



Robert Smid*

Σ the Arc of the Missile
the Arc of the Narrative

On Cartographic Techniques in Literature

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Abstract: My article investigates the manifold interactions between textual and diagrammatic elements. First, it outlines the changes in literary and cultural studies in the wake of the so-called ‘topographical turn,’ which have made possible the identification of certain cartographic practices as cultural techniques. Second, it discusses Friedrich Kittler’s idea of literature as a cultural technique itself, and considers how this concept can be reconciled with the topographical turn. Third, it analyses a handful of cartographic techniques employed in narratives and argues for a field of scriptural operations that provide a common ground for jointly reading maps and novels. Fourth, it carries out a reading of Thomas Pynchon’s *Gravity’s Rainbow* which focuses on how the diagrammatic inscription of the V2 rocket and its arc condition both the protagonists’ movement on the novel’s plane and the map-making instances in the narrative. Fifth and finally, it points out why Pynchon’s work might be considered a medial counterpart of a map if the topographical approach, instead of being considered a comparison between fictional and real locations, is understood as a scrutiny into the operations indispensable to creating a fictional territory.

1 Introduction

The topographical turn is arguably the latest turn in literary and cultural studies. Topographical readings tend either to extract ethical and political issues from a text’s geo-spatial organisation, or to reflect upon the conditions of representability and the level of interactivity between fictional and real locations (see Weigel 2009). Yet, despite the presence of various practices inherent to mapmaking in novels, very rarely has topography been investigated in terms of cartography, an approach which could pave the way for a new theory of the cultural technique of reading. The value of excavating cartographic techniques during literary

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interpretations can only be presumed at this point: it could initially dislocate the reading of novels from the traditional field of alphabetic inscription by encompassing a wider interpretative spectrum in which trajectories, or alphanumerical and other miscellaneous notations play a crucial role. In other words, the literary text will be subject to a critical re-evaluation so that its graphic potential receives more emphasis, be it in the form of diagrams or other types of non-verbal material entities that are unorthodox to literary texts (i.e. essentially non-discursive, but discourse-modulating elements beside punctuation). An attitude that focuses on the interaction of diagrammatic and discursive elements in the process of composition as reflected in the text could truly investigate the manifold connections between maps and literary texts as well, since it does not exclusively concentrate on fiction as either denoting an existing place or the geo-political disposition of authority. That is to say, cartographic techniques do not promote the idea of how textual mimesis of material factors can be executed in literature but rather ask by what means such practices are activated on a fictional level. Therefore, a common ground between a novel and a map may be found with regard to the operations of inscription; just like the latter requires certain graphic and scriptural actions during its production process, the former may use them in constructing and narrating the plot.

Hence, my article begins with a short overview of cutting-edge projects that understand the topographical turn along these lines, and then moves on to briefly discussing productive blind spots in Friedrich Kittler's conception of cultural techniques. By merging these two approaches, I will argue that there is no such thing as a cartographic text since constitutive map-making practices always already include a dimension that cannot simply be enacted by textual means. This will lead to situating these operations as being carried out both on the novel's and the recipient's side. In order to demonstrate this dynamic, I will draw on the novel *Gravity's Rainbow* by Thomas Pynchon. My final goal is to present how cartographic techniques are employed to construct the arc (of missiles) between Peenemünde and London, a figure Kittler so often lamented on, yet somehow overlooked as an operation that produces the arc of the narrative itself.

2 Of a Cartographic Focus Recently Adopted in Literary Studies

The connection between maps and literary pieces may seem rather evident at first: after all, any story does take place somewhere; moreover, characters tend to move

from one place to another as well as habitually articulate their experience and thoughts concerning the location where they currently dwell. But it was not until 1904 that these very basic ideas were explicitly put forward and enriched with a topographical agenda. Since William Sharp's book *Literary Geography*, however, much progress has been made in the scene, which even brought along a rival or, at times, complementary concept: literary cartography (see Alexander 2015, 4). In Robert Tally's book on spatiality, in which he exclusively understands space as topographic, literary geography and cartography are distinguished according to where their operations are manifested. Tally situates the former on the side of the recipient, stating that it is more often than not an *a posteriori* action, consisting of conditions that make a literary topos realised in the reader's world, thus modifying his or her perception of certain places (Tally Jr. 2013, 82–85). In contrast, literary cartography is an *a priori* cluster of operations that the author makes use of when preparing the fictional landscape for narration (Tally Jr. 2013, 42). In both cases, the experience of reception and production is heavily influenced by mapping, whether it is mental, as in the former, or graphic, as in the latter. It nevertheless provides a sharp contrast to how this experience was envisioned before the topographical turn. For instance, in the early 1990s, J. Hillis Miller applied a pre-Deleuzean and post-pragmatist logic of potentiality and actuality, declaring that even if the text presented maps as the potential condition for putting its fictional mechanics to work, these maps were still solely dependent on diegesis: they could not exist without being narrated (see Miller 1995, 20).

