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Common Sense Geography and Mental Modelling

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CHAPTER 1
COMMON SENSE GEOGRAPHY AND MENTAL MODELLING: OPENING THE STAGE[1]

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Schon der Augenschein überzeugt uns offenbar, dass die Erde eine Kugel ist. Dennoch darf man den Augenschein nicht als Beweismittel verwenden, denn nicht alles erscheint uns so, wie es in Wahrheit ist. Daher müssen wir von dem, was uns ganz offenbar ist, auf das schließen, was uns nur zu sein scheint.
(Kleomedes, 1, 8)

Summary

Common sense geography refers to the aspect of historical geography concerned with implicit or tacit knowledge in ancient cultures. Common sense geography denotes a 'lower' geography, to be distinguished from 'professional' or 'higher' geography: that is, the phenomenon of the spread and application of geographical knowledge outside of expert circles and disciplinary contexts. Common sense geography refers finally to a 'naive' perception and description of space and the use of 'intuitive' arguments in geographical contexts. These three areas taken together have been almost fully ignored in Classical studies. The polyvalence of this concept of common sense geography captures these three aspects of our study.

1. Introduction

This volume offers a new approach to spatial orientation as implicit knowledge processes from a cross-disciplinary perspective. The title *Common Sense Geography and Mental Modelling* presents this approach *in nuce*. We are surveying and connecting ancient texts with state of the art models of mental representation. Hence, we aim to (re)construct mental models in ancient orientation in connection with cognitive psychological and cognitive linguistic methods.

First, let us deconstruct the title of the volume. Common sense *geography* refers to the aspect of historical geography concerned with implicit or tacit knowledge in ancient cultures. As such, this collection of papers implements the cognitive psychologist theory of mental models fro reading ancient descriptions of spatial orientation and navigation as presented by different writers and empirical sources, e.g. artefacts, maps, itineraries. We argue that *common* sense geography denotes a ‘lower’ geography, to be distinguished from ‘professional’ or 'higher'

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geography: that is, the phenomenon of the spread and application of geographical knowledge outside of expert circles and disciplinary contexts. Common *sense* geography refers finally to a 'naive' perception and description of space and the use of 'intuitive' arguments in geographical contexts. These three areas taken together have been almost fully ignored in Classical studies, as in other disciplines.

2. Common Sense *Geography*

In general, Ancient Geography can be described as a discipline that explores the general geographical ('physical') conditions people were living under as well as the concepts and mental maps Greeks and Romans had in their minds. Historical geographers of the Mediterranean do basic research for all branches of classics and ancient history. They work primarily with historical, philological and archaeological methods, but also – in an increasing degree – with digital methods and techniques like geographical information systems (GIS).

In the scope of our research project we deal with those notions about space(s) to which Greeks and Romans ascribed, the ways they obtained geographical knowledge, how they made use of this knowledge in terms of political, religious, cultural, scientific thinking, and last but not least how geography as a discipline evolved throughout antiquity.

Geography arose as part of cosmological reasoning. It emerged as a distinct scientific discipline not before Hellenistic times, when – and this needs more discussion – more data became available, the dependency of earthly on these celestial phenomena was called into question, and an environmental awareness and concern developed. This question of spatial hierarchy is one raised, e.g., in both common almanacs or parapegmata and scientific treatises.

Our goal here is to analyse the cultural assumptions, traditional habits and behaviours, patterns and aims of action and elementary measurement procedures in spaces. The possible scholarly gains promise to be important. Among others, we will learn more about implicit presuppositions of knowledge, review and reappraise customary termini, and offer a way to new perspective on interpreting historical events and processes.

2.1 *Common* Sense Geography

Up to now, the questions of to what extent and how geographical knowledge was spread among and stratified throughout the ancient communities has been vastly neglected, as have been such questions as who taught geography, and where and how geography was instructed

in Greek and Roman times. The main reason for this lacuna in the scholarship must lie in the state of our source material. We are pretty well informed about professional geographers like Eratosthenes or Ptolemy – and consequently there are several studies of their work – but to those more practical questions regarding the dissemination of knowledge, our sources provide access only in an oblique way. One type of source which has not been used so far, is, for example, the measurements of distances transmitted in several different ancient texts, and not only those chiefly geographical. Work remains to be done too on the Roman military diploma, the portable sun-dials, the paradoxographical literature and even on the didactic poems in order for their contribution to thinking about common geography to be valued properly.

Here we would stress the distinction between commonsensical experience and scientific understanding. The following aspects need to be studied: reception and translation of ideas; forms of discourses between community members; knowledge of laymen in comparison and contrast with that of experts; application of geographical knowledge; 'diagnostics' and 'therapy', i.e. the observation and monitoring of spaces and the intervention into them.

2.2 Common *Sense* Geography

Common sense geography was first a topic of discussion in the final decades of the last century when software writers tried to design virtual spaces. These first man-made worlds produced an awkward and phony feeling. The reason for this was these virtual scenarios were designed according to objective parameters which differ from human sensation and experience. These results agree to a large extent with studies of development psychologists like Piaget & Inhelder and Tomasello who investigate the spatial perception of children and show its difference from that of adults.

This topic of intuitive perception of space is far from fully explored and understood. We may cite the following as examples of particular human perceptions: the so-called 'hodological' orientation according to routes and streets; the alignment of administrative and religious buildings according to cardinal or compass points and sacral axis; or the negligence of the third dimension, the height, in our everyday experience of space; or the impact of insularity, the real or felt isolation of peoples and individuals who inhabit islands; and so on.

Our investigations into the subject thus far suggest that the historical aspect has been missing from recent research on spatial perception and spatial representation. Again, we cite a few instances: ancient distances are measured often in 'days', i.e. in a time, not a distance unit stricto sensu; or, the puzzling finding that maps or geographical diagrams did not play a major

role in antiquity outside of the scientific realm; or the fact that zoological and botanical information was used and applied to geographical purposes: the Indus was identified as the upper part of the Nile because crocodiles and a certain plant, the Egyptian bean, could be found either on the Indus bank and the Nile bank; or, a last example, that the distance between Spain and East India over the Atlantic Ocean was thought to be very small – because elephants live near the Pillars of Heracles and in India, an argument that no less than Aristotle will put forward in one of his books.

The central feature of common sense is that it concerns the consensus of an epistemic collective or community. Thus 'common' is not only to be understood as 'lower' (vs. 'professional' or 'higher') but also as 'shared' knowledge. Orientation according to shared beliefs and perception was discussed quite late in the history of ancient philosophy and science. The sophists were the first to discuss and formulate a theory of knowledge (Protagoras´ famous statement: 'Man is the measure of all things'). Till then, knowledge was mostly achieved and justified by divine authorities (oracles, epiphanies, dreams etc.). Opinions of – mostly anonymous – groups were often satirized and derided, e.g. by Parmenides, Heraclitus and Xenophanes. Against this background, a history of common sense must identify and denote the authorities for *doxai* and shared beliefs in geographical matters.

The polyvalence of this concept of common sense geography captures these three aspects of our study. In cognitive psychology, implicit knowledge structures are investigated arguing for specific knowledge representations systems such as mental models. At this point, we would like to point out that common sense geography has been and for the most part still is dismissed as 'knowledge' which is at best of a pre- or sub-scientific sort. The failure to investigate more fully the subject is all the more surprising given that it is an essential prerequisite to know how the paradigms of perception and representation have been predefined or preformed by those we are studying. Whether we want to reconstruct the mental maps of ancient people or to show how they Greeks and Romans moved in space, we must identity their *a priori* notions about space, the implicit knowledge or the linguistic determinants: these are all important features of common sense geography.

3. Structure of the Book

The different chapters in this volume range from the broad introduction of common sense geography (Geus & Thiering) presented here to a rather theoretical chapter on mental models and some technical tools for analysis (Thiering). The chapter entitled “Spatial Mental Models

in Common Sense Geography" serves also as the theoretical outline and platform for the following case studies. The following chapters then are all applications based in a variety of empirical sources, geographic areas, and time frames. We believe that this volume presents a new field of research and hope to trigger and gain insights into fundamental issues of spatial orientation in Antiquity.

In detail then, Thiering's comprehensive paper summarizes the connection between cognition, perception, and language in general. Thiering furthermore defines mental models or mental-frame systems, spatial frames of reference as coordinate systems for orientation, the *gestalt* theoretical notion of figure-ground asymmetries to pinpoint cognitive and linguistic reference points, the degree of specificity in language, and landmarks especially as reference points on land and on sea.

Thiering summarizes several cognitive linguistic and cognitive psychological methods and terminology serving as analytical devices for the different case studies. His goal is to implement mental models on the various implicit knowledge systems. He also plans to adjust ancient descriptions of orientation with current examples specifically in ancient and non-ancient cultures, some without writing systems. To do so the argument is that ancient techniques and descriptions of common sense geography are practices. These practices are externalized via language, but in particular in texts. The overall goal is to ask about universals vs. culture-specific patterns.

Chiai's *Thinking space: Insularity as mental model* surveys insularity as mental representation for orientation. Moreover, Chiai explores the significance and the cultural role of insularity for perception and thinking of space in the antiquity. His main argument is that the idea of islands or insularity played an important role in the ancient conception of the unknown territories in the west during the time of the so-called second Greek colonization. Chiai argues in favour of island as externalized mental models based on networks, i.e., islands serve as a dense system of reference points.

Dan's *Xenophon's Anabasis and the common Greek Mental modelling of spaces* describes a collective voyage in lands unkown to Greeks. Her study of the *Anabasis* examines the relationship between the common geographical knowledge of the Greeks returning from Babylon, and the theoretical knowledge of Anatolia possessed by an Athenian aristocrat and author of the early 4th century BC. She seeks to make inquiry of Xenophon's oral and written sources, both during and after his travels. Xenophon's readers quickly notice that the Greeks had no conception of directions and distances on their journey to the east and north of

Anatolia. Xenophon shows this ignorance by means of different narrative voices in his text (e.g. a soldier, a Pontic Greek, a local warlord, and Xenophon himself). The analysis shows that there are different degrees of geographical knowledge among the 10.000 Greeks and those whom they were visiting. Xenophon surely re-wrote his text upon the basis of further geographical knowledge, with a view to opinions of others and other Greek texts. The *Anabasis* as it has come down to us combines redactions in several phases. We do not know if it consists of several editions from Xenophon's time, or if it also includes later versions. In any case, the transmitted text exhibits several attempts to integrate common sense geography into a historical discourse

Florentina Badalanova Geller's work on *Geography of heavens in the Byzantine Commonwealth: The "Enochic" chronotope* argues that there are two models of celestial topography outlined in *2 Enoch*. They are revealed in two quite independent, although interrelated, consecutive narratives, presented by two speakers. The perspective of the first storyteller is human, while the second is divine. The first model of celestial topography is contained in Enoch's monologue, in which the visionary describes his ascent to God's throne step-by-step, heaven by heaven. In his testimony Enoch reports diligently everything he witnesses during his celestial journey. Geller argues that from Enoch's monologue knowledge of celestial cosmography can be gained, whereas God's statement discloses the secrets of cosmology. As a result, two different schemes of heavenly taxonomy emerge and are discussed in the paper. Her preliminary conclusion is simply that the analysis of celestial geography revealed in apocryphal writings composed/copied in the Byzantine Commonwealth the existence of a multi-layered common sense cosmographic model.

Mark Geller's paper on *Berossos on Kos from the view of common sense Geography* claims that it is easy to see how circular logic can creep into historiography and hardly any better example presents itself than the works of the Babylonian priest and scholar Berossos, who is thought to have composed his magnum opus, *Babyloniaka*, in Greek. Geller's paper intends to challenge the assumption that Berossos abandoned his sinecure as a temple priest in Babylon, moved to the island of Kos and founded a new 'school', based on his knowledge of Chaldean astronomy. In geopolitical terms, this tradition is remarkable in many ways, since it suggests a shift in 'knowledge transfer' from one geopolitical sphere to another, i.e. from Seleucid Babylonia to the West, which runs counter to the usual pattern associated with the Near East after Alexander, namely the almost "relentless" spread of Hellenism to the East. Berossos' presumed passage to Kos significantly alters the paradigm of Babylonian culture becoming

fully Hellenised, since it lays open the possibility that Berossos' Greek text was not produced in Babylon itself. Geller argues that common sense geography solves a problem which has hardly been recognized. The mapping of ancient science shows no traces of large-scale exchanges of scientific data between the Greek and Babylonian worlds within a few decades after Alexander, and there is no reason to assume that Berossos' work defied this trend.

Geus presents some arguments for mental models of distances to explain deviations and variants in measurements in ancient texts. Hence, he gives a glimpse into distances based on subjectivity in the seemingly objective ancient measurements, focusing on the *Histories* of Herodotus. Geus' paper on *A day's journey in Herodotus Histories* argues that the *Histories* are the earliest prose texts in Greek where space and spatiality play an important "conscious" role. Arguably, Herodotus is the first author who uses the measurement unit 'a day's journey' for terrestrial travels. Geus argues that a 'day's journey' (but other ancient measurement units, too) was subject to other factors like day's length, landscape, weather, state of the roads, condition of the traveller etc., and could vary vastly. This was recognized already in antiquity. Strabo added that the *schoinos* could vary between 30 and 120 *stades*. The Roman encyclopaedist Pliny reports the same for the Persian parasang. In light of such variability Geus asks if the terminus 'measuring tolerance' still makes sense. What is clear, though, is that the Greeks like the Persians and the Egyptians, could have very different notions of *schoinos*, *parasang*, *stadion* and especially of a day's journey. Geus focuses on Herodotus here. He claims that even when Herodotus states "I am calculating a day's journey as 200 (or 150) stades", it is not averaging in a statistical sense. He is not deriving at a means by tampering with the data. He chooses from real measurements transmitted to him by written or oral sources or he is making up the distance according to his subjective concept of a day's journey–which was of course influenced by his own personal experience.

Guckelsberger asks *What distinguishes scientific geography from common sense geography?* He focuses specifically on one of our technical terms, i.e., geography, in a rather synchronic way. He argues that psycholinguistic cognitive linguistic methods can help to analyze and bridge ancient and modern thinking of geography. Guckelsberger states that geography is narrowly understood as the art of locating points on the surface of the Earth and efficiently communicating this knowledge. Two techniques are available to achieve this goal: common sense geography (CSG) and scientific geography, both have pros and cons. Using a modern canon of what a scientific measurement should mean, a short list of historical achievements of that goal is given to help distinguish CSG from early (not so successful) scientific geography.

Moreover, Guckelsberger shows that certain judgements on early geographers depend more on erroneous interpretations by modern scholars than original flaws. He presents two known case studies a) Eratosthenes' determination of the circumference of the Earth and b) the geodesy at the upper Germanic limes and for aqueducts to argue for a common sense geography approach. Guckelsberger also includes navigation techniques such as dead reckoning, that are important for our development of mental models as implicit knowledge structure systems.

Ilyushechkina's *Spatial orientation in the didactic poem of Dionysius Periegetes* presents some first thoughts on winds as direction in Dionysius of Alexandria utilizing two traditional "naïve" or "intuitive" types of spatial survey. Her argument is that the conception of space is related to the question of the spatial orientation of the ancients, and more specifically to *periegesis*. Furthermore Ilyushechkina argues that ancient geographical literature traditionally uses natural points of orientation (constellations, winds, rivers, mountains etc.), with which the observer determines different directions or geographical objects. All geographical points of orientation depend on the perspective of an imaginary observer (and only to a very small extent to a "global", astronomical, i.e. absolute coordination-system). Dionysius' spatial orientation reflects the whole assembly of ancient mental models for orientation on land and sea, like the wind and compass directions, celestial bodies. Her research questions focus on how Dionysius orients himself in the world he describes. What means does he employ to facilitate for his reader this implicit orientation and to offer him a clearer and more vivid view of the world?

King's paper on *The creation and development of an ancient scientific »fact«: Paradoxography in the Peripatos* argues that the notion of »common sense« as it was formulated in Scottish Enlightenment philosophy and further developed in philosophical epistemology offers a conceptual frame for the analysis of pre-theoretical knowledge. King explores this conceptual frame and develops it with particular respect to the ancient tradition of paradoxography. His study presents the beginning of a philosophical and historical investigation of the epistemic norms of rationality and evidence implicit in this tradition of writing on strange (geographical) things. Special emphasis is placed on the change in the epistemological background theory which leads to the integration of folk lore and ethnographic information in Peripatetic science.

Finally, Poiss' *Looking for bird's eye view in ancient Greek sources* starts from the assumption that the hodological view of the itinerary has been widely accepted as the mental

master-model in ancient descriptions of geographic space in modern research on ancient geography. Poiss argues that it cannot have been the only mental model in ancient times for two reasons: a) there are testimonies of alternative models coming from literary genres apart from geography and historiography, and b) there are other purposes to look at landscape and toponyms even in geographic description, e.g. strategic, political, and economical. Common sense geography specifically identifies those alternative mental models, which have been hitherto mostly neglected.

The different chapters in this volume combine fundamental questions of common sense geography with case studies. Our intention is to investigate accurately the different empirical sources from different writers to implement and apply the concept of mental models on common sense geography. The idea is to bridge synchronic cognitive linguistic and cognitive psychological approaches with ancient texts from a diachronic perspective. The innovative potential lies in the historic perspective. The usefulness of this interdisciplinary approach is evident in the various case studies presented here. Surely, future research will have to sharpen and unify the different approaches. The mental modelling of common sense geography is a fruitful theoretical approach to gain deeper insights in universal and cultural-specific mnemonic representational systems.

CHAPTER 2

SPATIAL MENTAL MODELS IN COMMON SENSE GEOGRAPHY

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Keywords: Mental Models, Common Sense Geography, Implicit Knowledge, Spatial Language, Ancient Writers, Environmental Experience

Summary

A thought is generally interpreted as something expressed in words, and so it is natural to assume that its underlying representation must be in a verbal form. But words and propositions are not the only kinds of thing of which individuals are consciously aware when they are thinking. They also experience imagery; they 'see' pictures in their mind's eye with varying degrees of intensity. Do words and pictures exhaust the possible candidates for thought? […] Oatley records a variety of ways in which the Polynesian have used their world to navigate between islands without instrumentations. Such (so-called) primitive people are apparently able to accomplish accurate voyages by the use of an elegant system of 'dead reckoning'. They conceive of the boat as stationary with islands 'moving' past it, and the stars wheeling overhead. This internal representation plays a key role in their navigational system. The most important aspect of the system *for our purpose* is that it is no mere visual image. It is a dynamic 'cognitive map', a representation of the world from which spatial inference can be made. (Johnson-Laird & Wason 1977: 523, passim 526–527; italics M.Th.)

1. Introduction

Our coined term *common sense geography* is concerned with implicit or tacit knowledge of spatial orientation in ancient cultures (see introductory remarks of this volume above). This survey in particular takes one of our three aspects *common*, *sense*, and *geography* at face value, i.e., *sense*, implementing *mental models* as cognitive representation of implicit knowledge systems in orientation and specifically navigation on land and on sea.[2] The introductory quotation already presents a snap-shot of our point of departure: we believe that *common sense geography* is an internal representation of implicit knowledge structures that are only partially represented in language. Clearly, *mental models* are dynamic systems of representation. As such, we survey different systems of spatial orientation as described in ancient texts by different authors from different areas.

Our point of departure is that common sense geography has been and for the most part still is dismissed as knowledge systems which is at best of a pre- or sub-scientific sort (cf. Geus &

[2] Minsky uses the term *frame-system theory*. He proposes that "[w]hen one encounters a new situation […], one selects from memory a structure called a frame. This is a remembered framework to be adapted to fit reality by changing details as necessary. A frame is a data-structure for representing a stereotyped situation like being in a certain kind of living room or going to a child's birthday party. Attached to each frame are several kinds of information. Some of this information is about how to use the frame. Some is about what one can expect to happen next. Some is about what to do if these expectations are not confirmed. We can think of a frame as a network of nodes and relations" (Minsky 1977: 355; highlight original). Note that we use *mental models* and *frame-system theory* interchangeably.

Thiering above). The failure to investigate more fully the subject is all the more surprising given that it is an essential prerequisite to know how the paradigms of perception and representation have been predefined or preformed by those we are studying. Whether we want to reconstruct the mental models of ancient people or to show how the Greeks and Romans moved in space, we must identify their *a priori* notions about space, and the cognitive implicit knowledge or the linguistic determinants that are assumed, i.e., *mental models*. These are all important features of common sense geography, and mental models as cognitive computation mechanisms and processes in particular. The application of mental models needs to be modified since they are usually synchronically viewed from[3]. Hence, we take a diachronic stand here.

Orientation processes on land and on sea are based on some fundamentals in mental triangulation and gestalt theoretic conceptions of spatial relations (figure/ground asymmetries). A prominent example from orientation on water comes from dead reckoning as navigation without instruments (Hutchins 1996: 65–93; see also Hutchins 1983). More specifically this method in navigation depends on determining one's position at any time based on the distance and direction travelled since leaving the last known location (Gladwin 1970: 144). So, the navigator monitors the motion of the boat to determine the displacement from a previous position (Hutchins 1996: 56). This mental computing or mental triangulation, i.e., the transformation and propagation of representational states, is arguably also used on land (Hutchins 1996: 49). Hence, in addition to this method also travellers' reports, stories, symbols, icons, winds, roads or any other kind of representations are surveyed to reconstruct ancient mental models of spatial orientation based on implicit knowledge systems. Hence, our project assembles various toponyms, landmarks, and reference points in various texts to elucidate common sense geography. As such, we believe that ancient common sense geography underlies cognitive information-processing systems of spatial orientation (Marr 1982). As is argued here, the specific encoding patterns vary in the orientation reference systems. Moreover, spatial reference frames are surveyed that construe a dense matrix or gestalt-like representation of knowledge systems. As such, we survey course maintaining systems on land and on sea based on different sorts of texts. The rationale behind this is to argue in favour of mental models/cognitive maps as gestalt-like representations of environmental cues forming a dynamic mental model/cognitive map. This means that different knowledge systems of an implicit (tacit knowledge) and explicit (e.g., itineraries)

[3] Johnson-Laird (1983); but see Renn & Damerow 2007 on the historicity of mental models; see also below.

nature interact with each other to enable a traveller to find his/her way in sea or in vast terrains.[4] Arguably, such mental models have also been used in ancient cultures. As such they are of particular interest to survey questions regarding universals of spatial encoding patterns as opposed to truly culture-specific or historical ones. Clearly, different cultures differ in this respect. What might be common to all culture and hence universal is the gestalt-like constructive process of mental models (see below). These mental models function as implicit knowledge systems that enable people to explicitly navigate in a specific environment at a given time and space.

In our project we focus specifically on inscriptions, stories, and itineraries from around 2nd century A.D. especially texts from Ptolemy, Dionysios of Alexandria, Aelius Aristeides, Pausanias, Polyainos, Appianos, and also Cretan inscriptions and Greek novels. We investigate implicit knowledge as opposed to or in accordance with practical knowledge in a heterogeneous environment ranging from the Mediterranean area to mountains and rivers. The purpose is to reconstruct mental models of implicit geographic knowledge, i.e., common sense knowledge.

This paper focuses on some rather theoretical issues with regard to mental models using toponyms of environmental landmarks and topographical reference frames. Mental models represent among other things spatial information at an abstract conceptual level of cognitive representation, i.e., they are a cognitive layout of the environment and human experience as represented in long term memory (Wilson & Keil 1999: 25). Knowledge about both space and time must be integrated to provide the capability for human orientation in the environment. Humans are capable of forming sophisticated representations of spatial relations integrated as mental models. Some more central mental representations appear to be closely tied to perceptual systems (Ehrenfels 1890; Pinna 2010; Rubin 1921; Thiering 2011; Wertheimer 1923). Humans use various forms of imagery based on visual, auditory and other perceptual systems to perform internal mental processes such as mental rotation (Shepard & Metzler 1977). Tolman's results implying that animals or humans go beyond the information given when they go directly to a goal after having learned an indirect path (Tolman 1948). That conclusion is strongest when the spatial cues marking the goal location are not visible from the starting position (Wilson & Keil 1999: 135). Historically it is of particular interest to compare different texts and itineraries giving insight into the external representation of mental

[4] Renn and Damerow present an adaptation from the Cognitive Science inspired mental models onto the transmission and transformation of knowledge especially in ancient cultures (Renn & Damerow 2007).

models. Such modes may be compared to synchronic representations with respect to the question of universals.

Furthermore, this project presents some fundamental theoretical implications in adopting mental models onto ancient texts and other encoding devices. It has been argued elsewhere that maps, persons, buildings, objects, historic or fictive events are perceived at a given time and place, hence, a link is established between these cues and cognitive association. The representation of such cues is modelled in cognitive psychology as *schemas*, *frames*, *scenarios*, *scripts*, *mental models*, *mental frames* or, *cognitive maps*. These *mental models* in particular are ever so often collections of toponyms, landmarks, frames of reference and other cues that help to mentally triangulate a reference system. Objects as reference clues are defined here as follows:

> Knowledge of an object embodies knowledge of the object's spatial dimensions, that is, of the gradable characteristics of its typical, possible or actual, extension in space. Knowledge of space implies the availability of some system of axes which determine the designation of certain dimensions of, and distances between, objects in space. (Lang, Carstensen & Simmons 1991: 7)

We are interested in surveying such systems. A very specific mental model of a combination between implicit and explicit knowledge is the above mentioned practice of navigation on sea in Micronesian cultures. We adopt these practices and cognitive processes onto ancient navigation or piloting techniques on land and on sea. Micronesian cultures are known for not using actual instruments as hardware for navigation in open sea, but mental gestalt-like, as I argue here, constructions based on various implicit and explicit knowledge cues. The implicit cues are based on the construction of the so called *star compass* and based on this compass is some kind of mental triangulation (Hutchins 1983, 1996). This mental triangulation is apparent through the usage of a so called *third*, *phantom* or *emergency island* (Gladwin 1970; Oatley 1977; Sarfert 1921).[5] In addition, navigators need to know a number of islands (50–100 on average), reefs (as seamarks), water drifts, winds, wave color etc. Also, navigators are trained explicitly by elder navigators to empirically accommodate, assimilate and finally equilibrate knowledge systems using a bird's eye perspective (Piaget & Inhelder 1956; cf. Poiss this volume). They learn a vast number of information clues explicitly, but also learn how to mentally represent maps and different routes.

This paper presents the theoretical framework to explore the degree to which environmental experience and spatial orientation is reflected in ancient texts, language and practices (as

[5] This mental triangulation is summarized neatly in the following description of the Micronesian navigator's techniques claiming "[w]hen the navigator envisions in his mind's eye that the reference island is passing under a particular star he notes that a certain number of segments [etak; M.Th.] have been completed and a certain proportion of the voyage has the therefore been accomplished" (Gladwin 1970: 184).

implicit knowledge systems, e.g., mental models). It is an ethnogeographic account of place names, distances between cities or other localities, or coastlines etc. It is argued that non-linguistic information as cultural practice and implicit knowledge system has its impact upon spatial language and categorization in orientation. Furthermore it is believed that topographical information, but also scale, scope, distance of the immediate environment is represented as mental models of topographical coordinates. Data is presented showing the constructive process of environmental landmarks and cultural heritage (e.g. practices, myths, texts) upon shaping of spatial categorization. Moreover, any kinds of landmarks on land and on sea are used as proximate course-maintaining devices for orientation. These landmarks shape and determine a detailed topographical mental model of the environment as represented via language and various practices.

Reference frames are of specific importance to orient oneself in different environments. The texts under survey present interesting descriptions of environmental terrains and coordinates. The mental and perceptual course maintaining in different cultures rely arguably on mental models, i.e., the orientation techniques are processes of inference within the structure of cognitive maps. As such, they are structures of spatial reasoning, which is an activity of unconscious inference (Helmholtz 1866). The aim here is to employ mental models that draw a correspondence between the "real world" cues such as objects and places and their symbolic equivalents in the models. As such, they have the ability that knowledge is implemented from earlier experiences. They are instruments of deduction processes in the context of given knowledge (Renn & Damerow 2007: 313). They are also context-specific and do not, as opposed to gestalt theorist approaches, rely on universal mechanisms. They combine present with past experiences to form a cognitive network. This network entails also cultural–, linguistic–, historical knowledge. In the case of orientation mental models are cognitive maps and these in turn provide mental clues about the traveller's trajectory in his/her environment.

It should have become obvious so far that the project explores the degree to which environmental experience and spatial orientation is reflected in written "language", itineraries, texts and practices. It is in line with current anthropological linguistic approaches placing language and other knowledge systems in its social and cultural context, and its cultural practices (Foley 1997; Mark et al. 2011). As such, spatial knowledge is not only encoded in mental concepts or categories, but is embodied in the lived histories of human beings, and their cultural and linguistic practices as encoded in texts or maps (Foley 1997: 177; Johnson 1987). The following premise is adopted here arguing that

descriptions of space, or allusions to space in language, must rest on two kinds of knowledge. The first appears to be based on models (maps, representations) which people construct to guide *spatial behavior*. The second appears to consist of a linguistic symbol-system that allows the models to be shared within a community of discourse. (Siegel & White 1975: 11; emphasis original)

The question concerns the relationship between non-linguistic information and spatial language, i.e., environmental landmarks such as rivers, mountains, trees, winds, and the medium (time, distance, measurement data) between the landmarks etc. The argument is that non-linguistic information has its impact upon spatial language and categorization, i.e., reference to space and its relation to semiotic systems. Data points are presented indicating the influence and constructive process of environmental landmarks and cultural heritage upon shaping of spatial categorization. Burenhult and Levinson ask how landscape features appear as nameable objects and more so, whether there are universal categories (Burenhult & Levinson 2008: 136). Moreover, they argue that landmarks or rather environments are interesting features of categorization (see also Mark et al. 2011). This is indeed the case as will be shown here with regard to the texts under focus.

The aim of this project is hence to present some of the very fundamental spatial notions based on environmental or regional landmarks as transmitted and represented in ancient texts. This project deviates from the descriptions of landscape features above in the sense that it adopts mental models that are referred to in navigation techniques of orientation. This kind of navigation on land and on sea relies heavily on mental models and mental triangulation so that the navigator, traveller, or geographer has a spatial conception of their position at any time. These techniques combine implicit and explicit knowledge systems based on geographical coordinates.

2. Theoretical Basics

This paragraph presents some theoretical fundamentals of the project necessary to follow the argument of our common sense geography. The first subsection presents some cognitive techniques for orientation and navigation, i.e., landmarks, and mental models as cognitive maps. It is argued that for orientation, travellers rely on cognitive maps as a mental process of inference. This is followed by a description of ideas of space and the degrees of specificity. The section ends with some basics on figure/ground asymmetries and frames of reference. All of these theoretical issues are of importance to describe the orientation of oneself in environments using or not instruments. With respect to referring to other kind of orientational devices implicit knowledge of course maintaining and explicit knowledge of place names, buildings, rivers, coasts lines etc. serving as reference systems are at work.

In the course of argumentation some fundamental spatial concepts and representations are presented which are based on anthropomorphological spatial knowledge in different texts. Knowledge members of any culture developed on the basis of human phylogenetic adaptations, throughout their ontogenesis.

Finally, it is important to stress again that spatial cognition is externally represented in language, texts, and maps as well as in cultural-specific practices (Foley 1997: 169–178). Hence, language and practice are understood here as an external representation of mental concepts, or, as Boas puts it about hundred years ago, human language is one of the most important manifestations of mental life (Boas 1997 [1911]: 68).

To start with, the very general notion of mental models is presented followed by general comments on visual perception and cognition.

2.1 Cognitive Representation of Knowledge: Mental Models

This paragraph introduces a brief summary on mental models (Johnson-Laird 1983; van der Zee & Nikanne 2000). In general terms, mental models are cognitive ways of representing knowledge. The quotation below summarizes the idea of mental models as implicit processes of deduction. Here the example is based on Aristotelian dynamics.

> Das Beispiel dieser aristotelischen Dynamik zeigt, wie ein mentales Modell durch den Wechsel vom Medium des intuitiven Denkens zur schriftlich fixierten Sprache zum Ausgangspunkt und zur Grundfrage einer naturphilosophischen Theorie werden kann. Die aristotelische Dynamik expliziert in der Form von allgemeinen Aussagen die Struktur von intuitiven Schlussfolgerungen [...]. Das Beispiel macht darüber hinaus deutlich, dass die sprachliche Explikation intuitiver Schlussfolgerungen, indem sie Bedeutungsspielräume einengt, eine Transformation des solchen Schlussfolgerungen impliziten Wissens bewirken kann.“ (Renn & Damerow 2007: 317).

Renn and Damerow argue that the mental model of Aristotelian dynamics, specifically the motion-implies-force-model, is based on an explication of intuitive thinking of ancient philosophers. This model is not based on perception and phenomenology of the ‘Welt-an-sich’ (the world as it is), but on a mental construct, i.e., mental model. The transmission from intuitive thinking to a written language and theory shows that a mental model can be the basis for a theory. Here we see the change from implicit (declarative) to explicit (procedural) knowledge structures. More specifically, and more importantly, verbal manifestation of intuitive deduction (as in our corpus of ancient texts) profile a transformation of deduction of implicit knowledge structures.

Moreover, mental models consist of elements and relations (spatial, temporal, causal etc.) between them. Elements are prototypically objects in the world (Bryant et al. 2000: 118). Various qualitative properties can be ascribed to the objects. They enable, as we have just

seen, deductive reasoning on the basis of *a priori* knowledge. The surveyed texts in this project regard any kind of written sources as a form of externalized mental representation. Clues are represented that fill in the gaps of memory and knowledge. Hence, they are not universal, but context-specific depending on a culture, its history and the speaker. As an example of cognitive representation procedures, the TOTE unit is presented here. This unit is a cognitive procedure to calibrate between *as-is* states and *target* states in long-term memory. These units enable mental models to adapt new forms of knowledge, hence, they act as Test-Operate-Test-Exit (TOTE) procedures as a feedback system. This simply means that an incoming perceptual input I_n assimilates and accommodates to the given mental model R_n, i.e., cognitive knowledge representation (= *R*) system to eventually equilibrate the input and output systems (*as-is* vs. *target* state). This input-output mechanism is not a linear calibration, but a trial-and-error procedure through feedback systems. In simple terms, new externally triggered information (= assimilation) meets old information or representation (= accommodation) and needs to get adjusted (= equilibration). Hence, past experience is connected and combined with present experiences as outlined in semantic network theories (Jackendoff 1983: 122–127; Johnson-Laird 1983: 211–242). This new experience is embedded in a cognitive network. A simple network as a rule system is: [PLACE^{X}] → [$_{PLACE}$ PLACE-FUNCTION ([THING^{y}]). Using this rule system the English proposition *The mouse ran from under table* formally looks as follows: [$_{PATH}$ FROM ([$_{PLACE}$ UNDER ([$_{THING}$ TABLE])])]. Or *The mouse ran into the room*: [$_{PATH}$ TO ($_{PLACE}$ IN ([$_{THING}$ ROOM])])]. Clearly, the figure (the mouse), the path and location (ran into/ran from under), and the ground (table/room) are conceptual entities. These entities are linguistically encoded in English at least by prepositions, verbs of motion and other participants. The task to analyze ancient texts is to come up with a number of general rule systems to be implemented in semantic or propositional networks. Semantic networks are representation systems of knowledge in the memory. As such they are semantic relationships of conceptual or cognitive entries. Entities of abstract or concrete objects are represented as units in semantic networks (Strube et al. 1996: 422–423). Connections between units represent relations between entities. In English for example it can be argued that path is encoded via *to*, *from*, *towards*, *away from*, or *via* a thing^{y} or place^{y} (Jackendoff 1983: 166). Hence, we will identify various cognitive parameters such as figure, ground, scope, scale, perspective, and reference frames to describe common sense geography in ancient conceptions of space.

These networks enable to deduce from insufficient knowledge a coherent gestalt. Moreover, mental models bridge different levels of knowledge representing the same object or event in different knowledge structures.

Again, mental models are specific forms of knowledge representation. The quotations below summarize neatly three different approaches to define such models. The first two quotes capture the synchronic cognitive knowledge system whereas the last quotation by Renn & Damerow focuses on the historic or diachronic value of mental models.

> Mentale Modelle bezeichnen eine bestimmte Form der Repräsentation von Wissen [...]. Das Konzept des mentalen Models sieht vor, daß Menschen strukturelle und dynamische Aspekte komplexer Problembereiche des Alltags (z.B. technische Geräte, logische Schlußfolgerungen) dadurch repräsentieren, daß sie interne Modelle aufbauen, welche die jeweiligen Sachverhalte (Funktionieren einer Kaffeemaschine, Textverstehen bei Gebrauchsanweisungen, räumliche Inferenzen) anschaulich machen und mental zu simulieren erlauben. (Strube et al. 1996: 406)

> Die einzigen Wege zwischen der Welt und dem Gehirn sind Nervenstränge wie jene, die von Augen, Ohren und der Haut her kommen. Auf welche Weise gelingt es den Signalen, die durch diese Nerven gehen, uns das Gefühl zu vermitteln, uns »in« der Welt außerhalb zu befinden? Die Antwort lautet, daß dieses Gefühl eine komplexe Illusion darstellt. Wir haben nie tatsächlich *direkten* Kontakt zu der Welt außerhalb. Statt dessen arbeiten wir mit Modellen der Welt, die wir in unseren Gehirnen fertigen. (Minsky 1994: 110; emphasis added)

> Mentale Modelle verknüpfen gegenwärtige mit vergangenen Erfahrungen, indem sie neue Erfahrungen in ein kognitives Netzwerk aus vorangegangenen Erfahrungen einbetten. Sie ermöglichen so Schlüsse aus unvollständigen Informationen. (Renn & Damerow 2007: 313)

Following Strube et al. (first quotation) mental models are specific forms of knowledge representation. Mental models are problem-solving procedures built on internal models of experiences in daily routine. In other words, mental models are the ability that "human beings construct mental models of the world, and that they do so by employing tacit mental processes (Johnson-Laird 1983: X)[6]. The second quotation by Minsky argues much more epistemologically in stating that the only connections between the world and the brain are nervous systems starting from the eyes, ears, and the skin. Minsky argues in line with Radical Constructivist approaches (Helmholtz; Maturana; Merleau-Ponty; Roth; Varela; von Glasersfeld) that the idea of being directly in contact with the world is an illusion. Human beings like other animals are never in direct contact to with the world. Instead humans construe cognitively models of the world, cognition is the filter between the world and the human being, i.e., autopoietic systems are at work here. In a broader and diachronic sense the last quotation states that mental models combine past with present experiences embedding information to form cognitive networks of memory representation. Note that this is not a new idea since Fauconnier introduced his mental spaces being "structured, incrementable sets with

[6] Johnson-Laird goes on stating that "the concept is that of *recursive* mental processes that enable human beings to understand discourse, to form mental models of the real and the imaginary and to reason by manipulating such models" (1983: XI; emphasis original). The point here is the focus on tacit, or as we state, implicit knowledge.

elements (a, b, c, …) and relations holding between them (R_1ab, R_2a, R_3cbf, …), such that new elements can be added to them and new relations established between their elements" (1985: 16). Clearly, the idea of matching new with old information is highlighted here similar to Renn and Damerow. Fauconnier is very specific in his modelling of mental spaces and its relations to linguistic cues. He states that "linguistic expressions will typically establish new spaces, elements within them, and relations holding between the elements. I shall call space-builders expressions that may establish a new space or refer back to one already introduced in the discourse" (Fauconnier 1985: 17). Similar to all these approaches is a cognitive level of mental representation. Fauconnier argues in line with Nunberg that human beings establish links or connections "between objects of a different nature for psychological, cultural, or locally pragmatic reasons and that the links thus established allow reference to one object in terms of another appropriately linked to it" (Fauconnier 1985: 3). The basic argument is the Identification Principle. This principle states that two objects, a and b, are linked by a pragmatic function F ($b = F(a)$), a description of a, d_a, may be used to identify its counterpart b. The example Fauconnier uses is that this function links for example authors with the books containing their work: a = Plato, $b = F_1(a)$ = "books by Plato". The Identification Principle allows the following deduction from "Plato is on the top shelf" to 'the books by Plato are on the top shelf" (see M. Geller this volume). The first proposition encodes a description or name of a person, d_a (= Plato) that identifies an object b, i.e., the collection of books (on the book shelf) (Fauconnier 1985: 4). This principle also profiles in a connected situation a trigger that identifies the target or source domain. Clearly, it is not Plato who is on the book shelf, but his work. The decision to profile his work depends on the context. It would sound rather strange to have Plato sitting on a book shelf, but this would have been a possible world at least.

Now with respect to common sense geography mental *space builders* or *connectors*, i.e., the deduction from one information to clue a to another one b, help to model the various itineraries and reference points as outlined in the various texts by different authors or translators. We use these connectors to model semantics networks that are interrelated knowledge systems of implicit (procedural) and explicit (declarative) processes. This is even more interesting since Fauconnier clearly argues that, e.g., geographic spaces are linguistic spaces (1985: 30). Hence, we have a direct link between physical or imagined spaces and its linguistic and cognitive counterparts modelled as semantic networks.

How do we conceive of this interaction between perception and cognition? Some first glimpses in the intricate procedures are presented in the following outline.

