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Gray's Epicyclical Evolution

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² An appendix provides the name lists on which this curve is based, with a description of my premises and procedures in constructing them. For much of the format of this graph and my symbolism, as for criticism and encouragement in general, I am indebted to A. L. Kroeber of the University of California. In his pioneering *Configurations of Culture Growth*, Kroeber failed to discern any pattern in the arts and sciences studied separately, whereas my study indicates a pattern when they are taken as a whole. When and in which of the arts and sciences genius would emerge appeared random, but the totality of genius in any particular time appeared not random but determined.

REFERENCES CITED

B. FARRINGTON

1949 *Greek Science*, 2 vols. New York, Penguin Books.

M. ROSTOVTZEFF

1927 *Social and Economic History of the Roman Empire*. Oxford, Clarendon Press.1941 *Social and Economic History of the Hellenistic Age*, 3 vols. Oxford Clarendon Press.*Gray's Epicyclical Evolution*

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I SUGGESTED to Gray that his style was overcompact for his subject matter in *The Epicyclical Evolution of Graeco-Roman Civilization*, and that his manuscript might find easier and wider comprehension if he could make it more redundant. He answered that he did not know how; perhaps if he became polemical in a future article, he might be able to amplify.

My function in this comment on or complement to his paper is first to supply the needed redundancy, and second to point out certain relations of Gray's thought to that of others and to the basic problems involved.

1

"Epicyclical" here has nothing to do with mathematics. There is nothing more mathematical in Gray's paper than counting.

In astronomy an epicycle is the path of a circle that spins on an axle which rotates around the circumference of another circle. A point in the peripheral or epicyclic circle is therefore sometimes outside and sometimes inside the basic circle. This is *not* a picture of what Gray is formulating.

A related meaning is that of "cycle" or "cyclic," which denotes not complete revolutions around a fixed center or the perimeter of a circle, but repetitive waves, like the up-and-down recurrent "cycloid" curves traced by a point on a wheel rolling on a plane. From this seems to come the derivative meaning of "cycle" as the recurrent *period* of cycloid or other curves. These two meanings of wave and period are often confused with each other and can be confused with epicycle. This fact has led to many ambiguities, like "cycles of history."

Gray's epicycles I think would technically be "epicycloids," that is, cycloid or near-cycloid curves superimposed on a circle or part of its perimeter instead of on a straight line. The epicycloid starts in contact with the basic circle or

segment, rises above it, descends, touches, and then repeats over. The whole is like small, gentle waves of water, of short length and height, carried on the surface of a ground swell. Physically, the ground swell and the superimposed little waves are usually due to separate forces, such as a strong and distant or past wind, and a local or temporary breeze in another direction.

These are the sort of cycles and epicycles that Gray finds in the progress of Graeco-Roman civilization.

If we assume that this civilization as a whole behaved like one grand heave or wave, it is expectable that geographical, economic, and populational factors found expression in largish social and political waves, and that these in turn carried tertiary "cultural" waves of intellectual-esthetic creativity.

What Gray has done is to summarize the course of Graeco-Roman civilization by a conceptual model which can be visually diagrammed. He has even shown the successive steps by which his model is built up.

The only questions that should be asked are: Do the graphs express the phenomena consistently and do they help insight by the way they organize the facts?

The first question I would answer by an unqualified: Yes, obviously. On the second question, I want to try to make the significance of his results more explicit.