Franco Moretti's eccentric project of "distant reading," supported by the digital humanities' technique of data-mining, proves exactly the opposite, however. Concentrating primarily on literary topoi and tropes as figures anchored to locations when investigating European novels, his maps actually prepare literary works for textual analysis (see Moretti 2005, 53). This approach, building also upon network principles, assumes its pertinence in interpretation exactly due to keeping its distance from texts through integrating graphs. Therefore, it can grasp not only motifs but processes, for example, how binary oppositions – like those associated with the dynamics that link the decline of one form to the emergence of another (see Moretti 2005, 9–30), with the transitions between centre and periphery (see Moretti 2013, 48–50), and with the tree-like and wave-like developments of genres (see Moretti 2013, 53–54) – can be easily demolished when they are in fact visualised cartographically. At the same time, Moretti's method seems to work on a smaller scale, for instance when he does not aim at examining literary corpora originating from a wide variety of traditions. One such case is the comparison of Arthur Conan Doyle's fictional account of white-collar crime in the City of London with the statistics in criminology during the era (see Moretti 1998, 134–137). Drawing the contours of a district by laying out literary and statistical

proof of criminal activity, or sketching out the spatial division of labour in a community (see Moretti 2005, 42–45) are just stepping stones and do not constitute the finish-line of Moretti's enterprise, though. Synchronic cross-sections, when ordered consecutively, indicate the interconnections between descriptions of a place and shifts in human activities, let these be criminal, artistic, or manufacturing (see Moretti 2005, 46–51). From here, it is easy to expand the focus to entire continents, and then investigate the handling of locations with respect to cultural and economic developments, even supposing that it is in fact the cartographic-textual analysis which eventually makes such processes transparent. This last suggestion gains relevance due to a clever observation on Moretti's part: it is strange that, while the majority of works most influential in literary studies were, as a matter of fact, concerned with analysing topoi, they hardly contained any maps or other types of diagrams (see Moretti 2005, 35). Although Moretti's criticism directed against his antecedents is serious and legitimate, the flaw evident in his own quantitative means is presented as an actual gain: between the smallest and largest scales, the text itself can easily slip away, disregarding the need for close-reading of a literary corpus (see Moretti 2013, 48).

This criticism does not apply to Christina Ljungberg, however. Studying diagrammatic formations and maps in literary texts, she is in many ways Moretti's opposite. Building upon Wolfgang Iser's reader-response criticism, Ljungberg explores the boundaries of semiosis to widen the spectrum of traditional textual interpretation with a graphic horizon. On the one hand, she accepts Iser's concept of double signification of maps which no longer coincide with the territory, yet create their own imaginary borders (see Iser 1993, 248). On the other hand, and not independently from such imaginary mechanisms, she approaches the relationship between maps and works of fiction by dislocating receptive processes to the outside of language. According to her, the world of the text and the world of the reader no longer meet up in a verbal field exclusively but can have secret trysts far away from the realm of language, thanks to graphic entities that both show and tell (see Krämer 2010, 280) such as diagrams possessing iconic, indexical, and symbolic features. Such forms can extrapolate the interpretation process to fit the multimodality of the text, which affects the reader on multidimensional levels (i.e. orienting him or her, modifying his or her perception, etc.; see Ljungberg 2003, 184–185). Maps, in this regard, always offer a trace of reading patterns along with a diagrammatical projection of possibilities (see Ljungberg 2012, 162). This type of schematisation is iterative to the text's linguistic one but does not become superfluous. The compression executed by the former can indeed yield to unexpected constellations because it realises a bilateral transfer between two distinct semiotic systems in which new combinatorial possibilities come to the fore (Ljungberg 2010, 50). This geo-poetic attribute of diegetic levels, according to

Ljungberg, approaches graphic figures as inherently materialising in the process of reception.

Barbara Piatti, when sketching the literary atlas of Europe, promotes interpretation as a procedure of visualisation for exactly such trajectories. Starting from the theory of fictional worlds, she prefers not to approach the interplay of fictional and real places as dominated by the former's potential realisation, thus situating works of fiction as eventual possibilities of another reality that has not taken place after all. She argues that whenever the reader faces the description of a place in novels, its referential relation has already been amended – in contrast to the situation, for instance, when one comes across the same location in a travel guide. The fictionalisation of places notwithstanding, Piatti claims that factuality stems from this very modification (see Piatti 2008, 28–29): the interaction between fictional worlds and real geographies is established upon the principle that while a map can produce knowledge despite inevitable distortions in ratio, scale, representation, etc., literature can likewise offer insights into (the description of) places, yet first and foremost not in a mimetic way. Her strongest argument concerns how the usage of perspective affects the inscription of a place and its identification by the reader (see Piatti and Hurni 2011, 220): contingencies (e.g. reaching a decision concerning the scale, synchronising viewpoints, etc.), which are produced by the quasi-objective processing and visualising in geographic information systems (GIS) – what Piatti labels literary cartography as part of literary geography (Piatti and Hurni 2011, 219) – are simultaneously reinscribed into the text. In this fashion, differences are no longer posed between two supposed worlds, fictional and real, but between two media, text and map: on the one hand, the possibility of a fictional territory can only be articulated via textual operations, while the cartographic ordering of topographic markers results in the mapping of the text, on the other.