2.2 Cognition, Perception, and Language

It is commonly agreed on in cognitive linguistics that languages reflect conceptual structure and that variation across languages encode different conceptual systems (Evans & Green 2007; Jackendoff 1983; Langacker 1987; Levinson 2003; Levinson & Wilkins 2006; Talmy 2000; Thiering 2009b). About three decades ago, the cognitive linguist (or cognitive generativist, p.c.) Ray Jackendoff asked about the nature of meaning (and we would add spatial memory) in human language, "such that we can talk about what we perceive" and "what does the grammatical structure of natural language reveal about the nature of perception and cognition?" (Jackendoff 1983: 3). He furthermore claims, as we do, that to study language *is* to study cognition. His focus though was the grammatical structure of a natural language. Three decades later cognitive linguistics has certainly revealed many insights into the intricacies of language and cognition from different interdisciplinary perspectives (Evans & Green 2007; Geeraerts & Cuyckens 2007; Langacker 2000, 2008; Levinson 2003; Levinson & Wilkins 2006). A common denominator is indeed that language gives insights into the mental world of a speaker and a speaker community. This is especially true in combing psychological theories on cognition with semantic models, i.e., semantic networks (Johnson-Laird 1983: 211)

Moreover, cognitive linguistics asks among other foci whether language actually has a constructive or determining function upon cognition, and what role visual perception has in this process (Marr 1982: 31–38, and chapter 2 on Vision; Thiering 2011). Talmy and others refer to the gestalt theoretical framework of figure/ground asymmetries in particular (Langacker 1987, 1991, 2000, 2008; Talmy 1978, 1983, 2000). Figure/ground asymmetries are essential in constructing spatial and geometrical relationships (Ehrenfels 1890; Koffka 1930; Pinna 2011; Rubin 1921; Thiering 2011; Wertheimer 1923, 1925). In visual perception, a reference object is chosen to relate a canonically smaller object in a given spatial scene (see below). This process is not only constitutive for cognitive representations of objects, events etc., but also for linguistic constructions, at least from a cognitive linguistic perspective. Those constructions are processes embedded in mental models that entail engrams. These engrams or memory chunks are cognitive meaning components, i.e., knowledge of the experienced world is represented in such mental models. These models are here named gestalts to refer to the constructive process of the speaker in his/her interaction with the perceptual world, linguistically, phenomenologically and cognitively. Hence, the idea of a

gestalt as a mental model or cognitive map is motivated here referring to the phenomenologist approach following Merleau-Ponty and the later Wittgenstein (Merleau-Ponty 1942, 1945; Wittgenstein 2006). A mental model is not a static cognitive representation, but a rather dynamic cognitive model. Changing aspects of a figure or the ground also implies changes of meaning ascription (Thiering 2011). As such the gestalt model adapts to changes in perception and various information clues that are non-linguistic and linguistic. Changes of figure/ground asymmetries support the idea that those are only partially universal across cultures, but change with respect to culture-specific and individual choices. These changes are online processing adapting to input cues, hence, mental models are dynamic representation systems. As an example, navigation on open sea not using instruments supports such gestalt-like mental models. Some information cues are wind directions, reefs, birds, and the so called third–, phantom–, or emergency island (Gladwin 1979; Hutchins 1983, 1996; Sarfert 1921). In addition landmarks such as rivers and their streaming directions, mountains, but also the star constellations determining directions and hence frames of reference for orientation are surveyed here. It is assumed here that the input clues assembling a gestalt as a cognitive mental model are multimodal, i.e., different information channels influence the cognitive apparatus. These resulting mental models, i.e., abstract mental representations are conceived as gestalts (Oatley 1977). They combine various implicit and explicit information clues that are not necessarily conscious to the speaker-hearer. With respect to cognitive economy gestalts have the advantage to gain information in a holographic manner. This sounds more far fetched than it is. A holographic visual representation needs only a small number of information clues to construe an image, usually a 3-D image (Marr 1982)[7]. This image is based on the speaker-hearer physiological apparatus and his/her cognitive structures. To form a gestalt, for example to orient oneself in a known or unknown environment, a small number of cues are sufficient to construe a gestalt-*like* representation. This gestalt is much more than a simple figure/ground asymmetry since it depends also on online computing. It adds also various other imaging parameters that set the stage for a speaker/hearer (see below for some additional imaging parameters). Note that Hutchins explicitly argues in favour of this idea stating that with respect to Micronesian navigation "a practiced navigator can construct the whole compass mentally from a glimpse of only one or two stars near the horizon" (Hutchins 1996: 70). He furthermore states that this ability is inevitable to construe a mental model for his orientation since the star bearings he needs to triangulate may not be the one's visible at

[7] This is also known from navigating without nautical instruments. A number of environmental clues are added to from a *gestalt*, a cognitive map to orient oneself on sea (see below).

the time of the voyage. Hence, "the star compass is an abstraction which can be oriented as a whole by determining the orientation of any part" (Hutchins 1996: 70).

Johnson argues furthermore that these "are gestalt structures, consisting of parts standing in relations and organized into unified wholes" (Johnson 1987: xix; cf. Miller, Johnson-Laird 1976: 47–57 on the relationship between parts and wholes in object perception).[8] In other words,

> our experience is embodied, that is, structured by the nature of the bodies we have and by our neurological organization […] the concepts we have access to and the nature of the 'reality' we think and talk about are a function of our embodiment: we can only talk about what we can perceive and conceive, and the things we can perceive and conceive derive from embodied experience. (Evans & Green 2007: 46)

The empirical support comes from different sources, e.g., geographers, historical texts, practices. Practices are simply actions of handcraft or construction sites. In the empirical sources under survey those practices encode knowledge systems transferred from one generation to the next via actual hands-on practices.

Ever since gestalt psychologists developed theories of perceptual constraints on visual perception, the extent to which language and hence symbolic function has an impact upon construing a visual scene has also been at issue (Ehrenfels 1890; Koffka 1935; Köhler 1929; Rubin 1921; Wertheimer 1923, 1925; see Merleau-Ponty 1974, 1976 on a phenomenological approach). Minsky points out that human beings always construe mental models of the world based on the structure of our brains (and added here the *body*; Minsky 1977). Hence, perception is a mediator or a process between cognition and the external world. Mental models specifically are the actual constructing devices or rather abstract mental representation of "the real world" (Johnson-Laird 1983; Krumnack et al. 2011; Minsky 1994).

The cognitive semantic approach following Langacker (1987) and Talmy (1978, 1983, 2000) adopts the figure/ground asymmetry (or Langacker's technical term trajectory/landmark[9]) and uses it for cognitive linguistic and cognitive anthropologist analysis. Broadly the distinction generally follows the syntactic division into subject and object of a sentence, but not always (Langacker 1987: 231; Thiering 2011).

[8] It should be noted here that Johnson explicitly attacks objectivist theories of meaning claiming, e.g., "meaning is an abstract relation between symbolic representations (either words or mental representations) and objective (i.e., mind-independent) reality. These symbols get their meaning solely by virtue of their capacity to correspond to things, properties, and relations existing objectively in the world" (Johnson 1987: xxii).

[9] A trajector is a "figure within a relational profile" and a landmark is "a salient substructure other than the trajectory of a relational predication or the profile of a nominal predication" (Langacker 1987: 490, 494). The profile here determines the scope of the scene or sets the stage of the scene by introducing the hearer-speaker and the object to be located and the coordinate system.

Beside the above introduced mental models, this project presents various 'ideas of space' or *Raumbilder* (Malotki 1979). Such ideas of space, i.e., the speaker's basic delimination of his/her world of experience, are important in any language and culture. A selection of such ideas of space are for example the deictic parsing of space into 'here', 'there', and 'over there' or simply 'celestial space' versus the 'earth' as encoded via 'above' and 'down'. Also ideas of space are at work such as the projective 'left' and 'right', 'in front of' and 'behind', 'up' and 'down', 'near' and 'far away', 'inside' and 'outside', 'in' and 'on', the cardinal directions 'North', 'South', 'West', and 'East', 'back' and 'forward', manmade places such as a 'house' and 'geographic places' or 'surfaces' (Malotki 1979: 294–297).[10] These surely are based on cognitive frames of reference, i.e., the cognitive descriptions of spatial arrays as reference systems serving as a shared spatial anchor (Haun et al. 2011).

The following section presents the idea of frames of reference as coordinate systems for orientation.

2.3 Frames of Reference

The meanings of verbal expressions are based on conceptualizations of figure/ground asymmetries (Thiering 2011). In addition, all facets of our general knowledge of a conceived entity contribute to the meaning of an expression which designates this entity, and by that, any sharp distinction between semantics and pragmatics is gratuitous (Nunberg 1978; Sweetser 1990). The encoding of spatial relations depends on certain spatial (and temporal) parameters that set the linguistic coordinate reference system for the speaker/hearer. In general, spatial marking is based on the three different reference frames to be selected from. These are assigned to the objects profiled in the situation (Carlson-Radvansky 1993; Carlson 1999, 2000, 2001, 2003; Coventry 2004; Levinson 2003).

The three frames of reference divide into (a) a viewer/ego-centered or relative frame as in the English example *he's to the left of the house/Hannibal venit ad portas* (assuming that from the perspective of the viewer, a person is situated to the left side of the house), (b) an object-centered or intrinsic frame as in *he's in front of the house/Hannibal est ante portas* (assuming that the front is where the main door is located; the object has an inherent front and back

[10] Note that in contrast to Hopi (the language Malotki worked on), some languages do not have true terms for cardinal directions, yet, it is believed that expressions such as 'downstream' and 'upstream' have a similar semantic function. Hence, it may be stated that selected languages also evoke a threefold system of deictic reference. Note that this three way separation is similar to, e.g., German *hier* 'here', *da* 'there', *dort* 'over there' differentiating between proximal, and distal distances taking the speaker as the anchor of her/his perspective (note the lack of a medial marker as we have seen for Hopi above).

side), and (c) an environment-centered or absolute frame as in *he's north of the house/city* or *Hannibal in septentrione urbis Romae est*.

In (a), the viewpoint depends on the location of the perceiver's vantage point and his/her relation to the figure and ground. The intrinsic frame in (b) is an object-centered reference system determined by culture-specific inherent features of the object. Finally, the absolute frame (c) is a fixed direction provided by, e.g., cardinal direction (for an extensive overview, see Levinson 2003; Levinson & Wilkins 2006).

For purposes of the current study, it is primarily the semantic features of location and direction of the figure that are singled out. It is argued here that these ascriptions are determined by cultural, environmental and language-specific affordances (Whorf 1956; Vygotskij 1964; Watzlawick 1981; Hunt & Agnoli 1991; Lucy 1992a, 1992b). These in turn depend on writer/speaker-imposed figure/ground asymmetries that are attributed to the respective objects (Talmy 1978, 1983, 2000).

It has been highlighted so far that spatial marking is based on the instantiation of three different reference frames to be selected from. These are assigned to the objects profiled in the situation (Carlson 1999, 2000, 2003; Carlson, Logan 2001; Carlson-Radvansky, Irwin 1993; Coventry, Garrod 2004; Levinson 2003). Dokic and Pacherie highlight that the use of frames of reference "involves different cognitive abilities" (2006: 264). Those distinctions into frames of reference are not absolute or clear-cut. These are highly idealized classifications that can intersect with each other. Nevertheless, frames of reference do have the advantage of spelling out the specific semantic functions and imaging parameters of language and the construer in particular to show the often highly subjectivized construction mechanisms. Grabowski proposes the following situation: a car driver drives along a road seeing at a certain distance a car parking in the direction of traffic (in this example the car is a yellow beetle) (Grabowski 1999: 14–15). The passenger asks whether she (the driver) could park *in front of* the BEETLE (the German example is: "*Halte doch bitte vor dem gelben Käfer an*!"). Now, where is *in front of the beetle*? Grabowski claims that we usually use *in front of*, and *behind* as follows: If we move towards and pass by an object, then the place appearing first is called "in front of X (any object)". The object itself (the yellow beetle) would appear first and then the location behind the object. Hence, *in front of* means that it is placed between the object (the beetle) and our perspective. *Behind the object* is the location which is beyond the actual object (away from it). But cars have their own front-end, i.e., intrinsic. *In front of the beetle* can therefore also mean something like the location of the car's fore-front which is

behind the actual beetle from the driver's perspective. We see that the choice of reference has to be specified to maintain location. Two frames of reference interfere here: the intrinsic and the relative.

Semantic structures are predications characterized relative to cognitive domains such as time, space, and color. Any cognitive structure can function as a domain for a predication (Langacker 1987: 56). Moreover, meaning is conceived as cognitive processing[11]. Expressions used to describe a presumably objective situation may differ in meaning, depending on how the situation is construed. This is known from figure/ground reversals (Thiering 2011). An expression imposes a particular image on its domain. Imagery is used as a technical term for the cognitive capacity to construe a cognitive domain in alternate ways.

2.4 Figure/Ground Asymmetries

This survey addresses this question with respect to the role of meaning in form of mental models in spatial semantics and its various figure/ground alignments. Hence, at focus are participants that are construed as foregrounded (being canonically the figure or trajector) as opposed to rather backgrounded anchorage (the expected ground or landmark) and its reversed patterns. This commonly known aspect in gestalt psychology is not limited to visual processes only, but also applies to linguistic and verbal encoding patterns (Langacker 1987; Talmy 1978, 1983, 2000; Thiering 2011).

With respect to the figure/ground asymmetry the cognitive semanticist Talmy adapts a rather simplified gestalt psychologist dichotomy. This is followed here arguing that certain cognitive categories play an important role in attributing the primary and secondary objects of a scene or stage (Talmy 1983: 230). These functions are encoded by the figure and ground of a scene – the variable element or positive space versus the reference element or negative space (Hofstadter 1980; Talmy 1978: 627, 1983: 232, 2000).

The former is the smaller and moveable object whereas the latter is usually the permanently located, larger object (see Talmy's 20 parameters for the domain of spatial configurations of figure/ground asymmetries; Talmy 1983: 277–78).

[11] Langacker argues more specifically that verbs are symbolic processes, i.e., "a verb is a symbolic expression whose semantic pole designates a **process**" (1997: 244; highlight original). Different states are profiled in such a process consisting of a figure (trajector) and a ground (landmark) in a spatial domain. The key processes are summary and sequential scanning as contrasting modes of cognitive processing. The former is an additive process, a set of events contributing to a single configuration (coexistent and simultaneously available) whereas the latter involves the transformation of one configuration or blending into another (Langacker 1987: 145; see also Fauconnier 1985 on conceptual blending).

Three basic factors determine the contrast between figure and ground: the size, movement, and position of the figure in relation to the ground in the shared knowledge of the discourse participants. Talmy states that, e.g., adpositional phrases profile relationships such as the location of the figure in relation to the ground, the time of the unfolding event, the manner in which the event unfolds, and the transition, motion and path of the figure (Talmy 2000).

Talmy adopts and simplifies the gestalt theorists figure/ground asymmetry stating that a physical object is located or moves with respect to another object which serves as a reference point (Talmy 1978: 627). This asymmetry is embedded in schematization. Schematization is the process involving the profiling of specific aspects of a reference point of a scene representing the whole gestalt (Talmy 2000; Sinha & Kuteva 1995). Talmy defines the basic asymmetry in a schematization process as follows:

> The Figure object is a moving or conceptually movable point whose paths or site is conceived as a variable [...]. The Ground object is a reference-point, having a stationary setting within a reference-frame, with respect to which the figure's path or site receives characterization. (Talmy 1978: 627, 2000: 315)

In a similar vein, the cognitive grammarian Ron Langacker defines the asymmetry as "a trajector as the figure in a relational profile; other salient entities are identified as landmarks" (Langacker 1987: 231). He argues furthermore that

> […] relational predications display an inherent asymmetry in the presentation of their participants. This asymmetry is not reducible to semantic roles, i.e. the nature of participants involvement in the profiled relationship. [...] it is observable even for predications that designate symmetrical relationships: X equals Y is not precisely equivalent semantically to Y equals X, nor is X resembles Y equivalent to Y resembles X. [...] In the expression X equals Y [...], X is referred to as a trajector, and Y as a landmark. This terminology reflects the intuitive judgment that Y provides a reference point with respect to which X is evaluated or situated [...]. (Langacker 1987: 231)

Clearly, the semantic distinction between the two conceptually based categories reflects the fundamental notion in gestalt psychology of figure and ground (Ehrenfels 1890; Köhler 1920, 1929; Koffka 1935: 177–210; Rubin 1921; Wertheimer 1923, 1925). It should be noted though that the gestalt psychologist's definition is much more complex and broader than the notions adopted in cognitive semantics. Nevertheless the basic idea of a reference object and an object that needs an anchor in a phenomenology of perception is somehow similar.

Conceptually, the cognitive semantic notion is very specific in the distribution of meaning components in a sentence. Talmy shows that arguably similar sentences such as (a) *The bike is near the house* and (b) *The house is near the bike* are not the same semantically. They present two different (inverse) forms of a symmetric relation (Talmy 2000: 314). In (a) the house is the reference object, and in (b) it is the bike, which seems unlikely naturally. Depending on the real world situation, a speaker might refer to the bike as the reference object for various reasons. Zlatev presents a similar example arguing in favour of construed

situations. In the expressions (a) *The tree is by the car* and (b) *The car is by the tree* different situations are encoded. These differences indicate different worlds of human experience, i.e., a non-objectivist approach is favoured here (Zlatev 2003: 332; see also Zlatev 2007). Hence, the semantic function chosen by the speaker does not correspond to the world of part-whole partitioning, but language-specific information. This might be due to pragmatics or cultural-specific decisions or biases. This example already reveals that language or rather writers/speakers choose to reverse alleged natural figure/ground asymmetries. The selected empirical evidence presented in our project supports this observation as well.

Talmy presents a list of various characteristics of the figure/ground asymmetry specifying the relationship such as the figure being of greater concern or relevance (more salient) as opposed to the ground being of lesser concern or relevance (more backgrounded) (Talmy 2000: 316). This semantic distribution is clearly different from the gestalt notion which is rather perceptually based on geometric coordinates (Lewin 1936).

Some of the just mentioned notions and technical terms will be used to analyse ancient cultural assumptions, traditional habits and behaviours, patterns and aims of action and elementary measurement procedures in spaces (see Geus this volume). We claim indeed that the application of cognitive psychological and cognitive semantic models onto ancient texts will enhance the implicit presuppositions of knowledge in common sense geography. We also believe that applying synchronic tools of cognitive semantic analysis will help to review and reappraise customary termini, and hence to offer a way of new perspective on interpreting historical events and processes. Moreover, the presented cognitive semantic approach is important for the analysis of the following text examples. We will survey very specific encoding patterns such as the concept of islands (Chiai), bird´s eye view (Poiss), wind directions (Dan & Ilyuchechkina), and itineraries, chorographies or descriptions of the earth (Guckelsberger), distances, measurements (travellers reports, geographical didactic poems, paradoxographical literature) and geometry (Geus; King this volume), and finally implement these different concepts into historical mental models of *common sense geography* (Thiering).

As Chiai highlights (see this volume) *insulae* functioned as utopian places or distances as transmitted via myths in ancient texts. They were references for the perception and construction of physical space. It should be noted that island do not only refer to landmasses, but are used metaphorically to encode different of physical limitations, e.g., walls, buildings etc. Chiai also points out that Strabo refers to the Egyptian usage of *chorai* meaning in the middle of a desert, an oasis (Chiai, p.c.). The point made here is that islands represent mental

models to perceive and conceive vast distances, *immensa spatia*. The concept of an island also functions as an analogy for the geometrical concept of a circle (*cingere*, *circuitus*). Another important issue is the bird´s eye view (see Poiss this volume) and the different orientation reference systems based on wind directions (see Dan & Ilyuchechkina this volume).

Moreover, cognitive and linguistic structures are both intertwined in the construction of a cognitive world in forms of mental models. Subjective decisions to relate for example objects depend not only on the cognitive apparatus, but also on the language affordances as represented by the writing system and the different practices. It is argued here that reversal patterns of figure/ground asymmetries and the various degrees of specificity (see below) indicate the human capacity for constructing and relating objects in space independent of phenomenological clues of the objective world, but based on implicit knowledge structures, i.e., mental models (Thiering 2011, 2012b). Hence, this process of ascribing meaning to a visual situation depends not only on objectively given features such as buildings, walls, cities, rivers, mountains etc., but subjective and pragmatic encoding decisions as well. In cognitive semantics this shift of aspects of semantic foci is known in the different ascriptions of phenomenological figure/ground relations. Visual aspects can shift depending on the speaker/hearer's focus and his/her construction of a spatial situation. Rubin states that

> dazu ist der Nachweis erforderlich, daß wirklich ein ansehnlicher Unterschied zwischen dem besteht, was bei ein und derselben objektiven Figur erlebt wird, wenn ein Feld, das bei einer Gelegenheit als Figur bezw. Grund, bei einer anderen Gelegenheit als Grund bezw. Figure erlebt wird. (Rubin 1921: § 4, 31)

Rubin asks basically to prove the difference between figure/ground asymmetries and there reversals. What is the reason why at a certain point a figure becomes a figure, and at another point the same figure functions as a ground or reference point. This shift in meaning has, among others, also been pursued by the later Wittgenstein. Wittgenstein differentiates between *Aspektsehen* and *Aspektblindheit* (Wittgenstein 1958: Part II: 213). He claims that *Aspekt-sehen* and *Aufleuchten eines Aspekts* are different processes (Wittgenstein 2006: Part II). I would add also that those are indeed different perceptual cognitive processes that intersect. Gestalt theoretic processes and universal laws of perception are nowadays still in use in phenomenological approaches, but background information of a speaker and attention span are added. Wittgenstein already points to the fact that universals laws do to suffice to encode spatial relations. He also adds certain criteria of experience with the perceived object. His duck-rabbit head (taken from the gestalt psychologist Jastrow) exactly highlights this fact. We perceive either a duck or a rabbit, bit never both aspects at once. In fact, we might never perceive either of the aspects unless we are told "what (else) do you see?". Hence, the context

triggers different aspects. This is expansion from classic gestalt theorist approaches is important in our current approach to implicit knowledge structures and mental models.

With respect to this survey one additional component in deciding whether figure or ground is embodied cognition is crucial. Rohrer states that the most general definition of embodiment is that "the human physical, cognitive, and social embodiment ground our conceptual and linguistic systems" (Rohrer 2007: 27). Furthermore, Johnson argues "that human bodily movement, manipulation of objects, and perceptual interactions involve recurring patterns without which our experience would be chaotic and incomprehensible […]" (Johnson 1987: xix). These recurring patterns are called *image schemas* functioning as abstract structures of mental images. In other terminologies in cognitive psychology the above mentioned *cognitive maps*, *frames*, *mental models, slots* or *scripts* are invoked each with a different focus of knowledge representation (Anderson 1990; Schanks & Abelson 1977; Neisser 1976). Mental models, as defined by Renn and Damerow (2007), have the advantage to present knowledge structures and changes of them as diachronic processes. They are hence dynamic systems and not reduced to propositional or syllogistic knowledge as Johnson-Laird argues (Johnson-Laird 1983).

With respect to parsing linguistically spatial relations the next section presents the idea of the degree of specificity, i.e., the morphosyntactic and semantic detail to encode spatial relations. This degree will be explored in particular with respect to measurements of distances (see Geus in this volume). Ancient distances are measured often in days, i.e. in a time, not a distance unit, as in many other cultures using dead reckoning strategies for example. One initial puzzling finding is that maps or geographical diagrams did not play a major role in antiquity outside of the scientific realm and the fact that zoological and botanical information was used and applied to geographical purposes. So, what are the mental models of common sense geometry in ancient texts, and how do they differ or overlap between authors?

2.5 Degree of Specificity

Historically human beings have been and still are embedded in shared cultural practices in a specific culture (Zlatev 1997; see also Johnson 1987). Naturally, this approach is also along the lines of *situated embodiment*. Linguistically such situated embodiment constructions are morphosyntactically represented. As such, one phenomenon explored here in more detail is known as the above mentioned *degree of specificity* of the figure's location with respect to the ground (Svorou 1993; Thiering 2012b). This degree of specificity is related to the amount of

detailed expressive morphosyntactic content with which spatial relations are described by the figure/ground asymmetries in various languages and texts. As an example, Svorou argues that the English prepositional phrase *on the door* has a lower degree of specificity compared to *on the left side of the door* (Svorou 1993: 6–8; see also Langacker 2008: 19, 43, 55–57; Ameka 2006: 371 for an example in Ewe). The latter specification encodes further partitions of the door into smaller regions (Thiering 2011, 2012b). Writers are required through their language, or rather language affordances to depict a visual scene in a highly specified and often highly contextualized way. These affordances are the semantic content encoded via specific morphosyntactic devices (Gibbson 1986). This is even more so considering the impact of a written system in a culture. The ability to preserve knowledge via written symbols (texts, itineraries, instruments, travellers reports, maps etc.) enables to reconstruct different mental models for, e.g., orientation. Of course, we are not able to look into an ancient writers' mind, but the inherited written texts samples can be understood as externalized representations of mental models. We argue indeed that the different empirical sources used here present a specific detail of common sense geography.

From a rather synchronic point of view, Malotki presents various facets of the Hopi language encoding spatial relations and demonstrates various *degrees of specificity* (Malotki 1979; Svorou 1993; Thiering 2012b). As we have seen, this linguistic phenomenon of the figure's location with respect to the ground is related to the amount of detailed expressive content with which spatial relations are described in various languages (Svorou 1993). Malotki states that Hopi uses a fine-grained linguistic system to encode spatial relations and, as added here, spatial concepts that also differ, to a certain degree, from most other languages (Malotki 1979: 293). The survey of such fine-grained structures in ancient sources is our point of departure to analyze common sense geography.

It should be of no surprise that different languages and cultures present language-specific affordances, i.e., the semantic content hard-wired into specific morphosyntactic devices or morphosyntactic patterns. These patterns manifest verbally mental models. As such, spatial concepts are linguistically represented in different forms, which are based in the respective language system.

Obviously ancient texts present crucial environment-dependent encoding patterns mirrored in common sense geography. The mountains, rivers, walls, buildings, bridges and cities are important limitations in various cultures. Note the difference here between small-scale (buildings, walls) and large-scale orientation (between cities). These limitations show their

repercussions in the language patterns and the carving-up of spatial concepts at the language level.

2.6 Mental Models as Cognitive Maps: Orientation as Implicit Spatial Reasoning

Referring to the introductory quotation once more, it is believed here that travellers or navigators for that matters locate their current position on the earth's surface symbolically within *mental models*, or more specifically, *cognitive maps*[12]. For orientation in the environment relying on, e.g., toponyms or landmarks, implies that the traveller must mentally compare the necessary direction of travel toward the destination with reference orientation of the respective cognitive map. The above introduced procedure of dead reckoning is of particular interest here since we believe that ancient orientation and certain techniques of navigation and pilotage are similar with respect to the invoked mental models. Navigating without instruments implies keeping distance and heading based on wind directions, reefs, tides, birds, possible visible islands, but mostly *etak* systems. According to Hutchins are not distance measures, but time related measurements (spatial duration; Hutchins 1996: 87–88; see also Gladwin). The *etak* is based on the sidereal compass, an abstract construction of star positions. Hence, a specific mental model for the relevant journey is adapted to the actual conditions, e.g., winds, visibility. The sidereal compass provides directional reference frames, but also enables the traveller to envision a third island as reference point. This third island (or emergency-, phantom island depending on the respective researcher) is a reference point to follow the distance travelled. It is over the horizon and out of sight of the first two islands that serve as reference points. As Hutchins points out, this system to encode distance travelled "in terms of the changing bearing of a reference island is called *etak*" (Hutchins 1996: 70; highlight original). The navigator knows (explicitly) the star bearings for the different inter island routes in the respective area. He also knows the star bearings of the reference island from his point of origin and the bearing of the reference island from his destination. Hence, the navigator conceptualizes the reference island starting out from a particular star (keeping in mind the sidereal compass) "and moves back abeam of the canoe during the voyage through a succession of star bearings until the canoe reaches its destination, at which time the reference island is under the point that defines the course from the destination island to the reference island" (Hutchins 1996: 70–71). Gladwin highlights that

[12] We have not used the term cognitive map here since the term *mental models* is preferred. The idea of a cognitive map might be misleading implying a mathematical coordinate system which is certainly not meant here.

the etak system does not add anything to the input of concrete information upon which the navigator bases his judgment of position and course. It is a way of organizing and synthesizing information obtained through a variety of discrete observations and nothing more. In sum, the contribution of etak is not to generate new primary information, but to provide a framework (mental model; M.Th.) into which the navigator's knowledge of rate, time, geography, and astronomy can be integrated to provide a conveniently expressed and comprehended statement of distance traveled. (Gladwin 1970: 184, 186).

This quotation is of specific interest here since it is believed that the etak system functions according to gestalt principles based on mental models for orientation. Hence, parameters such as distance, scope, scale, frames of reference, the star compass, currents, reefs, and other spatial and non-spatial information is amalgamed to form a mental model for the respective journey. The same is true for ancient or pre-modern navigation. Hutchins presents a nice example. He states that "navigation in European waters looked a good deal like a rather unsophisticated version of Micronesian navigation" (Hutchins 1996: 93). He goes on arguing that the sun and the stars were the guides in Western navigation, before the discovery of the magnetic compass needle. The most interesting example for this project is the reference to Homer's Odyssey where Homer comes home from the west

[…] by keeping the bear (the Big Dipper) on the left and sailing toward the rising of the Pleiades and Arcturus. The Pleiades and Arcturus have similar declensions (they rise out of the same point in the eastern horizon) and are 11 hours different in right ascension (they are on opposite sides of the night sky), so one or the other would be in the sky of any night regardless of season. (Hutchins 1996: 93)

Here we find at first sight practical knowledge applied in navigation, but the implicit knowledge evoked here is much more sophisticated than it seems. This linear constellation is not sufficient for orientation. In addition, the distances etak, stadia, or kenning need to be conceptualized. The implicit knowledge for longer distance is the day's sail, a distance a "normal vessel would accomplish during a twenty-four-hour run with a fresh following wind" (Hutchins cites Taylor; 1996: 94). The interesting aspect here is that the navigator requires the knowledge of the respective weather and water conditions determining a day's sail. Hutchins states that "[m]aking this judgement is probably the sort of skill that no practitioner can describe in detail" (Hutchins 1996: 94). And it is argued here that he does not need to do so since this is implicit knowledge applied if needed. At any time the navigator can estimate distance and direction to known points such as the starting point. Hence, the difficult aspect is to retain a sense of direction especially when being out of sight of any landmarks as in dead reckoning navigation (Gladwin 1976; Hutchins 1983; Oatley 1977; Sarfert 1911). This continuous application of change of location with respect to changing surroundings is embedded in implicit knowledge structures that evolve from practices.

How do ancient authors use and describe such navigating techniques on land and on sea? What is presupposed as implicit knowledge and what is construed *en passant*? We argue that

human beings as any other animal construe mental models or cognitive maps to orient themselves and to navigate in familiar and unfamiliar terrain. The bases for these maps are proximal input clues from visual perception (and other input systems), e.g., from external reference points. These maps have the advantage to not only orient oneself, but also to anticipate movements ahead, i.e., they are mental models as defined above. These movements depend on the changes of positions with respect to objects, or, landmarks. As such they are manifested in texts via different degrees of specificity. These degrees imply also the importance of the different reference frames. Cognitive maps entail not only representations of distal objects and coordinates, but also representation of spatial relations in general including unknown and not yet perceived objects. The focus here is on distal as opposed to proximal perceptions of objects. The ability is on the one hand to mentally triangulate different distances for orientation based on the body and landmark clues, but also the ability to mentally represent spatial environments and coordinates[13]. These representations are evidently necessary to orient and navigate in known and unknown terrain. Arguably, these cognitive maps are based on universal cognitive processes that are biologically and evolutionary wired in the cognitive apparatus. Hence, there is an ontogenetic development of an individual to orient and navigate depending on different cultural practices, but also a phylogenetic necessity to use specific mental models/cognitive maps.

As already argued above, it is believed here that mental models of spatial orientation are based on mental triangulation processes that endorse a cognitive compass. This cognitive compass is a conceptual representational system that computes information clues to form gestalt-like structures based on different input patters. As such we find different perspectives, distances (proximal, medial, distal), perspectives, frames of reference, scope, scale and other features that go into mental triangulation. Hence, different intermodal processes are at work here. These processes can be inferred from stories Micronesian navigators tell, but also from ancient texts in which authors describe different landmarks and toponyms that are based on implicit knowledge structures. The next section deals with landmarks as reference points specifically. It is argued here that they are a part of the respective mental models for orientation keeping track on distances and frames of reference to navigate.

[13] As such we argue in line with Hutchins that "[i]n the Western tradition of pilotage, virtually all computations involving position are carried out on nautical charts. While there are many other ways to represent the date and carry out the computations of navigation, the chart is the key representational artifact. The most obvious property of maps or a chart have correspondences with positions in a depicted large scale space. That is always true. But charts designed for navigation are something more than this. A navigation chart is essentially a carefully crafted computational device" (Hutchins 1995: 61). Hence, our proposed mental models of implicit knowledge structures are similar to Hutchins´ navigation charts as computational devices.

2.7 Landmarks as Coordinates of Orientation

Landmarks are defined here as any kind of cultural-specific environmental reference points (see Mark et al. 2011 on a collection of papers on the influence from landscape upon language; landmarks are here synonymous to topographic markers). This can be the above mentioned mountains, a river, a house, or even a tree, but also cities in general to measure distances. Landmarks are point references external to the person. In a city, landmarks may be distant buildings or geographical features that can be seen from many angles and distances, or they may be primarily local such as buildings, signs, trees, storefronts, doorknobs, or other urban details (Miller & Johnson 1976: 378). Siegel & White argue that

> landmarks are unique configurations of perceptual events (patterns). They identify a specific geographical location. A person's account of his spatial representation generally begins with landmarks, and these landmarks are the strategic foci to and from which the person moves or travels. Landmarks are used as proximate course-maintaining devices. Not only do they identify beginnings and endings, but also serve to maintain course. (Siegel & White 1975: 23)

Arguably, landmarks shape and determine a detailed topographical map of the environment as represented via written or spoken language and practices. By landmarks and the environment the following quote by Fowler and Turner summarizes the function of landmarks or geographic features in particular. This quote also summarizes the point of departure with respect to the function of environmental knowledge and its reflection in language (see also Miller & Johnson 1976: 377).

> The naming of geographic features as part of territorial marking and orientation is a common occurrence in all cultures […] topographical names reflect specific cultural interests and historical developments within the possibilities given by the morphology of the language. (Fowler & Turner 1999: 424)

Fowler and Turner clearly point out that the process of naming geographic and territorial landmarks are crucial in all cultures. More specifically they conclude that topographical names indicate particular cultural interests as represented by the language repertoire or the language-specific affordances. Indeed, data presented in this volume show a rather dense linguistic system of topographical reference frames represented, e.g., in place names, itineraries, serving as mental maps for orientation. As is argued above human beings instantiate relations between objects relying on various frames of reference that, as the name implies, serve as reference points to locate participants. These reference points anchor a specific orientation between objects and an imposed viewer (Carlson-Radvansky 1993, 1996; Carlson 2001, 2003; Levinson 2003; Levinson & Wilkins 2006). These linguistic coordinates are important for the description of topographical spatial relations and for the description of projective relations in general (Malotki 1983: 16; Thiering 2011; 2012).

Following Malotki, the term linguistic coordinate here means the division of a spatial configuration into a speaker, a hearer and a third part (a person of a thing the speaker-hearer refers to). Hence, a linguistic reference system is not a geographical or mathematical abstract concept, but a means of spatial or semiotic configuration in the linguistic encoding. We adapt this rather semiotic idea to survey ancient written text forms.

In the course of this paper some selected fundamental spatial concepts and representations are assumed based on anthropomorphological spatial knowledge in ancient cultures. Culture-specific structures and behaviours are examined reflecting experiences with local environmental conditions, e.g., rivers and mountains, or rivers and lakes, roads and coastlines as natural or manmade boundaries or important delimiting features. Fowler and Turner summarize this aspect as follows:

> If peoples choose to orient themselves to coasts or seas, rivers or mountains, the sun's path, or some other feature, some aspect of this will usually show up in their place-names. (Fowler & Turner 1999: 424)

Adopting Fowler and Turner's point some of these aspects will be shown. People in ancient cultures use indeed place names and coastal lines in their specific environments to construct a linguistically dense topographical reference system for orientation. Hence, environmental experience is represented via “language” (written or spoken) and language in turn constructs spatial concepts or mental models. We indeed have to parse out the implicit underlying presumptions which we call common sense geography.

3. Intermediate Conclusion

This paper argues for certain fundamental aspects of spatial cognition and topographical coordinates to apply to ancient geographic description of common sense geography as implicit knowledge structures. Clearly, some aspects of spatial cognition are culture specific, being shaped, for instance, by culture-specific practices of spatial orientation and organization. In our project, language, texts, pictures, monuments play a double role as external representation. On the one hand these sources are throwing light on structures of cognition and on the other they indicate some fundamental structures of knowledge, i.e., mental models or frame-system theory, in shaping spatial cognition and influencing its structure. We assume that different data points from a broad range of sources lead us to our common sense geography. This theoretical point of departure attempts to distinguish some basic aspects of spatial cognition in ancient geography. Some might be candidates for universals although they may find different expressions in different languages. Aspects of spatial topography will be shown that are truly culture specific in the sense that different

cultures develop different cognitive structures based on different environmental coordinates, i.e., culture-specific mental models. Examples of concern here will be deixis and other references to and conceptualizations of space, but also landmarks, itineraries, winds for direction, measurements, spatial data and other reference systems. Moreover, the project presents cultural and language specific *ideas of space* of the ancient world's conception of spatial, or geographical representations. Such spatial concepts are shown to be of crucial importance to describe mental models as cognitive representational systems that entail different forms of implicit and explicit knowledge. We have seen that such systems are very powerful with respect, e.g., to dead reckoning practices.

People of the Mediterranean Sea lived in complex environments, travelled long distances into dangerous terrain and usually made their way back safely (as do Micronesian seafarers using dead reckoning systems). Survival in their habitats depended on evolved capacities typical for human beings to efficiently manage orientation in space via mental models. Moreover, it depended on ontogenetic learning about the geography with its many specific features and on culturally transmitted, linguistically encoded spatial reference systems sufficiently precise to foster the process of forming cognitive maps of their land and sea. Linguistic information about the encoding of such spatial concepts in our project will be provided based on classical texts from the same time frame, e.g., Ptolemy, Dionysios of Alexandria, Aelius Aristides, Pausanias, Polyainos, Appianos. These concepts are topography-based and related to environmental landmarks. Such landmarks are mountains, rivers and lakes, and also own experience when walking to and returning from various distant places.

With respect to the notion of space, the ethnolinguist Volker Heeschen cites Konrad Lorenz who states that "human thinking is nothing but movement in space, that is, moving on probation in imagined spaces" (Heeschen 1998: 198). Hence, spatial classification implies locating objects i.e., defining places is basically deliminating or categorizing, based on the environment and the available mental models. Writers (and navigators) parse up their environment into an important and necessary topography or spatial matrix which is represented in the language and practices (dead reckoning) via a vast matrix of mountain, river or place names (the parsing up into degrees of specificity will show this process). Traditional stories, myths, and other text forms function as chronological topologies of places, i.e., they encode common sense geography. The description of such components, as Malotki rightfully points out, should include anthropological and cultural aspects of the language

(Malotki 1979: 301). These aspects find indeed their way into the cultural-specific mental models.

The interrelation of ancient cultures, environments, and written language is at focus in this project. As a working hypothesis it is assumed here that the environment acts upon mental concepts which have proven to be functioning and hence upon language and action which in turn influence the mental construction of space. This should be of no surprise since every language presents language-specific affordances, i.e., the semantic content hard-wired into specific morphosyntactic devices or morphosyntactic patterns. As such, spatial concepts are linguistically represented and differently based on the respective written language system. Malotki points out the idea of a Hopi *Raumbild* or 'idea of space' that might be cultural and language specific. Such ideas of space are also crucial for ancient mental models of geographic knowledge of the environment.

This project will also show the rich linguistic inventory of detailed spatial concepts encoded in different text forms. Finally, one can conceive the (linguistic and cognitive) meaning and the understanding of an utterance as the "concrete manifestation of a semantic horizon which generally already exists prior to the heard utterance[22].

> […] it is certainly space, which forms such a 'Sinn-Horizont' or, in other words, a principle which has a determining influence upon the semantic layer of language. (Heeschen's translation of the German original: Konkretisierung eines allgemein schon vor der gehörten Äußerung vorhandenen Sinn-Horizontes. (Hörmann 1978: 394; cited and translated by Heeschen 1998: 29)

The goal is to show the influence from culture upon language (and vice versa) and cognition. Questions such as "what is cultural or language-specific?" and "what might be candidates for universals?" frame eventually the interest in the different empirical sources under review. Certain practices, habits, and environmental landmarks clearly show repercussions upon language (as will be shown in some selected linguistic examples and text excerpts). Our insights mirror Humboldt's idea of *Weltansichten* 'world perspectives', i.e., the idea that the structure of language might influence the thought process. In North America, this concept is known as the linguistic relativity principle or Sapir–Whorf theory (cf. Lucy 1992; Levinson 2003; Levinson & Wilkins 2006). The idea is supported here that languages differ in the way they shape our world perspectives, but believe that non-linguistic information, i.e., implicit knowledge structures has its impact upon spatial language and categorization. Hence, the current research aims to show the ideas of *Raumbilder* as a web of intertwined interaction of language, culture, and cognition. This interaction is represented in different text forms based on the authors´ interpretation and presentation of actual or fictive events. The following quote

by Heeschen summarizes the function of non-linguistic, e.g., environmental, cultural etc., information upon language.

> The importance of reference to space, the social context of giving and taking, and references to non-verbal communication shape the content of the vocabulary. The characteristics and peculiarities of everyday interaction and speech follow from the fact that speech is complemented by, and related to, other semiotic systems. (Heeschen 1998: 381)

Heeschen's point of view with respect to the reference of space and its relation to semiotic systems is subscribed here. Hopefully, it will be shown that spatially implicit knowledge and orientation is embedded in cultural and linguistic practices of implicit and explicit knowledge systems. This has been outlined above as the guiding principle, i.e., that spatial knowledge is not only encoded in mental models, but also embodied in the lived histories of human beings, e.g., using instruments for measurement (gnomon, groma etc.). These histories are represented by cultural and linguistic practices of common sense geography. Hence, the notion above arguing in favour of an influence of non-linguistic information upon spatial language and categorization is of crucial importance in this project.

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CHAPTER 3
THINKING SPACE: INSULARITY AS MENTAL MODEL

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What is an island? An island is a body of more or less vast land, emerging from the water (sea, ocean, lake, rivers etc.) and surrounded by the water.[14]
This simple definition is not able to render the importance of this concept in Greek and Roman civilization. The aim of this paper is to explore the significance and the cultural role of insularity for the perception and thinking of space in the antiquity.

1. Thinking the Unknown Territories: Islands in Greek Colonization

The idea of islands or insularity played an important role in the ancient conception of unknown territories in the west during the time of the so-called second Greek colonization.15 Indeed, the first Greek colony in the west was an island, whose name, Pithekoussai, derived from an animal name (monkey),16 which probably served to emphasize both the wildness of the new unknown territories and the boundaries of the new world in the far west, inhabited by unknown peoples.17 In the historical reality off-shore islands have often been used as a first step in colonization or as trading-posts (emporia), when the mainland and the local people were unknown. Pithekoussai was also a rich trading-post, where Greeks, Italians (Etruscans) and Phoenicians lived together peacefully.18 According to Thucydides (6.3.2) the first Greek settlement in Sicily was the island Ortygia, occupied by Corinthian colonists before the foundation of Syracuse, the first Greek colony on the island. Thucydides (6.2.6) tells us also that the Phoenicians "occupied the headlands and small islands off the coasts and used them

[14] According to the definition of a social anthropologist (Waldren 2002: 1) an island may be "not just an area surrounded by the sea, but a social, political, economic, cultural unit with its own character and development, an integral part of a greater unit which may include other islands and mainlands". For a discussion of the different definitions of island and insularity see also Ampolo (2009a: 3–4).
For insularity in antiquity see Borca (2000); Ceccarelli (2009); Constantatakopoulou (2007); Gabba (1991); Marimotou-Racault (1995); Moggi (2009); Lätsch (2005); Létoublon (1996); Prontera (1998); Traina (1986); Vilatte (1991).
[15] For an overview of the mythical traditions see; Ballabriga (1986); Fabre (1981); Grilli (1991).
[16] For the literary traditions about *Pithekoussai* see Cerchiai (1996); Gras (1994); Peruzzi (1992); Torelli (1994). The texts of Strabon (5.4.9) and Livy (7.22.6) describe the island as an active center of metallurgy with an important position in the network of redistribution (see the important historical reconstruction of Ridgway (1984)).
[17] We can for example consider the traditions (Hes. *Theog.* 274–275; Plin. *NH* 6.200; Mela 3.99; Sol. 56.12; Mart. Cap. 6.702) about the so called *Gorgades insulae*, located beyond Africa's boundaries and regarded as the living place of the *gorgones*, as Pliny (*NH* 6.200) tells us: […] *contra hoc quoque promunturium Gorgades insulae narrantur, Gorgonum quondam domus* ("Opposite this cape also there are reported to be some islands, the Gorgades, which were formerly the habitation of the Gorgons". – Translation by H. Rackham). About these traditions see Bianchetti (1989). For the authors of *nesiotikà* see Ceccarelli (1989).
[18] For the presence of Greek and Phoenician settlers on the island see Buchner (1975); Docter (2000).

as post for trading with the Sicels".[19] In other words: these islands were trading-posts, without permanent settlements,[20] and combined two important elements of insularity: centrality in the system of communications, and relative isolation that provided some security for the settlers.[21]

Islands were also the places where fantastic peoples like the *Phaiakes* in *Scheria* lived,[22] or gods and magicians, like *Aiolos*[23] and *Calypso*.[24] Plato's description of Atlantis shows how islands were also perceived as utopian places.[25] Insularity also became an object of reflection in the context of historical thinking after the Peloponnesian War. Pseudo-Xenophon asked what would have happened,[26] had the Athenians inhabited an island, listing and considering the pros and cons of island life.

