PERIODIC EMERGENCE OF GREAT HISTORIANS IN THE HISTORY OF ANCIENT GREECE, ROME & CHINA

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Abstract

A periodicity of about 500 years has been discovered in the history of Graeco-Roman and Chinese historiography and documented by means of inferential statistics. Great historians emerged periodically and synchronously in both cultural areas for at least two millenia or longer. Although no liaison between historians in the West and Far East is known. It is a surprising fact, that this periodicity as well as the times of maximum creativity have been foretold by Babylonian priests, who knew about this rhythm already before 600 B.C. What is the cause of this periodicity and synchronicity is left to be an open question.

Background: Configurations of culture growth still unsolved

It is a well known but unexplained fact of cultural anthropology, that the growth of culture does not appear as a continuous one, but occurs in creative outbursts or waves. Great personalities in arts and sciences were not being born isolated or scattered along the time-axis but emerged in clusters. Periods of splendid achievements have been followed by centuries of mediocrity and epigonism until the next wave of original inspiration arrived. This uneven distribution of genii is unexplicable in terms of heredity and genetic constitution. Therefore, sociologists suppose, that such creative outbursts must be the outcome of some sociocultural synergy of events in the given time and place. However, no systematic sociological factor ever has been identified (such like the prosperity of Elisabethan England and Shakespeare´s dramas), which could be associated with creative periods in various arts and sciences on a regular basis.

American anthropologist Alfred Louis Kroeber dedicated a lifelong study to understand the manifold time-patterns of growth of culture. An elaborate description of constellations of genii in world philosophy, science, painting, sculpture, literature and drama resulted from his effort.[1] Kroeber admits, that what are the forces causing these patterns is wholly unknown to us.[2]

The idea, that there could be some kind of regular pattern or periodicity in history, fascinated many thinkers since antiquity until modern times. Many historians of art looked for some underlying law, which would govern the tides and ebbs of culture. Although in the 20th century the opinion prevailed, that there are no universals in history and the uniqueness of each single event is being stressed. Neither Kroeber saw any system or regularity in the patterns of culture growth. If he saw some synchronicities, he considered them either to be an outcome of chance (like in the case of Greek, Indian and Chinese philosophy in 600 B.C.) or supposed, that there must had been some contact between those cultures, although there are no records to document it (for instance the simultaneity of English, French, Spanish and Japanese drama around 1600 A.D.). Nevertheless, thorough computer analysis of time-patterns of occurrence of genii in history reveals, that there are regularities in Kroeber´s own data, which he did not notice. These regularities go far beyond what is thinkable in terms of an accidental coincidence.

Aim

To find out, whether there is a significant periodicity, which could be observed in the history of historiography.

Data

Two sets of famous historians – 46 of Graeco-Roman and 26 of Chinese origin living between 600 B. C. and 1200 A. D. – were analyzed. The lists of famous historians were taken from Kroeber´s

Configurations of Culture Growth, one of the most comprehensive and renowned works in this field.[3] Kroeber also ranked qualitatively the relative importance of each historian - the very best among the best ones, like Herodotus, Tacitus, Ssu-ma Ch´ien were marked by an asterisk. That was taken into account by ourselves by counting such historians as two. A score resulted, expressing the amount of creative activity in each country per each half century.

Methods: Periodogram analysis and cosinor regression

Powerful mathematical tools for detection of rhythms and more generally periodic phenomena have been already developed in chonobiology and chronobiometry. Fisher's periodogram performs a spectral analysis of time series data. It enables researchers to detect cyclicity and determines the variance in the data accounted for by cyclic activity. Results describe cycle frequency, period length and amplitude. For all existing period-lengths it calculates their statistical probability and determines, whether there is one or more periodicities in the data, which are statistically significant.[4]

The cosinor method is based on Fourier analysis and performs a harmonic regression by cosine function. It involves the least-square fit to the data of a model consisting of one or several cosine curves with one or several periods anticipated to characterize the data, with or without the inclusion of a polynomial trend. Its role is to justify or not the existence of a given rhythm and to calculate its parameters. It calculates overall the best sinusoidal model that can test pass through the set of experimental points and yields its mesor (a rhythm-adjusted mean), phase of culmination, amplitude and probability of error.[5]

Briefly, the periodogram detects whether there are some significant periodicities in the data and if yes, what kind of. The cosinor enables to test the presence of a fixed rhythm. To analyze Kroeber's data on historians we shall use Fisher's periodogram first to search „blindly" for significant period lengths T. In the second step, Halberg's cosinor regression is going to be applied to test the presence of one leading period τ. It shall be chosen with respect to the outcome of the periodogram. Results are presented as parameter point and 95% confidence estimates and in the form of graphs. Software used is made by Kubáček & Ondrejka and Kubáček & Valach.[6, 7]

Results: A significant periodicity

Periodogram revealed for Graeco-Roman historians a single statistically significant period length T of approximately 472 years. In the case of Chinese historiography the relatively most probable period length of approximately 518 years was found. That is, in both cases the most probable period length is that of approximately 500 years (Fig. 1).