3 Kittler's "Kulturtechnik Literatur"

All of those projects briefly presented above generally miss out on situating the processes of interpretation as intimately linked to practices of mapping. While Piatti's *Literary Atlas of Europe* comes close, she still does not propose a culture-technical approach, which would otherwise support a routine-based research like hers. Interestingly, another missed encounter comes in handy here; whereas Kittler's excavation of literature's cultural techniques stands as an important milestone even today, there is a gap in his theory that can be exploited by suggesting a cartographic reading of texts.

My own cartographical reading of Pynchon's novel draws on Kittler's theory of cultural techniques, about which Eva Horn remarks:

What Kittler designs [in his book *Discourse Networks 1800/1900*] is a blueprint for the history of literature as a cultural technique; it is a history that looks at two stages of literature from the advent of a third one. He looks at the age of books, images, cinema, and music from the age of computation. In short, from the advent of a technique into which all other data-processing techniques will be drawn into. (Horn 2012, 16)

However, I disagree with her interpretation on the basis of Kittler's rigid distinctions as obstacles to characterising literature as a model of how cultural techniques are produced in other media. Horn's elegant formulation, in my opinion, initially reciprocates Kittler's theory of how shifts occur in discourse networks, since there can only be an interaction between different media without leaving any room for approaching one on the merits of another. While her point in establishing the discourse network of 1800 on the basis of reading, writing, counting, and drawing is understandable and further legitimised by Kittler's interest in the process of alphabetisation, his clear-cut distinctions between media go exactly the other way. Kittler's synchronic epochs, within which each particular medium is unambiguously categorised as far as its means of operation are considered, leave no room for the fluidity that is so characteristic of the theory of cultural techniques. Due to synchronicity in Kittler's account, it hardly seems possible to measure one medium using the standards of another, exactly because this incommensurability is key to distinguishing elements in a synchronic network. Although I would argue that Kittler regards each medium as part of "the Real" (Kittler 1999a, 14), that does not mean that the disparity from which the clash between different media originates, and on which a discourse network contrasting two incompatible media (e.g. gramophone recording versus the human voice) ultimately rests, can be overcome in Kittlerian media theory. Literature, for example, as a technique exclusive to writing – the very medium which is unfit for differentiating between the channel and the code (see Kittler 1993a, 178) – can only manipulate symbolic syntactical structures that make sense (or make up nonsense), while the gramophone can actually record noise itself (see Kittler 1999a, 35; 1993b, 184–185).

Treating media as devices initially based upon, or originating from, cultural techniques is nonetheless an attitude that aims to widen the field of certain practices allocated to media, and thus extends the definition of media, respectively. Take, for instance, Sybille Krämer's culture-technical project of notational iconicity (*Schriftbildlichkeit*). It is the sheer opposite of Kittler's, since with her frequented example of the shift from binary Greek letters to tangible Roman lines (i.e. numbers that can be counted by hand), and another one to the purely symbolic Arabic numerals, its logic is expressed as the diachronic tracing of changes

within the same medium, and not in-between media (see Krämer 2003, 167). Kittler's interest, however, lies in the meeting of at least two media because their description is what cross-sections are good for in the first place. The reader of Kittler consequently has to reconcile the action of confronting media – which makes it crystal clear what a certain medium is capable of (viz. writing – manipulating symbolic structures; gramophone – recording ‘the Real’) and how in each medium the techniques of transmission, storage, and processing (the holy trinity of media discourse analysis) are carried out in a way intranslatable to any other media – with the fact that literature has set exactly these standards (or gave the blueprint of the mentioned techniques; see Horn 2012, 16) for investigating other media (in a sense as was already the case with Marshall McLuhan). So, the actions which Horn addresses as cultural techniques can only be identified in the discourse of literature as such; in all other (i.e. technological) media they are techno-mathematical operations carried out by elements transporting bits of information through wires. Yes, technically and on an abstract meta-level, these operations are the same, but when they become implemented – and this is the stage where media discourse analysis begins its scrutiny – they show the very incompatibility that characterises the constitution of a discourse network as a medial episteme with at least two opposing technologies for storing, recording, and transmission. Therefore, Kittler did not so much provide a blueprint for these cultural techniques via the mechanisms in the discourse of literature but rather identified these cultural techniques *themselves* as the blueprint of those operations that take place in technological media. Along these lines, Kittler made it absolutely clear what literature is capable of. All in all, media can mimic each other, or even do each other's (dirty) work, but for Kittler, treating a text as if it were a map would most certainly have been heresy, plain and simple.

What I call cartographic cultural techniques may nonetheless pose an epistemological gain exactly because they stem from a synthesis between this clear-cut Kittlerian conceptualisation and the recently blossoming geo-critical trends in literary studies (see Tally Jr. 2013; Ljungberg 2012; Piatti 2008). Acting complementarily to one another, the latter investigates literary texts on the merits of various graphic and diagrammatic constellations, providing that mentioned ‘reading as’ syntax missing from Kittler's theory, while the former in return can help us overcome the basic aporia to which each cartographic disposition of reading seems to come down to: the relation between the map and the territory, or, to put it more bluntly, the question of reference. Therefore, I am not concerned with how “Pynchon weaves real historical events and geographies into his fictional labyrinths” (Bulson 2009, 94), like Eric Bulson marvellously did in his book *Novels, Maps, Modernity*, but ask how we can overcome this dichotomy with the help of a culture-technical framework.

