with standardised projection techniques, and their inscription on a transportable carrier. ‘Immutable mobiles’ are part of a cycle of knowledge accumulation that Latour describes using the example of an expedition: the first successful expedition brings back a map of a previously unknown territory; a second expedition can build upon this knowledge to accumulate additional facts; a third expedition builds upon the second, and so forth. In order to ensure the establishment of accumulation cycles, objects have to be created that are ‘mobile but also immutable, presentable, readable and combinable with one another’ (Latour, 1986: 7). As a precondition of this shifting of knowledge, the immutable mobile eventually affords the exercise of power over distance in a process that renders ‘facts’ durable through what he terms the ‘strategy of deflation’ (Latour, 1986: 3). The ‘strategy of deflation’

signifies the production of two-dimensional inscriptions out of accumulated scientific facts by translating aspects of the three-dimensional and dynamically changing (geographic) world onto a flat and static surface. Therefore, only through fixation can knowledge be stabilised and safely brought back from distant places to central agencies Latour calls 'centers of calculation' (Latour, 1987: 215). Because knowledge accumulation demands an immutability of the sign plate, fixed maps have been mobile and thus time-critical, merely in the sense of circulation as an artefact. One consequence of this mismatch between stabilised and immutable knowledge, as against depicting the dynamics of change and history, could have been that the depiction of time has been a neglected topic in geography.

While Latour sketches the role of graphic inscriptions in the epistemological groundings of Western science, others have taken different critical positions towards the ontic status of mapping itself. For example, Doreen Massey (2005) describes how space in (Western) cartography became a static representation; cleared from uncertainties and procedural knowledge, human movement and displacement. She asks what it means to travel across space and argues that it is not an activity of simply crossing through space, but an act closer to a co-production:

you are not just travelling *through* space or across it, you are altering it a little. Space and place emerge through active material practices. Moreover, this movement of yours is not spatial, it is also temporal. (Massey, 2005: 118)

The critique implied here claims that by dismissing any form of movement, the temporal dimension is neglected by cartography because only knowledge that can be brought into stable forms is taken into account – despite the fact that movement through space and change over time are identified as the productive driving forces behind the production of space (Turnbull, 2007). Tim Ingold calls this the logic of inversion, a central process of modern thought which turns pathways into boundaries, movements into point to point connections, and way-faring into transport. In transport, movement is 'decoupled' in perception and motility, and becomes pure displacement (Ingold, 2009).

However, the material representations of geography have always had more or less hidden temporal aspects, even though the act of mapping has also been as concerned with time as it has with space. In addition to being mere 'snapshots in time', maps have been equipped with time stamps indicating the historical state of the world they refer to, or have been animated to depict time-critical processes such as human rhythms. But all in all, the cartographic depiction of time in pre-digital, modern times prioritised static representation

of temporality, with the line being the dominant figuration of chronological information, ordering time as linear and continuously proceeding (Rosenberg and Grafton, 2010).

This has clearly changed with the contemporary hybrid media forms of the digital age, which offer new and multiple ways of time integration. Therefore, this chapter argues that one of the main distinctions between analogue maps and digital geomedial¹ (Döring and Thielmann, 2009; Felgenhauer and Quade, 2012) can be found in the way visualisations organise the temporal dimension. In order to show this, I do not reject the idea of representation and inscription, but rather look at the transformations of these concepts in and through digital geomedial. Accordingly, the following pages highlight several stages of time integration in digital maps and globes to show a transition that could be part of a larger paradigm shift in cartography: from static representations to the dynamic presentation of space, at the intersection of mobility, visibility and individual memory. It is argued that a medial turn within geography introduces heterogeneous time frames missing in traditional representations of space and place.

Mediality and time

The assumption that new media introduce specific spatio-temporal frames for our perception of time draws on a line of thought pointing back at least to Walter Benjamin's (1969) famous essay, 'The work of art in the age of mechanical reproduction'. Benjamin points out that not only nature but also historical circumstances – including media development – organise and re-organise human perception. New modes of production can lead to new modes of cultural reproduction and introduce new modes of perception (Benjamin, 1969: 222). Benjamin sees the big shift in modernity in the possibility of mechanical reproduction of cultural artefacts that leads to a detachment from tradition and authorship. He uses the example of film to explain how the new medium introduced a new temporal structure leading to a shift in perception from concentration to '[r]eception in the state of distraction' (Benjamin, 1969: 240), well in line with the increased pace of mechanical industrial work and the modern city.²

Half a century later, Friedrich Kittler makes the notion of new media forming novel structures of space-time into an essential part of his media theory. In his workings, Kittler repeatedly shows how technical media alter the continuous flow of time. Above all, it is the media's constitutive ability to transform time into a spatial unit so as to make it manipulable that makes the difference; this function, according to Kittler, specifies the mediality of all technical media,

from the gramophone over film to the universal Turing machine (Kittler, 1999). Sybille Krämer calls this the 'Cultural Techniques of Time Axis Manipulation', highlighting the significance of the media's own spatio-temporal structure for culture at large, and she argues that in Kittler's media theory, technology provides a means for channelling temporal irreversibility (Krämer, 2006).