This is why the period of 500 years was taken into the cosinor computation. It was significant in both cases. In the case of Graeco-Roman historians with $p < 0.001$ and in the case of Chinese historians with $p < 0.002$. The culmination in the estimated score of historians has been identified around the year 28 A. D. in China and around the year 38 A. D. in Greece. That is, in both cases the culmination took place closely around the year 33 A. D. Accessory culminations appear in the successive time distances of 500 years back as well as ahead. Results are summarized in Table 1.

Verification: Are Kroeber´s data reliable?

One may raise the question, whether the same periodicity is going to be found also in further lists of famous historians by another authors than Kroeber. As a control sample we took the monograph on history of Byzantium by Avenarius.[14] It contains 148 references to 33 most famous Byzantian historians. Indeed, there is a significant rhythm with the period length of approxiamtely 520 years and culminations around the years 31, 551 and 1071 A. D. Obviously, the rhythm of Byzantian historiography is a continuation of the Graeco-Roman rhythm and is exactly synchronous with the Chinese one (Fig. 2). Probability of error is even less than with Kroeber´s data ($p < 0.0005$). This has been published in a separate paper.[15]

Suffice it to say here, that the discovered rhythm seems to be independent on the choice of various authors and source books. Krober´s aim it was to present a broadly accepted opinion about notable personalities in history and he apparently succeeded to do so.

Discussion: The pattern of historians´ creativity

The obtained results are interesting in several ways. First of all, we discovered, that there exists indeed a rhythm, a regular periodicity in the history of historiography. The period length was in both cases practically the same: great historiography in the West and in the East recurred approximately every 500 years. Moreover, the waves of historiographic creativity in the West and in the East are synchronous. The greatest occidental and oriental historians have been contemporaries.

The first Greek logographers (Hecataeus of Miletus) appeared around 520 B.C. At the same time, the first Chinese historical writings (Shu-king or the annals of Lu attributed to Confucius) were edited. Herodotus, Thucydides, Xenophon mark the culmination of Greek historiography in the 5th century B.C. In the same century historiography culminated in China and the first Chinese historian of importance, Tso Chuan (Zuo Zhuan), is an exact contemporary of the „father" of Greek historiography Herodotus.

In the 4th, 3rd, 2nd century B.C. the production of historical writings lessened considerably in quality as well as in number. The next wave of great historians arrived at the turn of the Christian era in Rome: Polybius, Sallust, Livy, Tacitus, Suetonius, Diodorus Siculus, Josephus Flavius, Plutarch and many others. The pendant of this splendid constellation of Romans constitute the best Chinese historian ever, Ssu-ma Ch´ien (Sima Qian) and the Pan (Ban) family. The preoccupation with history reached its absolute climax in Rome as well as in China in the 1st century B.C. and 1st century A.D.

After a few barren centuries, another synchronous wave of Chinese and European historians arrived 500 years later. A group of foremost Chinese historians of the 6th century can find their professional colleagues in Cassiodorus or the best Byzantian historian Procopius.

In the 11th century, a synchrone wave of great historians emerges for the fourth time. The second greatest Chinese historian Ssu-ma Kuang (Sima Guang) lived in the 11th century. A respectable pleiad of annalists was active at the same time in Europe: Psellus, Thietmar of Merseburg, Robert of Auxerre, Nestor the annalist etc. Most important historical writings have been compiled in this period.

Overall, there is an evident synchronized rhythm in the history of Western and Far Eastern historiography: 5th century B.C., 1st, 6th, 11th century A.D. In the 5th century B.C. historiography was born in China and Greece, and synchrone waves of great historians recurred every 500 years thereafter.