4 There Is No Such Thing As “Cartographic Text”: What Cartographic Cultural Techniques Are Not

While it would prove fruitful to trace the changes of the relations between map and territory from Alfred Korzybski to Umberto Eco, the history of the ‘cartographic text’ starts a few decades later with the rise of so-called ‘Critical Cartography.’ In the 1980s, this topographical school opened up new interpretative horizons by attributing textual effects to the study of maps. Such a trend was heavily influenced by deconstruction, and, not surprisingly, the essay that achieved the status of a manifesto among its practitioners was John Brian Harley’s *Deconstructing the Map*. Even though Critical Cartography managed to shift the emphasis from the map’s referentiality to its textual mechanisms by using idioms like paramap – made up of perimap (title, charts, legend) and epimap (endorsements, review articles), both of which are allusions to Gérard Genette’s textual model in which a certain type of language is supposed to be in operation (see Wood 2010, 90; 273) – on the whole, it did not quite manage to grasp the scriptural-material basis of maps. Critical Cartography simply abandoned semiotic questions of indexicality and iconicity in favour of a Paul de Manian textual machine (see Derrida 2001, 306–329), wherein semantic connections are made not solely between different graphic entities (see Piatti et al. 2009, 186–191) but between graphic entities and linguistic forms to which they refer.

Bernhard Siegert was the first to open up new horizons with his essay entitled “The Map is the Territory” in which the map itself was made subject to spatial practices. No longer regarding the map as an object solely intended for reading, Siegert suspended analogies, metaphors, and tropes (Siegert 2011, 16), that is to say: he ushered out the textual dimension while simultaneously pointing out the field of operations composed by a map’s scriptural and notational materiality. Alluding to Krämer and Bredekamp’s programmatic statement that culture has been regarded as text for far too long (see Krämer and Bredekamp 2003, 11), an entity such as the cartographic text does not hold any potential in the field of cultural techniques. If we henceforth take on the new materialist point of view by declaring culture as nothing more than history in representational form (see Galloway 2012, viii), then Siegert has made it evident that for each subsequent successful scrutiny the emphasis has to be shifted from the representation of spaces to spaces of representation (see Siegert 2011, 13). In this fashion, every investigation that addresses the graphic dimension of a text is fundamentally rooted in cultural history, insofar as the latter poses as the history of those cultural techniques that make up media (see Ernst 2013, 133) which are eminently utilised in assembling the conditions of spaces.

Consequently, the map itself can become a territory because cartographic techniques can be traced back to its graphically available apparatus such as notations, figures, legends, etc. (Siegert 2015, 131). Differently put, the map no longer requires an outside reference for its readability. This approach sheds some light on why cartographic cultural techniques can be more than just another buzzword in literary studies. When the map is positioned as a source of identifying new cultural techniques, it first and foremost draws our attention to the protocols of the plane; to the act of mapping – which constitutes a graphic register of correspondence for two places (see Siegert 2015, 132; Wood 2010, 88), hence making up a space of representation between them – and also to events happening on flat and scaled territories that cannot be traced otherwise (such as the trajectory of an intercontinental missile). Since these operations call for an interaction-based approach, mapping can be positioned as the cultural technique of forming and reforming limits between imaginary and contemplated, immaterial and material, desired and actual, and in general, fictional and real places (Ljungberg 2005, 190) – but on a compressed plane that initially belongs with fiction. Literary scholars (e.g. Frank Zipfel, Lubomir Doležel) traditionally handled these relations with the theory of ‘possible worlds,’ borrowed from analytic philosophy, thus introducing yet another binary structure. It was made up of the fictional world (as a semiotic system established upon a collection of entities created by the power of fictional discourse) and the story world (as a discursive model the reader necessarily creates in his mind in order to understand the narration; see Koten 2010, 50). Hence, even according to Zipfel’s taxonomy in which real and pseudo-real elements could be combined in the narrative (see Zipfel 2001, 97–101), and in its reappropriation by Piatti, where categories of fiction and reality are always manifested in a homogenous topographical field (Piatti 2008, 137), there still exists the menace of transfer from the real to the imaginary. But concentrating on cartographic cultural techniques as implemented in literature means breaking up these binary approaches, whether they become manifest in representation (from the landscape to the plane [Piatti] or from the text to the mind of the reader [Ljungberg]) or as text (appropriating inscription as a textual effect, instead of a scriptural practice [Critical Cartography]).