Because the cinematic image has been perceived by media theorists as radically different in its representation of time, this chapter starts by highlighting the similarities and differences between the temporal structures of the moving image and geographic media. It continues by showing how the integration of time changed with the introduction of navigational means in geomedial, and then outlines the influence of algorithmic image production onto their temporal frame, using Deleuze's term of the 'crystal-image' (Deleuze, 1989: 89). In a final step, these heterogeneous temporalities are confronted with subjective perceptions of time with reference to Bergson's concept of duration (Bergson, 2005 [1988]). By doing this I highlight different interminglings between strategies of time integration in digital geomedial, foregrounding the relations between temporality and the technicity (Ash, 2012) of the artefact and its use. For example, contents are transmitted through the time stamp of images, or the time of origin suggested by the aesthetics, while the individual user's perception of time, memories and longing for the past are incorporated into the reading process. Therefore, when taking the actual usage into account, visual geomedial afford a *threefold temporality* where memories meet visual images which have been algorithmically stitched together, and get interconnected through navigation by the users.

Digital geomedial, such as Google Earth, serve as objects for investigating heterogeneous and artificial cultural and perceptual temporalities. I use this example of Google Earth as a 'theoretical console' (Verhoeff, 2009; 2012a). Verhoeff deploys this term to illustrate how the study of objects as indicators can point to the significance of contemporary theoretical conceptions as part of the discourse in culture and society. Following this methodological and theoretical position, geomedial applications become more than direct implementations of theoretical thought and instead interact with, and shape, theoretical conceptions of time and space. In this case, it is argued that the heterogeneous temporalities inscribed in geomedial are indications of a shift in the perception of cartographic space and time. Taking Google Earth as a telling example, I will argue that in contemporary networked and navigational geomedial, structures of space-time are not as clearly discernible as in older technical media but exhibit a stratified structure. This becomes clearer when we take a look at how contemporary interfaces of geomedial encapsulate different temporal frames within a single surface.

Temporality by animation

The first mode of temporal integration in geographic media can be described as the convergence of animation and cartographic inscriptions. The essential prerequisite for this has been the disengagement of the image from paper as its carrier medium. In the beginnings of electronic cartography, there were experiments with different display technologies. For example, in 1966, Bruce Cornwell and Arthur Robinson discussed a method to depict movement with the help of a computer attached to a cathode ray tube. In this process, a line-drawing ray of light was filmed by a 16-mm or 35-mm movie camera frame by frame. The results were animated maps that were used to depict meteorological data and the movements of satellites (Cornwell and Robinson, 1966: 79). The remediation of the cartographic sign plate, combined with the coupling of cathode ray tube, computer, input device (light pen) and film camera, added movement to the cartographic presentation. The film recording served as an intermediary to enable the publication and circulation of cartographic movement. Beginning in the 1950s, the cathode ray tube in the form of the television was the main source for the diffusion of animated maps, and one of the first regularly televised animated maps were weather maps (Cartwright, 2007: 14). But even before that, animation was widely used in so called cinematic maps and can be traced back to the first docudramas of the 1910s (Caquard, 2009).

But strictly speaking, it is wrong to call the animated maps used in films cinematic, because, as Deleuze points out, '[a]ny other system which reproduces movement through an order of exposures [*poses*] projected in such a way that they pass into one another, or are "transformed", is foreign to the cinema' (Deleuze, 1986: 5). The difference between cinematic and animation film lies therefore in the treatment of space by the medium: 'the cartoon film is related not to a Euclidean [*sic*], but to a Cartesian geometry. It does not give us a figure described in a unique moment, but the continuity of the movement which describes the figure' (Deleuze, 1986: 5). In animated visual media, time is on the whole subordinated to movement. So instead of regarding the cinematic map as the animation of a single sign plate, another perspective might be to regard it as a filmed geography, set in motion not by changes on the surface, but through the succession of discrete shots. Historically, the cathode ray tube was the medium of choice here as well. At the end of the 1970s the Massachusetts Institute of Technology (MIT) created hypermedia systems that promised to enhance and extend hypertext with video images, and thus enabled movement as a result of interactive navigation. One of these systems is a virtual car ride through the city of Aspen in Colorado. The Aspen Movie Map (1978–1979) is

