

Towards historical cognitive science: the case of Ancient Greece

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Abstract

This study rests on the two basic ideas: that there has been a visible development of cognitive skills from the Antiquity to nowadays, and that the text analysis is the only way to bring it out. The author addresses the three eminent works: Euclid's *Elements* and the historical treatises by Herodotus and Thucydides to reveal the notable peculiarities of the Ancient Greeks' cognitive style in comparison with the current cognitive models.

Introduction

Cognitive scientists traditionally look at language as a cognitive system. However, it is not the only acceptable view on language within the scope of cognitive science. The distinguished German historian Reinhart Koselleck emphasized «a methodologically irresolvable dilemma: that every history, while in process and as occurrence, is something other than what its linguistic articulation can establish; but that this "other" in turn can only be made visible through the medium of language» (Koselleck 2004, 223; cf. Pocock 2009, 106–119). Admittedly, this position may just as well be applied to cognition: the way people think is different from verbal representation, but we cannot comprehend how the people of the 19th century and earlier used to think and perceive the world without a scrupulous analysis of the texts they created. Although such a view on text as a medium for revealing cognitive models is not widespread amongst cognitive scientists, there are a number of branches within cognitive science that have emerged recently (cognitive stylistics, cognitive poetics etc.), in which scholars apply a cognitive analysis to particular texts, mostly fiction (Attardo 2002; Culpeper 2002; Semino 2002; Tsur 2002; Emmott et al. 2007; Semino 2007). However, we can hardly encounter any works that provide us with a precise analysis of different types of texts, created in the same historical epoch in order to explicate general for these texts cognitive models. To develop an elaborate methodology for such analysis is not a matter of cognitive stylistics or cognitive poetics; it is merely a matter of a special branch of cognitive science which can be called historical cognitive science.

This paper focuses on two case studies, but its bottom line is to provide some conceptual pillars for investigations in this field, in other words, to discover some correlations between the narrative models of the text construction and the cognitive models used by its author. The concept of *cognitive style* will be the main methodological tool for that. This concept is widely applied in different types of researches (Rubin 1970; Berzonsky & Ondrako 1974; Witkin et al. 1977; Logan 1983; Roberge & Flexer 1983; Fuchs 1991; McIntyre & Meloche 1995; Judice 1997; Riding &

Rayner 1998; Riding & Rayner 2000; Tomes 2004; cf. concept of *mind style* in Semino 2002; Semino 2007); although it cannot be called fairly clear-cut (see some criticism in Tomes 2004, 47–48), its gist is quite transparent: a) *cognitive styles* characterize the form rather than the content of cognitive activity; b) they are pervasive dimensions which cut across the disciplinary boundaries; c) they are stable over time; d) they are bipolar, that is, they can be sorted out into opposite pairs (field-dependency – independency; holist – serialist thinking; adaptors – innovators etc.) (Witkin et al. 1977, 15–16; Riding & Rayner 1998, p. 20). The two peculiarities of my applying this term here should be featured as follows: firstly, in this context I mean a cognitive style of a particular culture, but not a particular person; in other words, I address the mode of thinking common to a notable number of culture bearers, involved in different types of intellectual activity; secondly, I seek for some criteria to compare these modes and establish the foundations for cultural-historical typology of cognitive styles.

The only parameter we will focus on is *field-dependency – independency*. Following H. Witkin, the field-independent cognitive style characterizes the tendency to differentiate objects from their surroundings whereas the field-dependent one stresses the strict connection between surroundings and objects. It concerns the subjects themselves as well; people of the field-dependent style are more likely to follow external instructions while field-independent style people prefer to rest on the internal basis for their actions (Witkin et al. 1977, 2-14).