Additionally, insularity represented a very important mental model in ancient thought and perception of space, as the following passages from works of Greek and Latin literature will show.

2. Defining Urban Space

The first source for consideration is a text by Festus, transmitted by Paulus Diaconus, concerning the etymology of the term *insula.*

Insulae dictae proprie, quae non iunguntur communibus parietibus cum vicinis, circumituque publico aut privato cinguntur […] *a similitudine videlicet earum terrarum, quae in fluminibus ac mari eminent, suntque in salo.*

Houses, which are not connected by common walls and are surrounded by public or private streets are called *insulae* […] evidently because of the similarity with places that emerge from the rivers or from the sea, and are located in open water too.[27]

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[19] About this tradition see remarks in Musti 1990, who discusses the concept of "Phoenician landscape", and Guzzo (2008-2009). For the Phoenician colonization in Sicily see Bondì (1979, 1984, 1994, 2000, 2009); Falsone (1995).

[20] Other examples are the islands: Oreine (Arrian, *Periplus Maris Erythraei* 4); Cerne (Ps. Scylax 112) on the African coast of the Red sea; Ictis (Diod. 5.22.4) in the strait between Britain and Gaul. For the difference between *emporia* and *apoikiai* see; Osborne (1998); Purcell (2005); Ridgway (2000); Wilson (1997).

[21] See remarks by Constantatakopoulou (2007: 7–9).

[22] For an overview of these traditions see Villatte (1991: 50–55).

[23] Villatte (1991: 18, 48–50).

[24] Villatte (1991: 17–18, 32–33).

[25] For Atlantis see Forsyth (1980); Geus (2001). For the islands as utopian places see Amiotti (1988); Brun (1993); Borca (2000: 53–69); De Vido (2009).

[26] *Ath. Pol.* 2.13–16: (14) [...] εἰ γὰρ νῆσον οἰκοῦντες θαλασσοκράτορες ἦσαν Ἀθηναῖοι, ὑπῆρχεν ἂν αὐτοῖς ποιεῖν μὲν κακῶς, εἰ βούλοιντο, πάσχειν δὲ μηδέν, ἕως τῆς θαλάττης ἦρχον, μηδὲ τμηθῆναι τὴν ἑαυτῶν γῆν μηδὲ προσδέχεσθαι τοὺς πολεμίους ("If the Athenians were thalassocrats who lived on an island, it would be possible for them to inflict damage, if they so wished, but, as long as they ruled the sea to face the enemy's invasions". – Translation by J.L. Marry and P.J. Rhodes). For this tradition see Ceccarelli (1993) (with a carefully reconstruction of the historical and cultural context); Constantatakopoulou (2007: 124–125, 147–149); Fantasia (2009); Payen (1997, 292–293); Sordi (2006. 2011).

[27] For this tradition see carefully Borca (2000: 15–17 with bibliography).

The text's terminology is very interesting and deserves particular consideration. The island seems to represent the mental model for rethinking and defining the urban space of the Roman houses called *insulae*. They are isolated and surrounded by streets in a similar way to how islands are surrounded by the sea. Another very important term for understanding and defining island is the verb *eminere* (emerge), because islands are bodies of land emerging from the sea (or from rivers).

Livy can thus define the fortress of Pella in Macedonia as an *insula*, because it emerged from the marsh.[28] By means of the mountains *Aetna* und *Eryx* Sicily emerges from the sea,[29] and Cicero says that the land itself emerges from the sea water,[30] recalling the ancient world's view of the Ionian philosophers, who regarded the inhabited world (οἰκουμένη) as a large island, surrounded by the Ocean.[31]

The expression *terrae ... in salo* represents a pseudo-etymology for an island, regarded as a land in open sea.[32] Martianus Capella uses the same etymology for the islands, considered as *emergentes terras, quae, quod in salo sint, insulae vocitantur.*[33]

2.1 Defining the "Nilotic" Space

The next text for consideration is a passage by Curtius Rufus, in which he describes how the high tide invades the camps and creates hills, similar to islands:[34] The verb *eminens* emphasizes the fact that these hills emerge from the flooded landscape as islands.

Seneca (*Nat.* 4a, 2, 11) tells us,[35] how due to the Nile floods[36] the high-lying cities (*oppida*) emerge in the landscape like islands (*oppida insularum modo exstant*):

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[28] Liv. 44, 46, 6: *velut insula eminet.* Livy (2.5.4) describes with the following words the „Isola Tiberina" in Rome: *ut tamen eminens area firma templis quoque ac porticibus sustinendis esset.*

[29] Sol. 5.9: *eminet montibus Aetna et Eryce.*

[30] *Tusc.* 1.68: *globum terrae eminentem e mari.*

[31] Aristotle (*de Mundo* 3.20–22) also says: Τὴν μὲν οὖν οἰκουμένην ὁ πολὺς λόγος εἴς τε νήσους καὶ ἠπείρους, ἀγνοῶν ὅτι καὶ ἡ σύμπασα μία νῆσός ἐστιν, ὑπὸ τῆς Ἀτλαντικῆς καλουμένης θαλάσσης περιρρεομένη. For this text see remarks in Reale (1995: 265–267).

[32] The right etymology of the term *insula* is unknown. About this problem see; Ernout-Meillet (1959: 319–320); Gaheis (1932); Hamp (1969); Pisani (1934–1935); Skok (1934–1935); Rozitis (1971); Walde-Hoffmann (1938: 707–708).

[33] *Philologica* 6.643: […] *nunc quoniam continentis terrae limes interfluentis freti coercitione distinguitur, non alienum est inter fluenta emergentes terras, quae, quod in salo sint, insulae vocitantur, praesertimque nobiles commonere*. Isidorus gives the following etymology: (*orig.* 14.6.1) *Insulae dictae quod in salo sint*.

[34] Hist. 9.9.18: *Iamque aestus toto circa flumen campos inundaverat, tumulis dumtaxat eminentibus velut insulis parvis, in quos plerique trepidi, omissis navigiis, enare properant*.

[35] *Nat.* 4a.2.11: *Illa facies pulcherrima est, cum iam se in agros Nilus ingessit, latent campi opertaeque sunt valles, oppida insularum modo exstant, nullum in mediterraneis nisi per navigia commercium est, maiorque est laetitia gentibus, quo minus terrarium suarum vident.*

[36] For the Nilotic see Borca (1998).

It is a beautiful sight when the Nile has spread itself over the fields: the plains lie hidden, the valleys are covered over, towns stand out like islands. In the interior of the country there is no communication except by boat. The less people see of their land the happier they are. (Translation by T.H. Corcoran)

Using similar words in Greek Herodotus says that only the cities, because they are situated in high places, are visible in the Nilotic landscape, and that they are similar to the Aegean islands:[37]

When the Nile overflows the land, the towns alone are seen high and dry above the water, very like to the islands in the Aegean sea. (Translation by A.D. Godley)

Diodorus (1.36.8) uses almost the same expression, when he writes:[38]

And since the land is a level plain, while the cities and villages, as well as the farm houses, lie on artificial mounds, the scene comes to resemble the Cyclades Islands. (Translation by C.H. Oldfather)

Concerning these towns, Strabo (17.1.4) says:[39]

… but at the rising of the Nile the whole country is under water and becomes a lake, except the settlements; and these are situated on natural hills or an artificial mounds, and contain cities of considerable size and villages, which when viewed from afar resemble islands. (Translation by H.L. Jones)

All these passages by Latin and Greek authors from different periods show how insularity serves as a mental model for thinking about and defining the Nilotic flooded landscape.

Insularity also represented a category for the definition and perception of territories between two rivers on the mainland. Polybius recounts that the region of the Allobages north of Gallia Narbonensis was named νῆσος, because it was delimited by two rivers:[40]

Hannibal, marching steadily from the crossing-place for four days, reached a place called the „Island", a populous district producing abundance of corn and deriving its name from its situation; for the Rhone and Isère running along each side of it meet at its point. It is similar in size and shape to the Egyptian Delta; only in that case the sea forms the base line uniting the two branches of the Nile, while here the base line is formed by a range of mountains difficult to climb or penetrate, and, one may say, almost inaccessible. (Translation by W.R. Paton)

This landscape description is very interesting and deserves our consideration. The nature of the territory is characterized by the adjectives πολύοχλον and σιτοφόρον, emphasizing and praising the fertility of the soil, due to the position between two rivers. The expression ἔχουσαν δὲ τὴν προσηγορίαν ἀπ' αὐτοῦ τοῦ συμπτώματος as well as the repetition of the

[37] Hdt. 2.97: ἐπεὰν δὲ ἐπέλθῃ ὁ Νεῖλος τὴν χώρην, αἱ πόλιες μοῦναι φαίνονται ὑπερέχουσαι, μάλιστα κῃ ἐμφερέες τῇσι ἐν τῷ Αἰγαίῳ πόντῳ νήσοισι. Τὰ μὲν γὰρ ἄλλα τῆς Αἰγύπτου πέλαγος γίνεται, αἱ δὲ πόλιες μοῦναι ὑπερέχουσι. About this passage see also Corcella (1984: 71).

[38] Diod. 1.36.8–9: [...] καὶ τῆς μὲν χώρας οὔσης περιάδος, τῶν δὲ πόλεων καὶ τῶν κωμῶν, ἔτι δὲ τῶν ἀγροικιῶν κειμένων ἐπὶ χειροποιήτων χωμάτων, ἡ πρόσοψις ὁμοία γίνεται ταῖς Κυκλάσι νήσοις.

[39] 17.1.4: [...] ἐν δὲ ταῖς ἀναβάσεσι τοῦ Νείλου καλύπτεται πᾶσα καὶ πελαγίζει πλὴν τῶν χωμάτων ἵδρυνται, πόλεις τε ἀξιόλογοι καὶ κῶμαι, νησίζουσαι κατὰ τὴν πόρρωθεν ὄψιν.

[40] 3.49.5: Ἀννίβας δὲ ποιησάμενος ἐξῆς ἐπὶ τέτταρας ἡμέρας τὴν πορείαν ἀπὸ τῆς διαβάσεως ἦκε πρὸς τὴν καλούμενην Νῆσον, χώραν πολύοχλον καὶ σιτοφόρον, ἔχουσαν δὲ τὴν προσηγορίαν ἀπ' αὐτοῦ τοῦ συμπτώματος. ᾗ μὲν γὰρ ὁ Ῥοδανός, ᾗ δ''Ισάρας προσαγορευόμενος, ῥέοντες παρ' ἑκατέραν τὴν πλευράν, ἀποκορυφοῦσιν αὐτῆς τὸ σχῆμα κατὰ τὴν πρὸς ἀλλήλους σύμπτωσιν. ἔστι δὲ παραπλησία τῷ μεγέθει καὶ τῷ σχήματι τῷ κατ' Αἴγυπτον καλουμένῳ Δέλτα, πλὴν ἐκείνου μὲν θάλαττα τὴν μίαν πλευρὰν καὶ τὰς τῶν ποταμῶν ῥύσεις ἐπιζεύγνυσιν, ταύτης δ' ὄρης δυσπρόσοδα καὶ δυσέμβολα καὶ σχεδὸν ὡς εἰπεῖν ἀπρόσδιτα.

terms σύμπτωμα and σύμπτωσις stress that the origin of the place name is connected to the particular nature of the region. Another element to consider is also the relative isolation of this territory because of the surrounding mountains. The Greek terms δυσπρόσοδα and δυσέμβολα emphasize the inaccessibility (ἀπρόσδιτα) of this area, described almost as a utopic rich and secure region because of its relative isolation. Furthermore its particular triangular form leads him to compare it with the Nile Delta. The same place name is mentioned by Livy,[41] who, however, does not describe carefully the natural condition of this territory, inhabited by the Allobroges, characterizes this people as one of the most rich of Gaul, because they live in a fertile region (almost in an utopian island) (*nulla Gallica gente opibus aut fama inferior*).

2.2 Defining Oases and Desert

Insularity serves as mental model for thinking about and defining oases in the desert. Strabo says for example that the Egyptians named islands oases.[42] Oases were defined as οἰκουμέναι χώραι "inhabited places" in very large uninhabited territories, like islands in the sea. Strabo's line "the Egyptians call oases the inhabited districts" seems to emphasize that it is a local perception of the desert space. The oases are conceived as islands and, just like in the sea, they represent the sole inhabited spaces.

Strabo is not the only source, because we can find this mental model in several authors of classical literature. Pliny (*NH* 6.73) compares the oasis of the Indian desert with islands in the sea.[43] The desert is also compared with the sea by Curtius Rufus, describing Alexander's arrival with his army in the oasis of Siwa, seat of Ammon's oracle.[44] Particularly interesting is

[41] 21.31.4: *Quartis castris ad Insulam pervenit. Ibi †Sarar† Rhodanusque amnis diversis ex alpibus decurrentes, agri aliquantum amplexi confluent in unum in mediis campis; Insulae nomen inditum. Incolunt prope Allobroges, gens iam inde nulla Gallica gente opibus aut fama inferior* ("The fourth day's march brought him to the Island. There the rivers Isara and Rhone, rushing down from different Alps, unite their waters, after enclosing a considerable territory, and the Island is the name which has been given to the plains lying between them". – Translation by B.O. Foster).

[42] 17.1.5: [...] Αὐάσεις δ'οἱ Αἰγύπτιοι καλοῦσι τάς οἰκουμένας χώρας περιεχομένας κύκλῳ μεγάλαις ἐρημίαις, ὡς ἂν νήσους πελαγίας (The Egyptians call „oases" the inhabited districts which are surrounded by large deserts, like islands in the open sea. – Translation by H.L. Jones). About this passage see Wagner (1987: 113–115).

[43] *NH* 6, 73: […] *DCXXV infra solitudines Dari, Surae, iterumque solitudines per CLXXXVII, plerumque harenis ambientibus haut alio modo quam insulas mari* ("Below the deserts at a distance of 625 miles are the Dari and Surae, and then deserta gain for a distance of 187 miles, these places for the most part being surrounded by sand exactly as islands are surrounded by the sea". – Translation by H. Rackham).

[44] *Hist.* 4.7.10–12: (10) *Ac primo quidem et sequente die tollerabilis labor visus, nondum tam vastis nudisque solitudinis aditis, iam tamen sterili et emoriente terra*. (11) *Sed ut aperuere se campi alto abruti sabulo, haud secus quam profundum aequor ingress terram oculis requirebant:* (12) *nulla arbor, nullum culti soli occurrebat vestigium. Aqua etiam defecerat, quam utribus cameli vexerant et in arido solo ac fervido sabulo nulla erat* ("And indeed on the first and the following day the toil seemed endurable, since the solitudes to which they had come were not yet so desolated and barren, yet the land was already sterile and moribund. But when plains covered with deep sand disclosed themselves, just as if they had entered a vast sea, they looked in vain for land; not a tree, not a trace of cultivated soil met the eye". – Translation by J.C. Rolfe). For the representation of the

the expression *profundum aequor* "profound sea" as a characterization of this immense space.[45] In the fantastic and romantic representation of the desert space, the oases, like islands in the sea, represent for travellers of course the sole hope of survival. The image and perception of oases as islands is connected to the image of the habitability of these spaces.

The adjective *profundus* shows a dimensional (vertical) perception of sea, but the desert is *profundus* because the horizon can appear as unending for travel. So we have a horizontal perception of this space, expressed by the use of the same sea terminology.

So insularity seems to represent an important mental schema for thinking about the spaces of the oasis and the desert.

Indeed, being an important reference-point for navigation at sea, the oasis, seen as an island, has the same function for travellers in the desert.

3. The Island as Figure

Another aspect connected to insularity is the perception of islands as circles, because they are surrounded by the sea. In Latin the terms *cingere, ambire, circuitus* etc. are often found in connection with descriptions of islands.[46] The same terminology is also used in relation to other geographic spaces surrounded by water (seas, rivers, lakes), such as peninsulas. Livy tells us for example that Italy is surrounded by the upper and lower sea like an island. Another interesting testimony is that of Cicero (*Verr.* 2.4.117–119),[47] who says, while describing the topography of Syracuse, that the fourth quarter of the city, which is called *Ortigia*, is also named *insula* (*pars oppidi appellatur insula*). The origin of this place-name is connected with the perception of the peninsula (Ortigia was a peninsula at that time) as an island.

As reference points for sea travellers, islands necessarily provide variety in the *immensa spatia* of the seascape. Seneca (*Cons. ad M.* 18.5) says for example that the *insulae*, scattered

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desert as sea and the oases as islands see also Hdt. 3.26; Arrian. *Anab.* 3.3.3–4. 3.4.1; Sal. *Iug*. 79.6; Mela 1.39; Sen. *Herc. fur.* 319–321; Plin. *NH* 5.26.80; Plut. *Alex*. 26.11–12.

[45] The author of the *itinerarium Alexandri* (51) calls the desert *immensum pelagus arenarum*.

[46] See references in Borca (2000: 25–34.)

[47] *Verr.* 2.4.117–118: *Nam et situ est cum munito tum ex omni aditu vel terra vel mari praeclaro ad aspectum, et portus habet prope in aedificatione amplexuque urbis inclusos; qui cum diversos inter se aditus habeant, in exitu coniunguntur et confluunt. Eorum coniunctione pars oppidi quae appellatur Insula, mari disiuncta angusto, ponte rursus adiugitur et continetur.* LIII. *Ea tanta est urbs ut ex quattuor urbibus maximis constare dicatur; quarum una est quam dixi Insula, quae duobus portibus cincta in utriusque portus ostium aditumque proiecta est* ("Its position is not only a strong one, but beautiful to behold in whatever direction it is approached, by land or sea. Its harbours are almost enfolded in the embrace of the city buildings, their entrances far apart, but their heads approaching till they meet each other. At their meeting place, that part of the town which is called the Island, being cut off from the rest by a narrow strip of sea, is re-united with it by a connecting bridge. LIII. So large is the city that it is described as being four great cities joined together. One of these is the Island already mentioned, girdled by two harbours, and extending to their two mouths or entrances". – Translation by L.H.G. Greenwood)

in the sea, vary the seascape (*maria distingunt*).[48] In this text the expression *interventu suo* seems to allude to the active role of the islands in the differentiation of the seascape.

We also encounter this literary topos in Cicero, when the orator from Arpino praises the world's beauty together with the *pulcritudo maris* (beauty of the sea) and the *varietas insularum* (variety of the islands):[49]

> Then how great is the beauty of the sea! How glorious the aspect of its vast expanse! How many and how diverse its islands! How lovely the scenery of its coasts and shores! How numerous and different the species of marine animals, some dwelling in the depths, some floating and swimming on the surface, some clinging in their own shells to the rock! And the sea itself, yearning for the earth, sports against her shores in such a fashion that the two elements appear to be fused into one. (Translation by H. Rackham)

This variety is also considered in connection with the function of the islands as reference points for travellers. The terminology of this text deserves particular consideration. The expression *quanta pulcritudo* emphasizes the beauty of the sea together with the great number (*multitudo*) and the variety (*varietas*) of the islands. The most important element of this beauty seems be the diversity of the landscapes and seascapes.

We can look at ancient place names like *Trinakria* (for Sicily) and *Ichnoussa* (for Sardinia).[50] The former is an adjectival form, meaning "islands with three corners", because of its triangular shape. Diodorus tells us[51] that the in archaic Greek the island was called *Trinakria* because of its form (ἀπὸ μὲν τοῦ σχήματος); the use of the adverbial form τὸ παλαιὸν serves

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[48] It is a very interesting example in the bird's eye view of the world (see also Poiss this volume): (*Cons. ad M.* 18.5) *varii urbium situs et seclusae nationes locorum difficultate, quarum aliae se in erectos subtrahunt montes, aliae ripis lacu<m>, vallibus, palude circumfunduntur; adiuta cultu seges et arbusta sine cultore feritatis; et rivorum lenis inter prata discursus et amoeni situs et litora in portum recedentia; sparsae tot per vastum insulae, quae interventu suo maria distinguunt* ("You will see cities in diverse places, and the nation fenced off by natural barriers, some of them withdrawn to mountain heights, and others in their fear hugging the river-banks, lakes, and valleys; corn-fields assisted by cultivation and orchards that need none to tend their wildness; and brooks flowing gently through the meadows, lovely bays, and shores curving inwards to form a harbor; the countless islands that are scattered over the deep and, breaking up its expanse, stud the seas". – Translation by J.W. Basore)

[49] *De nat. deor.* 2.100: *At vero quanta maris est pulchritudo, quae species universi, quae multitudo et varietas insularum, quae amoenitates orarum ac litorum, quot genera quamque disparia partim submersarum, partim fluitantium et innantium belvarum, partim ad saca nativis testis inhaerentium! Ipsum autem mare sich terram appetens litoribus alludit u tuna ex duabus naturis conflate videatur.* For this Elogium of the world's beauty see Borca (2000: 35–38); Leach (1988: 86–88); Sechi (1990: 121–122).

[50] See Chiai (2002);; Frisone (2009); Geus (2012); Prontera (2009) with a carefully analysis of the ancient sources.

[51] Diod. 5.2.1: ἡ γὰρ νῆσος τὸ παλαιὸν ἀπὸ μὲν τοῦ σχήματος Τρινακρία κληθεῖσα, ἀπὸ δὲ τῶν κατοικησάντων αὐτὴν Σικανῶν Σικανία προσαγορευθεῖσα, τὸ τελευταῖον ἀπὸ Σικελῶν τῶν ἐκ τῆς Ἰταλίας πανδημεὶ περαιωθέντες ὠνόμασατι Σικελία ("The island in ancient times was called, after its shape, Trinacria, then Sicania after the Sicani who made their home there and finally it has been given the name Sicily after the Siceli who crossed over in a body to it from Italy". – Translation by C.H. Oldfather). Strabo (6.2.1): confirms this tradition: Ἔστι δ'ἡ Σικελία τρίγωνος τῷ σχήματι, καὶ διὰ τοῦτο Τρινακρία μὲν πρότερον, Θρινακρὶς δ'ὕστερον προσηγορεύθη μετονομασθεῖσα εὐφωνότερον. Τὸ δὲ σχῆμα διορίζουσι τρεῖς ἄκραι ("Sicily is triangular in shape; and for this reason it was first called „Trinakria", though later the name was changed to the more euphonios „Thrinacis". Its shape is defined by three capes". – Translation by H.L. Jones). For the different names of Sicily in antiquity see Manni (1981: 44).

to emphasize that the most ancient Greek name for the island by the Greek was *Trinakria*: a geographical entity thus derived from a geometric figure.

The latter is an adjectival form, meaning "island with the form of a foot". The origin of this place name is connected with a note by Pausanias, according to which in archaic times the Greeks visited Sardinia for commerce (κατ' ἐμπορίαν).[52] In the context of these commercial relationships the Greeks would have known and visited the island, perhaps drawing the perimeter of its coasts on a map. The origin of the place name *Trinakria* can perhaps be explained in the same context of exploration of the colonial world in the west.

So we can interpret the *varietas insularum*, praised in the literary sources, both with references to place names, derived from the forms of the islands, and to the island's role in breaking the monotony of the *immensa spatia maris*, providing important reference points for travellers.

4. Conclusions

The literary documents discussed above show how insularity represented an interesting and important mental model for thinking about and perceiving space in antiquity.

Because of their relative isolation and security islands played an important role in the early phase of the Greek colonization in the far west. They represent utopian places as well as a central mental model for thinking of the unknown boundaries of the *oikoumene*; they furnish a model to perceiving the pieces of land that emerge from the flooded landscapes as well as the deserts. The islands also represent very important reference points for sea travellers and according to the philosophical view of the world they provide for variety in the *immensa spatia* of the sea. Such a variety can be connected to the form of the islands, as the appellations of Sicily and Sardinia as *Trinakria* and *Ichnoussa* show.

[52] Pausanias (10.17.5): [...] ἡ δὲ Σαρδὼ μέγεθος μὲν καὶ εὐδαιμονίαν ἐστὶν ὁμοία ταῖς μάλιστα ἐπαινουμέναις. ὄνομα δε αὐτῇ τὸ ἀρχαῖον ὅ τι μὲν ὑπὸ τῶν ἐπιχωρίων ἐγένετο οὐκ οἶδα, Ἑλλήνων δὲ οἱ κατ'ἐμπορίαν ἐσπλέοντες Ἰχνοῦσσαν ἐκάλεσαν, ὅτι τὸ σχῆμα κατ' ἴχνος μάλιστά ἐστιν ἀνθρώπου ("In size and prosperity Sardinia is the equal of the most celebrated islands. What the ancient name was that the natives gave it I do not know, but those of the Greek who sailed there to trade called it Ichnussa, because the shape of the island is very like a man's footprint". – Translation by W.H.S. Jones). For this tradition see Rowland (1975); Ceccarelli (1996); and Geus (2012). The historians Timaios and Myrsilus confirm this tradition: (Pliny, *NH* 3.85) *Sardiniam ipsam Timaeus* (FGrHist 477, F. 11) *Sandaliotim appellavit ab effigiae solae, Myrsilus* (FGrHist 477, F. 11) *Ichnusam a similitudinem vestigii* ("Sardinia itself was called by Timaeus Sandaliotis, from the similarity of its shape to the sole of a shoe, and by Myrsilus Ichnusa, from its resemblance to a footprint". – Translation by H. Rackham) For this tradition see also remarks in Chiai (2002: 138–143). For a linguistic analysis of the place names in *–oussa* see Poccetti (1996: 51–52, 70–73). For the ancient Greek traditions about Sardinia see Bondì (1975); Chiai (2001); Breglia-Pulci-Doria (1981); Davison (1984); Mastino (1980); Nicosia (1981); Tronchetti (1986);.

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CHAPTER 4

XENOPHON'S *ANABASIS* AND THE COMMON GREEK MENTAL MODELLING OF SPACES

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1. Is the *Anabasis* a Document of Common Sense Geography?

In the first personal travelogue preserved from the Classical Antiquity, modern readers would expect to find clear traces of geographical perceptions and representations, shared by different social and cultural groups. But the text gives rise to more questions than answers. Firstly, if one supposes that common sense geography is most likely to be exposed in a worked based on concrete human experience, one has to decide whether Xenophon´s *Anabasis* corresponds to what we call an autobiography. The context in which it was written must be clarified, as much as possible: is this text based more on travel experience or on scholarship? Is the memory of this experience personal or shared by different participants and even authors of similar reports? Secondly, we should focus on what may be qualified as "common sense geography" in the present text of the *Anabasis*. The example of Hellas, as a clearly defined space with a cultural identity, helps us to understand how a familiar space – which is physically distant but psychologically present in the narration – is modelled in Greek representations of the inhabited world. But as an *oeuvre engagée*, the *Anabasis* can teach us even more: through its lines, one can perceive a unique ranking of the individual capacities of mental reconstructions of spaces. Thus, one can conclude that the study of Xenophon's text gives some clues about Greek common sense geography: about its reconstruction in a savant context, about the mental processus of spatial perceptions, about the fine manipulation of information in order to serve the purpose of a literate author.

1.1. The *Anabasis* and the Autobiographical Experience

The Anabasis is not an autobiography stricto sensu: it does not contain the "autobiographic pact", as defined by Philippe Lejeune.53 There is no identity between author, narrator and the homonymous character. Xenophon wants to convince his readers at the same time of objectivity and reliability of his information: thus, in his narrative, he willingly cuts all the

[53] Lejeune 1975, 2005. See also his Internet page http://www.autopacte.org/ (seen on 4th July 2012).

links between these three figures. Presumably, he presented his work under the name of the otherwise unknown Themistogenes of Syracuse.[54] As a result, even if his public knew that the author of the *Anabasis* related first-hand events – as expected in Greek historiography, according to the Herodotean principle of autopsy –, it was always impossible to say what Xenophon's personal experience was and what literary composition based on other knowledge.

Thus, in order to avoid anachronism, it is better to define the work as belonging to a particular genre of war memories. The author, participant in some episodes, reconstructs the full events in a narration presumed to be objective, but recognized as having a fully subjective purpose: to justify his misconduct at some moments. When compared with his predecessor, Thucydides, Xenophon's history appears at the same time more objective as well as more subjective: it is more abstract because the text is not signed and, as a consequence, there are not enough hints in order to identify the narrator with one of the characters; it is more personal because the story of the campaign identifies itself with the story of Xenophon's accession and exercise of the supreme command.

The nature of this military movement explains also the subjective character of Xenophon's geography. The abstract descriptions of older epic, logographic and historiographic works were based on a preliminary general mental representation of the oecoumene and presented as frameworks to certain actions. In the *Anabasis*, the actions are directly determined, in time, by the characteristics of successive spaces: the main part of the text, represented by the story of the κατάβασις, settles on the impossibility of the army of crossing the Tigris and the Euphrates, while attacked by the Persians. From this crucial moment on, when the Greeks are forced to take the unknown route northwards, the narration reconstructs the progressive discovery of spaces which determine actions. Thus, geographic and ethnographic references appear only episodically at key moments: places and peoples are mentioned only if they caused any harm to the Ten Thousand. The reader cannot reconstruct from the text the absolute chronology and the precise itinerary, because the author does not make enough references to the calendar and to every stage of the travel: he focuses on the subjective time and space of the group that tie in closely with the actions he wants to explain from a certain perspective.

[54] Xen. *Hell.* 3.1.2; Plut. *On the fame of the Athenians* 345e; Tzetz., *Chil.* 7.929–933 Leone. See the commentary of F. Jacoby (*FGrHist* § 108-109, Themistogenes von Syrakus and Sophainetos von Stymphalos); cf. Bux 1927. See also the interesting hypothesis of Prentice 1947, refuted especially in positivistic studies, who considered that this citizen of Syracuse was a real person and that his work was different from that of Xenophon: *e.g.* Høeg 1949.

Accordingly, even if it is not an autobiography, the *Anabasis* depends on an autobiographic experience, written down with a personal purpose. From a scientific point of view, one is tempted to suppose that the spatial perceptions and representations presented in this text should go to the core of what we call "common sense geography", an understanding of the environment accessible to a large group. But is it really Xenophon's and his companions' primary spatial knowledge that we can glean from the text?

1.2. The Writing of the *Anabasis*

1.2.1. Xenophon and the *Anabasis*

We know almost nothing about the literary context in which the final text of the *Anabasis*, transmitted until today, was elaborated. It is likely that it was written after the battle of Leuctra (371 BC, marking the end of the Spartan hegemony, refered by Xen. *Anab.* 6.6.9, cf. *Hell.* 3.1.5, as belonging to the past). At that moment Xenophon was exiled from Athens (7.7.57) and lived with his family (7.6.34) in Lacedemonia, at Scillous, near Olympia, where he consecrated a temple to the Ephesian Artemis (5.3.7–13). [55]

It is likely that at this point of his life the historian had access to different private and foreign documents and works, thanks to which he could reelaborate his own memories. However, today it is impossible to distinguish between what Xenophon learned during this campaign, from guides and other contact persons familiar with the realities of foreign lands and what he found out later from Greek oral and written sources. Scattered references suggest that the general knowledge of many of his fellow comrades-in-arms – hoplites as well as aristocratic chiefs – about the geography of inner Asia was next to nothing.

After the death of Cyrus the Younger at Cunaxa (401 BC), the first chief of the Ten Thousand, the Spartan Clearchos admits the difficulty of any of the roads chosen by the Greeks who were totally unaware of what an army should never neglect: the nature of the places, their resources and the natural and human dangers. This ignorance is expressely repeated in a speech addressed to his men (2.4.6) and in another one, pronounced in front of Tissaphernes, representative of Artaxerxes II, who was considered as the only hope at an early stage of this travel through hostile land (2.5.9):

2.4.6 (translation Carleton L. Brownson, Loeb, 1922)

ποταμὸς δ' εἰ μέν τις καὶ ἄλλος ἄρα ἡμῖν ἐστι διαβατέος οὐκ οἶδα· τὸν δ' οὖν Εὐφράτην ἴσμεν ὅτι

Then remember the rivers – there may be others, for aught I know, that we must cross, but we know about

[55] See Breitenbach (1967); more generally, Delebecque (1957).

ἀδύνατον διαβῆναι κωλυόντων πολεμίων.

the Euphrates at any rate, that it cannot possibly be crossed in the face of an enemy.

2.5.9

σὺν μὲν γὰρ σοὶ πᾶσα μὲν ὁδὸς εὔπορος, πᾶς δὲ ποταμὸς διαβατός, τῶν τε ἐπιτηδείων οὐκ ἀπορία· ἄνευ δὲ σοῦ πᾶσα μὲν διὰ σκότους ἡ ὁδός· οὐδὲν γὰρ αὐτῆς ἐπιστάμεθα· πᾶς δὲ ποταμὸς δύσπορος, πᾶς δὲ ὄχλος φοβερός, φοβερώτατον δ' ἐρημία· μεστὴ γὰρ πολλῆς ἀπορίας ἐστίν.

For, with you, every road is easy for us to traverse, every river is passable, supplies are not lacking; without you, all our road is through darkness – for none of it do we know – every river is hard to pass, every crowd excites our fears, and most fearful of all is solitude – for it is crowded full of want.

It is impossible to say whether this was also the case of Xenophon, student of Socrates. The study of sciences in the Socratic circle was sufficiently well known in order to be a topic of parody in a mainstream comedy of Aristophanes.

Clouds 200–217 (translation B. Bickley Rogers, Loeb, 1930)

Στ. πρὸς τῶν θεῶν, τί γὰρ τάδ' ἐστίν; εἰπέ μοι.
Μα. ἀστρονομία μὲν αὐτηί.
Στ. τουτὶ δὲ τί;
Μα. γεωμετρία.
Στ. τοῦτ' οὖν τί ἐστι χρήσιμον;
Μα. γῆν ἀναμετρεῖσθαι.
Στ. πότερα τὴν κληρουχικήν;
Μα. οὔκ, ἀλλὰ τὴν σύμπασαν.
Στ. ἀστεῖον λέγεις·
τὸ γὰρ σόφισμα δημοτικὸν καὶ χρήσιμον.
Μα. αὕτη δέ σοι γῆς περίοδος πάσης. ὁρᾷς;
αἵδε μὲν Ἀθῆναι.
Στ. τί σὺ λέγεις; οὐ πείθομαι,
ἐπεὶ δικαστὰς οὐχ ὁρῶ καθημένους.
Μα. ὡς τοῦτ' ἀληθῶς Ἀττικὸν τὸ χωρίον.
Στ. καὶ ποῦ Κικυννῆς εἰσίν, οὑμοὶ δημόται;
Μα. ἐνταῦθ' ἔνεισιν. ἡ δέ γ' Εὔβοι', ὡς ὁρᾷς,
ἠδὶ παρατέταται μακρὰ πόρρω πάνυ.
Στ. οἶδ'· ὑπὸ γὰρ ἡμῶν παρετάθη καὶ Περικλέους.
ἀλλ' ἡ Λακεδαίμων ποῦ 'στίν;
Μα. ὅπου 'στίν; αὐτηί.
Στ. ὡς ἐγγὺς ἡμῶν. τοῦτο μεταφροντίζετε,
ταύτην ἀφ' ἡμῶν ἀπαγαγεῖν πόρρω πάνυ.
Μα. ἀλλ' οὐχ οἷόν τε.
Στ. νὴ Δί', οἰμώξεσθ' ἄρα.

STREPSIADES. O! by the Gods, now, what are these? do tell me.
STUDENT. This is Astronomy.
ST. And what is this?
STU. Geometry.
ST. Well, what's the use of that?
STU. To mete out lands.
ST. What, for allotment grounds?
STU. No, but all lands.
ST. A choice idea, truly.
Then every man may take his choice, you mean.
STU. Look; here's a chart of the whole world. Do you see?
This city's Athens.
ST. Athens? I like that.
I see no dicasts sitting. That's not Athens.
STU. In very truth, this is the Attic ground.
ST. And where then are my townsmen of Cicynna?
STU. Why, thereabouts; and here, you see, Euboea:
Here, reaching out a long way by the shore.
ST. Yes, overreached by us and Pericles.
But now, where's Sparta?
STU. Let me see: O, here.
ST. Heavens! how near us. O do please manage this,
To shove her off from us, a long way further.

STU. We can't do that, by Zeus.

ST. The worse for you.

These verses imply that Socrates' school discussed about astronomic, geometric and geographic principles as well as about facts; thus, the comparison of this broad abstract image with the practice of Xenophon's experience in the Persian Empire is tempting. What could a young aristocrat trained there at the end of the 5th century BC really know about the geography of Asia in general and about the destination of the military campaign in which he enrolled? Did he have a more or less precise idea about the lands he was supposed to cross, at least in his initial schedule? One would expect an affirmative answer.

We have late information about regional mental maps of the Mediterranean, familiar to the Athenian youth before the expedition to Sicily (415–413 BC), in the same cultural context as that referred to by Aristophanes, at the Great Dionysia of 423 BC.[56] But even if some memory of the Classical Athenian science was preserved in these documents that went back more than six hundred years, Greek knowledge and common representations from the core of the Barbarian half of the oecoumene, inaccessible by sea, were most likely different. The scarce and precarious information available from late 5th till early 4th century sources about the topography of the Asiatic isthmus (between the Red and the Black Sea / Caucasus, on the Euphrates-Tigris line, or at the western extremity of Asia Minor, in Cappadocia) appear to bear out Clearchus' statements about the geographic ignorance of the Greeks.[57] As a consequence, Xenophon's rethinking of time-space as experienced, as part of not only a clearly defined historical purpose but also a solid scientific basis, is a highly probable scenario. Only this reconstruction provides the narration with coherence and gives due attention to Xenophon's interests.

[56] *Cf.* Plut. *Nic.* 12.1-2: "… καὶ νέους ἐν παλαίστραις καὶ γέροντας ἐν ἐργαστηρίοις καὶ ἡμικυκλίοις συγκαθεζομένους ὑπογράφειν τὸ σχῆμα τῆς Σικελίας καὶ τὴν φύσιν τῆς περὶ αὐτὴν θαλάσσης καὶ λιμένας καὶ τόπους, οἷς τέτραπται πρὸς Λιβύην ἡ νῆσος. οὐ γὰρ ἆθλον ἐποιοῦντο τοῦ πολέμου Σικελίαν, ἀλλ' ὁρμητήριον, ὡς ἀπ' αὐτῆς διαγωνισόμενοι πρὸς Καρχηδονίους καὶ σχήσοντες ἅμα Λιβύην καὶ τὴν ἐντὸς Ἡρακλείων στηλῶν θάλασσαν. // "... the youth in their training-schools and the old men in their work-shops and lounging-places would sit in clusters drawing maps of Sicily, charts of the sea about it, and plans of the harbours and districts of the island which look towards Libya. For they did not regard Sicily itself as the prize of the war, but rather as a mere base of operations, purposing therefrom to wage a contest with the Carthaginians and get possession of both Libya and of all the sea this side the Pillars of Heracles"; *Alc.* 17.3 (4): "…πολλοὺς ἐν ταῖς παλαίστραις καὶ τοῖς ἡμικυκλίοις καθέζεσθαι τῆς τε νήσου τὸ σχῆμα καὶ θέσιν Λιβύης καὶ Καρχηδόνος ὑπογράφοντας. // "Many were they who sat in the palaestras and lounging-places mapping out in the sand the shape of Sicily and the position of Libya and Carthage" (translations B. Perrin & Loeb 1916). Cf. Ael. *Var. Hist.* 3.28.

[57] *Cf.* the commentary of Lenfant (2004).

1.2.2. The Different *Anabaseis*

A good argument for this re-elaboration of the common sense geography principle could be the existence of other *Anabaseis*. If Themistogenes was probably just the pseudonym of Xenophon, a distinct *Anabasis* of Sophainetos existed at least until the end of the Antiquity: it is impossible to say whether it remained unknown for centuries – including to Plutarch –, or whether it was a late literary fake.[58] This Arcadian στρατηγός from Stymphalos is mentioned throughout Xenophon's text.[59] On the basis of four fragments attributed to him by the epitomist of Stephanos of Byzantium's *Ethnika*, some critics have tried to identify this lost *Anabasis* with the fourteenth book of Diodorus Siculus, who used Ephorus as direct source.[60] In turn, Ephorus would have used a complete version of what modern philologists call the *Hellenica Oxyrhynchia* and which has been attributed to Ephorus himself, but also to Theopompus, Kratippus and others.[61] Another *Anabasis*, perhaps this one by Sophainetos, could have provided the ultimate basis for Xenophon.[62] In any case, it seems that this tradition was probably contamined by Xenophon's text, because Diodorus (14.37.1–4) quotes him specifically for the prolongation of the campaigning with the expedition to Thrace.

Nevertheless, the only clear evidence which can be gleaned from these texts proves this reconstruction of the *Quellenforschung* to be false: where Xenophon mentions the people of Τάοχοι (*Anab.* 4.7.1, *etc.*), Diodorus (14.29.1) and perhaps Ephorus give the name of the Χάοι, while Stephanus of Byzantium quotes Sophainetos as evidence for the name Τάοι (*s.u.* "Τάοχοι" = 109 F 2). Errors are possible in any of the manuscript traditions of these authors. But all these ethnics can be explained through our modern linguistic and historical knowledge: Xenophon's Τάοχοι may be a doubly labelled plural of the Sophainetos' Τάοι, with the Caucasian suffixe of plural "*-χο" and with the Greek ending "-οι".[63] The ethnic Τάοι could have been retained by a Greek, thanks to a folk etymology, as a derivative of the name of the peacocks ("ταώς, -ω"), close to the Φασιανοί ("of Phasis" / pheasants), who where the neighbours of the Taoi/Taochoi.

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[58] See the general discussion of F. Jacoby at *FGrHist* 108–109 (Themistogenes of Syracuse and Sophainetos of Stymphalos).
[59] 1.1.11, 1.2.3, 1.2.9 (?), 2.5.37, 4.4.19, 5.3.1, 5.8.1, 6.5.13.
[60] *Cf.* 70 F 208 *apud* Diod. 14.22.2.
[61] See the articles of M.R. Cataudella, G. Schepens, M. Sordi in *Sileno* 27.1–2 (2001).
[62] Among the supporters of the survival of Sophainetos' *Anabasis* in Diodorus, see, e.g., Barber (1935: 126). Others have also proposed the existence of another work, never attested as such, written by one Phalinos, mentioned in the first two books of Xenophon's *Anabasis* as working for Thissaphernes (cf. Anderson 1974: 83, 111–112). Others consider that Ephorus used Ctesias (*e.g.* von Mess 1906a and 1906b). See also Westlake (1987), who thinks at some oral sources for the *Hellenica Oxyrhynchia*.
[63] *Cf.* Bux (1927: 1013).

In fact, this people should probably be identified with the Daiaeni-Diaeuehi of the Assyrian sources[64] and associated with the Armenian name of *Tayk'* / *Taoq* (*Tao* of the Georgians): this is the general designation of north-western part of the historical Armenia and, in a narrow sense, of the north of Vanand (the actual turkish province of Kars, on the north-west of the historical Armenian district of Basean, precisely where Xenophon puts the Taochoi in relation to the Phasianoi). On the other hand, the name of the Χάοι must be independent: it could represent the Greek attestation of the Armenian endonyme *Hayk* (maybe with the ethnic Χοί of Hecataeus).[65] Therefore, the two names (with the two linguistic variants of the first one) do not correspond to contradictory versions of the same story, but to historiographic traditions based on different sources.