a hybrid of video display and navigational interface that has been described as an image-based surrogate travel system. At the lower half of a cathode ray tube are arrow-shaped touch-sensitive interface elements accompanied by a topographical minimap that depicts the user's current position, the next crossing and the route already travelled. After touching the on-screen arrows, the system selects the appropriate film sequence on a laser disc. While playing the video recording of the actual travel through the streets of Aspen the impression of real-time movement is simulated. The developer of the Aspen Movie Map, Andrew Lippman, calls this 'tour[ing] the area' (Lippman, 1980: 32).

This individualising of spatial on-screen movement at the MIT is significant for the further development of digital cartography, and signals a paradigm shift in the experience of moving geographic images: a shift from animated presentations to navigable geography-based applications. For Lev Manovich these early hyper media systems illustrate a fundamental principle of new media, which he labelled 'variability':

in hypermedia, the multimedia elements making a document are connected through hyperlinks. Thus the elements and the structure are independent of each other – rather than hard-wired together, as in traditional media. (Manovich, 2001: 38)

The continuing convergence of cartography, film and computer technology results in an aesthetic transformation of time-cartography in motion. Along with this shift has come a renunciation of traditional static methods of geographic representation. At this juncture, I want to draw on a more recent example that seems symptomatic of the shift from static representations of space; via animated maps through to navigational geomedial. My exemplary theoretical object of choice here is the integration of Google Earth imagery in a Hollywood blockbuster, as illustrated in the following description:

after a wild chase through a shopping mall Chev Chelios, protagonist in the action movie *Crank* (2006), jumps on the backseat of a waiting taxi. The driver, noticeably unimpressed, asks him straight away, 'Where do you wanna go, man?' Sensing the urgency of the situation, he barely waits for the answer ('Beverly Hills'), and hits the road with squealing tyres. The camera remains in one spot, showing the lateral view of the car in a slight low angle shot moving to the right, and at the moment when only the trunk is within the picture, the background changes to a satellite view of Los Angeles. The satellite imagery in top-down view is assembled with the perspective film image; the camera picks up the dynamic of the vehicle and follows it to the right until the taxi leaves the frame. Suddenly, it zooms out of the satellite image, describes a half circle until it zooms back into the picture, and finally comes to a stop above a pool on the roof of a mansion. 'Carlito's Penthouse' is written with red letters onto the image. After a short halt the camera zooms towards the pool for a few more frames. There

the framing changes within an abrupt transition from a perpendicular view back into lateral view from where the storyline is picked up again. (Author's own synopsis)

Whole sequences in the action movies *Crank* (2006) and *Crank 2 – High Voltage* (2009) are produced using the geobrowser Google Earth. What happens to the cartographic image and what happens with cinematic time here? At first glance the effect of the use of Google Earth in *Crank* is congruent with the general functions of maps in movies, which are: to claim the authenticity of a place, to serve as a narrative device in the form of cartographic intertitles, and to provide a jump effect, when a journey is traced on a map (Caquard, 2009). But there is more to it. In the case at hand the cartographic imagery is not just intertitle, or solely a jump effect. The geobrowser imagery itself becomes a motion picture technology. The sequence is inserted to establish a manipulation of the time axis through which cinematic time is itself accelerated. As a result, the time of travel is adjusted to the overall rhythm of the movie, which draws on the suggestion of real-time action. Time-space gets compressed while the cinematic image is replaced by a geographic surface image. The contraction of space allows for a compression of narrated and screen time.

This reverse remediation of Google Earth is not purely aesthetic (see Figure 4.1). The original interface items – the compass rose and the copyright of the image provider ‘© 2006 Sandborn’ – are visible in the lower edge of the screen. The ‘authorised’ interface of Google Earth is transformed into a cinematic medium to traverse space. Integrated in the movie, the locomotion of the parabolic flight, in Google Earth a primary component of navigation, becomes an alternative to cuts and shutter dissolves and affords a cut-free traverse through the space between two scenes. In addition, the flight serves as a marker for a change of place and replaces the arrival normally signalled by an establishing shot. A new form of travelling with the virtual camera comes into existence by the montage of film images and satellite views. But the integration of the local context of the cinematic scene into the global context of the cartographic image and back also plays out the different aesthetics of the two types of images. Within the movie, the usage of satellite imagery points to the increasing capabilities of geosurveillance architectures that are able to track down and visually trace subjects through space and time and even predict their soon-to-be destinations.