The *field-dependency – independency* opposition, with some necessary corrections, seems to be a fruitful pathway to fit the process of cognitive evolution in phylogenesis. Furthermore, it correlates quite well with some classical researches in this field. I mean the investigations of Vygotsky's school of cultural-historical psychology or, more precisely, the distinction between complex and conceptual thinking (Vygotsky 1986(1934), 96-145) and the idea of field binding (Samukhin et al. 1934; Vygotsky 1984 (1933/34)). Briefly, the essence of this approach can be formulated as follows: unlike concepts which are characterized by a rigid structure and a set of objective features, complexes have flexible and contextually dependent frames. In the case of complex thinking, subjects' cognitive decisions are influenced by their unique experience, and they cannot be described by any general abstract model such as Aristotelian logic. Vygotsky created this model mainly to explain pre-school and primary school child cognitive development, and only outlined its application to phylogenesis. However, his followers applied this approach to different types of cultures and got the im-

portant results. Thus, Alexander Luria (1976), researching cognitive scenarios basic for Central Asia dekchans, pointed out that those scenarios were triggered by psychological fields of their everyday activity. Particularly, the subjects could not see the abstract principles used to classify a given set of objects and failed to identify the odd one out; they found all the objects useful for everyday life. As well, they could not solve syllogisms, conceiving their elements as independent propositions. Furthermore, their answers were based on their everyday experience, and they insisted that they could speak only about the things they had seen before. Further investigations (e.g., Mikheev 1985; Tulviste 1991) confirmed that complex thinking and rigid links with the psychological field of everyday experience can be called the bottom line of the traditional cultures' cognitive style.

At first sight our mind operates in a radically different way. Nevertheless, the investigations of R. Frumkina and her colleagues (Frumkina & Mirkin 1986, Frumkina et al. 1991, Frumkina & Mikheev 1996, Frumkina 2007) found out that complex thinking characterizes cognitive decisions of educated persons in modern culture in a great number of everyday situations. The only difference from the traditional culture is that they can explain their decisions and accommodate them to the experimenter's requests. As a generalization of these results, we can suppose that our cognitive structure has several levels, where complex thinking occupies the lowest, strongly field-dependent level, while different types of theoretical thinking are on the upper ones. In a concrete situation, we, guided by circumstances, resort to the relevant «floor» of our cognitive construction.

Given these standpoints as the background for the further discussion, we have a reason to ask in which cultures these floors emerge. It might seem that they emerge alongside the emergence of a written language and complex forms of social-economic activity in such large-scale civilizations as Ancient Babylon or Ancient Egypt. However, this point is the subject of serious objections. For instance, in Glebkin 2011 I address the Code of Hammurabi, i.e. the Babylonian law code, dated back to around the 18th century B.C., and argue that, in dissonance with our expectations, the code structure and its layout are accounted for by a complex thinking model. Consequently, the point that the theoretical mode of thinking is a feature of the Ancient Babylon culture cannot be taken for granted and needs convincing evidence based on a scrupulous analysis of concrete texts.

What cannot be cast in doubt is the fact that theoretical thinking is an important element of the Ancient Greek culture. However, it is the beginning but not the end of the investigation. The question is whether the cognitive style dominant in this culture is similar to the modern one, or it has some notable peculiarities. And, if the latter hypothesis is correct, can we track the trajectory of cognitive evolution within the theoretical mode of thinking? In order to answer this question, I would like to consider the three eminent works: Euclid's *Elements* and the historical treatises by Herodotus and Thucydides.

The cognitive style of Euclid's *Elements*

It is not a novel insight that modern mathematics (at least, mathematics at school) rests on Euclid's *Elements*. If so, we might expect to see in this work the familiar to us conceptual ideas and basic attitudes. According to common sense, mathematics is not grounded on any socio-cultural environment. Nevertheless, there are persuasive arguments for the opposite view. Thus, the eminent German historian and philosopher Oswald Spengler in his book *The Decline of the West (Der Untergang des Abendlandes)* claimed that every culture has its own mathematics, and the difference between the Ancient Greek mathematical style and that of Modernity is crucial (Spengler 1991 (1918), 41-69). So, let us have a more precise look at the text of the *Elements*.

We start up with the definitions of the first book. Here we encounter some surprises. For example, the definition of a triangle goes like this: *Of trilateral figures, an equilateral triangle is that which has its three sides equal, an isosceles triangle that which has two of its sides alone equal, and a scalene triangle that which has its three sides unequal* (Heath 1956, 1, 2). In modern understanding an equilateral triangle is a particular case of a triangle, and it sounds strange to mark out a scalene triangle as a special type of triangles. However, for the Ancient Greeks the more perfect cannot be a particular case of the less perfect, and it is an equilateral triangle which is a triangle par excellence. The next illustration of this principle is the difference between the concepts of number and magnitude. The definitions related to magnitude are placed in the fifth book of the *Elements*, whereas those related to number are located in the seventh one (Heath 1956, 2, 113-114, 277-278). Some of them are identical, and we can render number as a particular case of magnitude. However, for the Ancient Greeks it is not the case. Number is more perfect than magnitude; unlike the latter, the former has its own visual image, its own εἶδος. The idea of the perfect form, based on a visual perception, is extremely important for the Ancient Greek philosophy and culture. The more perfect the entity is the more perfect form it has. Thus, Parmenides' Being (τὸ ὄν) and Plato's Universe (κόσμος) have the most perfect form, that is the form of a sphere (Parmen. Fr. 7; Pl. Tym. 33b-34a).