5 Agency in Mapping

So far it has been discussed what maps in their scribed-down nature and mapping as a cultural technique are set up against. Now it is time to take up a more affirmative approach to situate cartographic cultural techniques. The map

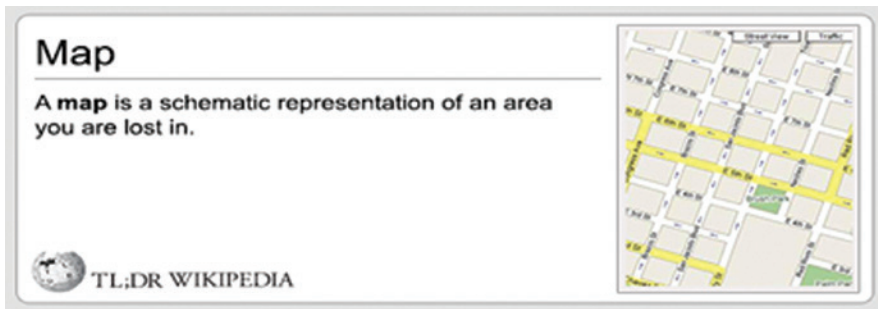


Figure 1: A short definition of what a map is. Source: <https://twitter.com/tldrwikipedia>, copyright: Jason Mustian, Jake Currie and Drew Dernavich.

is a diagram (see Figure 1), and in this sense, it deserves a different kind of attitude than textual reading – even if I am fully aware of the phrase ‘to read a map.’ Because it does not require much to explain that maps do not have meaning on their own; they are part of an assemblage of people, objects, and practices (not simply discursive ones but also those concerning calculations, measurements, simulations; see Kitchin et al. 2009, 16), and as such can assume their role in orienting their users. Maps constitute the basis for cartographic cultural techniques while themselves being material and containing factors that resist semanticisation (e.g. legends cross-referencing elements and notations included in maps). They also trigger respective means of handling them, like deciphering, extracting information, or the acts that produced maps in the first place. Consequently, maps can be deployed in a network of practices – like omitting certain elements, eliminating uncertainties, and choosing to yield distortions of area, angle, and distance (see Wood 2010, 92) – instead of being defined as incorporeal, *a priori* knowledge-objects (see Kitchin et al. 2009, 16).

Mark Monmonier, for instance, describes maps as powerful rhetorical devices introducing the idea of “graphic narrative” (Monmonier 1992, 247–260)¹ by arguing for the scriptural nature of maps, yet without textualising them. Opposing Critical Cartography’s idea of a map as a mechanism of antecedent and posterior textual effects, a map can be positioned both as a product of cartographic actions and of processes of usage at the same time. In these practices, the legend,

¹ It is worth noting that in different approaches, performativity seems to be the key factor in understanding maps as more than mere representations (see McIver Lopes 2004, 190). That does not mean, however, that performativity always has to stem from narrative functions, for instance exclusively complementing it with tours (i.e. the path for reading), as does De Certeau (1988, 120), whenever maps are investigated according to their practical side.

the typography, and the notation work on different yet complementary levels, eventually realising cross-mapping between space and plane. For instance, the legend acts as a mediator, or a ‘Rosetta Stone,’ in each case of deciphering distance, direction, quantity, extent, and identity (so that we can tell rivers from mountains [due to their different colours], or churches from museums [according to their shape]). Moreover, it executes the shaping and scaling of the graphic plane in such a way that the mentioned factors start to emerge from the map itself – especially when one is facing unconventional notations (in the case of ciphered military maps) or harmonographic maps where processes are juxtaposed, yet in reality they never occur simultaneously. Therefore, cartographic techniques are not simply put into action on the side of the user of maps, but are also exercised by maps themselves. In a more general vein, Cornelia Vismann states: “If media theory were or had a grammar, that agency would find its expression in objects claiming the grammatical subject position and cultural techniques standing in for verbs” (Vismann 2013, 83).

In a culture-technical context, the agency of mapping transgresses the boundaries of simple social acts that make up an assemblage, and begins to authorise the performative potential of maps, establishing them as true actants. Maps create links by connecting objects on a common plane. This also means bringing together propositions about the territory: “things of selected categories *are* where the maps say they are” (Wood 2010, 2; original emphasis). Textual representation, however, should not be mistaken for an exact rendering of spatial experience because what is depicted on the map never exactly coincides with what the text tells us. Take the cartographic holy grail of political correctness, the Gall-Peters Projection. It has never succeeded in fully substituting Mercator’s map despite the fact that it does provide a faithful representation of the size of continents and islands (e.g. Greenland looks bigger than Europe on it) and takes into account the geoid shape of the Earth (i.e. conceivable in a non-Euclidean geometry). But drawing a straight line on its plane does not lead to the same location in real life, which did pose a problem to pre-GPS seamanship. Likewise in literature: the straight line methodology fails to represent not the particularised geo-specific movements recorded by writers in their textual accounts of places but the trajectories between markers. Accordingly, when applying the theory of mapping to works of literature, it can be stated that cartographic techniques are not primarily concerned with how accurately certain places are represented in the text but rather how the arc of the narration establishes a connection between distinct elements. The narrative can be mapped or maps can serve as a blueprint for the narrative due to the latter’s operational graphic substance. Maps do not merely depict something but rather open up a two-dimensional space for handling and observing the narrative. The inscribed surface always creates a field

of operations and the cartographic always functions as a tool for orientation (Krämer 2010, 290). Such a field, whose boundaries are drawn by practices of inscriptions, provides a new palette for interpretation in an autopoietic manner. This is the case when a map simultaneously refers to a territory and the perspective from which it has been mapped (see Ingold 2000, 223) – and, as in Piatti's argument, it also consists of conclusions drawn from such actions. Therefore, a map does not simply, due to its potency of synchronisation, present things in constellations that could never come to be realised otherwise, but it also extrapolates its own means onto techniques that enable readers to establish connections within the narrative. Maps thus function like a black-box for both texts and their interpretations.²