As a consequence, we can be quite sure that we possess material from three accounts of the Ten Thousand's story: Xenophon, Diodorus (on the basis of unknown sources) and Sophainetos, of whom only the lexicographic tradition has preserved some minute traces. One has to admit that the only text passage that could have provided the evidence of a link between different *Anabaseis* and that represents a unique source of information contradicts such a hypothesis. The geographical and ethnographical facts of the retreat registered by Xenophon and by other historians did not correspond to what they could learn in the field. The texts probably illustrate different reelaborations. This corresponds to one of the fundamental principles of ancient descriptions of spaces and peoples: conservatism.[66] Unlike modern scientific discourse which gives priority to experimentation, ancient geography can be regarded as continuous reworkings of previous representations, which took into account new information based on autopsy, but never totally revolutionized the general picture of the world.

As a consequence, the autobiographic material which could enter into Xenophon's work passed through the filter of the tradition. In order to decide whether the *Anabasis* reflects some elements of common geography or not, the tracking and the tracing of these elements is necessary.

[64] Herzfeld (1968: 121: "§ 102). The Site of the Daiaeni – Taochoi"; Sagona-Sagona (2004: 30–37, 73–77).
[65] See Hewsen (2001). *Pace* F. Jacoby, *ad* 1 F 207.
[66] Dan (2009).

2. Greek Common Sense Geography in the *Anabasis*

In view of the specificity of the Anabasis as an objective narration of autobiographical travel and of the conservative character of the geographic and ethnographic information in ancient texts, the research of 4th century BC common sense geography in this text should not concern material facts but intellectual processes. In other words, one should not look for precise toponyms and ethnonyms which would have been known by a wide category of Greeks, but for ordinary mechanisms of appropriation and expression of foreign lands, common geographical mental models.[67]

2.1. The Mental Modelling of Hellas

The *Anabasis* reflects events which happened outside and on the fringes of Hellas (ἐπὶ ταῖς θύραις τῆς Ἑλλάδος, *Anab.* 6.5.23). The mentals projections and connections of this space, sometimes inaccessible, sometimes partially accessible to the characters, are an interesting example of the common construction of the geographical unit which forms the basis of the space-related Greek ethnic and cultural identity at the beginning of the 4th century BC. Two types of mental associations are suggestive for the implicit definition of Hellenic space: the sea (and its inland progressions) and the Occident among the cardinal directions.

2.1.1. The Sea

In the 5th century BC, the Greeks reinvented themselves as an ethnicity by opposition with their common enemy, the Persians.[68] This antagonism had geographical grounds too: the Greeks, following Plato's famous formula (*Phaedo* 109a–b), saw themselves as οἰκεῖν τοὺς μέχρι Ἡρακλείων στηλῶν ἀπὸ Φάσιδος ἐν σμικρῷ τινι μορίῳ, ὥσπερ περὶ τέλμα μύρμηκας ἢ βατράχους περὶ τὴν θάλατταν οἰκοῦντας / "dwelling between the pillars of Hercules and the river Phasis live in a small part of it about the sea, like ants or frogs about a pond." It is a cliché to speak of the *Odyssey* as an archaic, archetypal expression of the Greek Mediterranean identity and it is obvious that in Classical times the hostility between Greek and Persians was translated into a conflict between sea-related and land-based civilizations.

Under these circumstances, for the common Greek travelling to and from the core of the Asiatic part of the oecoumene, the sea was a symbol of Hellas. This explains the fame of one of the first expressions learned in the lessons of ancient Greek language, the exclamation of the soldiers who climbed on the top of the mysterious mountain Theches, in the hinterland of

[67] For the concept, see the papers and the bibliography of K. Geus and M. Thiering in this volume.
[68] See Hall (1989, 2002).

Trapezous: "θάλαττα, θάλαττα" (*Anab.* 4.7.24).[69] The hope suscitated by the first view of the Black Sea is directly proportional with the anxiety and the pain felt and expressed by Xenophon in the hinterland of the Bithynian port of Kalpe. The sea, synonym of main possibility of return to Greece, becomes here an impassable ravine, direct consequence of the difficulties of passage on a coast dominated by Sinope and Heraclea ("πόσον τι νάπος ὁ Πόντος;": 6.5.20).[70]

A further step is to consider the wide-ranging connection between lowlands and hellenisation: the degree of alienation increases as one advances from the sea to inland regions, and from the plain to the mountains. This mental model of correlation between relief and civilization – a recurring theme among different cultures of the world – can be observed, for example, in the portrait of the Carduchians, a mountainous people more barbaric than the Persian Barbarians:

3.5.16 (translation C.L. Brownson, Loeb, 1922)

τούτους (*i.e.* Καρδούχους) δὲ ἔφασαν οἰκεῖν ἀνὰ τὰ ὄρη καὶ πολεμικοὺς εἶναι, καὶ βασιλέως οὐκ ἀκούειν, ἀλλὰ καὶ ἐμβαλεῖν ποτε εἰς αὐτοὺς βασιλικὴν στρατιὰν δώδεκα μυριάδας· τούτων δ' οὐδέν' ἀπονοστῆσαι διὰ τὴν δυσχωρίαν. ὁπότε μέντοι πρὸς τὸν σατράπην τὸν ἐν τῷ πεδίῳ σπείσαιντο, καὶ ἐπιμιγνύναι σφῶν τε πρὸς ἐκείνους καὶ ἐκείνων πρὸς ἑαυτούς.	These Carduchians, they said, dwelt up among the mountains, were a warlike people, and were not subjects of the King; in fact, a royal army of one hundred and twenty thousand men had once invaded them, and, by reason of the ruggedness of the country, not a man of all that number came back. Still, whenever they made a treaty with the satrap in the plain, some of the people of the plain did have dealings with the Carduchians and some of the Carduchians with them.

Thus, unlike Herodotus and other ancient historians – who arguably structurated their stories in terms of centre-periphery and who imagined the map of the human civilization in concentric circles, like a gradual progression from the most remote and barbarous people until the Aegean middle sector –, Xenophon offers a more complex and more refined social and geographical picture of the oecoumene. From a social point of view, behind the dichotomy Greek-Barbarian, he knows about bad Greeks and good Barbarians.[71] Geographically, his "third category", the "more barbarian than the Barbarians", is not situated on the edge of the world but within it, in the mountains marking the junction between East and West and serving as a path to the Ten Thousand on their way back to Greece.

[69] *E.g.*, for the impact of this expression in the anglophone culture, see Rood (2004; see also Poiss this volume).

[70] It is possible that Xenophon's speech at Kalpe, to which belongs this pharse, was quite famous in Antiquity: he is preserved on papyri of Oxyrhynchos (*PSI* 11.1196 [*P.Cairo* Inv. JE 68899] + *PSI* 15.1485 [Inv. 287], the first available on http://ipap.csad.ox.ac.uk/PSI.html, seen on 4th July 2012).

[71] On Xenophon's Barbarians, see Briant (1989); Darbo-Peschanski (1989); Lenfant (2001). Hirsch (1985) is disappointing. The Barbarian καλοσκἀγαθός Barbarian is the educated prince Cyrus the Younger or the Thracian Seuthes: see Carlier (1978, 1984).

In the geocultural mosaic of the *Anabasis*, the sea is the most appropriate sign for Hellas and Hellenicity: this product of a certain common mental model is captured by Xenophon, and is easily understandable to the soldiers within the text and the readers of it.

2.1.2. The Occident

The second geographical emblem associated with Hellas is the Occident, as one of the cardinal points which form the general geographic frame of the *Anabasis*. This equivalence is normal for someone who has a terrestrial view from Asia and takes the sun as the principal measure. The reason for this pre-eminence of the solar course, especially in the context of travel on long distances through foreign lands to the Aegean and the continuous Hellas (Ἑλλὰς συνεχής),[72] is easy to understand: a short inventory of other types of orientation confirms the advantages of the solar system.

The simple, left-right orientation most frequently registered in the *Anabasis* serves only punctual military actions: for the στρατηγός, having the sea, a river or a country on one or other side has direct consequences on the disposition of soldiers on a march.[73] Otherwise, this relative positioning does not teach us much about Xenophon' sense of space: this system is simply consistent with the egocentrism of the narration, focused on the Greek army to the neglect of the environment, which has no direct strong impact on Xenophon's men.

Also, there is not much about winds – the episode of the difficult progress, north of the sources of the Euphrates, through a snowstorm, left to one side (4.5.3*sq*.). This comes as no surprise, when one thinks of the local character of the winds and of their deities: the sacrifice to Boreas is an interesting case of *interpretatio Graeca*, which tells more about the origin of the military chiefs (Sparta and Athens, in continental Greece, where the cold northern air was brought from Thrace by Boreas) than about the nature of the Armenian wind and the precise direction of the Ten Thousand's itinerary. Of course, this cultural borrowing was within reach of everyone, because, as Xenophon says, every single soldier was able to recognize the Boreas in the Black Sea (5.7.7, quoted *infra*).

The cardinal, global system offered much more appropriate markers for a space on a continental scale. Hence, prisoners, soldiers and chiefs seem to be familiar with the most basic

[72] For this geo-cultural concept, see Prontera (1991) and Gehrke (1992–1993); cf. the commentary of Arenz 2006. More generally, for the concept of Hellenism, see, e.g., Stier (1971) and Trédé (1991).

[73] E.g. 1.5.1, 5 (with the Euphrates on their right); 2.4.28 (Tigris on the left, near the city of Kainai); 4.8.2 (in the land of the Macrones: "εἶχον δ' ὑπὲρ δεξιῶν χωρίον οἷον χαλεπώτατον καὶ ἐξ ἀριστερᾶς ἄλλον ποταμόν, εἰς ὃν ἐνέβαλλεν ὁ ὁρίζων, δι' οὗ ἔδει διαβῆναι / Above them, on their right, they had a country of the sternest and ruggedest character, and on their left another river, into which the frontier river discharges itself, and which they must cross"); 6.1.14 (Paphlagonia on their left); 7.5.12 (the Pontus on their right).

orientation which takes into account the movements of the sun. They successfully explore unknown lands, when they have general information about the northern direction they have to follow and when they take into account the sun since its rise:

2.2.13 (translation C.L. Brownson, Loeb, 1922)

ἐπεὶ γὰρ ἡμέρα ἐγένετο, ἐπορεύοντο ἐν δεξιᾷ ἔχοντες τὸν ἥλιον, λογιζόμενοι ἥξειν ἅμα ἡλίῳ δύνοντι εἰς κώμας τῆς Βαβυλωνίας χώρας· καὶ τοῦτο μὲν οὐκ ἐψεύσθησαν.

For as soon as it was day they recommenced the journey, keeping the sun on their right, and calculating that with the westering rays they would have reached villages in the territory of Babylonia, and in this hope they were not deceived.

Moreover, on land (3.5.14-15) as well as on sea (5.7.6), exact equivalences between these elementary directions and ethnic and geographic unities seem generally accepted by Barbarians and Greeks, that is the military chiefs, some educated soldiers and Xenophon's readers:

3.5.14–15 (translation C.L. Brownson, Loeb, 1922)

… συναγαγόντες τοὺς ἑαλωκότας ἤλεγχον τὴν κύκλῳ πᾶσαν χώραν τίς ἑκάστη εἴη. οἱ δὲ ἔλεγον ὅτι τὰ πρὸς μεσημβρίαν τῆς ἐπὶ Βαβυλῶνα εἴη καὶ Μηδίαν, δι' ἧσπερ ἥκοιεν, ἡ δὲ πρὸς ἕω ἐπὶ Σοῦσά τε καὶ Ἐκβάτανα φέροι, ἔνθα θερίζειν λέγεται βασιλεύς, ἡ δὲ διαβάντι τὸν ποταμὸν πρὸς ἑσπέραν ἐπὶ Λυδίαν καὶ Ἰωνίαν φέροι, ἡ δὲ διὰ τῶν ὀρέων καὶ πρὸς ἄρκτον τετραμμένη ὅτι εἰς Καρδούχους ἄγοι.

... (the generals) brought together the prisoners that had been taken and enquired of them about each district of all the surrounding country. The prisoners said that the region to the south lay on the road towards Babylon and Media, the identical province they had just passed through; that the road to the eastward led to Susa and Ecbatana, where the King is said to spend his summers; across the river and on the west was the way to Lydia and Ionia; while the route through the mountains and northward led to the country of the Carduchians.

5.7.6–7

Ἀκούω τινὰ διαβάλλειν, ὦ ἄνδρες, ἐμὲ ὡς ἐγὼ ἄρα ἐξαπατήσας ὑμᾶς μέλλω ἄγειν εἰς Φᾶσιν. ἀκούσατε οὖν μου πρὸς θεῶν, καὶ ἐὰν μὲν ἐγὼ φαίνωμαι ἀδικεῖν, οὐ χρή με ἐνθένδε ἀπελθεῖν πρὶν ἂν δῶ δίκην· […] ὑμεῖς δέ, ἔφη, ἴστε δήπου ὅθεν ἥλιος ἀνίσχει καὶ ὅπου δύεται, καὶ ὅτι ἐὰν μέν τις εἰς τὴν Ἑλλάδα μέλλῃ ἰέναι, πρὸς ἑσπέραν δεῖ πορεύεσθαι· ἢν δέ τις βούληται εἰς τοὺς βαρβάρους, τοὔμπαλιν πρὸς ἕω. ἔστιν οὖν ὅστις τοῦτο ἂν δύναιτο ὑμᾶς ἐξαπατῆσαι ὡς ἥλιος ἔνθεν μὲν ἀνίσχει, δύεται δὲ ἐνταῦθα, ἔνθα δὲ δύεται, ἀνίσχει δ' ἐντεῦθεν; ἀλλὰ μὴν καὶ τοῦτό γε ἐπίστασθε ὅτι βορέας μὲν ἔξω τοῦ Πόντου εἰς τὴν

"I hear, soldiers, that some one is bringing a charge against me, namely, that I am going to deceive you and lead you to the Phasis. In the name of the gods, then, give ear to my words, and if it appears that I am guilty of wrong, I ought not to leave this spot without paying the penalty; [...] You doubtless know", he continued, "where the sun rises and where it sets; likewise, that if a man is to go to Greece, he must journey toward the west, while if he wishes to go to the lands of the barbarians, he must travel in the opposite direction, that is, toward the east. Now is there any one who could deceive you in this matter, by

῾Ελλάδα φέρει, νότος δὲ εἴσω εἰς Φᾶσιν, καὶ λέγεται, ὅταν βορρᾶς πνέῃ, ὡς καλοὶ πλοῖ εἰσιν εἰς τὴν ῾Ελλάδα. τοῦτ' οὖν ἔστιν ὅπως τις ἂν ὑμᾶς ἐξαπατήσαι ὥστε ἐμβαίνειν ὁπόταν νότος πνέῃ; ἀλλὰ γὰρ ὁπόταν γαλήνη ᾖ ἐμβιβῶ. οὐκοῦν ἐγὼ μὲν ἐν ἑνὶ πλοίῳ πλεύσομαι, ὑμεῖς δὲ τοὐλάχιστον ἐν ἑκατόν. πῶς ἂν οὖν ἐγὼ ἢ βιασαίμην ὑμᾶς ξὺν ἐμοὶ πλεῖν μὴ βουλομένους ἢ ἐξαπατήσας ἄγοιμι; ποιῶ δ' ὑμᾶς ἐξαπατηθέντας καὶ γοητευθέντας ὑπ' ἐμοῦ ἥκειν εἰς Φᾶσιν· καὶ δὴ ἀποβαίνομεν εἰς τὴν χώραν· γνώσεσθε δήπου ὅτι οὐκ ἐν τῇ ῾Ελλάδι ἐστέ …

maintaing that the place where it sets is the one where it rises? Again, you surely know this also, that the north wind carries one out of the Euxine to Greece, while the south wind carries you within, to the Phasis – indeed, the saying is, ‘When the north wind doth blow, fair voyaging to Greece’. In this matter, again, is it possible that any one could deceive you into embarking when the south wind is blowing? But I am going to put you abroad, you may say, when it is calm. Well, I shall be sailing on one ship, you on a hundred at least; How, then, could I either force you to voyage along with me if you did not choose, or deceive you into following my lead? But suppose you have been deceived and bewitched by me and we have come to the Phasis; we accordingly disembark upon the shore; you will perceive, likely enough, that you are not in Greece ...”

Xenophon’s speech contains three types of orientation markers which are synonyms with Hellas, as opposed to Colchis: Hellas corresponds to the sunset, the direction to which the northwind blows, and a nature which is implicit but opposed to that of Phasis’ surroundings.

Such mental correlations established between directions and countries of peoples allow the author to reconstruct the debates and the decision-making in literary *mises en scène*. These compass readings correspond to real crossroads in the history of the expedition; from these points, the army continues on its route, represented by lists of lands and peoples:

3.5.18 (translation C.L. Brownson, Loeb, 1922)

ἐδόκει δὲ τοῖς στρατηγοῖς ἀναγκαῖον εἶναι διὰ τῶν ὀρέων εἰς Καρδούχους ἐμβαλεῖν· τούτους γὰρ διελθόντας ἔφασαν εἰς ᾽Αρμενίαν ἥξειν, ἧς ᾽Ορόντας ἦρχε πολλῆς καὶ εὐδαίμονος. ἐντεῦθεν δ' εὔπορον ἔφασαν εἶναι ὅποι τις ἐθέλοι πορεύεσθαι. ἐπὶ τούτοις ἐθύσαντο, ὅπως ἡνίκα καὶ δοκοίη τῆς ὥρας τὴν πορείαν ποιοῖντο· τὴν γὰρ ὑπερβολὴν τῶν ὀρέων ἐδεδοίκεσαν μὴ προκαταληφθείη·

The opinion of the generals, however, was that they must make their way through the mountains into the country of the Carduchians; for the prisoners said that after passing through this country they would come to Armenia, the large and prosperous province of which Orontas was ruler; and from there, they said, it was easy to go in any direction one chose.

But at least a part of the Ten Thausand could understand more from solar directions. In elaborate mental maps from which Xenophon has preserved echoes, the cardinal directions can appear inscribed in bird´s-eye views, panoptic and syncretic images of the oecoumene. It is the case in the description of the Persian Empire, from Cyrus’ perspective, perfectly

compatible with what we know about the Persian representations of their world, from Achaemenid inscriptions and other Greek historians:[74]

1.7.6–7 (translation C.L. Brownson, Loeb, 1922)

ἀκούσας ταῦτα ἔλεξεν ὁ Κῦρος· ᾽Αλλ' ἔστι μὲν ἡμῖν, ὦ ἄνδρες, ἀρχὴ πατρῴα πρὸς μὲν μεσημβρίαν μέχρι οὗ διὰ καῦμα οὐ δύνανται οἰκεῖν ἄνθρωποι, πρὸς δὲ ἄρκτον μέχρι οὗ διὰ χειμῶνα· τὰ δ' ἐν μέσῳ τούτων πάντα σατραπεύουσιν οἱ τοῦ ἐμοῦ ἀδελφοῦ φίλοι. ἢν δ' ἡμεῖς νικήσωμεν, ἡμᾶς δεῖ τοὺς ἡμετέρους φίλους τούτων ἐγκρατεῖς ποιῆσαι.	When Cyrus heard that, he answered: "You forget, sirs, my father's empire stretches southwards to a region where men cannot dwell by reason of the heat, and northwards to a region uninhabitable through cold; but all the intervening space is mapped out in satrapies belonging to my brother's friends: so that if the victory be ours, it will be ours also to put our friends in possession in their room".

Unidimensional (linear, hodological, itinerary) and bidimensional (geographical) space-representations appear thus all together in what Xenophon himself assumed to be accessible geographical knowledge. From simple directions to correspondences between directions and lands with peoples, even to implicit links between directions and cultures and civilizations, the mental models which characterize the geography of the *Anabasis* are both complex and understandable, in differing degrees, to the different socio-cultural groups who participate in the action and who read the narration.

2.2. The Social and Cultural Individualization of Geographic Mental Models

At first glance, the spatial knowledge of the participants in the *Anabasis* seems standard: when writing down the text, Xenophon takes into consideration the capacity of the mental modelling of his educated audience. This represents simply the intellectual average by which he reconstructs the space of his travel experience. The initial question that prompted our inquiry returns: may we still speak of "common sense geography", if the author composes a geographical discourse, with scientific elements added to his personal experience, of spaces exterior to proper Hellas, for an elite? The answer can still be affirmative, because a careful reading reveals, if not varying degrees of knowledge, at least different capacities of adaptation of the participants into this military campaign. These distinctions do not come from literary necessities – as the ancient historian was not forced by the principle of plausibility to invent believable characters – but from the purpose of the work: Xenophon's own justification and eulogy.

[74] See Dan forthcoming.

The first distinction between spatial approaches is noticeable in the difference between the march of the army under Cyrus' command and the improvisation of the retreat. We do not know exactly how the route of the army was determined and measured during the proper ἀνάβασις, from the Aegean shore of Asia Minor towards the core of Asia.[75] But it is clear that the calculation of distances during the κατάβασις to the Black Sea and during the παράβασις on the northern Anatolian shore has nothing of the regularity and of the precision of the first itineraries. Xenophon made the improvisation which characterizes the return of the Ten Thausand one of the illustrations of his merits: on several occasions, he appears as the commander able to read the environment and to seize the opportunities it offered for the survival or the prosperity of his men.

This praise of his strategic talent can be well seen when compared with the capacities of the common mercenary. The one who accuses Xenophon at the process of Kerasous is unable to refer to the journey through Armenia other than in very general spatial and chronological terms, a mix of physical and mental sensations: Ὅπου καὶ ῥίγει ἀπωλλύμεθα καὶ χιὼν πλείστη ἦν / "In the place where we were perishing with cold and there was an enormous amount of snow" (5.8.2). Of course, Xenophon writes these words – the author, who is defending himself as much during his Lacedemonian exile as he is on the shore of the Euxine. But it preserves one of the few hints of what could have been the "lower" geography of the Greeks, the most common perceptions and reconstructions of unusual spaces.

Thus, if the topic of the *Anabasis* does not allow us to reconstruct the main core of Greek common sense geography – which must have been the perception and the representation of immediate spaces, strangely absent from classical texts –, it informs us about the mental modelling of the distant πάτρις and of the close, foreign and hostile lands. Despite the scientific and historical constraints, the text betrays variations in these mental processes, as much as it maintains its internal coherence and aims.

3. Conclusion

As a document of common sense geography, the *Anabasis* is satisfying and unsatisfying at the same time: it does not provide insights into what "normal" people could think about a "normal" environment; it does not teach us what a wider category of Greeks, of different *poleis*, could have known about Persia in particular and the oecoumene in general; it does not

[75] Nevertheless, there are some archaeological proofs of the boundary marking of achaemenid routes. See Callieri 1995, with Bernard 1995; we have also some information about Alexander's bematists (cf. Matthews 1974) an institution which could have Persian origins.

even show what Xenophon, pupil of Socrates, knew about the geography of the military campaign when he got involved in this adventure. The evidence of the *Anabasis* is useful for a much more sophisticated analysis: it illustrates the re-elaboration of an autobiographic experience into the Greek savant and aristocratic world of the beginning of the 4th century. It offers simple definitions of Hellas, an essential cultural concept of the time. It shows the literary talent of Xenophon, able to give a precise new sense to his reconstructed speeches of common sense geography.

A further study should analyse the intricate connection between common and uncommon sense geography in the *Anabasis*, in greater detail.

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CHAPTER 5

GEOGRAPHY OF HEAVENS IN THE BYZANTINE COMMONWEALTH: the "Enochic chronotope"

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Summary

The following paper represents "work in progress".[76] Preliminary results of my research on the *Enochic chronotope*[77] and patterns of celestial topography within the intellectual milieu of the Byzantine Commonwealth appeared in a Max Planck Preprint (Badalanova Geller 2010). I am now engaged in finishing a new edition of *The Book of the Secrets of Enoch the Just* (from the Manuscript 321 from the Belgrade National Library),[78] and the following study reflects ideas which have emerged from this work.

1. Geography of Heavens

There are two models of celestial topography outlined in *2 Enoch*, and they are revealed in two quite independent, although interrelated, consecutive narratives, presented by *two speakers*. The perspective of the first storyteller is human, while the second is divine. The first model of celestial topography is contained in Enoch's monologue, in which the visionary describes his ascent to God's throne step-by-step, heaven by heaven. In his testimony Enoch reports diligently everything he witnesses during his celestial journey. I will return to the details of his account after briefly outlining the characteristic features of the second narrative. It starts when Enoch reaches the highest heaven (be it fifth, seventh or tenth)[79] and encounters

[76] A shorter version of this text was presented at a conference organised by A. Kulik at the Hebrew University of Jerusalem on "Early Judaism and the Slavonic Pseudepigrapha" (4–6 June 2012).

[77] *The Books of Enoch* were originally composed in either Hebrew or Aramaic probably no later than the 1st century B.C. They survived in three versions: Ethiopic (also known as *1 Enoch*), Slavonic (*2 Enoch*) and Hebrew (*3 Enoch*). Extant Aramaic fragments from Qumran parallel the Ethiopic version; see Bhayro (2005). As for the Slavonic protograph of *2 Enoch,* it most probably originated from a Greek *Vorlage* which may have been based on a Hebrew or Aramaic original; it survived in two major recensions (shorter and longer). The first translation of "the Slavonic Enoch" into English was made by W. R. Morfill; it was edited by R. H. Charles and published as a monograph (with his introduction, notes and indices); for further details, see Morfill and Charles (1896). Recensions of *2 Enoch* were also published by Charlesworth (1983: 91–221) and Sparks (1984: 169–362). It is argued that the earliest version of *2 Enoch* appeared in medieval Bulgaria in the 10th century (Petkanova 1982: 351); Iordan Ivanov suggests as *terminus ante quem* 11th–12th cent. (1925: 167). For further details, see Sokolov (1899), A. Pennington's *Introduction* to her translation of *2 Enoch* in Sparks (*ibid*., 321–326) and F. Andersen's introductory notes to his translation in Charlesworth (1983: 91–100). On *The Book of the Secrets of Enoch* in Slavonic apocryphal tradition, see also Alexander (1998: 101–104, 116–117), Böttrich (1996), Meshcherskii (1964: 91–108), Navtanovich (2000: 204–241, 387–392), Orlov (2004; 2007), Santos Otero (1984), Vaillant (1952).

[78] Provided in the Appendix below are fragments from the same Ms. (in translation).

[79] There is a widespread misconception regarding the distribution of the two different schemes of the numbers of heavens employed in celestial cosmography of *2 Enoch*; it is maintained that in the longer recension the number of heavens is *ten*, whereas in the shorter recension the heavens are *seven*. A survey of MSS containing both the longer and shorter recension of *2 Enoch* shows that in the longer recension the number of heavens is either *seven* or *ten*, whereas in the shorter recension the heavens are usually *seven* (although in some isolated cases they may be *five*); the latter observation was briefly underlined in Iatsimirski's *Bibliographical Review of South-Slavonic*

God. In fact, Enoch's report on his ascent to God's throne functions as an introduction to God's testimony about the secrets of Creation and organisation of the Universe, about the origins of matter, and about its spatial and temporal dimensions.[80] From Enoch's monologue we gain knowledge of celestial *cosmography*, whereas God's statement discloses the secrets of *cosmology*. As a result, two different schemes of heavenly taxonomy emerge; these are discussed below.

Let us start with the taxonomy of the heavenly cosmography, as outlined in the narrative about Enoch's ascent.

1.1. The First Heaven

On the first heaven Enoch sees "a sea which is bigger than the one on Earth", and then encounters "the elders and the rulers of the stellar orders".[81] It is also on the first heaven where Enoch is shown 200 angels "who rule over the stars and constellations of the heavens and fly around all the floating (heavenly bodies)". F. Andersen indicates that this detail is found only in the longer recension; he also emphasises that there is no other occurrence of a similar description of the luminaries as heavenly 'swimmers' (плавающи^{x}).[82] However, Greek **πλανήτης** (meaning both 'wanderer' and 'planet') may have provided the basis for the image of the planets in *2 Enoch* as floating luminaries.

On the first heaven Enoch further observes the treasures of snow and ice, and sees "the angels who keep these awesome storehouses in the clouds from which they enter and exit." Then he is shown "the treasures of dew, the nature of which is like the balm of olive-tree", and the angels guarding them.

The most important question for me in this context appears to be not *what,* but rather *whom* does Enoch see on the first heaven? The picture gets much more clearer and more

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and Russian Apocryphal Literature. The model of 'seven heavens' is likewise represented in other apocryphal writings (such as *The Ascension of Isaiah*, *The Sea of Tiberias*), and in erotapocritic tradition. In some texts (e.g. *The Discussion Between the Three Saints*) each heaven is allocated to a different biblical figure; thus Seth is in the First Heaven, in the Second is Azariah, in the Third – Enoch, in the Fourth – Noah, in the Fifth – Abraham, in the Sixth – Isaac, and in the Seventh – Jacob; see Nachtigall (1902: 324), Questions Nos 4 and 5. A similar model of the sevenfold heavens (which are paralleled by the seven earths and/or the seven compartments of hell) is attested in oral tradition (Badalanova Geller 2011: 60–64). On the other hand, the number of heavens followed in the *Apocalypse of Baruch* (*Baruch 3*) is *five*; as clearly outlined in Kulik's excellent analysis of the apocryphon, the description of these heavens and the depiction of their 'content' is different from the pattern employed in *2 Enoch* (Kulik 2010).

[80] M. Stone in particular pointed to the importance of cosmological discourse for the genre of apocalypse (1976: 439–443).

[81] Some scholars interpret this particular expression (i.e. "the elders and the rulers of the stellar orders") as an implicit reference to the first chapter of *The Astronomical Book* in *1 Enoch* (72: 9 – 18, 20); see the discussion in Forbes and Charles (1913: 432, fn. IV.1).

[82] See Andersen (1984: 112, fn. f).

straightforward, as heavenly topography appears to be bound with (and spelled out as) heavenly agency. Because on the very first heaven Enoch encounters:

i. “the elders and the rulers of the stellar orders”;

ii. the 200 angels “who rule over the stars and constellations”;

iii. the angels who are in charge of the treasures of snow and ice;

iv. the angels who guard the treasures of chrism-like dew.

1.2. The Second Heaven

When Enoch ascends to the second heaven, he is embraced by darkness much deeper than that on Earth; there he encounters a host of heavenly prisoners — “angels who are much darker in their appearance than earthly darkness”; they are “constantly crying and weeping”, while “hanging on chains” (верижни блѧдоми висѧще), “awaiting infinite judgement” (ждѫще сѫда безмѣрнаго). The visionary is informed by his heavenly escort that those are God's apostates (си сѫ^{т} ѿстѫпници гни) who did not obey the commands of the Most High (не послоушаѫще повелѣнїе гне), but kept counsel according to their own will. The longer recension further clarifies that those enchained in the Second Heaven “had stepped back from God with their Prince (i.e. Satan/Lucifer)” (ѿстѫпишѧ съ кнѧзо^{м} своимь); this Prince, together with his closest disciples, is sentenced to the Fifth Heaven. This particular detail is absent from the narrative about the second heaven in the shorter recension: there is no reference either to the Prince/Leader of the fallen angels, or to the place where he is sentenced with his closest followers. (Both the shorter and the longer recensions describe in more detail their “prison location” at a later point, in the account about the fifth heaven). In the longer recension, on the other hand, it is simply implied that the dark angels, enchained on the second heaven, are no more than wrongdoers overpowered by a charismatic evil master; they are regarded as weak, obedient collaborators in wicked deeds, rather than initiators of these deeds. They are considered to be enslaved followers of an evil ideology, rather than the active generators of that ideology. Of course, sinning in ignorance does not pardon the sinner itself, neither is the magnitude of this sin diminished by the ignorance of those committing it. Yet the Divine judgement and sentence are distributed accordingly — the malevolent leader of God's apostates, along with his closest allies, are those to be most severely punished: they are sentenced to a different, higher heaven. In a similar way, in *The Apocalypse of Baruch* (aka *3 Baruch*) the first heaven accommodates those who built the tower of Babel (2:7), whereas the second heaven is for those who planned it (3:5). The higher the heaven, the heavier the sin,

the harder the punishment. In this way the concept of sin acquires specific spatial dimensions, a reflection of common-sense celestial cosmography / geography.

In any case, both the shorter and the longer recensions assert that the dark angels sentenced to the second heaven bowed before Enoch, saying, "Man of God (мжжоу бжїи), pray for us to God." At that point Enoch leaves them, but without promising to plead on their behalf before God (although, as we learn later, he will do so; the motif of Enoch's agency in angelic affairs is to be developed in the forthcoming description of the fifth heaven, when the appellation "Watchers" (*Gregori* (рекомїи григоре)) will appear for the first time.

1.3. The Third Heaven

When Enoch ascends to the third heaven, he finds himself in middle of Paradise. Notably, *The Book of the Secrets of Enoch* employs here the same celestial scheme as the Slavonic *Life of Adam and Eve* (25: 3) (following the Greek *Apocalypse of Moses* (37:5)), *The Apocalypse of Abraham* (*Откровение Авраама*) (21:2-3), *The Vision of Paul (Apocalypse of Paul*), and last but not least, Paul's *Second Letter to the Corinthians* (2 Cor 12:2). In all of them Paradise is found in the third heaven; this tradition has been fully analysed by P. Schäfer (2004: 257-8), so I will restrict my comments to very few points which are central to my argument.

First, the scope of technical vocabulary of "heavenly cosmography" (referring to "Paradise" / "Garden of Eden" / "Heaven") in different manuscripts of *The Book of the Secrets of Enoch* varies, resulting in diverse renditions of certain celestial toponyms throughout the texts. In some cases, the word used by the Slavonic scribes to denote "Paradise" is ***порода*** (= παράδεισος). It is quite significant that this "domesticated" equivalent of the original Greek form was semantically bound, on the basis of its close phonetic similarity to the Slavonic verb ***родити*** ('to give birth', 'to beget', 'to create'), to the idea of 'fertility', 'fecundity', 'birth', 'conception', 'creation'; thus ***порода*** — a *sui generis* telltale noun — came to describe "the Paradise topos" as the ultimate symbol of fruitfulness and abundance.

On other occasions the scribes use the lexeme ***Рай*** to denote 'Paradise'. The latter has its cognates in all Slavonic languages.[83] There are also some related vernacular expressions, such as ***Рай Божи, Рай Божен, Раюм Бога, Божорай, Райска градина*** (attested in oral sources), which may denote both Paradise and Hell (a point which deserves further investigation). Moreover in the same vernacular traditions the Sun is referred to as ***Райко***; the latter is a diminitive neuter noun (transformed into an anthroponym/theonym) deriving

[83] Bulg. *Рай*, Russ. *Рай*, Belorus. *Рай*, Serbo-Croat *Pâj*, Slovene *Ràj*, Slovak *Raj*, Czech *Ráj*, Polish *Raj*.

from the very same masculine noun used to denote 'Paradise' (***Рай***); this, in turn, indicates that in vernacular traditions the Sun and Paradise may be symbolically equated. The Old Church Slavonic noun ***Рай***, on the other hand, is a product of the proto-Slavonic lexeme ****rajь***, which derives from the ancient Indo-Iranian lexical corpus and has its close etymological relation to some Old Iranian/Old Persian words (thus the proto-Slavonic ****rajь*** corresponds to the Avestan form ***ray***, meaning 'wealth', 'happiness'). Then again, while the lexeme ***Рай*** is attested predominantly in *The Life of Adam and Eve*, *The Discussion Between the Three Saints, The Sea of Tiberias* and some other related apocrypha, in *2 Enoch* the nouns ***порода*** and ***Рай*** are employed concurrently as parallel celestial toponyms.

In "the midst of Paradise", Enoch sees "the Tree of Life" (дрѣво жизньно); it marks the spot "where God rests when He goes into Paradise" (на не^{М} же почивае^{Т} Гь егда въсходи^{Т} въ раи). Enoch reports that this tree, "in its goodness and fragrance is unspeakably beautiful beyond all other existing creations"; he also points out that its roots mark "the very exit from Paradise to Earth" (коре^{Н} емоу е въ породѣ, на исходѣ земно^{М}). Thus it is recognised not only as the *arbor mundi*, but also as the *axis mundi* constituting both the bridge and the boundary between celestial and terrestrial realms, their focal point. Two springs emanate from "the Tree of Life"; from the first milk and honey issue forth (единь точи^{Т} ме^{Д} и млѣко), and from the other oil and wine (елеи и вино). Dividing into four parts, while streaming silently, they cross the Garden of Eden and further divide into 40 parts, pouring out gently onto Earth. In this magnificent place, we are told, there are also "300 exceedingly luminous angels" who not only guard Paradise (храня^{Т} породоу), but also serve God all day long with unceasing voices and melodic singing; the latter detail indicates that the heavens in *2 Enoch* are imagined as a temple in which a constant service is being held — with one exception, the fifth heaven, where the Watchers are sentenced.[84]

Enoch further specifies that Paradise itself is positioned "between mortality and immortality."[85] Besides, as the narrative emphasises, this is the only place (apart from the seventh heaven) where God resides; from the height of His throne He reigns and by "the Tree of Life" He rests from His work. In other words, the spot in Paradise, marked by "the Tree of Life", appears to be recognised by the narrator as the *omphalos* of the Universe, connecting "ground zero" (i.e. the earth) and the highest heaven (= God's throne). This is also the place "prepared for the righteous" human beings (праведнико^{М} уготованно), "who suffered all kinds of misfortunes in their lives".

[84] An idea suggested by M. Himmelfarb (2010: 76–78).
[85] Lit. "between corruptible and incorruptible".

Next to Paradise, in the northern[86] compartment of the (very same!) third heaven, the narrator sees the sector "prepared for the unrighteous" human beings, for the sinners. This is the section where Hell is positioned. It is worth noting here that in Enoch's narrative the spot prepared for human sinners is different from the place allocated for the fallen angels; the latter occupy *the second* and *the fifth heaven*, whereas the former reside in the northern part of the *third heaven*. Unlike some other traditions, in which Hell is imagined as a subterranean locus (thus functioning as the lowest strata of the three-layered universe, with the Earth in the middle and Paradise on the top), in *2 Enoch* it is positioned next to Paradise, thus constituting a binary model of the "afterlife" human habitat, divided between "righteousness" and "unrighteousness". Accordingly, Hell is depicted as a counter-image of Paradise, as its reversion and antithesis; as such, it comprises all kind of sorrows and tortures, chilly darkness (люта тъма) and a fog without light (мъгла несвѣтла); dark fire (wгнь мрачнь) is burning inside it, and a fiery river (рѣка wгньна) is running through it. Likened to a "chilling dungeon", Hell is guarded by "murky pitiless angels carrying cruel weapons and causing merciless torture". Needless to say, the same afterlife imagery is employed in other apocryphal writings circulating in the Byzantine Commonwealth from the same period, such as *The Vision of Paul (Apocalypse of Paul*), *The Wanderings of the Virgin Mary through Hell*, etc.[87]

[86] It should be noted, however, that in *2 Enoch* the conventional compass points do not apply to celestial strata; while in the narrative it is emphasized that Hell is positioned in the northern compartment of the third heaven, nowhere is it stated that Paradise is in its southern section. Neither is *2 Enoch* suggesting that the Garden of Eden marks the eastern or the western corner of the third heaven; the patriarch merely testifies that he was placed by his angelic escort in the middle of Paradise, without being informed about its location on celestial map. It is simply acknowledged that *Hell is to be found on the third heaven, next to Paradise, to the north*. Still, in Slavonic vernacular geography the concept of "north" is symbolically equated to the direction of 'death' ('night', 'dark', 'cold', 'winter', 'bad'), while the concept of "south" is emblematic for the direction of 'life' ('day', 'light', 'warm', 'summer', 'good'). In fact, in some Slavonic languages and/or dialects the lexemes denoting 'midday' are identical with those denoting 'south', while the lexemes denoting 'midnight' are identical with those denoting 'north'. As for the "common sense" semantic affiliation of the other compass points, this can be clarified by the ethno-linguistic, folklore and ethnographic data from the region of the former Byzantine Commonwealth. Thus in some South-Slavonic (Bulgarian) dialects "the South Wind" (***Юг***, ***Южняк***) is often called "the White Wind" (***Бял вятър***), with the appellation "white" being an obvious synonym of "good" / "benevolent". Accordingly, "the North Wind" (***Север, Северняк***) is defined as "the Black Wind" (***Чер вятър***), with the epithet "black" unequivocally referring to its "malevolent" nature. At the same time "the North Wind" may also be designated as ***Кривец*** (meaning either "the Crooked one", or "the Left one"), and this unambiguously negative label reflects its further axiological comprehension as "bad" / "sinister". The western wind is given the name of "the Upper Wind" (***Горняк***), whilst the eastern wind is called "the Lower Wind" (***Долняк***); see Marinov (1981: 68–71). Thus, according to Slavonic and Balkan common sense ethno-geography, the vernacular "mental map" appears to be as follows: the west is imagined as the "upper" corner of the Universe, the east — as the "lower" one, the south — as the "white" ("good") one, the north — as the "black" ("bad") one. As for *2 Enoch*, the location of Hell in the northern compartment of the third heaven reflects, most probably, the universal symbolism of the ancient mythopoeic link between "death", "dark", "cold" on the one hand, and "north" on the other.

[87] See the discussion in Badalanova Geller (2010: 33–34).

To sum up, according to the description of the third heaven presented in *2 Enoch,* Paradise and Hell are put next to each other, on the same celestial stratum; the latter is positioned in its northern compartment, whereas the former is in its middle.[88] Its centre is marked by "the Tree of Life", which stands between corruptibility and incorruptibility. One further point: the same celestial model — of Paradise and Hell being "in heavens above, next to each other" — is attested in Slavonic and Balkan oral tradition (Kovachev 1914: 17-18); it should be mentioned, however, that this kind of celestial topography coexists with another cosmographic scheme, according to which the land of Paradise is to be found on Earth, to the East. The latter corresponds to the creation scenario of the Book of Genesis (2: 8), according to which "the Lord God had planted a garden in the East, in Eden". One final point; there exists another tradition in Slavonic thought according to which Paradise may be perceived only as an intellectual concept (***мысленный Рай***), but not as a tangible reality.

1.4. The Fourth Heaven

The fourth heaven in *2 Enoch* is yet another binary, twofold celestial spot; it is described as the habitat of both the Sun and Moon. As such, it is divided between them. In fact, at this point the narrative flexes its intellectual / scientific muscles. Astronomy and mathematics are bound into its tantalising core, and calendrical knowledge overwhelms the reader. This fragment of *2 Enoch* continues to present a serious challenge to all those studying history of ideas in ancient science.

Thus, on the fourth heaven Enoch is shown "all the movements and paths and rays of light of the Sun and Moon (всѧ лоучѧ свѣта слнчнаго и мѣсѧчнаго)"; he measures "the dimensions of their movements" (размѣри^{x} шествïа еѫ) and "calculates their light"; thus he finds out that "the sunlight is seven times greater than the moonlight". Exactly the same observation, that "the light of the Sun is seven times brighter than that of the Moon", is also registered in *1 Enoch*, in *The Astronomical Book* (72: 23; 78: 4-5) (and indeed in Isaiah 30:26).[89] Enoch also measures the paths and gates of the Sun and Moon and acquires knowledge about their movements; he is shown their chariots and describes in length all celestial paraphernalia related to them. Enoch further notices the "spirits in the image of two birds" (дси летѧще образо^{м} двѣю птице), Phoenix and Chalcedra, who are harnessed to the Sun's chariot. And since this motif is fully analysed by A. Kulik, who compares the ways in which the image of

[88] See the discussion above, fn. 11.
[89] I am grateful to James Kugel for this reference.

the Phoenix is interpreted in both *2 Enoch* and *3 Baruch*,[90] I will restrict my comments to only few points which I consider important to my argument.