This example tells us more about the mediatisation of cartography than about the integration of maps in movies. The key actor of this altered presentation and experience is the virtual camera that transforms the parameters of reception in computer-generated environments. The possibility to zoom in and freely choose the image section and the degree of mobility changes the subject-object

Figure 4.1 Compilation of stills from the movie *Crank* (dir. Mark Neveldine and Brian Taylor/Lakeshore Entertainment, Lions Gate Films, RadicalMedia, GreeneStreet Films/ USA/2006)

relationship. In contrast to a movie camera, the virtual camera mobilises not the image but the gaze of the user. In Google Earth, the virtual camera and the spectator enter a novel constellation where competences are distributed anew. It is the framing of space that is affected by interactive navigation.

Traditionally, framing entails the preselection of the media space by the camera operator as an intermediary licensed to steer the attention of the passive spectator.³ Thus in classical cinema, time as movement remains in the hands

of the producers, while in interactive environments the spectator becomes the mobilised agent of change. This possibility of spatial transition with the virtual camera opens up a new media space that Mitchell Schwarzer (2004: 12) calls 'zoomscape'. In reference to Virilio's (1986: 8) 'dromology', the term refers to a space perceived in motion either mediated, or experienced, from within a transport vehicle. According to Schwarzer (2004), as far as the aesthetic effect is concerned, both modes can be put on the same level, which is why he proposes to substitute the term movement for the term mobility. As distinguished from movement, mobility not only captures the actual movement of the body but also the latent mobility of stationary perception of moving images, in addition to the simulation of movement while navigating an interface.

In environments that can be navigated by the user, determining framing and assembling constituent elements within a frame are obsolete, there is no particular camera perspective and we cannot speak any longer of a prescribed setting, trajectory or time frame. The totality of the environment becomes a potential focus for the user-spectator. Similarly, mobile geomedia turn the view of the built-in smartphone camera into an interface, so the 'actual' environment of the subject using the device becomes a potential target. The whole of the environment – whether virtually or geographically real – becomes a potential interface, a mode of production that corresponds to the conditions of production of digital cinema (Manovich, 1999) and of immersive virtual environments in general.

With navigation, any producer-sided predictability of framing and mobility is dropped. If the virtual environment of the geobrowser is compared to the cinematic universe, every visual aspect can be brought into focus. The functional shift of the camera eye can be termed a 'mise-en-space' (Jones, 2007: 227) in order to distinguish it from the traditional cinematic art of *mise-en-scène*. As a result of this shift, the camera evolves from being a creative element to a primal tool of creativity itself (Jones, 2007). With the interactive virtual camera, framing is no longer delegated to an authorised alliance of operator and apparatus. The operator-apparatus becomes a mediator by order of the spectator-user, who is now in charge of the perspective and content selection. The map is transformed into a space of action.

The divergent production of time is significant here. Through navigation, the temporality inherent to the medium coincides with the temporality of its use: the missing sequencing and montage leads to the situation in which only a chronology of actions exists. Flashbacks can come about only by reversion of time and repetition, not by cutting and jumping back. In comparison to the cinematic handling of time, the act of creation in digital geomedia happens in the real-time of use. As a sequel of these transformations the spectator-now-user becomes the creator of an individual spatial narration.

The Google Earth sequence in the movie *Crank* can be thought of as an example of the middle-ground between the animated and the navigational map, still bound to the cinematic time, but already mimicking its collapse with the introduction of the gaze of the virtual camera. So the development of dynamic mapping becomes a history consisting of the mobilisation of cartographic images and the map user's gaze, where different steps of animation and phases of user mobilisation can be identified. Both modes ensure that time can enter cartographic visualisations, first with animated maps, and then by means of mobilising the cartographic gaze. Through these developments, cartographic mobility ultimately approaches a navigational regime (Verhoeff, 2012a).