The visual ground for cognition can be also illustrated by the "geometric algebra" of the second book. Here, elementary algebraic formulas, such as $(a+b)^2 = a^2 + 2ab + b^2$, are proved by employing the language of geometry (see fig. 1). This proof looks rather cumbersome (it occupies two pages, whereas an algebraic proof fits into one line), but here we encounter the fundamental limitations of the Ancient Greek mathematics. Such a "geometrization" of mathematics, its dependence on the visual field determined its frontiers¹; solution of some third and forth equations was

¹ The "visual vector" of the Ancient Greek mathematics can also be revealed in terminology. Thus, according to Liddell-Scott's Greek-English Lexicon the basic meaning of

the maximum to reach in that scope. The only way to take a further step in this field was to develop the abstract notation system of algebra which meant breaking the links between numbers and their visual ground. Such breaking demanded radical cultural transformations provided by medieval culture.

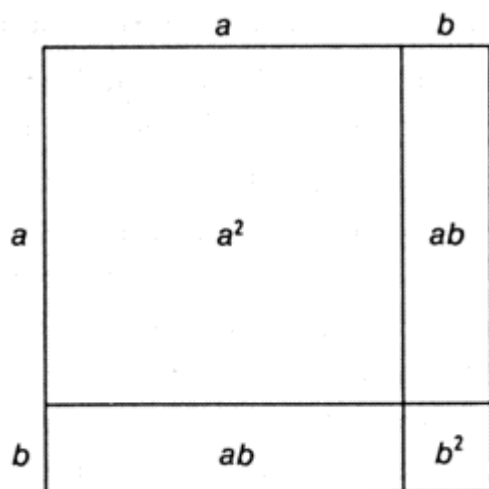


Fig. 1. A geometrical proof of the formula
 $(a+b)^2 = a^2 + 2ab + b^2$

It may therefore be interesting to sketch the bottom line of this process. From the Ancient Greek perspective, both the Universe and particular natural things were self-sufficient entities, and such self-sufficiency was perceived as perfection (see, e.g., Arist. Phys II 192 b8-30). It means that they contained within themselves a principle of their motion and transformation. In the medieval Christian culture, however, such a principle turns out to be situated outside the Universe. The Universe and particular things become there signs of the transcendental reality, the means to understand the scheme of God. The functional paradigm stands for the eidetic one. What it means for mathematics can be clearly seen if we compare views on number by Plotinus, whose “Enneads” is considered to be the outcome of the Ancient Greek philosophical attitudes, and Augustine, the key person of the early medieval philosophy. For Plotinus numbers are placed between *ἓν* (the One) and *νοῦς* (the Divine Mind), having the higher rank than the other *εἰδωτά* (ideas) (Enn. 6, 6, 8-14), whereas for Augustine numbers are transformed into tools in God’s hands, loosing in this their unique forms. Thus, he introduces numbers, perceived by sense (*numeri sensibilis*), numbers, moving over time (*temporales numeri*) etc. (Epistola III, 2; De musica, VI, 57). The diversity of types and forms of number entails the release from visual-field-dependence, which in turn

gives new opportunities for mathematics, particularly, for the theory of functions.

So, summing up this part of the paper, I would like to highlight the visual-field-dependence as the important feature of the mathematics cognitive style. Now, we move on to the Ancient Greek historical treatises.