In Enoch's testimony about celestial phenomena, witnessed by him on the fourth heaven, the Sun and Moon are placed together, next to each other, on the same horizontal stratum. In God's narrative about the construction of Creation, however, the Sun and Moon are housed on different heavenly rings. The Sun continues to be on the fourth ring, whereas the Moon is on the lowest seventh ring, closest to the Earth (as seen from God's perspective). In actual fact, the visionary will only learn this when he reaches the seventh heaven and hears God's testimony, a narrative in which, as mentioned earlier, a cosmological mode prevails. Earlier I pointed out that in *2 Enoch* one can detect two different schemes of heavenly taxonomy; the first is concerned with cosmography, the second — with cosmology. The cosmographic scheme is followed in Enoch's monologue (describing his journey up to the seventh heaven), while the cosmological one is revealed in God's testimony, given on the seventh heaven. These two schemes contain conflicting information about the location of Moon (in chapter 6 and chapter 11) — in the cosmographic scheme the Sun and the Moon are placed on the same heavenly ring, whereas in the cosmological one they are on different strata. One further clarification: the narrative about the creation of the seven planets and their distribution on separate heavenly rings is absent from the short recension but appears only in the long recension. Both schemes of heavenly taxonomy, however, whether in longer or shorter recensions, present a geocentric model of the Universe, which is imagined as a divine construction comprising (usually) seven (or on rare occasions ten) concentric rings/circles/spheres.

1.5. The Fifth Heaven

As for the fifth heaven, in both the shorter and the longer recensions of *2 Enoch* it is described as the place where the fallen angels, i.e. the sinful warriors/princes called *Gregori* (рекомїи гриторе),[91] were sentenced. At this point Enoch is informed that the name of the leader of the fallen angels, the very architect of rebellion against God and the broken covenant with Him is *Satanail*. His closest disciples were to undergo the same punishment as he on the fifth heaven,

[90] See Kulik (2010).

[91] Evidently, the Old Church Slavonic designation *григоре* comes from the Greek *Ἐγρήγοροι* (= Vigiles, the Watchers); see also the discussion in Forbes and Charles (1913: 439–440, fn. XVIII.3), and Andersen (1983: 130, fn. 18a). In fact, the form *Ἐγρήγοροι* is attested in the *Chronography* of Georgius Synkellos (the *terminus ante quem* for the composition of which was 810 A.D.). Included in the text are excerpts from the First Book of Enoch; see *Bonn Corpus scriptorum hist. Byz.*, vol. 1 (Dindorf 1829: 20–23, 42–47, 60). This Enochic fragment, however, was not included in the Slavonic version of the *Chronography*.

whereas their followers, as already mentioned, are to serve their sentence on the second heaven.

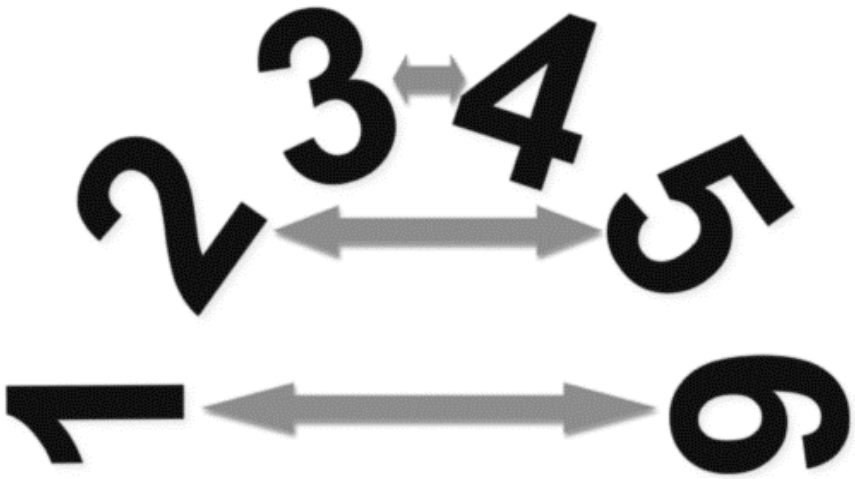
1.6. The Sixth Heaven

On the sixth heaven Enoch encounters seven highest ranks of the most bright and glorious angels, “whose faces were shining more strongly than radiant rays of the Sun.” They control the movements of stars, the Sun's orbit, and the Moon's phases; they register any act of benevolence and malevolence on Earth, giving orders and instructions accordingly. Singing with sweet voices, they praise the Lord. At this point Enoch further clarifies that the inhabitants of the sixth heaven are above all other angels and above every other creature, whether celestial or terrestrial; they monitor times and years, and control the angels who are in command of rivers and seas, and the angels who are responsible for every earthly fruit and every grass and every food given to each living being. The archangels residing on the sixth heaven are also responsible for the angels in charge of all human souls; that is why they write down the deeds of all people and their lives before God's face. Among them are seven phoenixes, seven cherubim, and seven seraphim. All of them sing in one voice, and nobody can describe with words their singing.

Until here Enoch's testimony contains description of everything imagined to exist below God's throne; then he ascends to the seventh heaven and meets God.

2. The Inventories of the Heavenly Geography below God's Throne

If we now compare the inventories of all the six heavens below God's throne, we discover a conspicuous symmetry between the first and sixth, second and fifth, third and fourth heavens.



On the first and the sixth heaven the visionary Enoch encounters the elders and the rulers/masters of the stellar orders (chapters 4 & 8); angels who rule over the stars and constellations (chapter 4), as well as those monitoring the movements of the stars, Sun and Moon and bringing harmony in heaven (chapters 4 & 8); the angels who are in charge of the treasures of snow and ice, along with those who guard the treasures of chrism-like dew (chapter 4), as well as those who are over the terrestrial landscape monitoring rivers and seas, and all that grows on Earth (chapter 8). Evidently, the angels responsible for the harmony in the Universe, along with their masters, the archangels, are situated on either first or the sixth heaven.

The second and the fifth heavens are occupied by the fallen angels, the Watchers and their followers.

The third heaven houses Paradise and Hell, while Sun and Moon are on the Fourth. Religious iconography provides further evidence in this connection: as a rule, Paradise is depicted below the Sun, whereas Hell is positioned below the Moon.

There is one particular detail in God's narrative about the secrets of Creation which I wish to point out. The description of planetary order in *2 Enoch* offers one of the most enigmatic schemes of celestial topography. While revealing to the visionary the secrets of the creation of heavenly bodies on the fouth day, God states:

On the first and highest ring I placed the star Kronos (i.e. Saturn) (на пръво^{м} и вишне^{м} кр҃зѣ постави^{х} звѣздꙗ Кронось). On the second ring, below it, I placed Aphrodite (i.e. Venus) (на в-емь ниже поставихь Афроди^{т}). On the third, Aries (i.e. Mars) (на г-емь Аррись). On the fourth, the Sun (на д- мь Слнце). On the fifth, Zeus (i.e. Jupiter) (на е-мь Зеусь). On the sixth, Hermes (i.e. Mercury) (на s- мь Ерми^{с}). On the seventh, the Moon (на з-мь Лоунꙗ).

The account about the seven luminaries in *2 Enoch* is similar but not identical to the contemporary astronomical fragment found in *Symeon's Florilegium*; in the latter the description of "the Seven Planets" is part of the section entitled ***Іѡа(на) Дамаскина о македоньскыихъ м^{с}цихъ отъ црк҃вьнааго прѣдания*** (Fol. 250 r), which, in turn, has its obvious roots in the famous *Fountain of Knowledge* (or *Fountain of Wisdom)* by John the Damascene. In fact, it is in Book 2, Chapter 7 (*Concerning light, fire, the luminaries, sun, moon and stars*) of his *Exact Exposition of the Orthodox Faith*, where John the Damascene actually outlines the following model of celestial topography:

There are, we are told, seven planets amongst these luminaries, and these move in a direction opposite to that of the heaven: hence the name planets. For, while they say that the heaven moves from east to west, the planets move from west to east; but the heaven bears the seven planets along with it by its swifter motion. Now these are the names of the seven planets: Luna, Mercury, Venus, Sol, Mars, Jupiter, Saturn, and in each zone of heaven is, we are told, one of these seven planets; in the first and highest — Saturn, in the second — Jupiter, in the third — Mars, in the fourth — Sol, in the fifth —Venus, in the sixth — Mercury, in the seventh and lowest — Luna.

The text of this particular chapter was translated in Bulgaria in the late 9th - early 10th century by John the Exarch, and included in his work *Theology* (*Heavens*). As for the version in *Symeon's Florilegium,* it represents a rather abridged redaction of Damascene's text. The *Florilegium* also has some specific textual features which indicate that it was translated from a source which was not identical with that used by John the Exarch. Still, in both sources (*Symeon's Florilegium* and John the Exarch's *Heavens*) the pattern given is: Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon, which is the standard Ptolemaic sequence of planets, but in reverse order.[92] The author of *2 Enoch*, on the other hand, puts Venus between Saturn and Mars. Still, in all three sources (*2 Enoch*, *Symeon's Florilegium* and Exarch's *Heavens*), Kronos (Saturn) is placed on the first and highest heavenly ring. Thus, according to *Symeon's Florilegium,* "the first planet on the first and highest level is called Kronos" (***планитъ •а҃• на***

[92] Compare to the order of stars in the Slavonic version of the *Chronicle of John Malalas*: *Крон* (i.e. Saturn); *Дыи* (i.e. Jupiter); *Ареи* (i.e. Mars); *Афродитъ* (i.e. Venus); *Ермин* (i.e. Mercury); see Istrin (1902: 466). The same celestial model is observed in the *Chronicle of George Hamartolus* (or George Monachus); see Istrin (1920: 33).

прьвѣємъ и на вышьшнимь • кронъ). Then again, in *2 Enoch,* Kronos and other luminaries were considered to be "stars" (as in Babylonian astronomy), while in *Symeon's Florilegium* and John the Exarch's *Heavens* they are called "planets" (as in Greek astronomy). Another difference is that in *2 Enoch* the expression used to denote "heavenly ring" is ***кржгь нбсныи***, while in *Symeon's Florilegium* (and John the Exarch's *Heavens*) the same concept is described as a "girdle" / "waist-band" / "belt" (***поясъ***).

On the other hand, Enoch's description of the position of Venus on the second ring parallels the planetary pattern given in Book 2, Chapter 6 (*Concerning the Heaven*) of the aforementioned *Exact Exposition of the Orthodox Faith*; in this chapter, however, John the Damascene lists the seven planets in an order which differs from that offered in Chapter 7 (*Concerning light, fire, the luminaries, sun, moon and stars*); in Chapter 6, he puts Venus between Saturn and Mars,[93] as in *2 Enoch*:

> They say also that there are seven zones of the heaven, one higher than the other. And its nature, they say, is of extreme fineness, like that of smoke, and each zone contains one of the planets. For there are said to be seven planets: Sol, Luna, Jupiter, Mercury, Mars, Venus and Saturn. But sometimes Venus is called Lucifer and sometimes Vesper. These are called planets because their movements are the reverse of those of the heaven. For while the heaven and all other stars move from east to west, these alone move from west to east. And this can easily be seen in the case of the moon, which moves each evening a little backwards.

As in Damascene's *Fountain of Knowledge*, in Slavonic sources Venus systematically appeared under two different names: either 'Lucifer' (=***Дьньница/Деница***), or 'Vesper' (=***Вечерница***).[94] The fact that one and the same luminary was designated by two different astronyms in various sources may have confused matters further in regard to the transmission of astronomical knowledge conveyed in Old Church Slavonic.

On the other hand, it is most intriguing that in the earliest extant copy of Symeon's *Florilegium* (i.e. the *Sviatoslav's Miscellany* from 1073) the planet Venus (=Aphrodite) appears on the fifth ring (precisely where *2 Enoch* has Zeus, i.e. Jupiter!), while the second ring houses Jupiter, denoted by the theonym/astronym ***дии*** (fol. 250 r) (Sreznevskii 1893: 665). A similar detail appears in the 13th century version of *Symeon's Florilegium* copied in the Hilandar Monastery (i.e. *Hilandar Miscellany*), according to which the name of the planet on the second ring is ***дни*** (Lavrov 1899: xii). The latter form could have been a corruption of

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[93] This planetary order corresponds to the ancient philosophical concept of "musica universalis**"** (or "harmony of the Spheres") regarding proportions in the movements of the seven celestial bodies (the Sun, the Moon and the five planets) as 'seven musical tones' (= octave, with $1^{st} = 8^{th}$ constituent); this theory rests on the Pythagorean idea that the Sun, Moon and five planets all produce their own unique tone (= "orbital resonance") based on their "orbital revolution". See also the analysis of this concept in Slavova (1994: 71–72).

[94] In his 1892 paper on "Sense and Reference" ("Über Sinn und Bedeutung"), G. Frege refers to the same issue, e.g. Venus being identified as both "morning star" and "the evening star".

the theonym / astronym ***дии,*** erroneously understood as a shortened version of the theonym / astronym ***Дьньница*** ("Lucifer" = "Vesper").

There may be one further clue to explain the different order of heavenly bodies in *2 Enoch*, which appears to have had Venus and Jupiter exchange places: Babylonian astronomy of the Seleucid period had Venus in the second position in the order of planets (as suggested by Koch-Westenholz 1995: 120, fn. 2), and *2 Enoch* may have attempted to follow this order, which required Venus changing places with Jupiter. In this way, *2 Enoch* appears to be a compromise between the Seleucid Babylonian and Ptolemaic Greek order of planets, and therefore reflects neither system precisely. Moreover, the interchange between Venus and Jupiter in the *2 Enoch* list may show their mutual links within Babylonian astrology, as both being benevolent and portending favourable omens (in contrast to malevolent Saturn and Mars, and ambivalent Mercury), as mentioned by Rochberg-Halton (1988).

On the other hand, the form ***Дьньница*** was likewise used to render the name of Lucifer in the Slavonic translation of *Isaiah* 14: 12-15; in the latter case, it functioned as a synonym of "the fallen angel" Satan. This detail may explain why in *2 Enoch* the Watchers and their followers are also sentenced in the second and the fifth heavens, in association with the second and fifth planetary rings which were implicitly linked with Satan, through the name of Lucifer (i.e. Venus, also positioned on either second or the fifth ring). It should be noted, however, that the Hell of the third heaven is not intended for fallen angels but for (human) sinners.

Finally, there is no evidence of any association in 2 *Enoch* between the names of the planets and days of the week in Slavonic tradition, although later related texts show awareness of this connection.

3. Conclusion

The analysis of celestial geography revealed in apocryphal writings composed/copied in the Byzantine Commonwealth suggests the existence of a multi-layered "common sense" cosmographic model. Some of its most important features were contained in *2 Enoch* and can be outlined in the following way:

1. The celestial chronotope in *2 Enoch* does not follow any of the known schemes.
2. The order of planets in *2 Enoch* pre-dates Ptolemy's fixed order of planets known from 2nd cent. A.D.
3. This suggests that *2 Enoch* may date from the 2nd Temple Period.

4. If *2 Enoch* were later, the order of planets would probably have reflected a standard order of planets.

5. The structural pattern of the celestial map — in which the heavens pair up between levels 1 and 6, 2 and 5, 3 and 4 — reflects a type of common sense cosmic geography and describes a realm known to exist but for which no maps or charts were available, apart from testimonies of visions / apocalypses.

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5. Appendix

Extracts from the 16th – 17th century Bulgarian redaction of *The Books of the Holy Secrets of Enoch* (Книги стиˣ таинь Енохоʙ) from Ms No. 321 from the National Library in Belgrade (fol. 269 – 323) (translated by the author).

TITLE: Books[95] of the holy secrets of Enoch (книги[96] стиˣ таинь Енохоʙ), a wise man and great scribe (велика хѫдожника), whom the Lord received and loved, allowing him to see life in heaven above (вышнѧѧ житиїе), and the most wise, and great, and inconceivable, and unchangeable Kingdom of the All-mighty God, as well as the most-wondrous, glorious, luminous, many-eyed sentinels (многоѡчитаго стоанїа) of God's servants, and the immovable Throne of God, and His minions/hierarchies and their manifestation, the incorporeal hosts and the indescribable composition of the great multitude of elements (стухїи) and various visions (видѣнїа), and the indescribable singing of the host of Cherubim, so that he might witness all this infinite universe (свѣта безь мѣрна самовидець быти).

The First Heaven (Chapter Three)

They showed me a sea which is bigger than the one on Earth. And they brought before me the elders and rulers of the ranks of stars, and they showed me 200 angels who rule over the stars and composition of the heavens and who fly with their wings and circle around all the floating (planets/luminaries). Here I saw treasures of snow and ice, as well as the angels who keep these awesome storehouses, and the treasures in the clouds from which they enter and exit. They also showed me the treasures of dew, the nature of which is like the balm of an olive-tree; and the appearance of their image was much greater than any earthly bloom; and they further showed me angels who were guarding these treasures, opening and closing them.

The Second Heaven (Chapter Four)

I saw darkness much deeper than that on Earth. Here I also spotted wrongdoers, hanging on chains, awaiting infinite judgement. These fallen angels were much darker in their appearance than earthly darkness and they produced incessant crying at all times. And I said to the men with me, "Why do they suffer unceasingly?" The men answered me, "These are God's apostates who did not obey God's commands but kept counsel according to their own will and stepped back from God with their Prince (i.e. Satan); these are sentenced to be in the Fifth

[95] Here the noun ***книги*** can also be translated as 'Scriptures'/'Bible'.
[96] In Old Church Slavonic the noun ***кънигы*** is *pluralia tantum*.

Heaven." I became saddened on account of them and the fallen angels bowed before me, saying, "Man of God (мѫжоу бжїи), pray for us to God." I answered them, saying, "But who am I? I am a mortal man (члкъ мртвь), but let me pray for the fallen angels. Who knows where I am going and what will befall me and who will pray on my behalf?"

The Third Heaven (Chapter Five)

From there, the men took me up to the Third Heaven and placed me in the middle of Paradise (постависта мѧ по срⷣ҃ѣ породи). This place is of immense beauty. I saw all kinds of trees with sweet blossoms, and their fruits were ripe and aromatic; and all food brought along there gave off a beautiful fragrance. In the midst of it was the Tree of Life (дрѣво жизньно), exactly on the spot where God rests when He goes into Paradise. This tree, in its goodness and fragrance, is unspeakably beautiful beyond all other existing creations. All around it looks like gold and fire-like red, covering entire Paradise. It combines properties of all trees ever planted and all fruits. Its roots are in Paradise (кореⷩ емоу е въ породѣ) at the exit to Earth (на исходѣ земноⷬ). Paradise (Раи) lies between mortality and immortality (междоу тлѣнїеⷬ и нетлѣнїеⷬ). From it two springs emanate, from one of which milk and honey issue forth, and from the other oil and wine. They divide into four parts; while streaming silently they approach Eden's Paradise (раи Едомскь) between mortality and immortality. Going further to the other side, they divide into 40 parts and pour out gently onto Earth. They make a circuit and revolve, like all elements of the air. There is not a single tree in Paradise
which does not bear fruit and each tree provides an abundant harvest. This entire place is blessed, and 300 exceedingly luminous angels who guard Paradise with unceasing voices and melodic singing serve God all day long. And I said, "How beautiful this place is!" The two men said to me, "Enoch, this place is prepared for the righteous who suffered all kinds of misfortunes in their lives. When their souls were becoming embittered, they turned their eyes from iniquity and they were judging justly. They gave bread to the hungry, they dressed the naked with garments, they raised the fallen, they helped the oppressed and orphans. They walked without vices before the face of God and served only Him. This place is prepared for them for an eternal inheritance."

The two men then took me to the northern side of the third heaven and showed me a frightening place of all kind of sorrows and tortures, chilly darkness and a fog without light there. A dark fire was burning there inside it, and a fiery river ran through the entire place. On one side was fire and on the other side — cold ice, both burning and freezing. I also saw a

rather chilling dungeon and murky pitiless angels, carrying cruel weapons which cause merciless torture. And I said, “Woe, woe, how very frightening is this place!” The two men told me, “Enoch, this place is prepared for those who do not obey God, who do evil on Earth, such as magic/sorcery, spells/incantations, and devilish divination; who boast their evil deeds; this place is prepared for the forlorn ones, who steal human souls, who harass the poor, take their wealth and become richer from the property of others; instead of feeding the hungry, they starve them to death. Instead of providing clothes for the poor, they leave them naked. They do not recognise their Creator but bow before soulless and vain gods, fashioning idols/images and bowing before the impure creation of the hand. For all these sinners, this place is destined for eternity.”

The Fourth Heaven (Chapter Six)

And these men took me and raised me up to the Fourth Heaven. Here they showed me all the movements and paths and rays of light of the Sun and Moon altogether; and I measured the dimensions of their movements. I calculated their light and I saw the sunlight is seven times greater than the moonlight; I saw their orbit and their chariots, on which each rides with wondrous velocity like the wind, without resting, day and night going and returning. And on the right hand side of the Sun's chariot I saw four big stars, each of which having 1000 subordinate stars; on its left hand side I saw another four stars, each of which having 1000 subordinate stars; all together, there were 8000 stars, always going with the Sun. During the day, the Sun is guided by 15 myriads of angels, and during the night by 1000 six-winged angels, marching before the chariot; and 100 angels give fire to him (i.e. the Sun). And spirits in the image of two birds, Phoenix and Chalcedra, are going before the Sun during the day; their faces are lion-like, and their feet, tails, and head are like those of crocodiles. Their image was many-coloured like the heavenly rainbow, and the size of their angelic wings is 900 measures; their wings are angelic and each of these birds has 12 wings; it is they who are harnessed to the Sun’s chariot, carrying dew and oppressive heat; and as God orders, they turn, descending and ascending along the sky and Earth, with the light of their rays.

The two men then took me to the eastern side of this Heaven and showed me the gates through which the Sun passes routinely at the times appointed, in accordance to its monthly rounds during the entire year, and to the numbering of the horologium, day and night. I saw six vast open gates; each of these gates had 61¼ *stadia*; I measured them diligently and I realised that this was their size. From them the Sun exits and goes to the Earth, and enters into

each month. From the first gate, the Sun is coming out for 42 days; the second gate — 35 days; from the third gate — 35 days; from the fourth gate — 35 days; from the fifth gate — 35 days, and from the sixth gate — 42 days; then again after that, the Sun starts in reverse from the sixth gate for a second circuit of seasons, and returns through the fifth gate for 35 days; through the fourth gate for 35 days, through the third gate for 35 days, and through the second gate for 35 days. This is how the days of each year end after the passing of the four earthly seasons.

And then these men took me to the western side of this Heaven, and they showed me five[97] large gates (врата петора велика) which are open on the other side of the eastern heavenly gates. Through them the Sun sets, and the number of these days is 365¼ (по числоу днїи .тѯе. и четвръ^{т}).[98] This is how the Sun sets through the western gates. When it goes out through the western gates, 400 angels take its wreath and bring it to God, while the Sun turns back with its chariot and spends 7 hours of the night without light. In the 8th hour of the night, 400 angels bring the wreath along and crown the Sun with it, while the elements, called Phoenix and Chalcedra, sing psalms to the Sun . Because of this, all birds clap their wings, rejoicing at the one who provides light and sing with their voices, "Here comes the Light-giver and gives light to its creation!"

And then they showed me the calculation of the Sun's itinerary (се расчитанїе показаста ми хожденїе слнчнаго) and the gates through which the Sun rises and sets. These gates are vast, because God created them for the horologium of the year. This is why the Sun was created so large.

Then the two men showed me another calculation of the entire path of the Moon, all its movements and phases, and 12 big gates eternally facing to the east. Through these gates the Moon enters and exits at a regular intervals of time. Through the first gate — 31 days precisely (извѣстно) according to the Sun's position; through the second gate — 35 days precisely (извѣстно); through the third gate — 30 days precisely (извѣстно); through the

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[97] Should read 'six'; as suggested by Andersen (1983: 124–125, fn. 14b), the numeral equivalent of the letter 'E' (***есть***) in Cyrillic alphabet is '5' whereas in Glagolitic the same letter has the numeral value of '6'. This detail indicates that the protograph of the *2 Enoch* may have been composed/copied initially into Old Church Slavonic/Bulgarian using Glagolitic script and only later converted into Cyrillic; this process caused varying readings in the text (reflecting differences between Glagolitic and Cyrillic numeral equivalents of one and the same letter). Similar mistakes took place when numeral values of other letters (such as Вѣди, Глаголъ, Добро, etc.) were converted from Glagolitic to Cyrillic. As usefully pointed out by Andersen, 'similar confusion among numerals can be explained in term of Glagolitic originals' (*ibid*.: 125, fn 14b).

[98] As noted by Andersen, this detail is found only in MSS of the longer recension (1984: 124–125, fn. d) and reflects later interpolations. It can be argued that it was inserted by scribe(s) in order to justify the span of the Julian year (i.e. 365¼ days) contradicting (in the same text) the earlier calendar tradition of the Jewish 364-day year.

fourth — 30 days precisely (извѣстно); through the fifth — 31 days exceptionally (изрѧдно); through the sixth — 31 days precisely (извѣстно); through the seventh — 30 days precisely (извѣстно); through the eight gate — 31 days exceptionally (изрѧдно), through the ninth — 31 days accurately (испитно), through the tenth — 30 days precisely (извѣстно), through the eleventh gate — 31 days precisely (извѣстно), through the twelfth — 22 days precisely (извѣстно). Thus having passed through all western gates, the Moon enters through the eastern gates and this is how the year ends. The days of the Sun are 365¼, while the lunar year is 354 days, consisting of 12 months calculated each to have 29 days. There is an 11—day discrepancy from the solar year, which is an annual lunar *epact*. This great cycle holds for 532 years.[99] By means of a quarter it passes by in 3 years,[100] and the fourth fulfils it precisely.[101] For this reason exclusions, that is ¼ days are being subtracted from calculations concerning heavenly bodies for 3 years, until what is less is filled in.[102] What is taken into account in figuring the epact is 3 years and is not added to the number of days i.e. ¼ days are excluded, which is why they alter the lengths of the years in 2 new moons for fulfilling, 2 others for diminishing the length of the year.[103] When this cycle is over, the western gates are passed through, and the Moon returns to the eastern gates with its light. This is how it moves day and night in a heavenly orbit; moving below all other heavenly orbits it goes faster than the winds of heaven. When the spirits are flying, each angel has 6 wings. The lunar orbit has 7 divisions and each cycle has 19 years.[104] Amidst the heavens I saw armed hosts serving God with drums and organs with the unceasing sound of sweet singing. Having heard it, I rejoiced at it.

The Fifth Heaven (Chapter Seven)

[99] This 'Great cycle' (i.e. 'Dionysian cycle', or 'Great Paschal Period') of 532 years reflects the total years of the solar cycle (28 years) times the years of the lunar / Metonic cycle (19) 'after which all movable ecclesiastical festivals occur on the same day of the month and the same day of the week' (Andersen 1984: 125, fn. 14d).
[100] That is, 365 days (omitting the quarter day).
[101] This means that the fourth year is going to consist of 366 days (+ 4 times ¼ days).
[102] That is, 366 days.
[103] This entire passage is complicated in both longer and shorter recensions, probably because scribes did not fully comprehend the *Vorlage*. The Moon's "fulfilling" and "diminishing" the year possibly refer to intercalations of the lunar calendar, which could potentially be made twice in the year, in months *Elul* and *Adar*, in Babylonian and early Jewish traditions. Yet this is unlikely to be a reference to the Roman calendar before Caesar, which had 12 months: Martius, Maius, and Quinctilius, with October being 31 days, Ianuarius, Aprilis, Iunius, Sextilis, with September, November, and December being 29 days, and Februarius 28 days (which adds up to 355 days). Every second (straight) year they intercalated either 23 or 22 days after the Terminalia at 23. February. A period of four years is thus: 355 + 378 – 355 + 377 = 1465 days, e.g. an average of 366 1/4 days. Hence, one could say that the moon is fulfilling and diminishing. (Information courtesy K. Geus).
[104] Reference to "the Metonic cycle of 19 years during which 7 lunar months must be intercalated" (Andersen 1984: 125, fn. 14d).

Here I saw countless warriors called *Gregori* (рекомїи григоре) (=Watchers), the appearance of which is like the appearance of humans. Their immensity was as enormous as the vastness of huge giants; their faces were morose, and their mouths are constantly silent.

There was no divine service in the Fifth Heaven, and I asked the men accompanying me, "Why are these *Gregori* so sad, and their faces are morose with their mouths silent and why no divine service is performed in this heaven?" The men answered me, "Those are the *Gregori*, and 200 myriads of them parted from God with their prince *Satanail*. Following in their footsteps are those who are now hanging on chains in the Second Heaven, engulfed by deep darkness. They descended to Earth from God's Throne on a place called Mount Hermon and broke their covenant with God on the shoulder of Mount Hermon. The Earth was polluted by their deeds. Human women sinned greatly during all times of that epoch, lawlessly committing the mixing of species, giving birth to giants and enormous colossi and thus bringing about great malevolence. Because of this, God condemned them in the Great Tribunal; and the *Gregori* are crying for their brethren, since they will be judged on the Great Day of God. And I said to the *Gregori*, "I saw your brethren. I saw their deeds, their suffering, and their great prayers, and I prayed for them; but God condemned them to be under the Earth,[105] until both heaven and earth are finished forever." And then I said, "Why are you waiting for your brethren instead of serving before God's face? Serve before God's face, so that you do not anger God to the end of His patience!" They listened to my advice and lined up in four ranks in that Heaven. While I was standing with the two men, four trumpets sounded together loudly and the *Gregori* began singing in one voice, and their voices ascended to God's face.

The Sixth Heaven (Chapter Eight)

Here I saw seven bands of the most bright and glorious angels, whose faces were shining more strongly than radiant rays of the Sun. Their faces were no different from the form and appearance of their garments. These bands of angels are in charge of the movements of stars, the Sun's orbit, the Moon's phases; they see earthly benevolence and malevolence. They give orders and instructions; and singing with sweet voices they give every glorious praise. These are the archangels who are above the angels and above every other creature, whether celestial or terrestrial; and these archangels are above angels who are in charge of times and years, and above angels who are in charge of rivers and seas, and above angels who are in charge of

[105] Here is a reference to the Second Heaven as a subterranean place, a discrepancy in the text.

every earthly fruit, and above angels who are in charge of every grass and every food given to each living being, and above the angels who are in charge of all human souls; these archangels write down the deeds of all people and their lives before God's face. Among them are seven phoenixes, seven cherubim, and seven six-winged angels. All of them sing in one voice, and nobody can describe with words their singing. And God rejoiced by His footstool.[106]

The Seventh Heaven (Chapter Nine)

From there these men moved me up and raised me the Seventh Heaven. Here I saw a rather great light, and the entire fiery force of great archangels; and I saw an incorporeal host, and the origins of dominions and power of Cherubim[107] and Seraphim,[108] and the Thrones and ten regiments of many-eyed angels, a luminous station of Othanim (i.e. Ophanim).[109] I got scared and started shaking from great fear. And the two men took me and conducted me among their midst, and told me, "Have courage, Enoch, do not be afraid!" And they showed me God from a distance; He was sitting on His highest Throne.[110] All the heavenly hosts stepped forth and stood in a line of ten ranks, according to their status. And they bowed before God; and with joy and merriment they again returned to their places, in exceedingly bright light, singing with low and gentle voices. And the glorious ones were serving Him without departure through night and without leaving through day, while standing before God's face and fulfilling His will. The Cherubim and Seraphim surrounded the Throne, and the ones with six wings were covering His Throne, singing with a quiet voice before God's face. When I saw all this, the two men said to me, "Enoch, we were ordered to accompany you until here." The men went away and I never saw them again. I remained alone on the brink of Heavens.

(...) God sent one of his glorious archangels, the archangel Gabriel, who said to me, "Have courage, Enoch, do not be afraid! Rise and come with me and stand before the face of God forever!" (...) And Gabriel swept me up just like the wind takes away a leaf. He took me and placed me before God's face.

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[106] An idiom based on a biblical metaphor "footstool of my feet" (Isaiah 66:1): «God said, "the heaven is My throne and earth My footstool"». The motif is classified by St. Thompson as A 133.2.2 (Heaven as God's throne, earth His footstool).

[107] Cf. Ezekiel 1, 10.

[108] Cf. Isaiah 6: 1–3.

[109] See *Enoch I* (61:10, 71:7) and Dan. (7:9), where wheels of the divine chariot or a class of angels are equated with Cherubim and Seraphim; see also Andersen (1984: 135, fn. 20b).

[110] Cf. Stith Thompson's *Motif-Index*: A137.15 (God represented on high throne surrounded by angels).

The Seventh Heaven: encounter with the Archangel *Vrevoil* (Chapter Ten)

And God summoned one of His archangels, whose name was *Vrevoil*, and who was swifter in wisdom than the other archangels; he was the one writing down all God's acts; Lord said to *Vrevoil*, "Bring out the books from my treasury! Take a reed(-stylus) and give it to Enoch and recount for him the content of the books!" *Vrevoil* hastened and brought exquisite books fragrant/anointed with myrrh and gave me from his hand a quick-writing reed(-stylus). And he told me about all celestial and terrestrial and marine activities, and the movements of all elements, and about the trajectories of their fluctuations, and about the *Zodiac-signs*, and he also instructed me about the Sun, the Moon, and the stars, and the change of their movements, seasons, and years, the days and hours and rising up of clouds, the departure of winds, the number of angels, songs of armed hosts, and about every human thing, and songs in various languages, and he told me about human life, and orders and instructions and sweet-voiced singing, and everything which is edifying. *Vrevoil* was telling me all this for 30 days and 30 nights without his mouth stopping speaking, whereas I was writing down all the signs of creation without ceasing. When I completed the 30 days and 30 nights, *Vrevoil* said to me: "This is everything which I had to tell you, which you have written down. Now sit and write down all the souls of the people who are yet to be born and also the places which are predestined for them forever, since every soul is predestined even before the creation of the Earth." I sat for another 30 days and 30 nights, and I wrote 366 books.[111]

The Seventh Heaven: before the Face of God (Chapter Eleven)

God called upon me and said: 'Enoch, sit at my left side with Gabriel! (...) I will disclose to you all the secrets from the very beginning, how I created *ex nihilo* the visible from the invisible. Because I have not disclosed yet My secrets even to My angels, neither did I tell them how they came to be, nor about My infinity and ineffability and rational creation, about which I tell you today.

(...)

Once all visible things did not exist. I was the only one moving within the invisible like the Sun, from East to West and from West to East. Yet while the Sun has peace I did not find peace, since I created everything. And I thought of making a foundation; I created the visible creation. At first I ordered one of the invisible to descend and become visible; and the massive

[111] The number of the books given (= 366) is a specific feature of the longer recension; in the shorter recension the number of books varies (e.g. 360, 300 etc.) (Andersen 1984: 140–141, especially fn. 23 h). Most probably the fluctuating number of books in the shorter recension is due to scribal errors. The number of books in the longer recension (i.e. 366) is probably an allusion to the solar calendar.

Adoil[112] descended; and I looked at him; in his abdomen[113] there was great luminosity yielded. I told him, "Deliver yourself, *Adoil*, and may the visible be born from you!"[114] He delivered himself (раздрѣши сѧ); and an overwhelmingly great Light came out, and I was in the midst of this Light. As the Light was looming, a great aeon came out from it, making manifest all creatures which I was thinking of creating. I saw that it was good; and I placed my Throne there, and sat on it; and told the Light, "Ascend above the Throne and stand fast! Be the foundation of the upper world!" Above the Light was nothing else. Then again I bent over, looked down from my Throne and for the second time raised my voice in the Abyss below and said, "May from the invisible firmament appear the invisible!"[115] *Arkhas* came out (изыде Архась), who was hard and heavy and very red (чрьме^{н}); and I said, "Unknot yourself (развръзи сѧ),[116] *Arkhas*, and may the visible be born from you!" He delivered himself (раз^{д}рѣши сѧ) and a very big dark aeon came out of him; it was carrying the creatures of all the lower worlds. I saw that it was good; and I said to him, "Go down and stand fast!" And thus he became the foundation of the lower world. And there was nothing below this darkness.

(...)

On the fourth day, I ordered large luminaries to appear on the heavenly rings. On the first and highest ring I placed the star Kronos (i.e. Saturn). On the second ring, below it, I placed Aphrodite (i.e. Venus). On the third, Aries (i.e. Mars). On the fourth, the Sun. On the fifth, Zeus (i.e. Jupiter). On the sixth, Hermes (i.e. Mercury). On the seventh, the Moon. I adorned the lower ether with smaller stars, and I put the Sun to shine during the day, while the Moon and stars were to shine during the night; and I ordered the Sun to advance through each Zodiac sign, being 12 Zodiac signs in the orbit of the Moon. I gave names to the Zodiac signs, and the time when they enter to be born, and in their chronology and how the hours go around.'

[112] According to Charles (1913: 445, fn. XXV. 1), the form *Adoil* is interpreted as 'the hand of God'.
[113] Lit. 'womb'.
[114] Here and further below, the terms 'deliver' and 'release' allude to childbirth terminology.
[115] A scribal error? Perhaps it should read: 'May from the invisible firmament appear the visible'.
[116] Another term for childbirth; lit. 'untie/unfasten unravel/disentangle yourself'.

CHAPTER 6

BEROSSOS ON KOS FROM THE VIEW OF COMMON SENSE GEOGRAPHY

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It is easy to see how circular logic can creep into historiography and hardly any better example presents itself than the works of the Babylonian priest and scholar Berossos, who is thought to have composed his magnum opus, *Babyloniaka*, in Greek. Berossos' text survives in fragments only, preserved in both Greek and Armenian, and the assumption has always been that Berossos, a contemporary of Alexander the Great, wrote his work in Greek as a way of presenting Babylonian history and culture to a wider Hellenistic readership.

The present paper intends to challenge this assumption, particularly in regard to the assumption that Berossos abandoned his sinecure as a temple priest in Babylon, moved to the island of Kos and founded a new 'school', based on his knowledge of Chaldean astronomy. In geopolitical terms, this tradition is remarkable in many ways, since it suggests a shift in 'knowledge transfer' from one geopolitical sphere to another, i.e. from Seleucid Babylonia to the West, which runs counter to the usual pattern associated with the Near East after Alexander, namely the almost relentless spread of Hellenism to the East. Berossos' presumed passage to Kos significantly challenges the paradigm of Babylonian culture becoming Hellenised, since it lays open the possibility that Berossos' Greek text was not produced in Babylon itself. Moreover, the very fact that Berossos is claimed to have moved to Kos to found a new 'school' indicates that Babylonian learning was being physically brought to Greece, which alters the mapping of ancient science, since there is no comparable evidence for Greek science being brought to Babylonia; we have no records of any major disciples of Aristotle opening schools in Babylon or even Seleucia-upon-Tigris.

Before we let this problem worry us excessively, it is important to recall how late and unreliable are all our sources on Berossos and his works. The only surviving record of Berossos' alleged move to Kos comes from Vitruvius, who mentions *en passant* the impressive credentials of Chaldean astrologers, with their particular expertise in horoscopes. He then adds,

primusque Berosus in insula et civitate Coo consedit ibique aperuit disciplinam, and the first was Berossos. He settled on the island and state of Kos where he opened a 'course of study' (Vitruvius, De architectura 9.6.2)

In fact, Berossos did not open a 'school' but a new curriculum (*disciplina*[*m*]), presumably referring to astrology, and Vitruvius goes on to mention two disciples (both unknown) who further developed horoscope calculations. There is no doubt about this being a reference to *Wissenstransfer*, but the question is whether Berossos himself actually traveled to Kos, or whether his *oeuvres* arrived there on their own, without him ever leaving Babylon.[117] There are good reasons to believe that this was the case.

First, let us consider Berossos' name: Why would a Babylonian priest who is thought to have composed his text in an impressive literary Greek not have taken a Greek name? Other Babylonian literati whose works were known and read in the West, such as Diogenes of Babylon or Seleucus of Babylon, are known to us only by their Greek names. Why would not this Babylonian priest, whose work survives in Greek, have not chosen to adopt a Greek name, as did his contemporary Anuballiṭ, a Babylonian official who took the name Nikarchos (Schaudig 2010: 57)? Berossos' name, in fact, is actually *Bēl-re'û-šunu*,[118] and Johannes Bach has produced convincing evidence that *Bēl-re'û-šunu* / Berossos is attested as *šatammu* of the Esangil Temple of Marduk in Babylon in a document dated to 253 BCE, during the reign of Antiochus II.[119] In other words, if Berossos did dedicate his book to his king Antiochus, as is widely assumed, this was in fact Antiochus II and not Antiochus I. Bach's discovery is of utmost importance, since it shows beyond any doubt that Berossos was a major figure in Babylon as both high priest and scholar, which is probably why his work was taken seriously in the West.[120]

The question is why a *šatammu* should abandon the most prestigious non-royal job in ancient Mesopotamia to go and live on Kos? For one thing, there is no popular tradition of Babylonian priests travelling abroad, in contrast to doctors, who were laymen; doctors were never supported by generous temple prebends. Both temples and priests were rich, and there was no reasonable incentive for a priest to leave his temple, unless his life was threatened. In

[117] Vitruvius ibid. 9.2.1 also says about Berossos: *qui ab Chaldaeorum civitate sive natione progressus in Asia etiam disciplinam Chaldaicam patefecit*, 'Berossos, who came from citizenship (or rather origin) of the Chaldaeans, opened up Chaldaean learning (*disciplina*) in Asia'. The information given here is vague but makes no mention of Kos or Berossos coming to the West. Vitruvius only knows of Berossos' interests in astronomy and related mathematics, and there is no suggestion of Berossos' work relating to Coan or Hippocratic medicine or even iatromathematics.

[118] See van der Spek 2000: 439, noting the meaning of Berossos' name in Akkadian as 'Bel is their shepherd'.

[119] J. Bach, 'Berossos, Antiochos, und die Babyloniaka', *Ancient and West* (forthcoming 2012).

[120] It is possible that Berossos may have been a rather minor priest in charge of astronomy, among the so-called *ṭupšarru enūma anu enlil*-priests who were responsible for the astronomical diaries; this is the opinion of de Breucker 2011: 637. Nevertheless, it is unlikely that a minor priest would have engaged in a major literary work and managed to have it gain such recognition. Manetho, for instance, had a parallel status as high priest of Ra at Heliopolis.

fact, we know of a case where such eventuality actually took place, namely the case of Onias IV, High Priest of Jerusalem who fled to Leontopolis in Egypt because he feared for his life. What happened? According to Josephus (Ant. xii 5.1, 9.7), Ptolemy VI granted Onias the use of a temple at Leontopolis so that he could carry on with his priestly duties, despite abandoning his position in Jerusalem. There is no evidence that Berossos indulged in any cultic duties on Kos, had he ever lived there.