Geobrowsing – temporality by navigation

To further grasp the distinction between static and dynamic geographic representations in theoretical terms, one can turn to the dichotomy of mimetic and a navigational map production and use. November, Camacho-Hübner, and Latour (2010) use this dichotomy in order to describe two different systems associated with the cartographic image. With regard to geomedia, they observe a major change in the epistemological foundation of cartography with the digital upheaval. The shift from isolated and static geographic representations to networked and interactive geomedia reconfigures the relationship between map and territory:

while, in pre-computer times (B.C. [before computers], as geeks say), a map was a certain amount of folded paper you could look at from above or pinned down on some wall, today the experience we have of engaging with mapping is to log into some databank, which gathers information in *real time* through some interface (usually a computer). (November, Camacho-Hübner and Latour, 2010: 583)

New geographic media alter our perception of maps insofar as a mimetic interpretation impedes a navigational interpretation of maps. While in pre-digital times people looked at maps from above, in the age of digital cartography, map reading means to 'log into some databank, which gathers information in real-time through some interface (usually a computer)' (November, Camacho-Hübner and Latour, 2010: 583). From these observations, the authors deduce a theory about the changing referential status of maps based on the epistemological gap between map and territory or between signifier and signified (Korzybski, 1994 [1933]) that is negotiated step by step. They suggest that navigational interpretation is strongly facilitated in digital mapping. Thus, mimetic

resemblance is a necessity but not necessarily a sufficiency to get from territory to map and vice versa. Following William James, the accuracy of the representation is of less importance than its ability to lead through successive signposts (James, 1996 [1907]). Thus, the navigational paradigm relativises indexicality until a 'circulating reference' (Latour, 1999: 24) becomes visible which enables varying degrees of resemblance of the signifier with the signified in an action space. The navigational approach assumes that map use in the digital age can be modelled as a trajectory along a chain of inscriptions, where each image is matched to the previous and the succeeding one rather than to some external point of reference.

This distinction adds to the performative critique invoked in the introduction, which questions the status of the map as a static representation of a territory. Massey (2005: 107) suggests that 'the dominant form of mapping, though, does position the observer, themselves unobserved, outside and above the object of the gaze'. Massey of course also acknowledges that there are static maps that tell stories, for example the Christian *mappae mundie* like the Ebstorf Map, but the story is usually framed within a closed system – in the example, pagan and biblical history epistemologically and graphically encloses the map's content within a circular space around the body of Christ.

The navigational, by contrast, emphasises the performative character of the mapping as an open process, and at the same time, the involvement of the spectator is thus able to challenge static and linear models of cartographic communication that are based on unified and standardised ontologies. Turnbull (2007), for example, criticises 'Western' mapping practices for dismissing the local and navigational dimension of spatio-temporal knowledge. There is an incommensurability between traditional, local (indigenous) knowledge and (Western) knowledge traditions of science because indigenous knowledge gets translated into a unified ontology by deflation:

mapping and databasing using scientific coordination of commensurability techniques not only subsume differing spatialities and temporalities into one abstract space-time they also omit the multiplicitous and interactive dimensions of the local and the practical, the stories and the journeys, the spiritual and the experiential. (Turnbull, 2007: 141)

Here performative critique is expressed in a concern about scientific knowledge becoming naturalised, when any trace of the local human journey or passage disappears. Eventually, this impetus to re-model cartographic communication with dynamic, performative and mobile parameters points to a general critique on the scientific self-conception and on the claim to truth of scientific facts. Following

Bergson, this distinction between mimetic and navigational also reflects a difference between the scientific use of images and the world of consciousness:

now no philosophical doctrine denies that the same images can enter at the same time into two distinct systems, one belonging to *science*, wherein each image, related only to itself, possesses an absolute value; and the other, the world of *consciousness*, wherein all the images depend on a central image, our body, the variations of which they follow. The question raised between realism and idealism then becomes quite clear: what are the relations which these two systems of images maintain with each other? And it is easy to see that subjective idealism consists in deriving the first system from the second, materialistic realism in deriving the second from the first. (Bergson, 2005 [1988]: 26)

If we follow Bergson even further, the line between these two positions can be drawn by looking at the different conceptions of the temporal structures of images and their relation to the body. The translation of images into actions by the mind is analogous to the transformation of a mimetic image into a navigational dynamic. In traditional map production, the mimetic is preferred over the dynamic in order to preserve, stabilise and mobilise geographic knowledge; a panoptic vision of the world is propagated. However, the navigational advocates a mode of spatial perception that can be thought of as an act of performativity, involving the interplay between vision and movement (Gell, 1985), or between image capture and experience (Verhoeff, 2012b).