The cognitive style of Herodotus and Thucydides

Let me start with the *History* by Herodotus. This historian is called the “Father of History” because his treatise is the first example of the elaborate systematic analysis of a huge amount of historical data. To some extent his status in science is similar to Euclid’s one. Here, we focus on the first book of the *History* and start up with the methodology. In order to give a more precise analysis of the narrative structure of this book, I first marked out three levels of narration: *external* (the basic level where people are considered social role-holders and their behavior is influenced by their surroundings), *internal* (the level corresponding to feelings, thoughts and decisions of humans as free will persons), *transcendent* (the level characterizing gods’ actions, fate, predestination and other factors which are believed transcendent to the human world). Then I divided the text into some structural elements, namely: *events*; *causal remarks*, situated both within an event and between the events (they explain why the event develops or the subsequent events are connected in this particular way), *expositions*, introducing unknown for the readers, but important for the further narration information about the venue of an event, people engaged in it, etc.; *philosophical, existential et al. reflections and explanations*. The events in turn were sorted out into three groups: “time markers”, i.e. some bare mentions to fill the time gap (e.g., “Not long after the overthrow of the tyrants by the Lacedaemonians, the battle of Marathon was fought between the Athenians and the Persians” (Thuc. Hist., 1, 18; tr. by B. Jowett)) (E0); the single events described briefly (E1); the events described in detail (E2) (although it was not the absolute criterion, the detailed description commonly had more than 2000 characters). Additionally, I recorded whether the event is single or iterative.

Since a comprehensive analysis of all the aspects of the narrative structure would doubtlessly lead to another long article I will restrict myself to the analysis of the 1st chapter, just focusing on some observations that should be definitely included in such a debate.

Firstly, 19% of the 1st chapter is taken by the events described in detail (E2)². Given that 21% of the chapter is devoted to ethnographic descriptions within expositions, we can stress a slow speed of narration; the historian’s view here is a sensitive to details view of a spectator, but not a bird’s-eye view of a long-term researcher.

qewrśw is “to look at, view, behold”, e.g., “to view the public games”; qewr...a basically means “sending the state-ambassadors to the oracles or games or being a spectator at the theatre or games”, qeərhma – “sight, spectacle, object of contemplation”. Thanks to Aristotle these concepts were shifted from the material world to the ideal one to characterize the process, product and object of intellectual contemplation.

² I counted the figure of characters in the Greek text.

The additional evidence for such visual-field-dependence is provided by the fact that 67% (55 from 82) of the events, described briefly (E1), turn out to be spectacular descriptions resting on a visual perception, or, put another way, a kind of performance the audience visualize at the theatre. Let me illustrate it with an episode of the tyrannus Pisistratus returning to Athens: "*Presently his enemies who together had driven him out began to feud once more. Then Megacles, harassed by factional strife, sent a message to Pisistratus offering him his daughter to marry and the sovereign power besides. When this offer was accepted by Pisistratus, who agreed on these terms with Megacles, they devised a plan to bring Pisistratus back which, to my mind, was so exceptionally foolish that it is strange (since from old times the Hellenic stock has always been distinguished from foreign by its greater cleverness and its freedom from silly foolishness) that these men should devise such a plan to deceive Athenians, said to be the subtlest of the Greeks. There was in the Paeanian deme a woman called Phya, three fingers short of six feet, four inches in height, and otherwise, too, well-formed. This woman they equipped in full armor and put in a chariot, giving her all the paraphernalia to make the most impressive spectacle, and so drove into the city; heralds ran before them, and when they came into town proclaimed as they were instructed: "Athenians, give a hearty welcome to Pisistratus, whom Athena herself honors above all men and is bringing back to her own acropolis." So the heralds went about proclaiming this; and immediately the report spread in the demes that Athena was bringing Pisistratus back, and the townsfolk, believing that the woman was the goddess herself, worshipped this human creature and welcomed Pisistratus*" (Her. Hist., 1, 60; tr. by A. Godley). We can see that the pivot component of this episode is the visual image of Phya-Athena, and its structure in general addresses us to Aristophanes' or Menander's comedy.

Secondly, the philosophical reflections are expressed here not through the author's words, but for the most part by the extended remarks of the characters in the dialogues. For instance, the idea of happiness, extremely important for Herodotus and the Ancient Greek culture in general, is put into the mouth of the eminent Athenian legislator Solon in his talk with Croesus, king of Lydia (Her. Hist., 1, 30-33). The behavior of the characters and the context of the talk are fairly close to Homer's epos or the ancient tragedy, where the spectator is expected to watch it.