So this leads us to the question of whether Berossos, a Babylonian priest of considerable standing, would have written a work in Greek within a few decades after the fall of the Persian Empire to Alexander and his successors. This is where circular logic comes in and it works something like this. Because we have the text of Berossos in Greek (and only cited by later authors such as Josephus and Eusebius, and preserved in the 9th century work of Synkellos in Greek and in Armenian), the assumption is that Berossos wrote his books in Greek for a Greek-reading public in Seleucid Babylonia. What is the evidence for a Greek-speaking public in Babylonia? The best evidence usually cited is the existence of the work of Berossos, which survives in Greek. Why would Berossos, a Babylonian high priest, have written in Greek? The logic is that he did so in order to bring awareness of Babylonian history and culture to a broader international public. Because Berossos' work is extracted by other later writers, such as Josephus and Eusebius, in Greek, we can assume that Berossos wrote in Greek, and we come full circle.

In fact, we have an excellent contemporary model for Berossos, namely the Egyptian High Priest Manetho who appears to have written books on Egyptian history in Greek for a Hellenised public, in third-century BCE Ptolemaic Egypt. The assumption is that both Berossos and Manetho (neither bearing Greek names) composed texts for a Greek-reading public (see Oelsner 2002: 185). Nevertheless, this Berossos-Manetho equation takes no note of the enormous differences between Seleucid Babylonia and Ptolemaic Egypt in the third-century BCE. For one thing, there is no Babylonian equivalent to Alexandria as a centre for Greek culture and learning, with its great Museum and advances in avant-garde medicine, as practiced by Herophilos and Erasistratos, who practiced vivisection in Alexandria. Alexandria was also where the Bible was translated into Greek under the auspices of Ptolemy Philadelphus, although no parallel or comparable Greek translation of the Bible is known from Mesopotamia, even in Parthian and Sassanian periods. If a Greek Bible translation were circulating in Mesopotamia, Eusebius would certainly have known about it. The reason why we have no Babylonian Septuaginta is simple: no one in Babylonia would have read the Bible

in Greek. Furthermore, no Greek papyri or ostraca have been found in Babylonia, certainly nothing on the scale of Oxyrhynchus. While Manetho would have easily found his Greek-reading public in Alexandria, no comparable Greek readership would have welcomed Berossos' *Babyloniaka* in Babylon itself, in such a few short years after the Macedonian conquest. So there is likely to be an alternative scenario which might avoid the present *Teufelskreis*.

What if Berossos was writing for a *grande publique*, but in Aramaic rather than in Greek? Aramaic was the second lingua franca of Babylonian and widely spoken throughout the first millennium BCE and the logical successor to Akkadian as the main language of the region in late periods.[121] Might it be possible that Berossos actually wrote in Aramaic for his Babylonian public, but this work was later translated into Greek? We have a parallel for this as well, namely Josephus, who wrote the first draft of his Jewish War in Aramaic (now lost), but the work only survives in its Greek translation. It is questionable whether Josephus could have translated his works into Greek without assistance, while writing in an imposing literary style reminiscent of Thucydides, but a more relevant question for us is: in what language does Josephus read Berossos? The usual assumption is that Josephus, writing in Greek, cites Berossos, also writing in Greek, through the mediation of the Greek historian Alexander Polyhistor. Although this might explain how Berossos' Greek text enters Josephus' Greek text, it is conceivable that Josephus was actually familiar with Berossos' *Babyloniaka* in its Aramaic original, rather than through its Greek translation.

So what about the idea that Berossos, like Josephus, actually wrote his work in Aramaic for his local public, and it was this work which traveled to Kos and was translated into Greek, either in Kos or more likely in Ptolemaic Alexandria? As Francesca Schironi points out, 'Even though the *Babyloniaca* might have been available in the Library of Pergamum, the Library of Alexandria is surely the most likely place. During this period a policy of systematic book acquisition was pursued by the Ptolemaic court, as indicated by many sources (Schironi 2009: 10). In addition to acquiring books, it was also common practice to translate them, as explained by Ptolemy in his *Tetrabiblos* I 21, who complained about having difficulty in deciphering an Aramaic (or Chaldaean) manuscript which arrived in Alexandria, not because of the language but because of the poor state of preservation of the text.

[121] Van der Spek recognises Aramaic as Berossos' own language, but still insists he wrote in Greek: 'Zijn dagelijkse spreektaal was Aramees (net als van de meeste inwoners van West-Azië in de Hellenistische tijd), hij kende spijkerschrift en kende zowel de Babylonische als de Sumerische literatuur, en hij was in staat een boek in het Grieks te schrijven' (van der Spek 2005: 203).

One obvious method to decide the question of the original language of the *Babyloniaka* is to examine the text itself, to see whether it fits into either Greek or Babylonian literary genres. De Breucker has no doubts about the Greek historiographical nature of Berossos' text, and he concludes as follows:

> Berossos conceived his *Babyloniaca* as an introduction to Babylonian history and culture for a Greek-speaking audience. Writing in Greek was not in itself sufficient to appeal to his intended readership. Berossos also had to adopt Greek forms, conventions and concepts. He organized his work as a Greek historical ethnography, an obvious choice for his purpose in describing the history and culture of a country alien to most Greeks. No comparable genre was known in cuneiform literature. (de Breucker 2011: 652)

Is this really the case? If one begins by assuming that Berossos wrote in Greek, then it becomes necessary to compare the style and content with numerous historiographic works in Greek from his time and later. If, however, one abandons the idea that Berossos wrote in Greek but considers the alternative proposition that he wrote in Aramaic for an Aramaic-speaking public, Berossos' work takes on a completely different character. For one thing, the themes which survive among Berossos' fragments (many of which are only preserved by Synkellos in the 9th century CE) are typically Babylonian in style and content, and *not* Greek. What we know about Berossos is that he wrote about astronomy / astrology (upon which he supposedly founded a new *disciplina* on Kos), Babylonian antediluvian kings and a history of Babylonia based upon earlier king lists, at the same time recounting some major Akkadian religious narratives, especially regarding creation and the Flood (much of which is only preserved in Armenian translations of Synkellos). A great deal of this material reads like typical Babylonian *Listenwissenschaften*, such as lists of kings and the lengths of their reigns, or lists of antediluvian sages known from Seleucid Babylonia, or reflects the rather terse chronologically arranged record of events known from Babylonian chronicles (see Glassner 2004). Even the more 'historical' passages in Berossos -- seen as comparable with Greek genres -- read rather like Babylonian school texts in their list-like formulations, such as the following passage:

> καὶ πρῶτον μὲν τὴν Βαβυλωνίων γῆν φησι κεῖσθαι ἐπὶ τοῦ Τίγριδος καὶ Εὐφράτου ποταμοῦ μέσην. φύειν δὲ αὐτὴν πυροὺς ἀγρίους καὶ κριθὰς καὶ ὄχρον καὶ σήσαμον. καὶ τὰς ἐν τοῖς ἕλεσι φυομένας ῥίζας ἐσθίεσθαι· ὀνομάζεσθαι αὐτὰς γόγγας· ἰσοδυναμεῖν δὲ τὰς ῥίζας ταύτας κριθαῖς.
>
> And he [Berossos] first says that the land of the Babylonians lies in the middle of the Tigris and Euphrates Rivers[122] and that it yields wild wheat, barley, chickpeas, and sesame. Roots are eaten that grow in the marshes. They are called *gongae*. These roots have the same properties as barley. (translation de Breucker 2011 of Synkellos 49, 19).

[122] It is interesting to see that the Tigris River is mentioned before the Euphrates, which is typical for Babylonia. In Greek and Roman texts, where the standpoint is in the West, Euphrates normally comes first [courtesy K. Geus].

This passage awards us with a possible clue to Berossos' original text, since it contains a foreign word gongae, which we might assume to be Akkadian, if Berossos was indeed translating classical Babylonian culture into Greek. Unfortunately, there is no known Akkadian agricultural or horticultural term corresponding to gonga but other possibilities exist. A Syriac plant name, *gō^{c}ā*, could serve as a possible candidate for *gonga* on etymological grounds,[123] but it would come as no surprise if the term has been corrupted over the length of time and through so many different redactions.[124] What is clear, however, is that we have an example of a Babylonian term preserved in Berossos which turns out to be neither Akkadian nor Greek.

Another famous example of how Berossos purports to translate Akkadian into Greek occurs within the same passage preserved by Synkellos, but this time referring to the 'sea'. The passage reads,

ὧν καὶ τὰς εἰκόνας ἐν τῶι τοῦ Βήλου ναῶι ἀνακεῖσθαι. ἄρχειν δὲ τούτων πάντων γυναῖκα, ἧι ὄνομα Ὁμόρκα· εἶναι δὲ τοῦτο χαλδαιστὶ μὲν †Θαλάτθ, Ἑλληνιτσὶ δὲ μεθερμηνεύεσθαι Θάλασσα. Images of these [animals] were also set up in the temple of Belos. Over all these a woman ruled named Omorka. This means in Chaldaean †Thalatth, in Greek it is translated as 'Sea' (Thalassa) (de Breucker 2011).

The assumption in this passage is that Berossos intends to translate the Akkadian mythical figure Tiamat ('sea') by Greek *thalassa*. There is a problem, however, since neither words *tiāmat* nor *thalassa* appear in Berossos' text, and ancient editors introduced Greek *thalassa* into the passage to render the meaning 'sea'. The Babylonian goddess Tiamat actually appears as 'Omorka' or in a variant form *Markaye* in a version of the story preserved in an Armenian translation of Eusebius.[125]

The first problem is how to identify Omorka / Markaye, referring to a female figure who ruled over various animals, images of which were set up in the temples.[126] It seems obvious that we are dealing here with Tiamat, goddess of the sea whom Marduk executed in Enuma Elish. Our suggestion is that a series of corruptions took place to Tiamat's name which are only recognisable within an Akkadian – Aramaic *Sprachbund*. Although Tiamat's name derives from Akkadian *tâmtu*, 'sea', it is not the only word for cosmic ocean in Akkadian. On the

[123] With ayin represented by /ng/.

[124] The word *gwng* is attested in Manichaean Middle Persian and in Manichaean Parthian texts, although usually in poor contexts, but one example of a Manichaean Middle Persian attestation in a kind of list reads: *ʾwrwr ʿsprhm w: mrw ʾwd ʾʾcyhr ʾwd gwng gwng ʾrwy kyšt ʾwd rwst* (M 7981/I/R/i/1-4/), '... plants, flowers, herbs – both seedless and all sorts of plants – (he/they) planted and grew' ¤courtesy Desmond Durkin-Meisterernst].

[125] The Armenian text reads, 'They kept images of these one after another in the temple of Bēl. And [he says] that one woman ruled over all of them, who could be called Markayē, which is named T'aghatt'a in Chaldaean; and in Greek is translated T'aladda, which is sea'; De Breucker 2011 also cites another orthography for the name Omorka in Byzantine manuscripts, ομορωκα.

[126] De Breucker 2011 thinks that Omorka might be a corruption of an epithet for Tiamat, namely Ummu-ḫubur, but the phonological similarities between these terms is remote and unconvincing.

famous Babylonian Mappa Mundi, the ocean surrounding the world is called *marratu* or 'bitter sea'.[127] The term *tâmtu* or even the name Tiamat, however, has no meaning within Aramaic, so the etymology of the name was no longer obvious to putative Aramaic readers of Berossos. In effect, the name Markaye (and even Omorka) could be late corruptions of *marratu*, essentially reflecting an original change in only one consonant.[128] The question is what is meant in Berossos' text by adducing a Chaldaean translation 'Talatth', which is then interpreted as a word for 'sea'? The logic may be a bit Talmudic but works quite well, since Aramaic *marta'* 'lady' is a near homonym to Akkadian *marratu*, and *marta'* is an appropriate epithet of a goddess, in the same way that Belos or Bēl represents Marduk in Berossos. What is the connection, then, between *marta'* and the sea? An Aramaic synonym for *marta'* is Aramaic *ṭaletha'*, 'girl', which can even refer to an older woman as a term of endearment, and this then leads us to the Syriac homonym *ṭala^{c}tha'* for 'marsh', one of the principle landscape features of Southern Mesopotamia. In fact, it may not be necessary to posit these intermediary meanings of *marta' and ṭaletha'*, 'lady' and 'girl', although this is exactly the kind of philological equations which an Akkadian scholar like Berossos would have known from Babylonian scribal school commentary traditions (see Frahm 2011). It is this kind of homonym and word-play which allow one to move from a word meaning 'bitter sea' to one meaning 'marshes', in order to explain the meaning of a name.

Two important results emerge from this line of argument. First, there is nothing similar from Greek historiography to compare with this text. Second, Berossos' themes and methods belong squarely to Babylonian school tradition, characterised by *Listenwissenschaften*, explanatory commentaries, brief historical fragments associated with a particular king's reign, and literary narratives reflecting creation and Flood motifs. It is quite plausible, on the other hand, to assume that Berossos did not compose his text in Akkadian, since the proper names are usually badly corrupted and there are virtually no Akkadian loanwords recognisable in his text. The idea that Berossos was responding to a new post-Alexander world order by writing for a larger public is quite acceptable, since Akkadian was no longer widely spoken as a vernacular language in his time. What is plausible, however, is that Berossos was writing in

[127] As opposed to the Apsû or sweet subterranean waters; for the Mappa Mundi, see Horowitz (1998: 20–42).

[128] An appended note to our text gives a numerological explanation for the goddess' name Omorka: κατὰ δὲ ἰσόψηφον σελήνη, 'or, according to the equivalent in numerical value, "moon" (see de Breucker 2011). In other words, one of the terms for the 'sea' in this passage has the same numerical value as a word for 'moon'. In fact, de Breucker cites a rather ingenious solution for the orthography of the name Omorka, since the numerical value of the Greek letters of Ὀμόρκα (70+40+70+100+20+1) is the same for σελήνη (200+5+30+8+50+8), i.e., 301 (de Breucker *op. cit.*), and hence the name could have been altered in this later interpolation to Omorka in order to make the *gematria* work out correctly.

Aramaic for an Aramaic-speaking public, and in this way appealed to a broader constituency. The difference is crucial, since one reads Berossos differently if one thinks of it as a work written by a Babylonian for Babylonians, rather than for foreign consumption. At the same time, a manuscript in Aramaic was far from inaccessible to foreign scholars, since there was a regular trend of translating Aramaic (or Chaldaeic) texts into Greek, as we know from Alexandria. Could the same process have taken place in academies on Kos? In other words, rather than Berossos himself traveling to Kos, it is more plausible that his works traveled there instead, either in their original Aramaic or having been previous translated into Greek, perhaps in Alexandria.

This means that common-sense geography solves a problem which has hardly been recognised. It is hardly credible to imagine that Babylonian science and literary culture would abandon its traditional formats and languages within its own habitat, within only a few years after encountering Hellenism at close quarters. The mapping of ancient science shows no traces of large-scale exchanges of scientific data between the Greek and Babylonian worlds within a few decades after Alexander, and there is no reason to assume that Berossos's work defied this trend.

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CHAPTER 7

A 'DAY'S JOURNEY IN HERODOTUS' *HISTORIES*[*]

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Summary

Antike Entfernungsangaben sind in antiken Quellen nicht nur in einer erstaunlichen Anzahl und Variabilität, sondern auch in einer erstaunlichen Maßtoleranz überliefert. Für diese riesigen Toleranzen, die nur selten mit echten Mess- oder Überlieferungsfehlern zu erklären sind, wird hier nach einer alternativen Erklärung (*mental model*, vgl. Thiering in diesem Band) gesucht. Der vorliegende Aufsatz kommt zu der These, dass es im griechisch-römischen Altertum keine echte Mittelwertbildung in der Praxis, speziell bei den antiken Geographen, gab. Herodot, Strabon und die anderen Geographen der Antike *wählten* aus vorliegenden Angaben die eine, ihnen richtig erscheinende Angabe aus. Anders als wir heute kommen sie gar nicht auf die Idee, alle ihnen überlieferten bzw. bekannten Werte zu addieren, durch die Zahl der Angaben zu teilen und so einen statistischen Mittelwert zu bilden. Es wird also keine *Rechenoperation* durchgeführt, um einen Mittelwert zu erzielen. Statistik ist wie Inkommensurabilität für die Griechen und Römer kein geeigneter 'Modus', um zur Realität zu gelangen. Die Folge war, dass das Toleranzintervall bei Entfernungsangaben, und speziell bei der auch anderen Faktoren unterliegenden Tagesreise, enorm groß war. Sie konnte zwischen ca. 15 und 120 km schwanken, ohne dass die Griechen und Römer versuchten, einen statistischen 'Mittelwert' festzulegen.

1. Introduction

While our modern metrical system is defined physically – either as a standard wavelength of krypton-86 emission, as a distance covered by light in a vacuum, or as a fraction of the meridian of Paris – and therefore reproducible at any time, the distance units in antiquity derived from the human body.[129] Hence, they were submitted to subjective perceptions. As man´s physique varies within certain limits, a finger´s breadth, a foot, a cubit or their multiples like *stadion* and mile are underdetermined units. This is a huge difference between now and then. There was nothing like a 'standard metre' in the Greek and Roman world.[130] Of course, ancient craftsmen and artisans had an accurate enough conception of certain norms and standards, but there was simply no way of checking this conception (e.g. of a Roman mile as 1,000 double steps, *mille passus*) to objective criteria. Modern handbooks on metrology obfuscate this fact, when they define the Roman foot as 0,2957 metre,[131] the Babylonian royal cubit as 0,525 metre[132] or the Celtic *leuga* as 2,22 kilometre.[133] Nowhere in antiquity existed

[*] I should like to thank the members of the Berlin Common-Sense-Geography-Group, especially Elton Barker, Kurt Guckelsberger, Elizabeth Irwin and Irina Tupikova and for their valuable suggestions.

[129] See Vitr. 3.1.5: "Further, it was from the members of the body that they derived the fundamental ideas of the measures which are obviously necessary in all works, as the finger, palm, foot, and cubit." Cf. Poll. *onom*. 2.32.

[130] *Pace* the metrological relief sculpture in the Asmolean Museum, Oxford, and the so-called 'Salamis relief' in the Archaeological Museum at Piraeus.

[131] Hultsch 1882: 98.

[132] Hultsch 1882: 390.

such a precision of measurements. Or to rephrase it: since we know of ancient architectural and other provisions of astonishingly accurate precision, a notion of how long a foot, a cubit, a mile really is, must have evolved in intersubjective, probably locally limited discourses[134] (as part of 'shared' or 'common' knowledge). Merchants and clerks especially were interested in standardization and normalization in order to exchange goods or calculate taxes. Since the Mediterranean world was not globalized in a modern sense and since there was no internationally accredited certification body[135], standards and norms were valid only for certain towns or regions and were never scrutinized. E.g, the greek *stade* could vary between c. 140 and c. 200 metre, i.e. for 40 %, without causing much trouble *in praxi*. Ancient geographers were surely aware of this fact but did only rarely take it into account. Considering such a huge margin of fluctuation, we understand that the thousands of ancient distances transmitted in Greek and Roman texts were probably measured very infrequently[136] but estimated according to (rather) subjective criteria.

This paper is concerned with this subjectivity in the (seemingly objective) ancient measurements. I limit myself to the *Histories* of Herodotus (second half of the 5th century BC). This narrative is arguably the earliest prose text (to a certain extent) in Greek where space and spatiality play an important role.[137] In addition, Herodotus is, as far as I know, the first author who uses the measurement unit a 'day´s journey' for terrestrial travels.[138] Other units like stades, *schoinoi*, stations, plethra will be treated only in relation to it. Despite being (most probably) the oldest unit for travels, a 'day´s journey' (inland) is mentioned relatively rarely and late in Greek sources. Herodotus uses it for the edges of the world, populated by barbarians, while applying the traditional *stadion* to Greece and regions inhabited by Greeks,[139] and, what´s more, the parasang for describing distances in the Persian sphere of influence – which is indeed far from surprising.

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[133] Hultsch 1882: 690. Other handbooks give other data in a bewildering diversity. In this matter only approximations seem to be attainable.

[134] The different standards in monetary, length of the foot etc. are evidence for this.

[135] The Athenian body of the *euthynoi* and *logistai* and the 'price edict' of Diocletianus are only initial stages of this evolution and are more an indicator of the bewildering variety than for universally accepted norms and standards.

[136] The nearest equivalents are measurements of the Roman roads and areas measured by Roman *gromatici*.

[137] See now Bichler (in print) with bibliography.

[138] The evidence in Homer (overview of nearly a dozen instances in Forbiger 1842: I 550 fn. 13) are only concerned with day´s journey over (open) sea.

[139] The questions when the Greek stadion became the standard measurement unit for length and what are the reasons for this development, are not settled yet.

In the following only inland routes measured in the unit 'day´s journey' with starting and end points clearly identified, are used for this study so that the results can easily be checked.[140]

2. Maxima in Herodotus´ Treatment of the Day´s Journey (System I)

Let us start with a passage in the first book of Herodotus´ *Histories* (1.72.3):

> Thus the River Halys divides nearly all of Asia between those regions in the south, facing the sea towards Cyprus, and those northern regions facing the Euxine Sea. It is here that the neck of the whole continent lies; it can be crossed by a man travelling *without heavy baggage* in five days.

Commentators are not getting tired to underline that this distance–c. 500 kilometres–is far from truth.[141] Also, the landscape is very rugged and no ancient road was connected these points, making the journey an ultra marathon on five successive days. Following an idea of Detlev Fehling, modern scholars David Asheri and Pietro Vannicelli thus declared the number of five days an "unità tipica", meaning that the number is not to be accepted on face value but shall evoke a certain notion in the reader.[142] Indeed, a day´s journey of 112 km is huge and seams record-breaking even for long-distance runners "without baggage".[143]

Nevertheless, some doubts linger. Why does Herodotus use a 'typical number' here? What exactly does he try to confer here to the reader? First of all, we have to maintain that excessive marches are not one-of-a-kind in the *Histories*. When the Athenians asked the Lacedaeonians for help shortly before the battle of Marathon (490 BC), the Athenian messenger *hemerodromos*)[144] Philippides arrived in Sparta on the second day (6.106.1):

> So, after Philippides had been sent off by the generals and … he arrived in Sparta on the day after he had left Athens.[145]

According to modern authorities, the route between Athens and Sparta was c. 230 kilometres long,[146] which is surprisingly close to the value estimated in the passage above. Herodotus is clearly being consistent here. Distances over 100 kilometres per diem were realistic in his mind. And since he read his work to an Athenian (and probably also international) audience, who would know exactly how far it is to Sparta, the numbers must have had some credibility.

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[140] Thus, we ignore here Hdt. 2.34.2; 3.5.3; 3.26.1; 4.18.2; 4.19; 4. 21; 4.22; 4.101; 4.101; 4.115; 4.182; 4.184.
[141] See, e.g., Janni 1984: 154 (speaking of "550 chilometri"); Asheri 1988: 314; Strassler 2007: 42 fn.
[142] Fehling 1971.
[143] This 'error' was even 'corrected' at later times. See Janni 1984: 154.
[144] Ancient sources for long-distance runners are collected and explained by Matthews 1974.
[145] Philippides probably started in the morning of the first day and arrived in the evening of the second. See also Matthews 1974: 162. But Isocrates (*Paneg*. 87) is speaking of ἐν τρισὶν ἡμέραις καὶ τοσαύταις νυξί.
[146] Modern calculations seem a little bit high (e.g., Matthews 1974: 162: 136 miles), probably influenced by ancient sources. Pliny (7.84) and Isocrates (Paneg. 87) give 1,160 stades or 1,200 stades, respectively. The distance between Athens and Sparta is, as the crow flies, c. 150 km. Our database shows that the route Athens–Eleusis–Megara–Krommyon–Korinth–Kleonai–Argos–Lerna–Tegea–Sparta adds up to c. 190 km.

Here I conclude that Herodotus is drawing on a common knowledge stock ('shared knowledge').

2.1 Average Values for Measurements in Herodotus (System II)

At other passages in Herodotus´ work, we find totally different values for a day´s journey, e.g. in 1.104.1:

> It is a thirty-day journey for a traveller *without heavy baggage* from Lake Maeotis to the River Phasis and Colchis, and from Colchis it is not much farther to cross into Media.

The distance between the Lake Maeotis (Sea of Azov) and the River Phasis (Rioni River in modern Georgia), respectively, adds up to c. 500 kilometres on the coastal street.[147] The stated value for a wanderer, who is classified as εὔζωνος,[148] lies at a meagre 17 kilometres per day.

At two instances Herodotus himself expressed how he calculated a day´s journey (4.101):

> And so the shape of Scythia is square: two of its sides reach down to the sea, and these and its coastal and inland margins make it equal on all sides. For from the Ister to the Borysthenes is a ten-day journey, and from the Borysthenes to Lake Maeotis is another ten days, while from the sea inland to the Black Cloaks, who live above the Scythians, is a journey of twenty days. In my calculations, *a day´s journey is reckoned at 200 stades* (ἡ δὲ ὁδὸς ἡμερησίη ἀνὰ διηκόσια στάδια συμβέβληταί μοι). Thus, lengthwise Scythia measures 4000 stades, and the distance inland at angles to the coast measures just as many stades. That, then, is the extent of this land.[149]

The *stade* is the most common unit of distance in Herodotus. It equalled 600 Greek feet. There were several standards for the length of the foot in antiquity at Herodotus´ time. For example, modern scholars calculate the Attic foot to 29,6 cm, the Olympic foot to 32 cm and the Doric foot to 32,7 cm.[150] A day´s journey of 200 stades can therefore vary between 35,52 km (Attic standard) and 39,24 km (Doric standard). We do not know which[151] unit of distance Herodotus employed, but it is clear from this and other passages that in his mind, an ancient traveller could easily cover 35–40 km per day over an extended period of time without much effort or haste. This may be far from the maxima of the long-distance-runners, but nevertheless a huge feat.

Now, to the second passage (5.53):

> If the Royal Road has been correctly measured in parasangs, and a parasang equals 30 stades, which it does, then there are 13,500 stades, that is, 450 parasangs, from Sardis to what is called the palace of Memnon. Thus those

[147] Asheri 1988: 331.
[148] Hesychius *s. v.* explains εὔζωνος as μὴ ἔχων φορτίον ("having no freight", i. e. "lightly equipped", "without baggage").
[149] According to Strassler 2007: 342 this is "inconsistent with his earlier description of Scythia (4,17–20, 4,47–58) as the land lying between the Ister (modern Danube) and the Tanais (modern Don) Rivers."
[150] Martin 2008: 775.
[151] Earlier scholars tend to assume that Herodotus was referring to the Attic standard, but see Lloyd 1988: 43; Martin 2008: 775.

travelling at a pace of about 150 stades a day (πεντήκοντα δὲ καὶ ἑκατὸν στάδια ἐπ΄ ἡμέρῃ ἑκάστῃ διεξιοῦσι) would use up exactly 90 days for a journey.[152]

Here Herodotus is reckoning with 150 (26,6 or 28,8 or 29,4 kilometres, depending on the respective foot standard) instead of 200 stades. In their commentary, How & Wells try to explain: "… but the Royal road is through hilly country, and the 150 stades (20 miles) may be intended as a day´s march for an army."[153] It is clearly true that the Kuban is mostly a steppe offering not much hindrance for ancient travellers but the Persian royal road between Sardeis and Susa was easy to travel either.[154] I think in this passage Herodotus is trying to demonstrate the vast distance from the coast to Susa, and the lower estimate of a day´s journey helps that argument. Note that in the previous sentence he provides the 'specialist' information about the name of the king's abode being 'Memnonian'–a demonstration of knowledge and expertise, as is the capacity to convert figures with alacrity.[155] In contrast to 4.101, I think it makes a huge difference that the μοι does not appear here. Thus, the calculation for the royal road is not a 'personal' but an 'official' reckoning. There is a contrast between the mode of communication in the two passages: 5.53 is almost the 'bureaucratic' distances[156] in the third person, while 4.101's tone is the first person narrator speaking in his own voice. By using the third person and 'administrative' distances on one hand, and the first person and 'personal' distances on the other, Herodotus is performing the opposite argument of Aristagoras of Miletus:[157] he wants to demonstrate how *far* it is to Susa, how impossible it is what Aristagoras is proposing, whereas it is in Aristagoras' interest to *shorten* the distance.[158]

Be that as it may, Herodotus obviously does not see any difficulty in using one ratio (200 stades) at one time and a second ratio (150 stades) at another. He is willing to put up with a huge 'confidence interval' in his measurement unit. What is more: he does not even bother to ex-

[152] See also Hdt. 5.50.2: "… he [Aristagoras] told them it was a journey of three months inland."
[153] How/Wells 1912: 24. As early as Forbiger (1842: I 551) Herodotus´ 'double approach' was explained by the difference in the landscape of the regions.
[154] Presumably on the Royal Road there is more to hold you up than there is travelling in Scythia. An official road might be smoother to travel on, but perhaps with more man-made impediments than travelling as one wills in Scythia.
[155] Many readers won't bother doing the mathematics to see whether this calculation is correct, and I am not sure there is a standard figure for what a person can travel in a day then anymore than there is now. If someone asked you, how long can you walk in a day etc., you wouldn't have a standard answer either, but a *range*.
[156] Elizabeth Irwin to whom I am indebted for this interpretation of this passage, drew the following comparison: "think about when one goes on a conference and needs to be reimbursed and is provided with a calculus of x cents per kilometre, higher than what you travelling on holiday might calculate."
[157] For a recent interpretation of this famous passage see Pelling/Barker (forthcoming).
[158] Herodotus is demonstrating precision – his account wishes to seem that way. Whether it is or not is another question, 'seeming' and 'being' a contemporary philosophical dichotomy of the time.

plain this fact to his reader. The conclusion is simple: there was no strictly fixed conversion ratio between a day´s journey and the *stadion* in Herodotus´ *Histories* and for his Greek audience.

If we scan the other examples in his work,[159] we see that Herodotus´ numbers are compatible with his statements. We come now to the surprising conclusion that Herodotus has a very well-defined notion of what distance a traveller can cover under normal circumstances in a day (between 150 and 200 stades or roughly, between 27 and 40 kilometres) and that he is applying this rule of thumb in most cases. Herodotus also gives (at least) two extremely different examples for a day´s journey without underlining this fact. On the contrary: in both systems an 'active' wanderer (εὔζωνος) is the measuring instrument. How then do we explain that Herodotus applies without discrimination two different concepts of a day´s journey–one for maxima, the other for average values–without marking that for his international audience?

This topic has been, as far as I know, not properly studied. Two questions must be answered here: a) did Herodotus and his audience not realize that the margin of variation for a day´s journey is so large?; b) did Herodotus and his audience have an average value for a day´s journey in mind? I think the answer to the first question must be 'yes', to the second 'no'. In order to show this, I have to include here an excursus on ancient averaging.

2.2 Excursus: Ancient Means and Averages

Strictly speaking, the idea of averaging and thusly the whole concept of stochastic thinking (*ars conjectandi*) was alien to Greek and Roman thought. There was, e.g., no application of the 'law of great numbers'. By this, I mean that by measuring several times and by dividing the sum through the number of the rounds, we get at a certain mean. No such 'modus operandi' was developed in ancient times, at least not for practical use.

A passage in Thucydides (3.20) may serve as evidence for what is meant here. In an escape attempt during the Peloponnesian war (428 BC), the Plataeans tried to build ladders which

[159] 1.179.4 (Is–Babylon, 8 days = c. 24,09 km per diem); 5.52.6; 5.53 (Susa–Sardeis; 111 or 90 days = c. 17,65 or 21,77 km per diem); 5.54.1; 5.54.2 (Susa–Sparta, 90 or 93 days = c. 26,87 or 26 km per diem); 9.37.3 (Tegea–Plataiai; 3 days = c. 38,07 km per diem). The data are from my database 'Ancient measurements'. The values are realized in Google Earth and measured 'as the crow flies'. Since roads are hardly ever straight lines, the real distances are a bit higher and thus compatible with Herodotus´ range of 150 and 200 stades. In 9.15.2 the distance between Skolos and Tanagra (13,34 km) is said to be a day´s journey, but it remains unclear, if the whole day was need to cover the distance. Thus a conversion into kilometres is pointless. In 8.115.1 Herodotus describes the distance between Thessaly and Hellespontus as 45 days (a 'typical number' according to Asheri/Vannicelli 2003: 314). According to How/Wells 1912: 273 the real distance is "550 miles" (cf. Asheri/Vannicelli 2003: 316: "ca. 850 km"), which can be converted to c. 19 km per diem. This fits, too, but the starting point is somewhat unclear.

matched the surrounding walls. In order to reckon the height of the walls they counted the layers of bricks:

Many were counting the layers, everyone by himself, and even if some erred, the multitude had to arrive at the right result, the more so because they counted several times …

Interpreting this passage, R. Invrea talks of "un applicazione avveduta della legge dei grandi numeri", and Bolzan of "the earliest clear example of applying the calculus of probabilities"[160]. But recently, R. Ineichen warned against such a reconstruction.[161] From a statistical point of view two things need to be underlined, first, that 'many' were counting, and second, that the adopted result was that of the 'majority'. The last is surprising. Nowadays everyone, even if he has only a basic mathematical knowledge, would probably add all single counts and then divide the sum by the number of those doing the counting in order to get the average value. The mode in Thucydides is strikingly different. It is not averaging, it is *choosing* or *selecting* from the variety of data. The number of bricks counted by the *majority* is considered as the valid one. *In praxi*, both methods will lead to satisfactory results. Nevertheless, the modes of getting to them are quite different. Thucydides´ result is not a *statistical* mean.[162] And this example holds true for antiquity as a whole: there was no averaging in a statistical sense.[163] The Greeks and Romans *made choices* (according to different criteria) from their data. The difference between both methods may be described as the application of two different mental concepts.

On a side note, we point out here also the well-known fact that ancient mathematics and reckoning had no concept of the number 'zero' and of 'negative' numbers. Therefore, ideas like "zero error" (= correct reading) or a 'plus/minus', which are essential for averaging and mean values, remained alien to Greeks and Romans.[164]

[160] Bolzan (1972); Invrea (1936); Ineichen (1996: 121). See also Ineichen 1998: 9.
[161] Ineichen (1996: 121).
[162] The same holds true for 1.17, where Thucydides tries to make a mathematical argument for his thesis that the Peleponnesian war is "greater" than the Trojan. Despite giving a minimum and maximum for the ship´ crews, he failed in making an average number.
[163] Again, I would underline here that I am concerned only with Greek and Roman *applied* mathematics here. At least as early as the Pythagoreans (but also see Neugebauer´s notorious 'babylonian algorithm') the Greek mathematicians knew of the arithmetical, geometrical and harmonic means.
[164] I owe this point to Kurt Guckelsberger.

3. Averaging in Ancient Measurements?

Keeping this in mind, let us return now to the ancient measurements of length.

The fact that a 'day´s journey' (but other ancient measurement units, too), which was subject to other factors like day´s length, landscape, weather, state of the roads, condition of the traveller etc., could vary vastly was recognized already in antiquity. The geographer Strabo provides an interesting insight into this (11.11.5, C 518):

> Some calculate the Persian parasang to 60, others to 30 or 40 stades; and when we sailed up the Nile, different measures for the schoinos were used from city to city. Thus the same number of schoinoi meant either a longer or a shorter voyage, because it was transmitted from the past and kept till today.

Later (17.1.24, C 803–4), Strabo adds that the *schoinos* could vary between 30 and 120 stades. The Roman encyclopaedist Pliny reports the same for the Persian parasang.[165] In light of such variability we can ask whether the terminus 'measuring tolerance' still makes sense here. What is clear, though, is that the Greeks, like the Persians and the Egyptians, could have very different notions of *schoinos*, parasang, stadion and especially of a day´s journey. Nevertheless these local or regional variants did factor only to a certain extent. The difficulties with them could be surmounted easily and thus, the terminus was kept without being challenged or at least questioned.

When Strabo was discussing variants in his sources for a peculiar distance, he made up his mind for one or the other. At no time did it occur to him to average the transmitted data. He never used a mathematical model to get to a *probabilistic* statement. There is no 'expected value', as the statisticians would say. This mode was–as was shown above–alien to Strabo and the whole Greek and Roman Antiquity.[166] What Strabo did, was choosing from the 'offerings' of his predecessors like Eratosthenes, Hipparchus, Polybius, Artemidorus etc.–and rationalize his decision according to some extraneous criteria.

The same has to be expected for Herodotus of course. Even when he states “I am calculating a day´s journey as 200 (or 150) stades”, this is not averaging in a statistical sense. He is not deriving at a means by tampering with the data. He is, like Strabo, either choosing from real measurements transmitted to him by written or oral sources or he is making up the distance according to his subjective concept of a day´s journey–which was of course influenced by his own personal experience.

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[165] Pliny (6.124) writes that also the Persians themselves gave different lengths for the *schoinos*. (*inconstantiam mensurae diversitas auctorum facit, cum Persae quoque schoenos et parasangas alii alia mensura determinent*).

[166] See, e.g, Strabo´s polemics against his predecessor Polybius, who was criticizing Dicaearchus, in 1.4.2, C 105.

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CHAPTER 8

WHAT DISTINGUISHES SCIENTIFIC GEOGRAPHY FROM COMMON SENSE GEOGRAPHY?

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Summary

In this essay, 'geography' is (narrowly) understood as: 'The art of locating points on the surface of the Earth and efficiently communicating this knowledge'. Two techniques are available to achieve this goal, common sense geography (CSG) and scientific geography; both have benefits and drawbacks. Using a modern canon of what a scientific measurement should mean, a short list of historical achievements of that goal is given to help distinguish CSG from early (not so successful) scientific geography. It then is shown that some judgements on early geographers depend more on erroneous interpretations by modern scholars than on original flaws. Therefore it is argued here that deeper understanding of the issues may be achieved by using modern psycholinguistic techniques to analyze both ancient thinking and modern thinking about geography.

1. Introduction and Definition

The research project: Common Sense Geography in antiquity states on page 7:

Here we would stress the distinction between commonsensical experience and scientific understanding. The following aspects need to be studied: reception and translation of ideas; forms of discourses between community members; knowledge of laymen in comparison and contrast with that of experts; application of geographical knowledge; 'diagnostics' and 'therapy', i.e. the observation and monitoring of spaces and the intervention into them.

Common sense geography (CSG), as defined here, pervades all aspects of every-day life even today. To illustrate, despite the fact that 'scientific geography' provides us easily with the distance between, say, Augsburg and Berlin to the nearest millimetre if necessary, we are (mostly) happy with the information that it would take us, depending on the means for transportation and conditions on the railway, autobahn or airports, about half a day to get there. Or consider the frequently heard news item 'Middle East' which bundles together a number of nation-states in a region which Germans commonly know as 'Naher Osten'. Increasing its range to MENA (= Middle-East-North-Africa, alternatively Arab Spring) most Germans (but not all) would recognise a quite compact and well-defined complex of political and socio-cultural phenomena. I suspect that similar processes are basically unchanged since Antiquity because they provide us with a 'Gestalt' in an otherwise overwhelming plethora of information. Due to its all-pervasive complexity, it appears to me simpler to describe what

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CSG is not, namely scientific geography. For the present purpose, scientific geography may be reduced to its numerical part which provides us with reliable, precise and repeatable locations in a unique reference frame for the surface of the Earth.

CSG is pretty reliable, rarely precise and comes in a bewildering array of reference frames. Nevertheless, people use it with great skill, are mostly successful – and sometimes fail miserably.

In the rest of the chapter I will first sketch a few remarkable historical achievements to highlight the fundamental properties of scientific geography, then give a brief account of the criteria which scientific measurements must fulfil in order to be accepted in the community and then consider two famous examples of *scientific achievements in Antiquity* and how they relate to CSG. This will help to distinguish what science-historians since the early 19th century declared as *scientific achievements in Antiquity*. Within the framework of nineteenth-century-thinking this was indeed the case but here I argue that these great ideas should be more properly considered as 'reasoned CSG' used by *early scientists* (see Cleomedes 1.8 as cited in the position paper), which I propose to distinguish from 'intuitive CSG'.

Applying the criteria for scientific geography presented in the next paragraph, one need not necessarily consider Ptolemy, for instance, as a scientific author.[168] His great achievement is beyond doubt the idea of ordering stellar and geographical positions in spherical coordinates and providing rules on how best to project them onto a plane (of a parchment). It is a great scientific achievement to formulate these ideas and to make the thinking behind them readily available, reaching far beyond intuitive CSG. Nevertheless, we would love to know where he obtained his geographical data, in what units, and how he reduced them to spherical coordinates and so on.

To find out what is missing, we need a reasonable and easily understood definition of what 'good scientific practice' is all about. Recent developments (in the last two decades or so) require that the result (of a scientific measurement) should be accompanied by an account of the method by which it was obtained. An analysis that both result and method should contain no logical contradiction and evidence for the confidence and reliability completes the list. A useful document for this purpose is the *Guide to the Expression of Uncertainty in Measurement* (GUM)[169], outlined by the international metrological institution BIPM. This

[168] The critique expressed by Robert Newton in his book *The Crime of Ptolemy* of how Ptolemy obtained his data is highly misleading and an excellent example of how one should *not* approach the subject. For details see Graßhoff (1990).

[169] See http://www.bipm.org/en/publications/guides/gum.html (all urls from 30-06-2012).

may be complemented by the memorandum of the Deutsche Forschungsgemeinschaft (DFG) on "Safeguarding good Scientific Practice".[170] Both documents are highly technical papers and at times difficult to read but the essential requirements are summarized below in an ultra-short version for the present purpose.[171]

A measurement shall consist of the following parts:

a) a mathematical model of the phenomenon to be measured
b) a description of the instruments used
c) a description of the measurement process (how was the instrument used?)
d) an experimental record and an analysis of the result and its uncertainty (what was measured and how large is the associated error?)

These requirements cover all physical measurements and hence also the determination of geographical coordinates.[172] In the next chapter, a few typical examples shall illustrate the meaning in a historical context.

2. Examples

A large fraction of the surviving ancient texts are fragmented, amountin to little more than second-hand excerpts of the original work reported (as required in sub-point d) in the list given above) by the investigator. Beyond that, only a few hints on instruments and methods remain, chief among them of course Vitruvius. As to the 'mathematical Model' (sub-point a)), Antiquity considers the 'phenomenon Earth' to be measured as a perfect sphere.[173] In later scientific investigations, the simple sphere evolves into the 'prolate spheroid' of Bessel in the 18th century and into today's *Potsdam-potato*.[174]

The 'description of the instrument(s) used' should address all relevant properties and is required in order to understand and evaluate the quality of the results obtained. In the present context, this means known instruments such as the gnomon, sundial or angular measurement devices. Information is sparse as only sundials have survived in sufficient numbers to evaluate the knowledge embodied in their realizations over time. [175] A very useful conference on this

[170] „Sicherung guter wissenschaftlicher Praxis. Denkschrift DFG, Weinheim" (Federal Republic of Germany), 1998 und http://www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/download/empfehlung_wiss_praxis_0198.pdf.
[171] They are complex because they must deal with complex legal (liability) issues which are outside the scope of the present discussion.
[172] Ptolemy would probably have failed with a DFG proposal.
[173] This is superbly documented in the dissertation of Vogel (1995).
[174] See http://op.gfz-potsdam.de/grace/more/wams040801_die_erde_ist_eine_kartoffel.pdf.
[175] A fine example is the description of Babylonian water-clocks (dibdibbu) presented in Walker (1996: 46–7), including the description of a daylight gnomon clock which surely could not work.

topic was held 2011 in Berlin.[176] When there are sufficient data available, one may glean supplementary information on the instruments and methods used, by analyzing characteristic deviations from the expected result (see below the work on the Limes)

The 'description of the measurement process' should include an account on how the measurement was really performed. In the present context, this means that we would like to know how the distance from A to B was obtained. Were paces counted or an odometer employed or maybe 'a day's journey' was converted into a distance? At sea, we would like to know whether early versions of dead reckoning or perhaps astronomical observations were used to obtain distances.