Synchronicities between China and Rome

Historians in the 19th century have been already fascinated by some parallels between the events in antique Rome and China: the era of great philosophers; then unification into one political empire; and later disintegration accompained by a spread of foreign religions and barbarian raids. Confucius and his pupils were almost contemporaries of Plato and Aristotle. The efflorescence of empire took place in China and Rome simultaneously. And in the first centuries A.D. it was the emanation of Buddhism in China and Christianity in Rome, which accompained the disintegration.

Obviously, the synchronicity of historians belongs to a broader set of synchronicities between China and Rome, which includes also philosophers, emperors and religious devotees.

Looking for the cause

The writings of Chinese historians were unknown to the Romans and vice versa, hence their synchronicity can not be due to mutual stimulation. An unknown third factor must be at work here. Frederick Teggart wrote a monograph on how conflicts used to flare up simultaneously on the frontiers of the Roman and Chinese empire.[8] He attributed this to the interruptions of long-distance trans-Asian trade along the silk road. A similar explanation does not work in the case of constructive cultural achievements like philosophy and historiography.

Frequently we can read in text-books, that similar ideas and cultural patterns appear in different parts of the world because they are products of similar social conditions. But that is no answer to the

given question at all. It only shifts the problem and requires to reformulate the question: Why should similar social conditions recur periodically and synchronously in different parts of the world?

Many authors dismiss the phenomenon of synchronicity as an interesting but rare curiosity of little historical importance. Others tried to explain it, but failed. Kroeber considered the simultaneous emergence of philosophers, for instance, to be an accidental coincidence only: *„The answer was that the total space-time distribution of philosophies being in accord with chance, there was no need to assume an immanence in this instance.“* [9] But in the case of historians, mathematics excludes such interpretation. If Chinese and European historiography should be really independent, there is a chance less than 1:500 000, that they shall follow a common pattern like they do. Karl Jaspers thoroughly studied the parallelisms in ancient world between 600 and 300 B.C. and conculded: *„It is a mystery the greater, the more it is studied.“* [10]

If synchronicity is a fact, we have to realize, that it is not enough to explain respective events *ad hoc*, in terms of local and momentary circumstances only, as historians usually do. For example, greatest historians appeared in the 11th century also in Persia (Firdausi) and India (Bilhana, Kalhana). Specialists on Indian history suppose, that the ardour for history in this period is due to the political fragmentation, as each minor king wanted to have an impressive genealogy of his own:

„The political fragmentation of nothern India and Deccan which occurred in this period (800-1200 A.D.) in the form of regional kingdoms was due to a number of developments... One result of this outlook was the increase of historical writings. There appeared many histories of comparatively small geographical regions such as Kashmir and family histories of still lesser dynasties, such as that of Nepal. A king did not have to be of the status of Samudra Gupta to become the subject of eulogy, minor kings being described with the same enthusiasm as important monarchs.“ [11]

The perishing of good historiography in the 3rd or 13th century A.D. is simply attributed to the „change of taste“ of the audience etc. The same events get a quite new meaning as soon as we can see, that they are part of a long-lasting and worldwide pattern.

A Babylonian prediction

The most surprising fact is yet to come. These waves of historiographic creativity seem to have been predicted. Ancient Babylonians used a calendar based on the belief that seven gods (corresponding to seven „planets“ in our solar system, later seven archangels in the Christian era) alternate cyclically as spirits of time. Each one of them rules the world for 72 years; i. e. one and the same deity comes to rule the world each 504 years again (504 = 7 x 72). The Babylonian god *Ningirsu* (identified with Saturn) returns in the years -495, 9, 513, 1017 etc. These dates result from a calendar-system known long before 600 B. C., exact dates being quoted on excavated clay tablets.[12] Our inferentially statistical analysis identified this ancient rhythm (504 years) and its culmination (around 9 A. D.) surprisingly exactly (see Table 1).

It is noteworthy, that the antique *Saturnus* or *Chronos* is exactly the deity, who was the traditional ruler of time and was a kind of a patron of historiography. The oldest known testimony of a historio-graphic activity in history can be traced back to the 25th century B. C. The most ancient „historians“ lived around 2500 B. C. in Lagash, a south-Sumerian city, whose city-god was Ningirsu. From the same period there comes also the so called Stone of Palermo, the oldest Egyptian chronicle and the oldest document of historiographic activity of its kind in Egypt. Dobiáš pointed out two periods in the most ancient history, when one could speak about the onset of a pre-scientific historiography: the 25th and the 15th century B. C.[13] Both periods fit well into the rhythm mentioned above – these are culminations, which took place four and two full periods before Herodotus.