Taken as a theoretical object, Digital Earth, as outlined by Al Gore in the 1990s, has indeed promoted a mimetic, holistic and all-encompassing world view. Thus, versions of Digital Earth could become tools of what Donna Haraway calls 'the god trick' (Haraway, 1988: 582). The product management of Google Earth also follows this process, but with the twist that Google introduces a vertical continuum, designed to cover all zoom levels, from the so-called ionic view of under one meter, to the arm's length away Google Goggles, through the panoramatic Street View to the Google Map view, and even further up to the orbital distance of Google Earth. The difference between Google Earth and the perfect panopticon is the lack of real-time imagery. A genuine panoramatic 'scopic regime' (Knorr-Cetina, 2009: 64) can only be effective if it is able to register and display every change in the status quo. But the seamless navigation in geomediality, along with the smoothing of zoom levels, only tricks us into the feeling of panoptic visibility, covering up the layered imagery, and the juxtaposition of different media with varying time stamps. The surface of the map strives for a geovisual holism. Thus, the mediation evokes the illusion of objectivity, totality and transparency whereas in reality, such a comprehensive view is merely illusory. At this point Latour draws our attention to the manifold

of ‘oligopticons’ (Latour, 2005: 175) that counteract conceptions of hierarchical power structures as determinants of human agency. According to Latour, the oligoptycons are little windows which only allow a snipped view of the social world when taken in isolation. Oligoptycons point to the deflation strategy mentioned in the introduction, since all facts are flat in the sense that understanding the world is not a matter of scale but a matter of connecting the dots and following the associations among them.

If we take Google Earth as a theoretical object, it helps us to picture the shift between the all-encompassing idea of one panopticon, to a relational understanding of many interconnected oligoptycons. The former is suggested by the overall presentation of the whole, projected onto the supratemporal ‘WGS84’ geodesic reference system; the latter is the image detail selected by the virtual camera cut-out while time-critically navigating the interface. The fact that the imagery of the geobrowser’s basic layer is made up of many images, each taken and produced at a different time, means the heterogeneous time frame of the geobrowser alone obscures the panoptic order. One could state that Google Earth supports heterogeneous temporalities within a single scopic regime through the juxtaposition of images with diverging time stamps, and by offering the means to virtually navigate them. In comparison to other panoptic regimes, Google Earth pre-structures the user experience of time-space in an incongruent fashion. This possibility to pick your own oligoptycons brings about new possibilities of being surprised by the encounter with cartographic space (see Massey, 2005: 116):

we pan the map, zoom in and zoom out, and change colors. All of these involve ‘playing’ with the map to allow latent relationships to emerge. There are other ways of manipulating maps for this purpose that we may not ordinarily do – turning the map upside down and sideways, for example. (Peuquet and Kraak, 2002: 82)

In geobrowsing, a playful cartography is acted out that is closer to a navigational form of cartography than to the mimetic paradigm. The map-supported appropriation means transforming the abstract logocentric space shown in a geobrowser into a personal egocentric space through interactive adjustments to the position and perspective of the viewer’s visual focus. The movement involved here is a form of knowledge generation since it allows for ‘latent relationships to emerge’ between different oligoptycons, while the ever changing surface of the geobrowser bears the possibility to show that ‘all spaces are, at least a little, accidental, and all have an element of heterotopia’ (Massey, 2005: 116). Geobrowsing allows for this kind of emergence in an otherwise pre-modelled environment, and emergence is only possible by linking perception to movement and as such by letting time lapse away.

Algorithmic temporalities

A third temporal dimension is closely associated to the technicity of the geomedia interface and therefore gets inscribed during the production process. Uricchio speaks of a spatial heterogeneity of digital media that comes from the technique of stitching images of different perspectives together (Uricchio, 2011). He draws on applications like Microsoft's Photosynth that combine geotagged photographs taken by different individuals to form navigational mosaics of digital images. The images have been taken from different angles, cameras, standpoints and with the help of different vehicles, like cars or satellites. They get algorithmically combined – stitched together – through calculation of overlaps and junctions in order to form a coherent whole. With enough data, three-dimensional spaces emerge which allow the user seamless navigation. In order to analyse the status and value of these image spaces, it is not sufficient to have the production process on one side and the user on the other, without showing an interest on the mediating entity in between. But Uricchio does not lament the loss of reference of digital images. His posture is not an ontological one. Instead, he takes a closer look at the aggregation and combination of images by means of 'algorithmic interventions' (Uricchio, 2011: 25) which lead to a reconfiguration of subject–object relations. Eventually algorithmic interventions circumvent conventions such as linear perspective and challenge notions of authorship.