Again, information is sparse but each measurement type leaves characteristic traces in the record which may be used to learn more.

Although we possess numerous measurement records, containing distances and sometimes even directions of travel, a critical evaluation of the associated confidence level is lacking. Of course, Ptolemy spends a large part of Book 1 of his *Geography* criticizing his predecessors but then settles on an arbitrary number of 500 stadia per equatorial degree. Here it is important to note that modern measurement practice accepts readily estimates in place of measurements when properly explained. This is so, because the true value of a physical quantity can never be known and only an approximate value, including an uncertainty interval, can be given which is sometimes as small as one part in a hundred billion.

To conclude, all the information discussed above may be combined into a set of metadata[177] and their role expressed in the catchword phrase: *Data without metadata are no data*. This means that a result is suspicious as long as one does not know how it was obtained because we cannot evaluate it.

3. Historical Milestones

The role and properties of metadata as briefly described above have been formalized only as recently as the 1980s (with many predecessor attempts) and were not available to the community at larg, with the result that various sets of requirements were in use in different communities such as historians of cartography etc. Recent investigations of historical data reflect this quite clearly. Consider the role of astronomical observations in the latitude values

[176] http://www.topoi.org/event/sundials/. For a more detailed summary see http://www.geschkult.fu-berlin.de/e/fmi/arbeitsbereiche/ab_geus/Archiv/Ancient_Sundials__Astronomical_Instruments_and_Geographical_Knowledge.html.

[177] This is not an official term of the BIPM.

of Ptolemy's *Geography*. If one follows Kremer's analysis[178] then the oldest observational record which can be properly evaluated is the astronomical diary of Bernhard Walther (1430–1504), who determined the latitude of Nürnberg to within a tenth of a degree during his observations between 1476 and 1502.[179] In contrast, Ptolemy's description of his observational instrument(s), the spherical astrolabe, was probably not used in actual observation (Tycho Brahe found it too difficult and imprecise to use). Observational astronomy's first reliable determinations of terrestrial coordinates (latitude and longitude)[180] within the reach of the oikumene must be attributed to Carsten Niebuhr, who determined, as a member of the so-called 'Danish Orient Expedition' (1761–1767), the locations of a number of historical places between Marseille, Cairo, Bombay and Persepolis. In this case, all requirements a) – d) are fulfilled, because his instruments are conserved in the *Dithmarschen Landesmuseum* and his records at the University-Library, Kiel. Before that time, we only have 'educated guesses' and estimates so that, positively stated, Niebuhr achieved what Ptolemy had dreamed of.

In the following chapter, I will discuss two outstanding achievements of reasoned CSG (or early science) to illustrate the meaning of the term. The first case will be Eratosthenes' estimate (not measurement) of the circumference of the earth, which has already been the subject of hundreds of essays down the centuries. The second amazing feat has only recently come to light but complements nicely the first theme: part of the Upper Germanic Limes seems to have been built along a geodesic line to within ± 69 cm over a distance of 50 kilometres in hilly terrain. Although an engineering achievement, its precision calls for a deep, scientific understanding of the required tasks and demonstrates the availability of precise, geodetic surveys over large distances, a necessary prerequisite of modern geographical mapping.

4. Example 1: Eratosthenes' Determination of the Circumference of the Earth.

The story has been told countless times: given that the sun is far away, her rays arrive parallel on Earth so that one may determine an angular distance at the surface of the earth by measuring angles. Knowing that Syene lies next to the tropic of cancer, it suffices to

[178] Kremer (1981: 124ff.).

[179] Walther´s method was properly described (including weather-reports which influenced his wooden instrument etc) and evolved into a precision tool prompting Tycho Brahe 80 years later to include observations of Mercury into his planetary tables.

[180] These are the earliest practical measurements using Tobias Meyer´s moon ephemerides and Bessel´s mathematical computation-tools.

determine the length of the shadow of an upright pole at Alexandria on the longest day of the year and the distance from Alexandria to Syene. Somebody (Eratosthenes?) did just that and obtained 1/50 of the full circle. Also knowing the distance from Alexandria to Syene was equal to 5000 stadia, the circumference of the earth amounts to 250.000 stadia. Since 252.000 can be divided by 60 without leftover, it is adopted as the result of an astronomical measurement. Excellent, but the observant reader immediately realizes that such nice round numbers[181] are estimates and never the result of arduous metering in the desert. Moreover, despite all its beautiful simplicity, a startling high number of erroneous embellishments were added, possibly to make it look more like a measurement. Importantly, besides this narrative, no further information is available, because the original work is lost and only two, slightly contradictory, second-hand accounts have come down to us, making its evaluation quite difficult. Apparently, Ptolemy didn't trust it, because he adopted the (wrong) measure of 500 stadia to the equatorial degree instead of Eratosthenes' 700 stadia. At this point in the agenda, the question of the 'gestalt' (see Thiering this volume) of this crucial estimate enters into the discussion because in all probability, in antiquity, it was not perceived as something very special, as we see it today.

To demonstrate its character as an estimate, I begin with the obliquity of the ecliptic which was determined as 11/83 of the full circle between the two tropics. This translates into 23.885° compared to ~23.726° at 250 BC (in 2005 it was 23.43864° due to the precession of the equinoxes). The latitude of Alexandria is[182] given by Ptolemy, *Almagest* 5.12, as 30° 58' = 30.9667° an impressive precision of two arcminutes, which dissolves when one finds that it corresponds to the ratio of the length of the shadow and the length of the pole being equal to 3:5.[183] If Ptolemy (Eratosthenes?) really had measured properly at the library (near Pharos at 31.2133° N), this latitude is off by nearly a quarter degree which either scientist should have noted; thus it provides another hint at estimates, using round numbers and simple ratios. The difference between the estimated latitude of Alexandria and the estimated latitude of Syene amounts to 30.967° – 23.885° = 7.08° which could be very precisely expressed as 1/50$^{5/6}$ but apparently, 1/50th is much nicer than 1/51st as the nearest natural numbers ratio.

[181] Quite generally, ancient Greek distance numbers come in hundreds and multiples thereof. Collected in sufficiently large numbers from old texts, an analysis similar to the study of fractional degrees in Ptolemy's tables might yield valuable insights into the mental processes connected with distance estimates (see Geus in this volume).

[182] Here I use partly Jones (2002: 14).

[183] arctan(0,6) = 31° 58'.

One may conclude that early Greek scientists loved natural number ratios to express their results which does not diminish their remarkable achievements; on the contrary, this observation agrees well with the notion, that Euclidean geometry also works with the simplest (perfect?) regular bodies. As all arguments may use only circles and straight lines, such a 'mental model' leads forcibly away from the elliptical (paths of the planets) and directly to an epicyclical universe, a view which lasted until Kepler.

Eratosthenes' estimate of the size of the Earth has prompted so many commentaries that it seems useful to explore the 'mental picture' of 'science in antiquity' we all have developed because:

> In the last analysis all maps are cognitive maps — diese These von BLAKEMORE und HARLEY markiert eine Position der jüngeren kartographiehistorischen Forschung, die immer wieder thematisiert wird.[184]

These cognitive maps are strongly influenced by errors in the original 'text' so I will explore some of the more common errors. Most comments start with the (correct) observation that Assuan/Syene is not on the same meridian as Alexandria, a fact which results in a consequential error. This is simply wrong because the three points Alexandria, Syene and the centre of the Earth define a plane which intersects the surface along a great circle. Therefore, only the distance Alexandria–Syene is required[185] and nobody needs to send camel caravans into the waterless Western Desert to stay along the meridian of Alexandria.

Despite the Nile´s considerable meandering, we may be relatively confident that Egyptian or Hellenistic agrimensores[186] had developed a reasonably straight distance estimate along the river; to quote Oswald Dilke: "The Alexandrian and other Hellenistic Greek scientists paid particular attention, among other subjects, to geodesy […]" (see also below chapter 5.2 on surveying).

Eratosthenes depended, as did all other early-scientific (CSG) geographers, on travel reports from varied sources. Thus, in reconstructions of an early world-map attributed to him (reconstructed according to Strabo[187]) one finds 14,000 stadia for the east-west distance between the Strait of Hormuz to the river mouth of the Indus near Karachi. One glance at a modern atlas tells us that the longitude-difference amounts to roughly 10 degrees. This

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[184] Görz 2010. In 1923, Wilhelm Kubitschek wrote: "metrology is today probably the most unappealing field of ancient scholarship." Maybe a new start is indicated (see http://www.metrum.org/measures/whystud.htm).

[185] This dispenses also with longwinded arguments that the measurements must be taken simultaneously. Another frequent misunderstanding is the legend, that Eratosthenes could not have seen a mirror-image of the sun at the bottom of the well in Syene because it lies not on the tropic of cancer. With a difference of latitude of ~0,35° a well about 10 m deep needs a diameter of slightly more than ~ 6 cm in order to see a reflection at noon of June, 20th each year (provided it is perfectly straight down).

[186] Dilke 1971: 26.

[187] Stückelberger 2009: 256.

number is sufficiently precise because it is not clear where exactly the strait starts and which of the many branches in the river delta is meant. Because both locations sit near 25° N and cos25° ~ 0,9, one finds immediately that Eratosthenes accepted a scale of 1400/0,9 ~ 1560 stadia for an equator-degree and 700 stadia for a meridian degree which both should be equal and amount to ~111 km. Who originated the original 14000 stadia?

It seems reasonable to assume that Nearchos' report on the return-voyage from India was available to Eratosthenes[188] and I find 12090 Stadia until Badis/Ras el Kuh at the entrance of the Strait of Hormus with a gap at Kap Bagia/Pasabanda (from Table 1 in Ref. 22). It thus becomes clear that Nearchos worked with a stadion near 100 m, the precise value depending on complicated details on how the numbers were generated as discussed by Bucciantini. This along with probably many other overestimations of the length of an equator-degree remained undiscovered or were simply ignored by the ancients. From a purely scientific perspective, it is difficult to understand such large discrepancies and this puzzle remains to be solved by new approaches to 'cognitive maps in Antiquity' and understanding better the 'Gestalt-building' through psycholinguistics.

On top of the confusions of scale used by ancient writers come erroneous judgments based on the 'cognitive maps of our early science-historians'[189] Here is not the place to go into these details but to sketch a way forward, keeping in mind the development of archaeology as practiced by Schliemann compared to the methods used nowadays. A prime example for how archaeology provides new insight into scientific reasoning through study of artefacts[190] is provided by the upper Germanic Limes.

5. Example 2: Geodesy at the Upper Germanic Limes and for Aqueducts

Scientific geography is unthinkable without large-scale local measurement by geodesic means to fill in the data between astronomically determined positions, until eventually all the land is covered. Over the past 30 years, global positioning systems have complemented these efforts by building a unique system – but have encountered an array of unknown local datum, unknown projections and unknown precision produced by a bewildering array of

[188] For more details see Bucciantini (in print).

[189] A very special case is perhaps Konrad Miller who did not hesitate to 'correct' the original source in order to conform to his pre-conceived ideas.

[190] Another fascinating development is the deciphering of the "Antikythera mechanism" http://en.wikipedia.org/wiki/Antikythera_mechanism: "from around 150 to 100 BC. It is evident that they contain a manual with an astronomical, mechanical and geographical section."

institutions.[191] Ancient surveys in the form of centurations are known from all over the oikumene[192]. In the lower Rhone valley, they dominate to this day the direction of hedgerows and drainage systems but there is no systematic (orderly?) connection to the nearest centurations in the Narbonensis. Evidently, they were extended objects but within local context. How precisely the Roman 'military surveyors' were is shown by a stretch of the Upper Germanic Limes:[193]

> Our results indicate a maximum deviation of the ditch-axis from the reference axis of 12 m.- Close inspection of these deviation revealed three main trends. At the southern and northern end of the survey two shorter straight lines about 15 km long. And in between a 50 km long straight section. The absolute mean deviation amounts here to 0,92 m only. Crossing points between the three sections may be regarded as major break-points. Between these points there exist short sections of average lengths between 150 and 200 m within which even smaller directional changes can be observed.

Precisions similar to these results (a 50 km long geodetic line with less than 1 meter overall deviation) were again reached by 18th century surveyors. These results were obtained by Laser Ranger Geodesy from airborne platforms, measuring hundreds of million points in a single flight.

Another amazing feat of ancient CSG-geodesy is embodied in aqueducts throughout the Roman Empire.[194] Surveying and building the aqueduct between sources in the Eifel and Cologne (~ 60 km) is described in detail by Klaus Grewe[195] including the instrument *and* method of using it, the corobat of Vitruvius. The device was ~6 m long and thus had to be 'properly aligned and positioned' about ten-thousand times. This is even more extreme than surveying the Limes which had to be 'properly stitched together' only from 300 or so parts. Similarly impressive engineering feats may be found everywhere and may even constitute a hallmark of CSG surveying if one includes ancient underground work for mining and water transport such as the numerous indigenous quanats in Iran and other desert regions.

6. Summary and Conclusion

Astronomical determination of locations on the Earth needs to be complemented by terrestrial measurements of distance and direction at intermediate locations. In our example 1, it is still unclear, how the 5000 stadia from Alexandria to Syene were obtained although, in principle, the methods to do so were available as shown in example 2 above. Large-scale geodetic

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[191] Ptolemy must have encountered similar problems while compiling his map of the oikumene.
[192] Browsing the Barrington Atlas reveals their wide-spread use.
[193] http://www.hft-stuttgart.de/Studienbereiche/Vermessung/Bachelor-Vermessung-Geoinformatik/Projekte/archaeologie/DIP_Baier-Haupter_SS2007_Kurzfassung.pdf
[194] For example between the Pont du Gard and Nimes in southern France, an inclination of only 14 cm per kilometre was possible. See Grewe (in print).
[195] Grewe (in print).

surveys covering hundreds of kilometres with superb accuracy were within reach of the 'average road-, hydrographic or military engineer', including scientifically sound methods for executing the task with amazing precision. Having said this, it is surprising that (to my knowledge) we have found no sign of actually combining both techniques in order to establish scientific geography and obtain a 'proper map' of the Empire.[196] Possibly, the ancients did not see the problem or it was recognized as a problem and ignored because, after all, periploi, itinerary collections or chorographic maps derived from CSG principles were adequate (fit-for-purpose)[197] but not good enough to construct an adequate map of the oikumene. Maybe psycholinguistics may shed new light on this old question.

As a final remark, there is a fairly simple reason why some of the amazing successes of CSG are not so far-fetched as a lay person may think. All long-distance measurements using local means must be repeated many times until the destination is reached. This rule applies to sailing by dead reckoning, building aqueducts as explained above and especially to all CSG-type estimates of distances. One key to success is the insight that errors come in two types: random errors (=statistical or stochastic errors) and systematic errors. The first species, statistical errors, do not simply add up with each repetition until final disaster but accumulate more slowly, provided some rules are followed consistently. In fact, modern physics rely on repeating measurements to improve on the quality of a measurement. Only systematic errors add up consistently until a point of failure is reached, if ignored.[198] This simple rule is immediately obvious by noting that estimates are sometimes high and sometimes low so that their sum may end up nearly correct after several tries.[199] Random errors increase only with the square-root of the number of tries. Therefore, the individual error of one measurement (say 1 cm) for the aqueduct Eifel–Cologne increased during 10,000 repeats only to 100 cm and not to 100 m and citizens could have a nice bath.

Reasonably slow accumulation of error is one component of why some navigational solutions found in CSG work out nicely without violating natural laws, despite our astonishment at their high quality without appropriate (to our minds) tools. The next question immediately

[196] Sparse information on the so-called Agrippa map (Riese 1878: 1–7) does not encourage further research unless substantial new evidence will be found.

[197] Polynesian sailing maps used to memorize actions for safe passage to distant islands bear little resemblance to the actual lay-out of the seas but serve well in practice.

[198] Nearchus´ error may have been –at least in part – systematic because, according to Strabo 15.2.5, he sailed in autumn with unfavourable head-wind. Successful dead-reckoning sailing always requires a 'reset to zero' the accumulating error at known way-points such as islands or remarkable promontories (see also polynesian navigation Thiering this volume). Maybe Nearchus lacked this extra information in the Arabian Sea.

[199] A nice example is the use of chorobates as described by Grewe. If the device is slightly asymmetric, the difference between left and right end would accumulate at each step. When it is turned around at every second step, this systematic error nicely cancels out. This principle is used still to the present day.

follows: how do we explain that humans hit upon exactly those rules which lead to success? Intuition, observation, trial and error or rational thinking (as Cleomedes says)? Otherwise stated: which processes allow us to see the 'Gestalt' of a solution in an endless sea of possibilities? Knowing more of the underlying physical processes may help reduce speculations about the cognitive processes involved.

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CHAPTER 9
SPATIAL ORIENTATION IN THE DIDACTIC POEM OF DIONYSIUS PERIEGETES

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1. Introduction

Οἰκουμένης περιήγησις by Dionysius of Alexandria, also known as the Periegetes (2nd century AD), is the only whole geographical didactic poem handed down from antiquity. In just 1200 Greek hexameters it illustrates all of the known world: The oikumene with its surrounding Ocean, the three continents (Libya, Europe, and Asia), various countries and seas, peoples and tribes. Dionysius' exhaustive knowledge is based on geographical and poetic sources, which, however, remain anonymous.[200] He himself, as he admits, has never travelled (Dion. Per. 707–717), so his work is not based on a precise autopsy of various areas. For this reason Dionysius seeks the necessary information in competent and respected sources of the literary tradition. His text has thus been influenced by literary topoi that fully reflect *Common Sense Geography*. Dionysius wants above all to fulfil a didactic task and to offer his readers a clear, systematic, and accessible portrait of the world.

Dionysius utilizes two traditional "naïve" or "intuitive" types of spatial survey.[201] The first type is "vertical": the so-called "view from above" or the "bird's eye view". This is the perspective, already at the very beginning of the work, from which the entire Oikumene appears in the shape of a slingshot (i.e. a diamond-shaped cloth). The contours of the continents and various countries are, also from above, compared with geometrical or other familiar shapes. The second type of survey is "horizontal": the so-called hodological space (from the Greek ὁδός, "way", "route"). The ethno- and geographical objects are listed paratactically, from the perspective of an imaginary subject moving around in space. The reader is meant to follow the description and thereby, together with the author, an imagined segment of a route.[202]

The conception of space is related to the question of the spatial orientation of the ancients, and more specifically to Periegesis: How does Dionysius orient himself in his imaginary world?

[200] Göthe 1875: 6; Anhut 1888, 5; Bernays 1905: 46–47; cf. Bowie 2004: 181–182.
[201] On the non-cartographical conceptions of space in ancient geographical texts, see among others Brodersen 2003: 110–130.
[202] On this concept see Purves 2010.

What means does he employ to facilitate for his reader this implicit orientation and to offer him a clearer and more vivid view of the world? Ancient geographical literature traditionally uses natural points of orientation (constellations, winds, rivers, mountains etc.), with which the observer may locate different directions or geographical objects. All geographical points of orientation depend on the perspective of an imaginary observer. Dionysius' implicit spatial orientation reflects the whole assembly of ancient mental models for orientation on land and sea, like the wind and compass directions, celestial bodies (above all the sun and the Dipper constellations), and the reference "right-left". These examples will be the subject of the present paper.

2. Wind and Compass Directions

The wind and compass directions are among the oldest points of orientation.[203] A reference to the wind or compass direction in Dionysius generally determines the location of a geographical object, e.g.:

ἄλλας δ' Ὠκεανοῖο περὶ ῥόος ἐστεφάνωται· / τάων δ' ἂν περίσημον ἐγὼ θέσιν ἐξενέποιμι, / ὁπποτέρου τ' ἀνέμοιο παρὰ σφυρόν ἐστιν ἑκάστη

And the stream of Ocean sets the others (sc. islands) about in a wreath, whose clear positions I would proclaim, and at the foot of which each wind is located (Dion. Per. 555–557);

Ἴστρος / αὐτός, ἐς ἀντολίην τετραμμένος ἄχρι θαλάσσης / Εὐξείνου,

The Ister, facing the east as far as the Euxine Sea (v. 298–300).

The observer's position plays an important role here. Dionysius varies the formulation (εἰς) ἄνεμον ἔλλαχε / τεκμαίρεται (ὁλκὸν) ἑκάστη "each directs a track into a wind / has been allotted a wind" regarding the seas:

ἡ μία δ' εἰς ἄνεμον τεκμαίρεται ὁλκὸν ἑκάστη, / Τυρρηνὴ ζέφυρον, Σικελὴ νότον, Ἀδριὰς εὖρον.

each sea directs a track into a wind: the Tyrrhenian toward the Zephyr, the Sicilian toward the Notus, the Adriatic toward the Eurus (v. 101–102);

... ἄνεμον δέ τοι ἔλλαχ' ἑκάστη, / ἑσπέριον Σικελή, τόν τε ζέφυρον καλέουσιν, / Αἰγαίη δ' εὖρον,

Each sea has been allotted a wind, the Sicilian Sea the western wind, which they also call Zephyr, the Aegean the Eurus (v. 401–402);

... ἄνεμον δέ τοι ἔλλαχ' ἑκάστη, / Ἀραβίη ζέφυρον, Περσὶς δ' εὔροιο κελεύθους,

Each sea has been allotted a wind, the Arabian the zephyr, the Persian the paths of the Eurus (v. 929–930).

In the above examples, Dionysius uses the wind direction to determine the position of each sea in reference to the part of the world that the sea surrounds. In the first example the

[203] In the phrases involving wind and compass directions, Dionysius uses prepositions to determine the direction, e.g. πρός βορέην / νότον, ἐς βορέην / νότον, ἐπὶ ζέφυρον, or adverbial phrases e.g. βορέηθεν (v. 79), βορέηνδε (v. 137, 438, 609, 785), ἀντολίηνδε (v. 260, 506, 739, 931).

imaginary observer finds himself in Italy, in the second in Greece, in the third in Arabia Felix. The possibility had also existed, since very ancient times,[204] to locate more precisely geographical points by means of astronomically defined compass directions.[205] Furthermore, the compass directions always turn into ordering principles wherever the Periplus model does not work (e.g. for the arrangement of tribes in the interior of a land). The combination of different methods of spatial orientation creates more precise information about the regions in question.[206] There are examples in Dionysius' poem in which a wind direction becomes synonymous with compass direction, i.e. a point of orientation:

ἀλλ' ἤτοι Λιλύβη μὲν ἐπὶ ῥίπην ζεφύροιο / εἰσανέχει,

Now Lilybe juts out into the blast of the zephyr (v. 470–471).

That is, Cape Lilybe is located at Sicily's western edge.

αὐτὰρ ὑπὲρ Βαβυλῶνος ἐπὶ πνοιὴν βορέαο / Κισσοὶ Μεσσαβάται τε Χαλωνῖταί τε νέμονται,

Moreover, beyond Babylon toward the blast of the boreas the Cissi, Messabatae, and Chalonitae dwel" (v. 1014–1015).

That is, the tribes live north of Babylon. There is an interesting example, in which Dionysius describes the directions of various rivers together with the winds and compass directions:

ἐκ τοῦ ἀπειρέσιοι ποταμοὶ καναχηδὰ ῥέουσιν, / οἱ μὲν πρὸς βορέην, οἱ δ' ἐς νότον, οἱ δ' ἐπὶ ῥιπὴν / εὔρου καὶ ζεφύροιο,

From this mountain (*sc.* Taurus) range countless rivers with a loud noise, some toward the north, some toward the south, some against the blast of the eurus and of the zephyr (v. 644–646).

In the next example the reader's attention is directed toward where the wind comes from, which was characteristic of the early Ionian tradition:[207]

... ἀλκήεντες Ἀχαιοί, / οὕς ποτ' ἀπὸ Ξάνθοιο καὶ Ἰδαίου Σιμόεντος / πνοιαὶ νοσφίσσαντο νότοιό τε καὶ ζεφύροιο, / ἑσπομένους μετὰ δῆριν Ἀρητιάδῃ βασιλῆϊ,

…and the courageous Achaeans, whom the blasts of the notus and the zephyr once separated from the Xanthus and the Idaean Simois, as they accompanied their war-like king in pursuit of battle (v. 682–685).

That is, the southwestern wind blew from Troy toward the east coast of the Pontus. More complicated is another passage, in which Dionysius also uses the names of the winds as directions:

Δοιαὶ δ' ἐξείης προτέρω φρίσσουσι θάλασσαι, / Ἰσμαρικοῦ πνοιῇσιν ἐλαυνόμεναι βορέαο, / Ὀρθὸν φυσιόωντος, ἐπεὶ κατεναντία κεῖται,

Next, two seas, one after another, bristle, driven by the breath of the Ismarian boreas, which blows straight down, since the seas lie opposite one another[208] (v. 112–114).

[204] Cf. for example already in Hekataios FGrHist 1, F 100 (πρὸς βορέω), 144 (πρὸς μὲν νότον), 203 (πρὸς νότον), among other passages.
[205] More extensively von Fritz 1967: 52 ff.; Kessler 1977: 1213–1215; Podossinov 1991: 233–286.
[206] Gehrke 1998: 185.
[207] Cf. for example Heilen 2000: 48.

The specifying attribute "Ismarian" (after the Thracian city Ismaros) indicates the concrete point from which the north wind blows in the direction of the Pharian and Sidonian Sea, i.e. southward. The adverb ὀρθόν „straight" complements the characteristics "of the Ismarian Boreas" and sets up the direction as imaginary meridian:[209] The Thracian city Ismaros is supposed to lie at its northern end, and at its southern end the Pharian and Sidonian Seas.

Dionysius uses the appellations of the four winds, already known from Homer – the Boreas, Zephyros, Notos, and Euros – in epic turns of phrase, with the lexemes πνοιή "breath" (βορέαο, v. 113, 1014; νότοιό τε καὶ ζεφύροιο, v. 684), ῥίπη "blast" (ζεφύροιο, v. 429, 470, 962, εὔρου καὶ ζεφύροιο, v. 645), and ἄνεμος "wind" (v. 101, 401, 557, 929).[210] This proves again that Dionysius locates geographical objects by means of wind directions in order to lend his text an archaic epic color.

Apart from the four main winds Dionysius twice mentions the Libs, the southwestern wind which comes from Libya and is familiar mainly from prose and scientific literature:[211]

ἐς λίβα μὲν Λιβύην, ἐς δ' αὐγὰς Ἀσίδα γαῖαν,

toward the Libs, being Libya, toward the dawn Asian land (v. 231).

In this first mention the Libs refers to the western direction (regarding the Nile, which divides Libya from Asia), which in Dionysius is contrasted with the eastern direction ("toward the dawn"). The dichotomy "west-east" is at first reminiscent of a wind rose. In this system the winds are seen from the centre, from the point of view of the observer, where the winds meet each other from diametrically opposed directions.[212] In Dionysius' example, however, there is no eastern wind (it is replaced by dawn), and the western and eastern directions also do not meet each other at the center, but rather "escape" it. So this system is in fact not comparable to a wind rose.

The second example with the Libs is to be found in a passage in which Asia is described from a bird's-eye view. It concerns the position of the Caspian Sea:

ἐς βορέην ὀρόωντα καὶ εἰς λίβα γείτονα πόντου / Εὐξείνου,

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[208] In the oldest ms., Paris. Suppl. gr. 388 (10th century), the verb is at the end of the sentence, in the singular κεῖται (*per figuram Pindaricam*), whereas most manuscripts have the plural κεῖνται. See Tsavari 1990: 42.

[209] A series of examples of the adverb ὀρθόν in Dionysius indicates a similar definition of imaginary meridians (v. 114, 167, 313, 341 – always at the beginning of the verse –, v. 1090 – in the final position –, cf. v. 641: ὀρθότατον, regarding the Tauros, which has stretched from west to east as an imaginary parallel).

[210] Cf. πνοιὴ Βορέαο, Hom. *Il*. 5.697; *Od*. 10.507; πνοιῇ Ζεφύροιο, Hom. *Il*. 19.415; *Od*. 4.402; πνοιαὶ παντοίων ἀνέμων, Hom. *Il.* 17.55; ῥιπὴ Βορέαο, Hom. *Il*. 15.171; 19.358; πνοιῆς ἀνέμοιο, Hom. *Il*. 12.207; *Od*. 2.148 and other passages.

[211] Hdt. 2.25; Aristot. *meteor.* 364b2; Polyb. 10.10.3 and other passages; lat. *Africus* (Sen. *NQ* 5.16.5; Plin. *NH* 2.46 (and other passages).

[212] Lasserre 1975: 1379.

(*sc*. Hyrcanian = Caspian gulf) looking toward the Boreas and toward the Libs, neighbor of the Euxine Pontus (v. 634–635).

Dionysius here arranges the directions yet again by means of the compass directions ("toward the Borean", i.e. to the north) and the wind direction ("toward the Libs", i.e. the southwest). The Libs in this case indicates the part of the Caspian Sea closest to the Black Sea.

3. Celestial Bodies: The Sun and the Constellations of the Dipper

Dionysius refers to the directions and areas of the sky by means of, for example, phrases about solar phenomena.[213] For the east he uses the combinations: ἐπ᾽ ἠῶ (v. 243); πρὸς ἠῶ (v. 332, 421), πρὸς / ἐς / εἰς / ἐπ᾽ αὐγάς (v. 199, 231, 384, 894 and *passim*) "toward the dawn"; πρὸς ἀντολίην τε καὶ ἠῶ (v. 437) "facing the east and the dawn"; ἐπ᾽ / ἐς ἀντολίην (v. 110, 419 and others) "toward the east"; πρὸς αὐγὰς ἠελίοιο "toward the rays of the sun" (v. 84, 487, 970). For the west there are the following phrases: ποτὶ ζόφον "toward the dark quarter" (v. 421, 500); πρὸς ἑσπερίην "toward the west" (v. 813); ἐς δύσιν "toward the evening glow" (v. 662, 762, 879). To speak of the north, Dionysius uses the constellations of the Dipper and Ursae: ἐπ᾽ ἄρκτοις (v. 130); μετ᾽ ἄρκτους, ἐπ᾽ ἄρκτους (v. 271, 471, 721) "toward the Bears"; ὑπ᾽ ἄρκτους "beneath the Bears" (v. 1066); ἐς πόλον ἄρκτων "toward the pole of the Bears" (v. 582, 1134). Poetic formulas mentioning the movement of the sun also occur, e.g.: πρὸς ἠελίοιο κελεύθους "along the paths of the sun" (v. 6); ἐπὶ κλίσιν ἠελίοιο "in the direction of the setting sun" (v. 1095); cf. also: ἄντην ἠελίοιο "facing the sun" (v. 980); ὑπ᾽ ἠελίῳ ἀνιόντι "beneath the rising sun" (v. 1083).

Some examples make it clear that Dionysius tries to combine the archaic system of orientation according to celestial bodies with scientific terminology (ἐπὶ <u>κλίσιν</u> ἠελίοιο "in the direction of the setting sun" [v. 1095], ἐς <u>πόλον</u> ἄρκτων "toward the pole of the Bears" [v. 582, 1134]), which had occurred in astronomical works since the early Ionic geographers. On the one hand this is a testament to the diversity of Dionysius' sources, on the other hand it suggests that the poet was interested mainly in the aesthetic aspects of his subject. One example is the locating of the island Taprobane with the help of the constellation (the tropic?) of Cancer right above it:

ἧς ὕπερ, οὐρανίῃσιν ἀειρόμενος στροφάλιγξι, / δινεῖται κατὰ κύκλον ἐν αἰθέρι <u>Καρκίνος</u> αἴθων,

[213] These phrases are characteristic of early Ionian geography, among others of Hekataios of Miletus. He has the verbatim quotes πρὸς ἥλιον ἀνίσχοντα (FGrHist 1 F 204, 207, 292a, 292b), ἀπὸ δύσιος (FGrHist 1 F 217), πρὸς μεσημβρίης / -αν (FGrHist 1 F 108, 163). A comparable collection of phrases used by Herodotus is offered by Rehm(1916: 28. There are similar formulas already in Homer, e.g.: πρὸς ἠῶ τ᾽ ἠέλιόν τε / (Hom. *Il*. 12,239; *Od*. 9.26; 13.240); πρὸς ζόφον (Hom. *Od*. 9.26).

Over which (sc. Taprobane) lifted up in heavenly revolutions blazing Cancer turns about in its orbit in the aethes (v. 594–595).

Thanks to this multiplicity of phrases Dionysius gathers and varies his references to the same directions, all while demonstrating his poetic vocabulary and mastery.

4. References to "Right-Left" (from the Perspective of an Imaginary Observer)

Another kind of directional feature is the localization of geographical objects from the perspective of an imaginary observer. In these instances there is always a direct or indirect reference to the ship on which the imaginary observer is travelling,[214] as well as the directions "right-left" (that is, for the observer on the ship):

δισσὰς δ' ἠπείρους ἐπερεύγεται· ἐς μὲν ἰόντι / δεξιτερὴν κατὰ χεῖρα φαείνεται Ἰλλυρὶς αἶα, / Δελματίη δ' ἐφύπερθεν, ἐνυαλίων πέδον ἀνδρῶν· / σκαιῇ δ' Αὐσονίων παραπέπταται ἄπλετος ἰσθμός / πουλυτενής,

It (*sc.* the Ionian Sea) disgorges itself upon two lands: as you enter this sea, the Illyrian land appears on the right hand, and above is Dalmatia, land of warlike men; and on the left side extends the immense isthmus of the Ausonians, far-stretching (v. 95–99);

Εὐρώπης δ' αἱ μὲν λαιῆς ὑπὸ νεύματι χειρὸς / Ῥώονθ' ἑξείης, Ἀσίης δ' ἐπὶ δεξιὰ κεῖνται, / Μῆκος ἐπ' ἀρκτῴοιο τιταινόμεναι βορέαο,

The islands of Europe lie in a row beneath the wave of the left hand; those of Asia lie along the right, reaching to the Arctic Boreas (v. 517–519).

In the first of these examples the phrase "on the right hand" (v. 96) is noteworthy, as it emphasizes the subjective nature of the description by the ship's passenger. Dionysius also displays the division, common in antiquity, of the Pontus coast into left and right sectors, from the viewpoint of those travelling to the Black Sea from the Thracian Bosporus.215 The left was the northwestern, the right the southeastern side:

ἀλλ' εἴη νευρῆς σημήϊα δεξιὰ Πόντου, / εὐθὺ διαγραφθέντα, μέση δέ τοί ἐστι Κάραμβις, / γραμμῆς ἐκτὸς ἐοῦσα καὶ ἐς βορέην ὀρόωσα· / σῆμα δ' ἔχει κεράων σκαιὸς πόρος, ὅστ' ἐπὶ δισσὴν / εἰλεῖται στροφάλιγγα, βιοῦ κεράεσσιν ἐοικώς,

Now the shape of the bowstring would be the right-hand portion of the Pontus, marked by a straight line, except for Carambis alone, which is outside the line and looks toward the north. The left-hand channel, which is bent into two curves, has the shape of horns, like the horns of a bow (v. 158–162);

ἔστι δέ τις καὶ σκαιὸν ὑπὲρ πόρον Εὐξείνοιο / ... εἰν ἁλὶ νῆσος / ἡρώων,

"There is in the sea above the left-hand portion of the Euxine sea … a very famous island of heroes" (v. 541–543);

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[214] Cf. ἰόντι "to him who enters (*sc*. the sea by ship)", v. 95, 539, 549; Πόντος μὲν πρώτιστος Ἰβηρικὸς ἀρχομένοισιν / ἀγκέχυται "As the very first the Iberian Sea lies poured out to the beginning ones", v. 69-70; ἐπὶ νηός "by ship", v. 482; κεν ... νηῒ θεούσῃ "would show themselves to the hurrying ship", v. 492; κεν εὐεργέϊ νηΐ περήσαις "you would cross over … with a well-built ship", v. 581; ὁπόταν ... νηῒ τάμῃς "as soon as you … have cut across by ship", v. 588; ἂν ... νηῒ περήσειας "you would … have circumnavigated", v. 720.

[215] Cf. similar statements in e.g. Strab. 1.3.21, C 61; 2.5.22, C 124–125; 7.1.1, C 289; 7.3.15, C 305–306; 12.3.2, C 541; Ov. *Trist*. 1.2.84, 8.36; 4.1.60, 8.42, 10.98; 5.10.14; Ov. *Pont*. 2.2.2; 4.9.119.

Κιμμέριον δέ κέ τοι ἀνὰ Βόσπορον ἰθὺς ἰόντι / ἄλλη ἀπειρησίη νῆσος πέλοι, ἥ ῥά τε λίμνης / ἔνδοθι δεξιτερῇ Μαιώτιδος ἐστήρικται,

Now as you go straight through the Cimmerian Bosporus there is another immense island, which is fixed within the Palus Maeotis on the right-hand side (v. 549–551).

So this information is based on Periplus sources in which the description of a seacoast occurs as it would appear to a circumnavigator.

5. Conclusion

In his geographical didactic poem Dionysius suggests various types of orientation, according to celestial bodies, winds, compass directions, and the references "right-left" from the point of view of an imaginary observer or even traveller[216]. The poet thereby demonstrates his scientific knowledge and his awareness of the tradition, as well as his desire to offer entertaining variety in his text. The combination of this variety of mental models on the one hand with the geometrical descriptions in the whole text on the other should create in the mind of Dionysius' reader a clear mental map of separately described geographical areas and of the whole world in general.

[216] Cf. The third person addressees in Herodotus (5.52–4) and Pausanias (1.1.1). Rood has discussed this recently (Rood 2012).

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CHAPTER 10

THE CREATION AND DEVELOPMENT OF AN ANCIENT SCIENTIFIC »FACT«: PARADOXOGRAPHY IN THE PERIPATOS

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In Thessaly they preserve memory of a time when snakes reproduced in such number that, if they had not been destroyed by the storks, the people themselves would have left the land. And in fact that is why they hold storks in esteem, and it is not custom to kill them. But if someone does kill one, he becomes subject to the same punishments as those which hold for murder.

Περὶ Θετταλίαν μνημονεύουσιν ὄφεις ζῳογονηθῆναι τοσούτους ὥστε, εἰ μὴ ὑπὸ τῶν πελαργῶν ἀνῃροῦντο, ἐκχωρῆσαι ἂν αὐτούς. διὸ δὴ καὶ τιμῶσι τοὺς πελαργούς, καὶ κτείνειν οὐ νόμος· καὶ ἐάν τις κτείνῃ, ἔνοχος τοῖς αὐτοῖς γίνεται οἶσπερ καὶ ὁ ἀνδροφόνος (Mirabilia 23, 832 a 14–18).[217]

The text cited above, from the pseudo-Aristotelian work »On marvelous things heard«, is presumably a fragment of a work by Theophrastus or one of his Peripatetic peers and dates, most likely, to the beginning of the 3rd Century B.C.[218] It presents us with an explanation of a custom in the form of testimony concerning the ecology of a particular place. In a manner uncharacteristic of Aristotle, the author of this text presents us with information based upon local knowledge in giving an explanation of an ethnological »fact«. The »fact« requiring explanation is that the Thessalians hold storks in high esteem, and that it is not their custom to kill them, and that – most strange of all – they punish those who do with the penalty for murder. The explanation comes in the form of a piece of testimony attributed to the Thessalians themselves. This testimony itself contains a »fact«, and a counterfactual. The »fact« is a wondrous occurrence of snakes in the past, to which local memory attests. And local memory also has a counterfactual account concerning this »fact«: if the storks hadn't killed the snakes, the Thessalians themselves would have had to emigrate.

For the modern, deconstructing reader this story may seem quaint. Such a reader might say that the tale told by the Thessalians concerning a plague of snakes is likely the cause of the custom itself. Or perhaps, yet more likely, the custom is the cause of the tale. The historical fact concerning the source of the Thessalians' regard for storks need not concern us here,

[217] Text cited according to the edition of Giannini 1966: 232–233.

[218] As Giannini (1966: 233) notes, this fragment may not be from Theophrastus himself, but rather from one his peers in the Peripatos (»tantum de generatione et hoc non tamquam ex Theophrasto«). For the purposes of my argument it will suffice that the fragment may be attributed to an author belonging to the Peripatos. Whether it was in fact part of a Peripatetic work »On [animals] appearing in groups« (περὶ ἀθρόως φαινομένων) is uncertain (*pace* Flashar 1972: 79). The title appears in the list of works given in Diogenes Laertius (5.43).

however. What I propose to consider is rather how this bit of ethnological testimony made it into a Peripatetic context, and more precisely: how it gained acceptance therein as a piece of information, and how we should understand its status as a *datum* or »fact« in the Peripatos.

I use the anachronistic word »fact« consciously, the quotation marks indicating that the concept must be understood in an attenuated and wider sense, namely as a piece of information which gains acceptance in a certain discussion – even if it is relativized or even negated elsewhere in that discussion or work. This is very different from our modern notion of »fact«, indicating some piece of incontrovertible and durable knowledge independent of changes in popular or expert opinion.[219] There is no corresponding concept in ancient Greek philosophy and science, as far as I know, but there are several concepts which relate to things considered particularly »apparent« or knowable. The Aristotelian background to our Peripatetic context is rich in conceptual inventory for the sort of information which constitutes the evidential substratum of inquiry. There are the »principles (ἀρχαί) from which all demonstrate« (*Met*. B 1, 995 b 8), to which Aristotle subsumes both »posits« (ὑποθέσεις) and »premisses« (προτάσεις) in both the wider and the technical sense of the syllogistic. To these principles of demonstration may be added principles of being, which Aristotle sometimes also calls στοιχεῖα (e.g. *Met*. A 3, 983 b 11 *et passim*). In a formulation which comes quite close to our concept of »facts« as certain »givens«, Aristotle states that »the that is first and the beginning« (*NE* I 7, 1098 b 2–3).

Aristotle also possesses less formal concepts for identifying inquiry-founding evidence, ones which are particularly important for less »exact« fields of inquiry such as ethics and political theory.[220] One particularly interesting concept, which is in fact an inherited one, is that of φαινόμενα, »things which seem to be true«. In a much discussed passage in the *Nicomachean Ethics* Aristotle states that we must »lay down the φαινόμενα and, having first gone through the difficulties, prove all the ἔνδοξα concerning these states or, if not all, the most, and most authoritative, ones« (*NE* VII 2, 1145 b 2–6).[221] This expresses a standard of evidence which commits the inquirer to a certain basis of information. The φαινόμενα, in this case what is observed and thought concerning cases of weakness of will (ἀκρασία), are not straight-

[219] See Fleck 1935: 1: »Was is eine Tatsache? Man stellt sie als Feststehendes, Bleibendes, vom subjektiven Meinen des Forschers Unabhängiges den vergänglichen Theorien gegenüber.«

[220] *NE* I 7, 1198 a 26–29: »One must also recall the things which have been stated before, that one need not seek exactness in all things in the same way, but in each realm according to the material at hand and so far as is appropriate to the method«.