Alternative theories: The Life Cycle of Civilizations by Stephen Blaha

Macro-histories have recently come back into fashion and one may ask, whether some of them can describe the dynamic pattern of cutural growth in the world better than the Babylonian cyclic system of seven divinities (or seven psychological archetypes). Blaha proposed a quantitative model of civilization growth in analogy with a harmonic oscillator.[16]

Let us compare the results of mathematical analysis of historians´ creativity with Blaha´s theory. First, Blaha (leaning on Toynbee) sees civilizations develop in a rally-rout cycle of three and half beats, which slowly die away. Contrariwise, we found a cycle recurring at least five and maybe up to ten times with no diminishing amplitude. Second, the distance between two peaks (or troughs) proposed by Blaha is 268 years. Spectral analysis did not find a significant periodicity of this length, but of about 500 years. Third, Blaha´s theory does not account for the synchronicity observed in the data. Though two civilizations might possibly start at the same moment by chance and then stay synchronized, this is not expected as a systematic phenomenon. Fourth, according to Blaha´s system, creativity in all compartments of society and culture should culminate at the same time, which is not the case. Within the same civilizations creative periods in medicine, poetry and philosophy arrive also periodically, but 90, 180 and 270 years later than in historiography.[17, 18, 19]

Fifth, Blaha´s oscillating model does not predict the absolute dates of culminations, which the Babylonian system does (and does correctly in the case of historiography, medicine, poetry, philosophy and wars). Sixth, the Babylonian system must be taken as a prediction, because it has been known earlier than all these historical events happened. That gives it a much greater persuasive power than any ex post speculation on history can achieve. Seventh, Blaha does not prove his theory by hard methods. There is no measurable variable, which could be statistically scrutinized, no blind experiment performed to eliminate author´s subjectivity. Events are being picked up ad hoc by the author himself to fit the hypothesis. Unlike speculative ideas of this kind, the system of Babylonian sages is obviously based on experience, which can be proved.

Conclusion

A periodicity of about 500 years has been discovered in the history of historiography and documented by means of inferential statistics. Famous historians during the last 2500 years (and maybe even 5000 years) emerged periodically. Moreover, the waves of historiographic creativity in the West and in the East were synchronous.

It is a surprising fact, that this periodicity as well as the times of maximum creativity have been foretold as early as by the Babylonian priests, who knew about this rhythm already before 600 B.C. To look for causes of this periodicity and to interpret its meaning is left to be an open question.

Notes

[1] Alfred Louis Kroeber, *Configurations of Culture Growth* (Berkeley, University of California, 1969).

[2] Ibid., 3-27, 90.

[3] Ibid., 465-466, 503-508, 515-518.

[4] Ronald A. Fisher, „Test of significance in harmonic analysis", *Proceedings of the Royal Society*, London, Ser. A, 125 (1929): 54-59.

[5] Christopher Bingham et al., „Inferential statistical methods for estimating and comparing cosinor parameters", *Chronobiologia*, 9 (1982): 397-439.

[6] Ľubomír Kubáček and Pavol Ondrejka, *Periodogram Analysis* (Bratislava, ComTel, 2001), computer programme.

[7] Ľubomír Kubáček and Alexander Valach, *Time Series Analysis with Periodic Components* (Bratislava, ComTel, 2002), computer programme.

[8] Frederick Teggart, *Rome and China. A Study of Correlations in Historical Events* (Berkeley, University Press, 1939).

[9] Kroeber, 790.

[10] Karl Jaspers, *Vom Ursprung und Ziel der Geschichte* (Frankfurt, Fischer, 1959), 25.

[11] Romila Thapar, *A history of India* (New Delhi, Penguin, 1990), I, 241.

[12] Emil Páleš, *Angelology of history. Parallel and periodic phenomena in history* (Bratislava, Sophia, 2001), 660 pp. in Slovak.

[13] Josef Dobiáš, *Antická historiografie* (Praha, Historický klub, 1948).

[14] Alexander Avenarius et al.: *History of Byzantium* (in Czech, Prague, Academia, 1996), 387-396.

[15] Emil Páleš and Miroslav Mikulecký sen.: „Rhythm in the Byzantine historiography", in *Acta historica posoniensia* (Bratislava, Comenius University Press, 2004).

[16] Stephen Blaha, *The Life Cycle of Civilizations* (Auburn, Pingree-Hill Publishing, 2002).