Furthermore, when maps are regarded as prescriptive systems of propositions, i.e. when they are not limited to the practices that made them (e.g. whether cartographers of an era had access to aerial view) since the interactions of their elements can yield to operations unforeseeable by their creators, then they cease to be generated as by-products in storytelling. They are created as both blueprint and end product instead, with their own waymarks (i.e. graphic notations) conceived of as plottings. Put differently: to follow the plot is like navigating with a map, recalling Tim Ingold's observation:

[F]or readers of medieval times, the text was like a world one inhabits, and the surface of the page like a country in which one finds one's way about, following the letters and words as the traveller follows footsteps or waymarkers in the terrain. For modern readers, by contrast, the text appears imprinted upon the blank page much as the world appears imprinted upon the paper surface of a cartographic map, ready-made and complete. (Ingold 2007, 24)

This also makes clear that maps inevitably have to encode time to the same degree as they encode space; not primarily in the sense of historical figures, but because they can trace movements as either footsteps or trajectories. The map employs a code of tense, concerning its temporal topology, and a code of duration, which concerns its temporal scale (see Wood 2010, 94–95). Tense is the direction in which the map points: it can refer to past, present, or future. The map with its vectors is then activated as a stochastic interface (initially, as has already been discussed, due to choices that include and exclude certain options in map-making) whenever event-paths and the trajectories of agents in texts are

² Take, for instance, Robert Louis Stevenson, whose *Treasure Island* was literally composed from a map (Stevenson 2011, 61–63), or the map of the fictional Yoknapatawpha county compiled by William Faulkner in order to synchronise his novels topographically (see Piatti 2008, 42).

to be transcribed, that is to say, whenever spatial elements of fictional texts are translated into cartographic symbols, which allows new ways of exploring and analysing the particular spatio-temporal geography of literature.

Moreover, arrangements of the story made and interpreted on the merits of axes, vectors, and arcs enable a cartographic space to emerge. This space contains well-defined and delimited regions, scaled areas, in which fictionally defined positions do not necessarily stay fixed. Formulating narrative gestures as mapping in literary texts sets the stage for and simultaneously enacts such cartographic techniques, whether they concern relations that are to be actualised or traces in the making that have to be unfolded. This dynamism prevails in the practices of production and reception, on the one hand, and on the operative plane of the map, on the other. Consequently, in literary interpretation, cartographic cultural techniques do not become activated when real and fictional places are combined but when the reader's act of producing a map out of the narrative and the narrative's act of generating an arc between two locations are intertwined. Performed readings are produced in relation to at least two geographies in this fashion, the first being the geography of the initial textual event, and the second being the geography of the context in which the reader's "orientation" is mapped out (Hones 2008, 1301). It can happen either as the visualisation of paths in novels, like in Piatti's project of a literary atlas, or as traditional close-reading that is, nevertheless, governed by spatial-material figures. This way, identifying trajectories that constitute the blueprint of the narrative becomes an authentic act of reading by/along/between those lines; it means overcoming the always immaterialising textualisation, and, at the same time, getting closer to the epistemology of the line. Such an interpretation is no longer a matter of paratexts, or a realisation of transportations (from territory to map), but of transformations, a transubstantiation of one scriptural object into another: rematerialising the text within the map. It is also a process of handling the scriptural with cultural techniques, which can open up new horizons for a cluster of cartographic operations, extending our range of interpretative tools.

6 Over the Rainbow

Following this outline, I will argue that, while Kittler interpreted Pynchon's novel with respect to the characteristics of the imaginary medium of film, the narrative's territory is primarily drawn out by cartographic techniques on an even more elementary level. Thus, let us take a look at Kittler's interpretation of *Gravity's Rainbow* first; his arguments are fundamentally backed up by regarding the novel both as "data retrieval" and a simulation of a simulation that is based on such data (Kittler 1997, 105). This simulation of a simulation can be executed by the

text due to a time-axis-manipulation; and while on this technical and temporal ground Kittler identifies the novel with the medial status of film, he still claims that this act is carried out textually (see Kittler 1997, 110). Hence, this manipulation always remains a simple matter of solely verbal narrative acts since the novel cannot reach beyond its medial limit(ation)s. Or, at least, that is what emanates from Kittler's idea of a shift in media, as laid out in the second part of my article. Instead of turning to an utterly different medium, however, for appropriating the technical basis of *Gravity's Rainbow*, the map as a material figure can establish an eminent scriptural interconnection between novels and diagrammatic forms. Because maps do not encode time to the same degree as they encode space, they enable practices of time-axis-manipulation as the result of cartographic techniques.