[221] *NE* VII 2, 1145 b 2-6: δεῖ δ', ὥσπερ ἐπὶ τῶν ἄλλων, τιθέντας τὰ φαινόμενα καὶ πρῶτον διαπορήσαντας οὕτω δεικνύναι μάλιστα μὲν πάντα τὰ ἔνδοξα περὶ ταῦτα τὰ πάθη, εἰ δὲ μή, τὰ πλεῖστα καὶ κυριώτατα· ἐὰν γὰρ λύηταί τε τὰ δυσχερῆ καὶ καταλείπηται τὰ ἔνδοξα, δεδειγμένον ἂν εἴη ἱκανῶς.

forwardly »empirical«, as they include both what is said (linguistic usage) and what is thought (e.g. cultural norms) along with observations concerning particular persons who act against their own expressed intentions.[222] The methodological recommendation of this passage can be construed as a consistency-test: we begin with a set of *prima facie* evident premisses, and then submit them to scrutiny in order to reduce inconsistencies within the set and preserve those which are »reputable« (ἔνδοξα).[223]

What is admitted to this procedure, and what the procedure itself is to yield, are propositions of a certain epistemic quality. The basis of the procedure are things which seem true, φαινόμενα; and the procedure is to yield things which are acceptable in a robust sense, ἔνδοξα. Both of these concepts figure importantly in the pre-history of what we would call »the facts«, serving as they do to describe particularly important and conclusion-supporting information. Particularly the notion of ἔνδοξα, understood as »that which seems true to all, or most, or the wise« (*Top*. A 1, 100 b 21–22), is open to the various sources which inform the »common sense« of modern philosophical epistemology: linguistic usage, common knowledge, and particularly a reflected awareness of what »we« (or most of us) really think.[224]

Equally important for the pre-history of the factual is the contrary opposite of what is ἔνδοξα: παράδοξα. Aristotle is concerned with propositions which he designates as παράδοξα particularly in his theory of sophistical argumentation. One of the goals of sophistical refutation is to force the interlocutor to say something »contrary to opinion«, for this itself counts as against the interlocutor's thesis.[225] Being παράδοξον is a clearly negative epistemic qualification, and nowhere does Aristotle collect accounts of events or things considered παράδοξα. In the field of natural science, Aristotle does give attention to things which »seem paradoxical«, but his efforts in this regard is to show why they are not.[226] And an interest for θαυμάσια is conspiciously absent in Aristotle's works.[227] In light of this, the introduction to

[222] On this »loose and inclusive« notion of information in the present passage and elsewhere in Aristotle, see Nussbaum 1987 and Owen 1961.

[223] Thus, in brief, the reconstruction offered by Barnes 1980 of an Aristotelian »Method of ἔνδοξα«.

[224] Barnes 1980: 495–497 discusses the interpretation of Aristotle as a »common sense« ethicist, which was expressed, i.a., by such a prominent philosophical exponent of »common sense« as Henry Sidgwick 1907: xix-xxi.

[225] See *SE* 3, 165 b 19–20.

[226] See e.g. Aristotle's discussion of the origin of hail in *Meteor*. 1.12, 347 b 34 ff. Here, the paradoxical »fact« is that hail occurs in warm regions; Aristotle develops an account which posits coldness in the heavens of such regions, thus preserving an efficient-causal explanation in terms of coldness and warmth.

[227] Bonitz 323 a 60 – b 2 records only five occurrences, none of which refer to »wonders« in the sense of paradoxographical literature. There was, however, an older tradition of interest in θαυμάσια which notably occurs in Herodotus, who announces that the exposition of his ἱστορία will serve in order that »neither the things which have been done by men are obliterated by time, nor their great and wondrous deeds (ἔργα μεγάλα τε καὶ

the Peripatos of a kind of literature in which παράδοξα become the object of interest and a criterion for information-collection is itself a remarkable historical fact.

The rise of paradoxography in the Peripatos represents a significant shift from the style of thinking characteristic of Aristotle himself in two further respects. First, the nearly 180 fragments of Peripatetic paradoxography preserved under Aristotle's name introduce a subject largely absent in the Aristotelian corpus. This is geography and ethnography, in a wide and inclusive sense of the study of places, their *flora* and *fauna*, and the peoples which inhabit them. The pseudo-Aristotelian work περὶ κοσμοῦ, which probably was composed sometime after Eratosthenes (276–194), is the only other writing in the Aristotelian corpus in which we find a comparable collection of geographical data.[228] Secondly, the source of this data is explicitly testimonial. Even the title of the (admittedly heterogenous) paradoxographical collection is explicit in this respect: περὶ θαυμασίων ἀκουσμάτων, »On wondrous things heard«, indicates that the content is »hear-say«, reports. Unlike many of the »doxographical« passages in Aristotle where we find isagogical discussions of certain opinions, these reports are attributed neither to any particular author, nor to any particular group.

The inclusion of a wide radius of testimony, such as folk explanations in the story of the Thessalians and their storks, and can include appeals to another source of »common sense« than general ones such as linguistic usage. These »facts« are not explained, but collected and presented in lists, which have a deonstrative character of their own: the mass of data The traditions appealed to concern particular places and the beings which inhabit them, the lore, knowledge and information thereby collected is local in a double sense: it concerns particular places, and derives from them. The integration of such information into a Peripatetic context of inquiry was, however, difficult for the reasons mentioned. Above all, there seems to be no room for paradoxical »facts« in Aristotelian conceptual repertoire for inquiry-founding information, much less for the inclusion of παράδοξα and θαυμάσια as a criterion for the selection of testimony. A major desideratum of the study of paradoxography is thus to show how interest in παράδοξα and θαυμάσια could be assimilated into the Aristotelian style of thinking. We must understand, in other words, how the Thessalian regard for storks and its

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θαυμαστά)« (Hdt. *Hist*. 1.1–3). For a discussion of the meaning of θαυμαστά in this passage, see Barth 1968. – One might reasonably ask if the terms θαυμάσια and θαυμαστά are completely co-extensive in this literature. Though I cannot answer this question here, it may be noted that both are to be assimilated to an interest in θαύματα.

[228] The *Meteorology* also includes geographical phenomena concerning places, rivers, winds, earthquakes, et cet., but we can identify two significant differences with paradoxography literature: it does not include ethnographic information, and the sources of the opinions quoted are almost exclusively experts or groups with expertise, such as »the Egyptians« and their astronomical observations, *Met*. 1.6, 343 b 10–11.

folk aitiology could become a Peripatetic »fact«. In future work, this may be accomplished, on the one hand, through tracking the opening of Peripatetic science for ethnographic information and its collection in inventories of otherwise unanalyzed testimony. The other, and highly significant, part of our research will be dedicated to explaining how paradoxical wondrous things became epistemic objects within Peripatetic science.

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Chapter 11

LOOKING FOR BIRD'S EYE VIEW IN ANCIENT GREEK SOURCES

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Summary

That the hodological view of the itinerary is the mental master-model in ancient descriptions of geographic space has been widely accepted in modern research on ancient geography. Nevertheless, it cannot have been the only mental model in ancient times because a) there are testimonies of alternative models coming from literary genres apart from geography and historiography, and b) there are other reasons for describing landscapes even in geographic description, e.g. strategical, political, economical, religious viewpoints. Common sense geography tries to figure out those alternative mental maps which have been hitherto largely neglected.

1. Introduction

Looking down from an elevated viewpoint seems to us the most natural thing to do when we want to take our bearings. Long before the time when zooming in via Google Earth View has become available all over the world, European tourists used to climb on church steeples and town-hall towers to get a first view of the town they visited, or they ascended the Palatine to get an overview of the Roman Forum. The same would have been possible at any time in almost any Greek city with an acropolis. In Athens, e. g., one can look down on the Agorá from the Acropolis or the Areopagus, and after a short walk one can have a panoramic view from Mount Lykabettos of the entire city, the surrounding *demes* and all the way down to the harbours of Piraeus and Phaleron. In addition, on a clear day without the usual haze, the island of Aegina can easily be discerned at striking distance, and one realizes at first glance how tight the rivalry between Athens and the Doric Aeginetans must have been when both cities struggled for naval hegemony in the 6th and 5th centuries BC. Taking a look from above and describing the geographical situation is, therefore, not only a modern habit of touristic curiosity, but it facilitates the understanding of politics and economics immediately. Strictly speaking, it would have facilitated ancient historiography, too, if we had any evidence from our sources that any Greek writer of history, geography, ethnography or related topics had ever taken a view from above.

But, with very few exceptions,[229] ancient Greek prose writers stuck to „relentless linearity"[230], i.e. in their descriptions they kept to a perspective which takes into account only the way how

[229] Pausanias just at one point (1.22.4) mentions that from the Nike temple at the Athenian propylaia the sea can be seen, but its obvious that the myth of Aigeus has caused this observation: τῶν δὲ προπυλαίων ἐν δεξιᾷ Νίκης

to get from point A to point B without looking left or right, let alone giving a survey of the landscape the path is winding through. The preset view, the mental model (see Thiering in this volume), of Greek historians and geographers, seems to have been the itinerary, not an abstract concept of geographical map-like space. According to Dueck[231], one can draw a clear distinction between scientific geography and descriptive geography: Only scientific geographers specialised and trained in mathematics and astronomy dealt with geographical space in a way similar to our modern understanding of map-like space, measured, reckoned, drew maps, and tried to develop elemental grids of coordinates. Descriptive geographers, on the other hand, never referred to maps and tried to present geographic information only by narrative means, although they sometimes gave figures and numbers but without checking them on their own; and the principle of descriptive geography was the hodological one. The scope of the research project outlined in the following pages is to investigate whether this clearcut view holds true, whether there are traces of other ways of seeing landscapes in ancient texts, especially from a bird's-eye view, and how the selection between different perspectives can be explained.

The evidence for the linear view in our historical sources is overwhelming, and does not need further demonstration: Generations of schoolboys wondered at Caesar's clumsy description of Gaul and the different tribes of the Belgians,[232] and even a scholar like Wilamowitz once lost his way between Olympia and Elis with Pausanias in his hands,[233] because the narrow angle of Pausanias' description was not embedded in a broader view for general orientation. Pietro Janni has founded upon these facts his widely accepted theory that the ancient authors adhered to a „hodological view": the Greeks, according to their mode of decribing space, lived in a „spazio odologico", while „spazio cartografico" was reserved only for specialists.[234] To give at least one example: It almost goes without saying that Xenophon in the *Anabasis* almost never[235] gives up this „hodological view" while he and his Greek army are trying to find their way back home out of the barren labyrinth of Persia, Armenia, and Asia minor. Not

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ἐστὶν Ἀπτέρου ναός. ἐντεῦθεν ἡ θάλασσά ἐστι σύνοπτος, καὶ ταύτῃ ῥίψας Αἰγεὺς ἑαυτὸν ὡς λέγουσιν ἐτελεύτησεν. − For the one, amazing, exception in Strabo see below.

[230] Snodgrass 1987: 84 (quoted in Hutton 2005: 119).

[231] Dueck 2012, distinguishes neatly between „chapter 2: Descriptive geography" and „chapter 3: Mathematical geography".

[232] Caesar is Janni's starting point: Janni 1984: 15f.

[233] Habicht 1985: 165−175.

[234] Janni 1984, chapter 2: Spazio cartografico e spazio odologico.

[235] The notable exception which confirms the rule seems to be Xenophon's description of the battle at Cunaxa: *Anab.* 1.8 ff.

even in the most famous passage of his work, the scene where the Greeks catch a first glimpse of the Black Sea, he raises his look from the ground:

Xen. Anab. 4.7.19−25 ἐκ ταύτης τῆς χώρας ὁ ἄρχων τοῖς Ἕλλησιν ἡγεμόνα πέμπει, ὅπως διὰ τῆς ἑαυτῶν πολεμίας χώρας ἄγοι [20] αὐτούς. ἐλθὼν δ' ἐκεῖνος λέγει ὅτι ἄξει αὐτοὺς πέντε ἡμερῶν εἰς χωρίον ὅθεν ὄψονται θάλατταν· εἰ δὲ μή, τεθνάναι ἐπηγγείλατο. (...) [21] καὶ ἀφικνοῦνται ἐπὶ τὸ ὄρος τῇ πέμπτῃ ἡμέρᾳ· ὄνομα δὲ τῷ ὄρει ἦν Θήχης. ἐπεὶ δὲ οἱ πρῶτοι ἐγένοντο ἐπὶ τοῦ ὄρους *{καὶ κατεῖδον τὴν θάλατταν}*, [22] κραυγὴ πολλὴ ἐγένετο. ἀκούσας δὲ ὁ Ξενοφῶν καὶ οἱ ὀπισθοφύλακες ᾠήθησαν ἔμπροσθεν ἄλλους ἐπιτίθεσθαι πολεμίους· (...) ἐπειδὴ δὲ βοὴ πλείων τε ἐγίγνετο καὶ ἐγγύτερον καὶ οἱ ἀεὶ ἐπιόντες ἔθεον δρόμῳ ἐπὶ τοὺς ἀεὶ βοῶντας καὶ πολλῷ μείζων ἐγίγνετο ἡ βοὴ ὅσῳ δὴ πλείους [24] ἐγίγνοντο, ἐδόκει δὴ μεῖζόν τι εἶναι τῷ Ξενοφῶντι, καὶ ἀναβὰς ἐφ' ἵππον καὶ Λύκιον καὶ τοὺς ἱππέας ἀναλαβὼν παρεβοήθει· καὶ τάχα δὴ ἀκούουσι βοώντων τῶν στρατιωτῶν Θάλαττα θάλαττα καὶ παρεγγυώντων. ἔνθα δὴ ἔθεον πάντες καὶ οἱ ὀπισθοφύλακες, καὶ τὰ ὑποζύγια ἠλαύνετο καὶ οἱ [25] ἵπποι. ἐπεὶ δὲ ἀφίκοντο πάντες ἐπὶ τὸ ἄκρον, ἐνταῦθα δὴ περιέβαλλον ἀλλήλους καὶ στρατηγοὺς καὶ λοχαγοὺς δακρύοντες.

From this city the ruler of the land sent the Greeks a guide, in order to lead them through territory that was hostile to his own. When the guide came, he said that he would lead them within five days to a place from which they could see the sea; if he failed to do so, he was ready to accept death. (...) On the fifth day they did in fact reach the mountain; its name was Theches. Now as soon as the vanguard got to the top of the mountain {and caught sight of the sea}, a great shout went up. And when Xenophon and the rearguard heard it, they imagined that other enemies were attacking also in front (...). But as the shout kept getting louder and nearer, as the successive ranks that came up all began to run at full speed toward the ranks ahead that were one after another joining in the shout, and as the shout kept growing far louder as the number of men grew steadily greater, it became quite clear to Xenophon that here was something of unusual importance; so he mounted a horse, took with him Lycius and the cavalry, and pushed ahead to lend aid; and in a moment they heared the soldiers shouting, „The Sea! The Sea!" and passing the word along. Then all the troops of the rearguard likewise broke into a run, and the pack animals began racing ahead and the horses. And when all had reached the summit, then indeed they fell to embracing one another, and generals and captains as well, with tears in their eyes. (transl. Brownson)

The whole event is staged as an acoustic process of delayed understanding among the single detachments of the marching army. The spot where all this happened never has been identified exactly, although behind Trabzon there is only one pass (2036 m, at Mt. Zigana Dag, 2650m) through the Pontic mountain range raising up to a height of 3000 m. But the coast is 50 km ahead and can be reached from there only after five days of marching.[236] Xenophon gives us not the least hint how far away, narrow and barely distinct was the shimmering stretch of the horizon, which caused such joy to the Greeks. The captivating story of the *Anabasis* seems to take place in a void and, thus, characterised by a view which Hutton, describing analogous features in Pausanias, has called „tunnel vision".[237]

Is „tunnel vison" the necessary result of the „hodological view"? I hope to show that neither hodological viewing nor tunnel vision are necessary consequences of a natural or cultural constraint, but both result from deliberately chosen perspectives, conventions of generic style.

As a test case, let us take the bird's-eye view: it seems to me the most obvious or nearest at hand alternative to the hodological view. I also want to maintain that labelling the view from above as „protogeographic" should not be inserted, as Alex Purves does, in a teleological

[236] Lendle 1995: 273−280 discusses thoroughly the actual situation at the Zigana Dach.
[237] Hutton 2005: 118−122.

model of literary evolution where the Muses with their god's eye view are succeeded by cartography as the origin of prose.[238]

It cannot be denied that gods are privileged observers of life on earth. Zeus and Poseidon give us a fine example (Hom. Il. 13.1−20; transl. S. Butler):

Ζεὺς δ' ἐπεὶ οὖν Τρῶάς τε καὶ Ἕκτορα νηυσὶ πέλασσε, / τοὺς μὲν ἔα παρὰ τῇσι πόνον τ' ἐχέμεν καὶ ὀϊζὺν / νωλεμέως, αὐτὸς δὲ πάλιν τρέπεν ὄσσε φαεινὼ / νόσφιν ἐφ' ἱπποπόλων Θρηκῶν καθορώμενος αἶαν / Μυσῶν τ' ἀγχεμάχων καὶ ἀγαυῶν ἱππημολγῶν / γλακτοφάγων Ἀβίων τε δικαιοτάτων ἀνθρώπων. / ἐς Τροίην δ' οὐ πάμπαν ἔτι τρέπεν ὄσσε φαεινώ· / οὐ γὰρ ὅ γ' ἀθανάτων τινα ἔλπετο ὃν κατὰ θυμὸν / ἐλθόντ' ἢ Τρώεσσιν ἀρηξέμεν ἢ Δαναοῖσιν. / Οὐδ' ἀλαοσκοπιὴν εἶχε κρείων ἐνοσίχθων· / καὶ γὰρ ὃ θαυμάζων ἧστο πτόλεμόν τε μάχην τε / ὑψοῦ ἐπ' ἀκροτάτης κορυφῆς Σάμου ὑλήεσσης / Θρηϊκίης· ἔνθεν γὰρ ἐφαίνετο πᾶσα μὲν Ἴδη, / φαίνετο δὲ Πριάμοιο πόλις καὶ νῆες Ἀχαιῶν. / ἔνθ' ἄρ' ὅ γ' ἐξ ἁλὸς ἔζετ' ἰών, ἐλέαιρε δ' Ἀχαιοὺς / Τρωσὶν δαμναμένους, Διὶ δὲ κρατερῶς ἐνεμέσσα. / Αὐτίκα δ' ἐξ ὄρεος κατεβήσετο παιπαλόεντος / κραιπνὰ ποσὶ προβιβάς· τρέμε δ' οὔρεα μακρὰ καὶ ὕλη / ποσσὶν ὑπ' ἀθανάτοισι Ποσειδάωνος ἰόντος.

Now when Zeus had thus brought Hektor and the Trojans to the ships, he left them to their never-ending toil [ponos], and turned his keen eyes away, looking elsewhere towards the horse-breeders of Thrace, the Mysians, fighters at close quarters, the noble Hippemolgoi, who live on milk, and the Abians, the most just [dikaioi] of humankind. He no longer turned so much as a glance towards Troy, for he did not think that any of the immortals would go and help either Trojans or Danaans. But King Poseidon had kept no blind look-out; he had been looking admiringly on the battle from his seat on the topmost crests of wooded Samothrace, whence he could see all Ida, with the city of Priam and the ships of the Achaeans. He had come from under the sea and taken his place here, for he pitied the Achaeans who were being overcome by the Trojans; and he was furiously angry with Zeus. Presently he came down from his post on the mountain top, and as he strode swiftly onwards the high hills and the forest quaked beneath the tread of his immortal feet.

But one need not be a god to enjoy a view from above. When the Troians light their fires on the plain outside the city's walls, Homer compares the appearance and number of the fires to stars gazed at by shepherds, as if the perspective were reversed and we were looking at the fires down on the plain (Hom. Il. 8.555−565; transl. S. Butler, *slightly modified*):

Οἳ δὲ μέγα φρονέοντες ἐπὶ πτολέμοιο γεφύρας / εἵατο παννύχιοι, πυρὰ δέ σφισι καίετο πολλά. / ὡς δ' ὅτ' ἐν οὐρανῷ ἄστρα φαεινὴν ἀμφὶ σελήνην / φαίνετ' ἀριπρεπέα, ὅτε τ' ἔπλετο νήνεμος αἰθήρ· / ἔκ τ' ἔφανεν πᾶσαι σκοπιαὶ καὶ πρώονες ἄκροι / καὶ νάπαι· οὐρανόθεν δ' ἄρ' ὑπερράγη ἄσπετος αἰθήρ, / πάντα δὲ εἴδεται ἄστρα, γέγηθε δέ τε φρένα ποιμήν· / τόσσα μεσηγὺ νεῶν ἠδὲ Ξάνθοιο ῥοάων / Τρώων καιόντων πυρὰ φαίνετο Ἰλιόθι πρό.

Thus high in hope they sat through the livelong night by the highways of war, and many a watchfire did they kindle. As when the stars shine clear, and the moon is bright − there is not a breath of air, *all the peaks and glades and headlands appear in brilliance* but it stands out in the ineffable radiance that breaks from the serene of heaven; the stars can all of them be told and the heart of the shepherd is glad − even thus shone the watchfires of the Trojans before Ilion midway between the ships and the river Xanthos.

Working as a shepherd in the mountainside was, from Hesiod onwards, a very common activity in Greece; sanctuaries were situated ontop of mountains, e.g. that of Zeus Hellanius on Aegina, Zeus Lycaeus in Arcadia,[239] or the throne of Pelops on the Sipylus.[240] Looking down from above must have been a very common experience in Greece, not just a privilege of

[238] Purves 2010: 97−117: Chapter 3: The world in the hand: Anaximander, Pherekydes, and the invention of cartography. The following chapter 4 on Herodotus („Map and narrative") develops this concept in an interpretation of the *Histories* which, at least in my view, comes very close to an allegorical reading of Herodotus.

[239] Paus. 8.38.6f.

[240] Paus. 5.7.13.

the gods.[241] Detlev Fehling has collected anthropological, even ethological (i.e. behaviouristic) evidence that vertebrates like to climb on any elevated point to control their territory.[242] But to control a territory is the scope of every watchtower, and the famous Greek Pyrgaki tower, too, dating from late classical times, serves the same purpose and surveys the whole Valley of the Muses.[243] Controlling the enemy within a landscape becomes most important during battles and sieges. One of the rare examples where Thucydides describes the features of a landscape in a more explicit way than he usually does[244] has been elucidated by Emily Greenwood[245] (Thuc. 5.6f.; transl. J. Powell):

Ὁ δὲ Κλέων ὡς ἀπὸ τῆς Τορώνης τότε περιέπλευσεν ἐπὶ τὴν Ἀμφίπολιν, ὁρμώμενος ἐκ τῆς Ἠιόνος Σταγίρῳ μὲν προσβάλλει Ἀνδρίων ἀποικίᾳ καὶ οὐχ εἷλε, Γαληψὸν δὲ τὴν 5.6.2 Θασίων ἀποικίαν λαμβάνει κατὰ κράτος. (...) 5.6.3 Βρασίδας δὲ πυνθανόμενος ταῦτα ἀντεκάθητο καὶ αὐτὸς ἐπὶ τῷ Κερδυλίῳ· ἔστι δὲ τὸ χωρίον τοῦτο Ἀργιλίων ἐπὶ μετεώρου πέραν τοῦ ποταμοῦ, οὐ πολὺ ἀπέχον τῆς Ἀμφιπόλεως, καὶ κατεφαίνετο πάντα αὐτόθεν, ὥστε οὐκ ἂν ἔλαθεν αὐτὸν ὁρμώμενος ὁ Κλέων τῷ στρατῷ· ὅπερ προσεδέχετο ποιήσειν αὐτόν, ἐπὶ τὴν Ἀμφίπολιν, ὑπεριδόντα σφῶν τὸ πλῆθος, τῇ παρούσῃ στρατιᾷ 5.6.4 ἀναβήσεσθαι. (...) 5.7.1. ὁ δὲ Κλέων τέως μὲν ἡσύχαζεν, ἔπειτα ἠναγκάσθη ποιῆσαι ὅπερ ὁ Βρασίδας 5.7.2 προσεδέχετο. (...) 5.7.3. καὶ ἐχρήσατο τῷ τρόπῳ ᾧπερ καὶ ἐς τὴν Πύλον εὐτυχήσας ἐπίστευσέ τι φρονεῖν· ἐς μάχην μὲν γὰρ οὐδὲ ἤλπισέν οἱ ἐπεξιέναι οὐδένα, κατὰ θέαν δὲ μᾶλλον ἔφη ἀναβαίνειν τοῦ χωρίου, καὶ τὴν μείζω παρασκευὴν περιέμενεν, οὐχ ὡς τῷ ἀσφαλεῖ, ἢν ἀναγκάζηται, περισχήσων, ἀλλ' ὡς κύκλῳ περιστὰς βίᾳ αἱρήσων τὴν 5.7.4 πόλιν. ἐλθών τε καὶ καθίσας ἐπὶ λόφου καρτεροῦ πρὸ τῆς Ἀμφιπόλεως τὸν στρατὸν αὐτὸς ἐθεᾶτο τὸ λιμνῶδες τοῦ Στρυμόνος καὶ τὴν θέσιν τῆς πόλεως ἐπὶ τῇ Θράκῃ ὡς ἔχοι. 5.7.5 ἀπιέναι τε ἐνόμιζεν, ὁπόταν βούληται, ἀμαχεί·

Cleon had now sailed round from Toronè against Amphipolis, and making Eion his headquarters, attacked Stagirus, a colony of the Andrians, which he failed to take. He succeeded, however, in storming Galepsus, a Thasian colony. (...) [3] Brasidas, hearing of his movements, took up a counter-position on Cerdylium. This is a high ground on the right bank of the river, not far from Amphipolis, belonging to the Argilians. From this spot he commanded a view of the country round, so that Cleon was sure to be seen by him if,—as Brasidas fully expected,—despising the numbers of his opponents, he should go up against Amphipolis without waiting for his reinforcements. (...). [7.1] Cleon did nothing for a time, but he was soon compelled to make the movement which Brasidas expected. (...) [3] He went to work in the same confident spirit which had already been successful at Pylos, and of which the success had given him a high opinion of his own wisdom. That any one would come out to fight with him he never even imagined; he said that he was only going to look at the place. If he waited for a larger force, this was not because he thought that there was any risk of his being defeated should he be compelled to fight, but that he might completely surround and storm the city. [4] So he stationed his army upon a steep hill above Amphipolis, whence he surveyed with his own eyes the lake formed by the river Strymon, and the lie of the country on the side towards Thrace. [5] He thought that he could go away without fighting whenever he pleased.

Brasidas and Cleon, both want to get into a postion near Amphipolis where each of them can see the other before being spotted or where one can fight from a favourable position – a perspective on landscape which was vital in any military action. Polybios seems to be the most promising author to look for such considerations upon miltary advantages, e.g. 4.70.5 where Philippus is occupying the hills in front of Psophis in Arcadia. A scrutiny of our

[241] An overview in Tozer 1897: 312−337: Estimates of Mountains in Antiquity.
[242] Fehling 1974: 39−58: Fernsicht, esp. 52−58: Vergnügen an der Aussicht im Altertum.
[243] Snodgrass 1987: 121−125, with photographs of Pyrgaki-tower and Valley of the Muses.
[244] „Marginalizing Geography“ (Funke & Haake 2006: 373), but taking account of the exceptions, e.g. the description of Sphacteria (Thuc. 4.8.6), and appreciating the functional economy of Thucydides' use of geographical informations.
[245] Greenwood 2006: 26−32.

historical (political, poliorcetic ...) texts should yield enough examples to formulate an ancient „strategical view“ on landscape besides the hodological.

There must have been many such alternative perspectives, e.g. when considering the foundation of cities,[246] discussing health and environment,[247] or even hydrographic aspects.[248] Inventive poets, too, were always capable to present geographical entities in any way they liked. The anonymous who composed the Cypria had a keensighted imagination at his disposition (frg. 13 Davies = frg. 16 West; transl. M. L. West):

αἶψα δὲ Λυγκεὺς / Τηΰγετον προσέβαινε ποσὶν ταχέεσσι πεποιθώς. / ἀκρότατον δ' ἀναβὰς διεδέρκετο νῆσον ἅπασαν / Τανταλίδ<εω> Πέλοπος, τάχα δ' εἴσιδε κύδιμος ἥρως / δεινοῖς ὀφθαλμοῖσιν ἔσω κοίλης δρυὸς ἄμφω, / Κάστορά θ' ἱππόδαμον καὶ ἀεθλοφόρον Πολυδεύκ<εα>·

At once Lynceus climbed Taygetus, relying on his swift legs, and going up to the summit he surveyed the whole island of Pelops the Tantalid. And with his formidable eyes the glorious hero soon spotted them both inside a hollow oak, Castor the horse-tamer and prize-winner Polydeuces.

And it was Pindar who was able to look through the eyes of the gods down on Delos, transposing the island to the ‚sky‘ of the gods (frg. 33c Sn.-M.; transl. W.H. Race):

χαῖρ', ὦ θεοδμάτα, λιπαροπ῾λοκάμου / παίδεσσι Λατοῦς ἱμεροέστατον ἔρνος, / πόντου θύγατερ, χθονὸς εὐρεί-/ ας ἀκίνητον τέρας, ἄν τε βροτοί / Δᾶλον κικλήσκοισιν, μάκαρες δ' ἐν Ὀλύμπῳ / τηλέφαντον κυανέας χθονὸς ἄστρον.

Hail, O heaven-built island, offshoot most desirable / to the children of shining-haired Leto ,/ daughter of the sea, immobile marvel/ of the broad earth, whom mortals / call Delos, but the blessed gods on Olympos / call the far shining star of the dark-blue earth.

But imagining the world from above and in a clearcut way is not just poetic license. It is a very useful tool in the hands of historians and geographers, too. When Herodotus has to set the stage for Xerxes’ daring project of digging a channel across the Athos he is able to inform his readers in a very lucid and economic way as if he were looking from above (7.22f.; transl. A.D. Godley):

Ὁ γὰρ Ἄθως ἐστὶ ὄρος μέγα τε καὶ ὀνομαστόν, ἐς θάλασσαν κατῆκον, οἰκημένον ὑπὸ ἀνθρώπων· τῇ δὲ τελευτᾷ ἐς τὴν ἤπειρον τὸ ὄρος, χερσονησοειδές τέ ἐστι καὶ ἰσθμὸς ὡς δυώδεκα σταδίων· πεδίον δὲ τοῦτο καὶ κολωνοὶ οὐ μεγάλοι ἐκ θαλάσσης τῆς Ἀκανθίων ἐπὶ θάλασσαν τὴν ἀντίον Τορώνης. Ἐν δὲ τῷ ἰσθμῷ τούτῳ, ἐς τὸν τελευτᾷ ὁ Ἄθως, Σάνη πόλις Ἑλλὰς οἴκηται, αἱ δὲ ἐκτὸς Σάνης, ἔσω δὲ τοῦ Ἄθω οἰκημέναι, τὰς τότε ὁ Πέρσης νησιώτιδας ἀντὶ ἠπειρωτίδων ὥρμητο ποιέειν, εἰσὶ [δὲ] αἵδε, Δῖον, Ὀλόφυξος, Ἀκρόθωον, Θύσσος, Κλεωναί· πόλιες μὲν αὗται αἳ τὸν Ἄθων νέμονται. Ὧρυσσον δὲ ὧδε κτλ.

Athos is a great and famous mountain, running out into the sea and inhabited by men. At the mountain's landward end it is in the form of a peninsula, and there is an isthmus about twelve stadia wide; here is a place of level ground or little hills, from the sea by Acanthus to the sea opposite Torone. On this isthmus which is at the end of Athos, there stands a Greek town, Sane; there are others situated seaward of Sane and landward of Athos, and the Persian now intended to make them into island and not mainland towns; they are Dion, Olophyxus, Acrothoum, Thyssus, and Cleonae. These are the towns situated on Athos. The foreigners dug as follows etc.

[246] Plat. *leg.*704a−d. Aristot. *pol. 7.*5f.; Vitr. 6. prooem.; 4.
[247] Hippocr. *De aere*.
[248] Aristot. *meteor* .350ab.

To grasp a complex situation at a glance seems to be the precondition of becoming a good historian – or the outcome of long training. When Lucian portrays the ideal historian he starts from experience and first hand knowledge (conscr. hist. 37; transl. K. Kilburn):

Καὶ τοίνυν καὶ ἡμῖν τοιοῦτός τις ὁ μαθητὴς νῦν παραδεδόσθω – συνεῖναί τε καὶ εἰπεῖν οὐκ ἀγεννής, ἀλλ' ὀξὺ δεδορκώς, οἷος καὶ πράγμασι χρήσασθαι ἂν εἰ ἐπιτραπείη, καὶ γνώμην στρατιωτικὴν ἀλλὰ μετὰ τῆς πολιτικῆς καὶ ἐμπειρίαν στρατηγικὴν ἔχειν, καὶ νὴ Δία καὶ ἐν στρατοπέδῳ γεγονώς ποτε καὶ γυμναζομένους ἢ ταττομένους στρατιώτας ἑωρακὼς καὶ ὅπλα εἰδὼς καὶ μηχανήματα, κτλ.

So give us now a student of this kind – not without ability to understand and express himself, keensighted, one who could handle affairs if they were turned over to him, a man with the mind of a soldier combined with that of a good citizen, and knowledge of gerneralship; yes, and one who has at some time been in a camp and has seen soldiers exercising or drilling and knows of arms and engines; etc.

In the end, the perfect historian has to control and to arrange all his material in order to become capable of looking down on earth like Zeus and flying all over the earth (conscr. hist. 48f.; transl. K. Kilburn):

καὶ ἐπειδὰν ἀθροίσῃ ἅπαντα ἢ τὰ πλεῖστα, πρῶτα μὲν ὑπόμνημά τι συνυφαινέτω αὐτῶν καὶ σῶμα ποιείτω ἀκαλλὲς ἔτι καὶ ἀδιάρθρωτον· εἶτα ἐπιθεὶς τὴν τάξιν ἐπαγέτω τὸ κάλλος καὶ χρωννύτω τῇ λέξει καὶ σχηματιζέτω καὶ ῥυθμιζέτω. [49] Καὶ ὅλως ἐοικέτω τότε τῷ τοῦ Ὁμήρου Διὶ ἄρτι μὲν τὴν τῶν ἱπποπόλων Θρῃκῶν γῆν ὁρῶντι, ἄρτι δὲ τὴν Μυσῶν – κατὰ ταὐτὰ γὰρ καὶ αὐτὸς ἄρτι μὲν τὰ Ῥωμαίων ἴδιᾳ ὁράτω καὶ δηλούτω ἡμῖν οἷα ἐφαίνετο αὐτῷ ἀφ' ὑψηλοῦ ὁρῶντι, ἄρτι δὲ τὰ Περσῶν, εἶτ' ἀμφότερα εἰ μάχοιντο. (...) ἐπειδὰν δὲ ἀναμιχθῶσι, κοινὴ ἔστω ἡ θέα, καὶ ζυγοστατείτω τότε ὥσπερ ἐν τρυτάνῃ τὰ γιγνόμενα καὶ συνδιωκέτω καὶ συμφευγέτω. καὶ πᾶσι τούτοις μέτρον ἐπέστω, μὴ ἐς κόρον μηδὲ ἀπειροκάλως μηδὲ νεαρῶς, ἀλλὰ ῥᾳδίως ἀπολυέσθω καὶ στήσας ἐνταῦθά που ταῦτα ἐπ' ἐκεῖνα μεταβαινέτω, ἢν κατεπείγῃ· εἶτα ἐπανίτω λυθείς, ὁπόταν ἐκεῖνα καλῇ· καὶ πρὸς πάντα σπευδέτω καὶ ὡς δυνατὸν ὁμοχρονείτω καὶ μεταπετέσθω ἀπ' Ἀρμενίας μὲν εἰς Μηδίαν, ἐκεῖθεν δὲ ῥοιζήματι ἑνὶ εἰς Ἰβηρίαν, εἶτα εἰς Ἰταλίαν, ὡς μηδενὸς καιροῦ ἀπολείποιτο.

When he has collected all or most of the facts let him first make them into a series of notes, a body of material as yet with no beauty or continuity. Then, after arranging them into order, let him give it beauty and enhance it with the charms of expression, figure, and rhythm. 49 In brief let him be then like Homer's Zeus, looking now at the land of the horse-rearing Thracians, now at the Mysians' country – in the same way let him look now at the Roman side in his own way and tell us how he saw it from on high, now at the Persian side, then at both sides, if the battle is joined. (...) When the battle is joined he should look at both sides and weigh the events as it were in a balance, joining in both pursuit and flight. All this should be in moderation, avoiding excess, bad taste, impetuosity; he should preserve an easy detachment: let him call a halt here and move over there if necessary, then free himself and return if events there summon him; let him hurry everywhere, follow a chronlogical arrangement as far as he can, and fly from Armenia to Media, from there with a single scurry of wings to Iberia, then to Italy, to avoid missing any critical situation.

But not only an imaginary historian, even a sober geographer like Strabo is fond of looking down on earth and starts many of his descriptions by coining a metaphor which gives the outline of land, district or city in one word: India is rhomboid (2.1.22 and 31 ῥομβοειδής), the provincia Narbonensis is a parallelogram (4.1.3 τὸ σχῆμα παραλληλόγραμμόν πώς ἐστιν), and so on. Daniela Dueck recently has given a comprehensive account of these phenomena,[249] but in her catalogue one of the finest passages almost gets lost. Looking down upon a city or looking all around is not just a poetical game − or the obsession of the author of these pages:

[249] Dueck 2005.

Strabo did it himself in the one case he is so proud of, his visit to Corinth (8.6.19; transl. H.C. Hamilton, W. Falconer):

καὶ ἡμεῖς ἀπὸ τοῦ Ἀκροκορίνθου κατωπτεύσαμεν τὸ κτίσμα.

And we have ourselves beheld the city from the Acrocorinthus.

Strabo behaved as every modern visitor would behave: he climbed up to Acrocorinthus, then describes the shape of the newly restored city, and gives a complete panorama (6.8.21; transl. H.C. Hamilton, W. Falconer):

Τὴν δὲ τοποθεσίαν τῆς πόλεως, ἐξ ὧν Ἱερώνυμός τε εἴρηκε καὶ Εὔδοξος καὶ ἄλλοι καὶ αὐτοὶ δὲ εἴδομεν νεωστὶ ἀναληφθείσης ὑπὸ τῶν Ῥωμαίων, τοιάνδε εἶναι συμβαίνει. ὄρος ὑψηλὸν ὅσον τριῶν ἥμισυ σταδίων ἔχον τὴν κάθετον, τὴν δ' ἀνάβασιν καὶ τριάκοντα σταδίων, εἰς ὀξεῖαν τελευτᾷ κορυφήν· καλεῖται δὲ Ἀκροκόρινθος, οὗ τὸ μὲν πρὸς ἄρκτον μέρος ἐστὶ τὸ μάλιστα ὄρθιον, ὑφ' ᾧ κεῖται ἡ πόλις ἐπὶ τραπεζώδους ἐπιπέδου χωρίου πρὸς αὐτῇ τῇ ῥίζῃ τοῦ Ἀκροκορίνθου. αὐτῆς μὲν οὖν τῆς πόλεως ὁ κύκλος καὶ τετταράκοντα σταδίων ὑπῆρχεν· ἐτετείχιστο δ' ὅσον τῆς πόλεως γυμνὸν ἦν τοῦ ὄρους· συμπεριείληπτο δὲ τῷ περιβόλῳ τούτῳ καὶ τὸ ὄρος αὐτὸ ὁ Ἀκροκόρινθος ᾗ δυνατὸν ἦν τειχισμὸν δέξασθαι, καὶ ἡμῖν ἀναβαίνουσιν ἦν δῆλα τὰ ἐρείπια τῆς σχοινίας· ὥσθ' ἡ πᾶσα περίμετρος ἐγίνετο περὶ πέντε καὶ ὀγδοήκοντα σταδίων. ἀπὸ δὲ τῶν ἄλλων μερῶν ἧττον ὄρθιόν ἐστι τὸ ὄρος, ἀνατέταται μέντοι ἐνθένδε ἱκανῶς καὶ περίοπτόν ἐστιν. ἡ μὲν οὖν κορυφὴ ναΐδιον ἔχει Ἀφροδίτης, ὑπὸ δὲ τῇ κορυφῇ τὴν Πειρήνην εἶναι συμβαίνει κρήνην, ἔκρυσιν μὲν οὐκ ἔχουσαν μεστὴν δ' ἀεὶ διαυγοῦς καὶ ποτίμου ὕδατος. (...) ἀπὸ δὲ τῆς κορυφῆς πρὸς ἄρκτον μὲν ἀφορᾶται ὅ τε Παρναςσὸς καὶ ὁ Ἑλικών, ὄρη ὑψηλὰ καὶ νιφόβολα, καὶ ὁ Κρισαῖος κόλπος ὑποπεπτωκὼς ἀμφοτέροις, περιεχόμενος ὑπὸ τῆς Φωκίδος καὶ τῆς Βοιωτίας καὶ τῆς Μεγαρίδος καὶ τῆς ἀντιπόρθμου τῇ Φωκίδι Κορινθίας καὶ Σικυωνίας· πρὸς ἑσπέραν δὲ ... ὑπέρκειται δὲ τούτων ἁπάντων τὰ καλούμενα Ὄνεια ὄρη διατείνοντα μέχρι Βοιωτίας καὶ Κιθαιρῶνος ἀπὸ τῶν Σκειρωνίδων πετρῶν, ἀπὸ τῆς παρὰ ταύτας ὁδοῦ πρὸς τὴν Ἀττικήν.

The position of the city as it is described by Hieronymus, and Eudoxus, and others, and from our own observation, since its restoration by the Romans, is as follows. That which is called the Acrocorinthus is a lofty mountain, perpendicular, and about three stadia and a half in height. There is an ascent of 30 stadia, and it terminates in a sharp point. The steepest part is towards the north. Below it lies the city in a plain of the form of a trapezium, at the very foot of the Acrocorinthus. The compass of the city itself was 40 stadia, and all that part which was not protected by the mountain was fortified by a wall. Even the mountain itself, the Acrocorinthus, was comprehended within this wall, wherever it would admit of fortification. As I ascended it, the ruins of the circuit of the foundation were apparent, which gave a circumference of about 85 stadia. The other sides of the mountain are less steep; hence, however, it stretches onwards, and is visible everywhere. The summit has upon it a small temple of Venus, and below it is the fountain Peirene, which has no efflux, but is continually full of water, which is transparent, and fit for drinking. (...) From the summit towards the north are seen Parnassus and Helicon, lofty mountains covered with snow; then the Crissæan Gulf, lying below both, and surrounded by Phocis, Bœotia, Megaris, by the Corinthian district opposite to Phocis, and by Sicyonia on the west. Above all these are situated the Oneia mountains, as they are called, extending as far as Bœotia and Cithæron, from the Sceironides rocks, where the road leads along them to Attica.

How exceptional, in fact, Strabo's description is can easily be seen, when compared to Pausanias' description of the same locality (2.4.6.1ff.): Pausanias neither looks down from Acrocorinthus nor looks around at the mountain scenery. An exception as Strabo's, for sure, does not disprove the rule, but Strabo's freedom can inspire us at least to take a fresh look on ancient geography.

To sum up our argument so far and the research on mental maps in antiquity: at no point in their history Greeks (or Romans) were obliged to look upon geographic items from just one perspective. Most probably, habitual conventions of genres must have restricted the selection of possible alternatives, but how these rules worked needs closer investigation. First, we have

to collect anew and without prejudice all evidence of of the ways in which landscape was represented in our written sources and set them into a chronological order (starting with early Greece and continuing at least up to the second century CE). Second, we have to identify the generic conventions behind these representations and study the function(s) of landscape within the differnt genres. Third, we need to check our findings against practical knowledge outside the texts: archeological evidence, technical developments, economical interests, cultural exchanges. Afterwards, perhaps, the ancient world will look a little more complex than a strictly hodological point of view would make out.

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