[17] Emil Páleš and Miroslav Mikulecký sen., „Periodic Emergence of Great Physicians in the History of Ancient Greece, India & China", *Proceedings of the 23rd seminary „Man in his terrestrial and cosmic environment"*, Úpice, Czech Republic, May 21-23, 2002.

[18] Emil Páleš and Miroslav Mikulecký sen., „Periodic Emergence of Great Poets in the History of Arabia & Persia, China and Japan", *Neuroendocrinology letters* 3 (2004): 169-172.

[19] Emil Páleš and Miroslav Mikulecký sen.: „Periodic Emergence of Great Philosophers in the History of Late Antique and Medieval Europe, Byzantium & India", submitted to the *Journal of the History of Philosophy*.

HISTORIANS	PERIOD-LENGTH	CULMINATION	PROBABILITY OF ERROR
Graeco-Roman	472	38 A. D.	$p < 0.001$
Chinese	518	28 A. D.	$p < 0.002$
Average	**495**	**33 A. D.**	
Expected	*504*	*9 A. D.*	

Table 1. Results of the chronobiometric analysis of the scores of 46 greatest Graeco-Roman and 26 Chinese historians living between 700 B.C. and 1400 A.D. Their periodicity coincides with the time-periods of god Ningirsu in the Babylonian hieratic calendar.
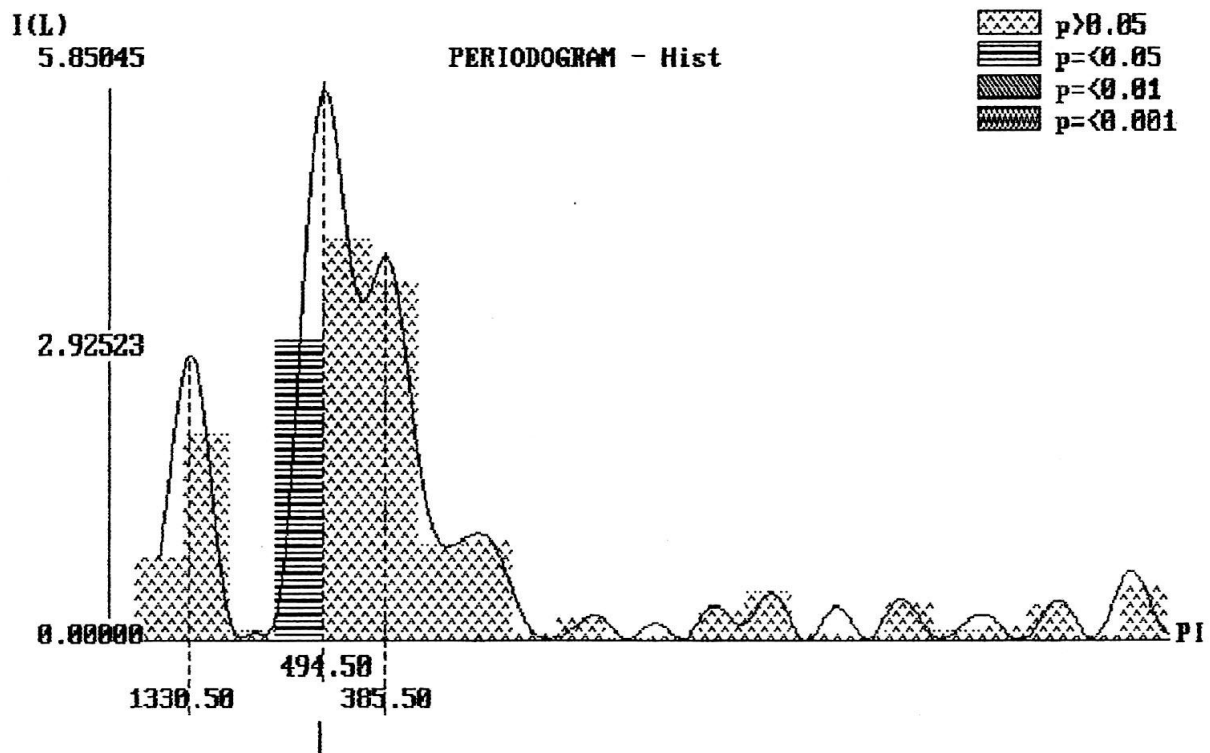