For example, single images of Google Earth are taken in different seasons and in different weather conditions. Resultantly, it can happen that while geobrowsing, the sun is shining and the trees are carrying green leaves, and within one second, it is getting dark and the trees show empty branches: seasons change by half-turns (see Figure 4.2). Thus, geobrowsing happens within an ambiguous temporality that is archetypal for the distributed aesthetics of new media (Lovink, 2008: 225). The heterogeneous temporalities of video platforms like YouTube come to mind where videos and commentaries of different dates of origin are combined, the timelessness of circulating memes that surface time and again, or the combination of contents on a Facebook profile site that the personal timeline organises in an only artificial chronology.

Avant-garde adoptions of geomedia, as also discussed in other chapters of this book, make use of algorithmic interventions to expose the delicacy of the boundaries among multiple spatio-temporal standpoints. Artists use geographic imagery as raw materials, which they recombine, modify or alienate in order to distill their specific medial engagements. One example is Christoph Engel's image series *Sommet*, for which the artist took screenshots of three-dimensional textures of mountains in Google Earth and altered the imagery with tonal

Figure 4.2 Seasons change by half-turns in Brooklyn, New York. Google Earth images © Google. This figure has not been made available under a CC licence. Permission to reproduce it must be sought from the copyright holder.

correction until they resemble analogue nineteenth-century travel photography (Engel and Westphal, 2009). Engel poses the question of authenticity since in these images the production date becomes an illusion, only maintained as long as the spectator keeps their distance. From close up, the pixelated mediality of the three-dimensional models shows up. But in a previous step, the treatment of the artist has already transformed the textures and satellite imagery into travel media; moving them away from their purpose as means of land surveying, map production and remote sensing through falsification of the time of creation. Another artist, Clement Valla, looks for already inscribed distortions, anomalies and non-standards in geomedia:

at first, I thought they were glitches, or errors in the algorithm, but looking closer, I realized the situation was actually more interesting – these images are not glitches. [...] These jarring moments expose how Google Earth works, focusing our attention on the software. They are seams which reveal a new model of seeing and of representing our world – as dynamic, ever-changing data from a myriad of different sources – endlessly combined, constantly updated, creating a seamless illusion. (Valla, 2012: no pagination)

Valla points to the specific mediality of Google Earth as a space of action that renders visible the polysemantic value of geomedia and the user's role in the

process of decoding these artefacts by exposing ‘algorithmic agency’. The glitch as the most visible evidence for an algorithmic agency at work becomes an element which is tied closer to the mediality of geomediality, and therefore exposes and uncovers part of the production process as well as allowing us a glimpse of the heterogeneous spatiality. While this notion of algorithmic intervention is focused on changes in the visual appearance of media and points to the impact automatic production has on the conception of space, there is an underlying time-critical aspect to it as well. What I want to stress here is the heterogeneous time frame introduced through applications that stitch together imagery from various sources, but not as something that prevents enjoyment or proper use. Instead, this uncertain temporal structure of the images in geomediality seems to invite a playful encounter with the aesthetics that are freed from a particular historicity.

The artistic examples above also exemplify how the context and framing of images and activities can be more important than indexicality in the sense of mimetic correspondence between map and territory. Instead, they show that referential cartographic indexicality can be replaced by polysemantic values in geographic images, which allow alternative interpretations without relying on a full correspondence to the depicted scenery, building or landscape. Thus glitches also point to heterogeneous times which intermingle within one image in the interface of geomediality. Deleuze uses the term of the ‘crystal-image’ (Deleuze, 1989: 89) to describe the simultaneous existence of the past, the present and ultimately the future within one image. He links the ‘crystal-image’ to the affordance of film that mingles different temporal horizons – usually done by addressing different ‘sheets of the past’ (Deleuze, 1989: 98) simultaneously with the help of mirrors or montage. Comparably the glitch becomes an image that points back to the bygone process of its own making. Thus, the glitch is part of the navigational paradigm of geomediality which integrates isolated cartographic images and re-connects them to the visualisation as a whole.