A reading based on this figure is all the more justified if one considers that the rocket *Aggregat* or *V2*, the real modulator of the characters' trajectories on the plane of the novel's territory, has been named the actual protagonist of the novel in numerous interpretations which I will refer to in my own reading. Whether this is true or not, one thing is certain: the *V2* has its roots neither in experience (i.e. in Pynchon's past in rocket engineering [see Comyn 2014, 3]) nor in the narrative itself (see Kittler 1997, 110) but in blueprints drawn on workbenches at the Military Research Institute in Peenemünde. Alluding to Werner Heisenberg's uncertainty principle (reformulated by Dénes Gábor), however, we may say that if we know where it hits, we no longer know what it is (Kittler 1993b, 204). The rocket as a meaningless marker or an empty signifier is defined only by its coordinates, that is to say, by the places it crosses from its launch to its impact. Therefore, the *Aggregat* only achieves agency cartographically, and is thus manageable solely by operations that dismiss interpretation. For instance, via fictional transubstantiation with László Jamf's *Impolex G*, the missile can be extended like Blicero's *S-Gerät* with five 0s to infinity:

'S-Gerät, 11/00000.'

If this number is the serial number of a rocket, as its form indicates, it must be a special model – Slothrop hasn't even heard of any with four zeroes, let alone five... nor an *S-Gerät* either, there's an *I-* and a *J-Gerät*, they're in the guidance... well, Document *SG-1*, which isn't supposed to exist, must cover that. (Pynchon 1973, 252)

This graphic action, which modifies the blueprint, has repercussions on a topographical level, thus connecting the locations Zürich and Berlin: "zeros strung end to end from here to Berlin" (Pynchon 1973, 258). Similar to the novel, the rocket possesses no sense of an ending.

And Slothrop's libidinally invested relationship with the rocket, which authorises him to predict where the next missile strike hits, is only one among several experiments that are aimed at overwriting the interpretative blank space of the rocket itself. This erotic precognition is nevertheless mapped out via a correspondence between the pin-up girls Slothrop dated and the stars that mark the locations of impacts on a London city-map (see Pynchon 1973, 18). Yet, the space represented on his wall in fact no longer converges with London but becomes the so-called "Zone" (Pynchon 1973, 3), a territory which is already scaled by those rockets that have been mapped beforehand as blueprints. These blueprints had been implemented into the earth – which, with reference to Heidegger, Kittler regards as impenetrable (See Kittler 1999b) – because after the war was over, American troops literally dug up fourteen tons of rocket designs buried by German scientists (see Kappel 1980, 233), thus expanding the borders of the Zone. Slothrop's movements on such a plane – made up from other numerous scaled planes, the blueprints of the V2 – from the Zone via Casino Göring to Peenemünde, may be positioned as a quest for identity, evoking and reforming the genre of the picaresque, or, *horribile dictu*, of the *Bildungsroman*. Yet this approach certainly misses out on an important aspect; in spite of his trajectory being modulated by the rocket, when Slothrop finally arrives at the V2's 'birth-place,' he finds no trace of its origin. This blank space of fiction does not occur to Slothrop for the reason that neither the Zone nor the launch station as some holy centre (see Pynchon 1973, 590) can be mapped as if they were a kind of Bermuda Triangle (see Kappel 1980, 233) that intermits or impedes rockets. On the contrary, when the places Slothrop visits become cartographic, like the Nazi camp laid out to form the abbreviation SS (see Bulson 2009 97; Pynchon 1973, 300–2), i.e. when the narrative makes them spatially accessible via their iconic dimension, the triangle actually appears: the triangle in Δt . This delta-t does not simply maintain an indexical relationship with the rocket, such that it appears in the formula which describes the rocket's arc, but indeed establishes an iconic connection: the notation and the rocket ready to launch converge in a graphic chiasmus because V2 can be extracted from Δt *à la lettre* (on the basis of notational iconicity, V and Δ as well as 2 and t are 180° rotational counterparts). Therefore, during the rocket's falling down on the movie theatre in Los Angeles in pursuit of the last delta-t (see Pynchon 1973, 760), it looks exactly like its notation (i.e. the letter V), and when it is launched in Peenemünde, it has already found its velocity (i.e. the letter Δ). In this context, Kittler maintains: "The quantitative parameter of the rocket was neither its course, as was the case with ground troops, nor its velocity, as had been employed with tanks, but rather acceleration, which is the only bit of information accessible to the rocket itself." (Kittler 1997, 110).

The infinite divisibility of movement into diminishing instances, the abstract possibility of analysing time as discrete and motionless entities thus not only relate the engineers' task to that of the storyteller's (see Molnár 2015, 7) but also the storyteller's to the cartographer's, since they are the ones who, between war fields and headquarters (see Pias 2001, 171–172), or zones and launch stations, can sketch out the triangle:

Three hundred years ago mathematicians were learning to break the cannonball's rise and fall into stairsteps of range and height, Δx and Δy , allowing them to grow smaller and smaller, approaching zero as armies of eternally shrinking midgets galloped upstairs and down again, the patter of their diminishing feet growing finer, smoothing out into continuous sound. This analytic legacy has been handed down intact – it brought the technicians at Peenemünde to peer at the Askania films of Rocket flights, frame by frame, Δx by Δy , flightless themselves... film and calculus, both pornographies of flight. (Pynchon 1973, 567)

But this distortion, owing to the rocket's trajectory that blurs the parts of the plane it crosses while rescaling the novel's territory, provides the self-reflexivity of fiction whenever it is applied to describing locations. In other words, covering the world external to the text is achievable because its own cartographic field has already been marked off. It exploits the distortion so as to disperse its markers, whether they are characters or locations. This spatio-temporal territory mapped out by missile-trajectories does converge with the text's narrative plotting so that, as a consequence, there is no longer anything unmappable, and everything receives its textual place due to cartographic techniques.