Fig. 1. Periodogram resulting from a 2100-year record of half-century frequencies in the occurrence of excellent Graeco-Roman and Chinese historians living between 700 B. C. and 1400 A. D. On the horizontal axis are period-lengths (from the longest to the shortest). On the vertical axis is a function expressing statistical significance. The interval of statistically significant period-lengths of circa 500-years is high-lighted by a darker column.
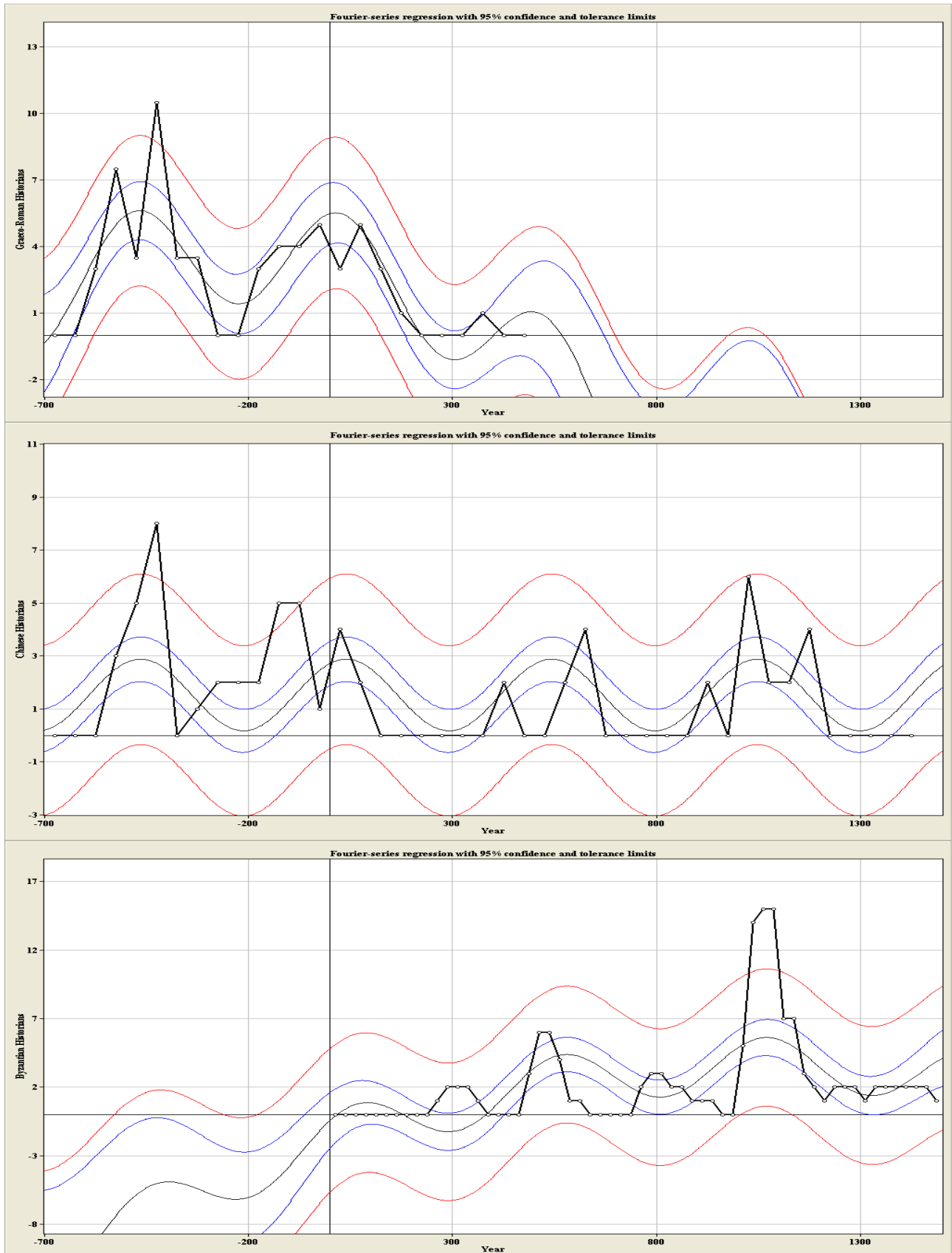
Fig. 2. Chronograms of the half-century scores of great historians in the history of China (above) Greece & Rome (in the middle) and Byzantium (below). On the horizontal axis is time from 700 B. C. to 1400 A. D. On the vertical axis is the index of creative activity in historiography. Besides the data (broken line with the dots) the periodic approximation function (middle sinusoid) with its 95% confidence (narrower) and 95% tolerance (broader) corridors is shown. Note that the rhythms of all three approximation functions are nearly exactly synchronous.