Thirdly, in order to reveal the reasons for historical events, Herodotus refers to both, transcendent powers (fate, gods' envy) and human intentions dependent on their character, social rank, view on the situation, etc. Most frequently his interpretation is guided by the cumulative principle, in other words, he gives a number of versions without reconciling them. Importantly, however, transcendent factors proved to be involved in human life as initial reference points, and from the matter of fact human quick-wittedness or stupidity appear the main reason for the historical development. A good illustration for

that is Herodotus' view on oracles and signs. Given the truth of the oracles as a point beyond doubt, he points at the capacity to render oracles and signs as a deciding factor to the successful action and puts the reason for human failures in people themselves rather than in fate or destiny (Hist. 1, 65; 1, 67-68; 1, 71; 1, 91 etc.).

So, in sum, we can conclude, that for Herodotus the cloth of history is woven by particular people who implement their intentions and projects and take into account various circumstances, from weather to oracles and signs, to do their best in that.

Let us look now at the Thucydides' treatise. At first sight, his narrative manner has nothing in common with the Herodotus' one. The notable part of events in the 1st chapter of his *History* is described with time markers, and the descriptions, resting on a visual perception, occupy just 13% (8 from 62) of the briefly described events. However, in comparison with Herodotus, the events described in detail occupy here much more space (41.5%). Part of them (12.3%) look quite "cinematic" stories (e.g., sea battle between Corinth and Kerkyra (1, 48-53), or constructing the walls around Athens (1, 89-93)), but the key place here (29.2%) is occupied by talks and dialogues, invented by Thucydides. In these dialogues the characters state their views on the situation trying to convince the audience to follow their suggestions. Taking into account their length and position within the text, we can call them the core elements of Thucydides' treatise. The analysis of these talks leads us to the two main conclusions. Firstly, their composition resembles Euripides' tragedies. Similar to Herodotus, these talks address a listener, but not a reader. Secondly, even much more intensively than Herodotus, Thucydides insists that human intentions and reasons are the main factor of the historical development. Transcendent level happens to be omitted in his text.

The situation changes radically if we resort to the medieval historiography. Let me illustrate these transformations with *The History of the Franks* by Gregory of Tours. Indeed, we can find here a number of descriptions resting on a visual perception. However, all of them appear signs of transcendent reality, the testimony of its presence in the material world. Here is the illustration: "*At that time Quirinus, bishop of the church of Sissek, endured glorious martyrdom in Christ's name. The cruel pagans cast him into a river with a millstone tied to his neck, and when he had fallen into the waters he was long supported on the surface by a divine miracle, and the waters did not suck him down since the weight of crime did not press upon him. And a multitude of people standing around wondered at the thing, and despising the rage of the heathen they hastened to free the bishop. He saw this and did not permit himself to be deprived of martyrdom, and raising his eyes to heaven he said: "Jesus lord, who sittest in glory at the right hand of the Father, suffer me not to be taken from this course, but receive my soul and deign to unite me with thy martyrs in eternal peace."* With these words he gave up

the ghost, and his body was taken up by the Christians and reverently buried" (1, 35; tr. by E. Brehaut).

Another important feature of this text is the lack of direct causal links between events. Similar to Augustine's numbers historical events turn out for Gregory of Tours the tools in God's hands, which leads us to breaking of the visual-field-dependence and gives new opportunities for historiography.

Conclusion

Now, it is time to return to the general issue raised in the introduction. It is not in doubt that the Ancient Greek culture is theoretical, where we can find most cognitive operations that we perform. However, we can also encounter some special features like visual grounding of cognitive operations. All in all, the question is whether it is correct to speak here about the cognitive development from antiquity to nowadays, or to compare different cognitive styles for the sake of revealing cognitive evolution means to put the shoe on the wrong foot. There is some evidence to support the former hypothesis. Thus, M. de Vega (2008) argues for the existence of two levels of embodiment: a first-order embodiment is "strongly grounded on current perception and action", whereas a second-order embodiment "is much more detached from current perception and action" (ibid., 300). Similarly, we can single out at least two levels of embodiment for mathematics: the one for Euclid's geometry and the other for, say, a functional analysis. So, the general point is that, following the more complex challenges of modern life, the cognitive structure of modern people has got more "floors", and their cognitive styles have much more variations than they used to have in Ancient Greece. The opposition "field-dependency – independency" seems quite productive to describe this development.

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