The blueprint of the narrative is the blueprint of the rocket when the latter is put into action; and all its determining factors solely exist on the plane in scriptural-notational and not in textual reality. In fact, this is why *Gravity's Rainbow* can *sui generis* operate as data requisition. But while its characters are trying to access the conditions that defer them from one place to another, they cannot escape the compulsion for constructing theories about conspiracies, supremacist firms, etc. They would, however, only have to take a look at the blueprints of the operational simulation they dwell in, so as to get access to those elements that make them move around in the first place. Therefore, the characters' locations are not subjected to the issue of being in the wrong place anymore, since there is no rift between the map and the territory, but they become dependable on arriving there too early or too late. For instance, the papers that Slothrop acquires at the SS-shaped camp's lavatory indicate that it would have been "too early" for him to smell Imipolex, since the plastic was only developed in 1939 by Jamf (Pynchon 1973, 251; 286), long after Slothrop's childhood. These papers thus provide support for deciphering the abbreviation *PC* that up to this point had been incomprehensible: while it can denote either 'pre-cognition' or 'pre-condition,' temporally it has to mean the former.

In *Gravity's Rainbow*, war itself has been turned into such “paper routines” (Pynchon 1973, 130) in which coordinates no longer denote places but probabilities via temporal indices assigned to them. This stochastic interface has more in common with a map than with film since its purely symbolic operations (see Tally Jr. 2011) stem from scriptural notations drawn out by cartographic practices instead of techniques of moving in reverse and fast-forward – a possibility which Kittler omitted in his reading of Pynchon. Could it be that Kittler fell prey to the same simulation that affected each and every character of *Gravity's Rainbow*? Surprisingly, he was also looking for textual markers in a system where there were none – or only to the extent as mathematical formulations employ a narrative in describing phenomena. The extrapolation of this graphic narrative to the entire Zone happens when a time-axis-manipulation is executed between the rocket's impact and the sound it makes. Accessing this constellation inevitably exploits “the analytical tendency to divide the world into infinitely smaller units” (Molnár 2015, 14). This operation, which is capable of enacting the reversal of cause and effect, can only be retrieved through symbols in a two-dimensional space; like inverting V_2 into Δt .

Yet, Slothrop is constantly drifting away from this plane whenever he substitutes textual conspiracy for notational materiality, for instance when he reads the abbreviation IG as *Interessengemeinschaft* instead of *Imipolex G* (Pynchon 1973, 164). Misinterpreting an abbreviation is, after all, a simple case of omitting the legend, which can lead to a neurotic search for the coordinates of an origin while moving on a path in reverse during the act of going against the rocket's arc. In other words, the statements that “ Δt is just a convenience, so that it can happen” and that “[i]t all goes along together. Parallel, not series” (Pynchon 1973, 159) can only be verified on a plane that belongs with the map and thus requires two-dimensional protocols and actual paper routines.

Rockets are supposed to be like artillery shells, they disperse about the aiming point in a giant ellipse – the Ellipse of Uncertainty.. [...] And there is more to this than ballistics. [...] Aggregat is on route, nothing can be changed. No one else here cares for the penetralia of the moment, or last mysteries: there have been too many rational years. The paper has piled too thick and far. (Pynchon 1973, 425)

The blindness to that is a trait Slothrop and Kittler ultimately share; they interpret the material presence of papers piling up as contributing to classified files of bureaucracy and proof of conspiracy, and not as planes where the mixed-up orders of impact and sound, cause and effect, can be mapped out. Simply put, the narrative itself stands out as a material presence and an interpretative absence without – contrary to Kittler's claim – having to shift to celluloid from paper.



Figure 2: The arc of the missile and the arc of the narrative in *Gravity's Rainbow*. Source: <http://www.youreuropemap.com>, copyright: pocket-talk.org.

Working with physical time itself, in which the purely formative path of the missile can be mapped with formulas and arcs, nevertheless requires transformation into paper-figures (Liste Noya 1997, 530) to intercept locations, trajectories, substance. The rainbow (see Figure 2) is broken up into the frequencies of its colours, while “it is just here, just at this dark and silent frame, that the pointed tip of the Rocket, falling nearly a mile per second, absolutely and forever without sound, reaches its last unmeasurable gap above the roof of this old theatre, the last delta-t” (Pynchon 1973, 760). This event, however, cannot be simulated exclusively on the movie screen but also on the plane where the hole in the diegesis finds its place at the very moment when the V2 begins its descent along with its rotation by 90°. Paraphrasing the conclusion of the infamous *Seminar on the Purloined Letter* by Jacques Lacan in this respect we can say that missiles always fall in time with their destinations on the stochastic interface of the novel, while literature with its notations still possesses respective planes to manoeuvre on.

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