Subjective time and individual duration

We cannot help but transform geographic space and its abstract depictions into spaces filled with our own memories and recollections of the past. Therefore, subjective perception and individual experience of time adds an additional temporal layer to geomediality applications. This final temporality at work is concerned with the subjective time of memory and remembrance of the locations of past events and the places along individual biographies. At this point we can draw on Bergson’s (2005 [1988]) concept of ‘duration’ (*durée*) in order to describe the temporality of the experience with geomediality. Bergson (2005 [1988]) describes

duration as the qualitative aspect of time, distinct from the quantitative concept of linear time that can be segmented in consistent intervals. '[T]here is no perception which is not full of memories. With the immediate and present data of our senses, we mingle a thousand details out of our past experience' (Bergson, 2005 [1988]: 33). As a consequence, while looking at it, while navigating through it, and while getting immersed in it, the abstract space of the map gets inevitably transformed into a personal space of remembrance. This makes geomedia suitable for evoking a feeling of nostalgia which is, at first sight, a structure of feeling that is inherently location-specific, but in fact it is a time-related yearning: 'at first glance, nostalgia is a longing for a place, but actually it is a yearning for a different time – the time of childhood, the slower rhythms of our dreams' (Boym, 2001: xv). Seen this way, the return to a place of the past – either physically or virtually – is the attempt to turn back time (Boym, 2001: xv–xvi). At this point, the time of the images, the narrative time of the medium so to speak, meets individual time; an encounter mediated by the navigational options of the interface. The retrieval of the places of the past depends on the congruence between the time of origin of the imagery, which as we have seen is heterogeneous in itself.

The heterogeneous temporalities of geomedia

For Bergson, the present is only a mixture and every recollection is nurtured by superimposed strata of the past (Bergson, 2005 [1988]). Deleuze writes about this organising principle of remembrance:

depending on the nature of the recollection that we are looking for, we have to jump into a particular circle. It is true that these regions (my childhood, my adolescence, my adult life, etc.), appear to succeed each other. But they succeed each other only from the point of view of former presents which marked the limit of each of them. (Deleuze, 1989: 99)

Put into practice, within geomedia this process becomes a feedback loop which constantly oscillates between the past and the past's presents: 'we have to jump into a chosen region, even if we have to return to the present in order to make another jump, if the recollection sought for gives no response and does not realize itself in a recollection-image' (Deleuze, 1989: 99). Similarly, the process of transforming the abstract and distanced space depicted in geomedia into one's own space is acted out by taking the trip down memory lane. Time and space become subjective in the course of this, but not in the way that we internalise

it. Our share of time also becomes visible and spatialised. As Deleuze (1989) emphasises, in Bergson's thought time is never subjective in the sense that it becomes interior to us. Instead, time is the interior in which we exist and consequently we can solely make the past become an interior *image* of us. According to this, visual geomedia, like geobrowsers, can serve as a medium of remembrance that translates their own biography into a topology of events. But only in navigating this trajectory can we overcome the stasis of this representation and start to virtually travel through our own past.

This results in a co-existence of the past and the present within a composite that is actualised in the act of navigation. Thus, geobrowsing, as the practice of using digital cartographic interfaces, turns into a game of *threefold temporality*: individual duration meets the heterogeneous time frame made of algorithmic imagery, which is then navigated by the users. So, on the one hand, contemporary geomedia act like traditional maps as agents of a spatialisation of time, supporting the tendency to convert time into space relations (Gross, 1981). However, on the other hand, a medial turn introduced by geomedia brings back heterogeneous time and individual duration that have been missed out in traditional, static geographic inscriptions. Within this process, representations of space and place that formerly relied on strictly standardised ontologies become augmented with subjective and local knowledge. Therefore, dynamic, performative and playful encounters with geographic space are the result of heterogeneous temporalities that challenge the immutability of the sign plate. With maps becoming 'navigational interfaces' (Lammes, 2011: 1), alternative temporalities enter cartographic interfaces and representations become more mutable, as cartographic indexicality is not subordinated to an absolute time frame but becomes just another layer of experience.

Notes

- 1 Tristan Thielmann's definition encompasses locative media and mediated localities (see Thielmann, 2010).
- 2 'Our taverns and our metropolitan streets, our offices and furnished rooms, our railroad stations and our factories appeared to have us locked up hopelessly. Then came the film and burst this prison-world asunder by the dynamite of the tenth of a second, so that now, in the midst of its far-flung ruins and debris, we calmly and adventurously go traveling. With the close-up, space expands; with slow motion, movement is extended. The enlargement of a snapshot does not simply render more precise what in any case was visible, though unclear: it reveals entirely new structural formations of the subject' (Benjamin, 1969: 236).

- 3 'We will call the determination of a closed system, a relatively closed system which includes everything which is present in the image – sets, characters and props – *framing*. The frame therefore forms a set which has a great number of parts, that is of elements, which themselves form sub-sets. It can be broken down' (Deleuze, 1986: 12, original emphasis).

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