2

Many historians prefer to keep the histories of the Greeks and the Romans tidily separate, and they have brought us up to assume that Greece and Rome are and ought to be separate universes of discourse and inquiry. But if Greek and Roman cultures are somewhat more similar to each other than either is to any other civilization, it is of course legitimate to treat them also as a unit of a one-step-higher order, especially in long-range or widely comparative situations. We all do that, for certain purposes, as in speaking of Classical Antiquity, or for that matter of Ancient History as contrasted with Medieval and Modern. Spengler united Greece and Rome into a single culture, using an established German term, *die Antike*, which we generally translate as Classical civilization. When Eduard Meyer, a great and professed historian, paid Spengler the tribute of acknowledging his basic point of view as worthwhile and largely correct, with certain reservations, one of the first of his reservations was that Greece and Rome did not constitute merely stages of one culture. Yet, not long after, Toynbee, who was a trained historian, calmly reunited them and even chose the name Hellenic to include Roman history. In my inductive examination in *Configurations of Culture Growth* (1944), I began conservatively by keeping Greek and Roman phenomena apart, but then found them meshing so neatly as obviously to constitute a single growth process (pp. 119, 688, 690). Gray chose the hyphenated name Graeco-Roman which admits the double constitution, but he is surely within his rights in choosing to treat the culture as a unit; and the smoothness of his results validates his choice.

As a matter of fact, it is entirely possible to go farther and to see Graeco-Roman history as only the central and culminating segment of a civilization

which began in Crete by 1700 B.C. at latest (possibly before 2000) and ended at Constantinople in 1453. Roughly the first quarter of this course was Minoan; the last, Byzantine. The total duration would be more than 3000 years; or, even if one ended the Byzantine phase with the first capture of Constantinople by the Fourth Crusade in 1204, the span would still extend through 2900 years.

Obviously it is not a matter of one of these delimitations being "truer" than the others, but of which one is most appropriate and useful as a frame to a given problem. Most narrative historians have more to say than they have space for, and prefer to limit themselves to Greece without Rome, or reverse, or even to fifth-century Athens, or the Peloponnesian War. Most comparers of civilizations feel that a larger unit enables them to compare more fruitfully.

3

Gray's interpretation throughout is based on the idea of rise and fall—a sort of trajectory curve. He uses a formula of Formative, Developed, Florescent, Degenerate stages. His first diagram shows a segment of a circle; his subsequent figures show segments of smaller circles successively superimposed on this. One might quarrel with the names of his four recurrent stages of formative, developed, florescent, degenerate; personally, I do not like them too well: yet the cardinal question is not the aptness of his designations but whether his organization of the history dealt with is sound in not violating the phenomena, and whether it is meaningful. And there I am mainly in accord.

4

The whole concept of growth of cultures, of their traversing a course, of evolving and degenerating, as Gray calls it, has often been attacked as being a false organic analogy. It is false if one imputes, explicitly or implicitly, organic processes as being directly operative in the history of civilizations. I do not know of anyone now concerned with civilizations who is guilty of this imputation, even unconsciously. (It was to a degree true of Danilevsky, who pioneered the attempts to compare individuated cultures systematically.)

It is neither false nor an analogy when we speak of cultures growing, or segments of them growing. The term is a metaphor. We are for the time being forced to use it because of the limitations of our language in a field where precision was until recently not even sought, and where we have still to put up with makeshift vocabulary.

Not only plants and animals grow, though it is in this biotic area that the term first developed. (The Greeks, incidentally, used *physis* for inorganic as well as for organic coming into existence or development: *physika* meant natural phenomena.) Crystals are said to grow. Fortunes and reputations grow and fade or vanish. Populations, societies, states, institutions, laws, religions, idea and value systems, arts, all grow. Why should we not speak of whole cultures, of individuated civilizations, growing? Or, to be more exact, growing and dying or dissolving?

It seems high time to ban the stereotype of the "false biologic analogy." Some of its use is derivative chatter. The rest comes mostly as incidental side-swipes by people who are not interested in tracing and understanding the courses of civilizations. They are not interested because it is a larger problem than historians and humanists ordinarily allow themselves, because they do not like to deal with what can be measured, because birds' eye perspectives make them uncomfortable, or for whatever other bias, taste, or preference—presumably all more or less justified. But so is an active interest in culture wholes justified. At any rate we need no more slapping on of this particular derogatory label of organicism.

In short, Gray's Diagrams 1-5 are schematically illustrative, not measurably representative, and they are based on common sense as well as common knowledge of the principal facts of "Ancient History." (Diagrams 6 and 7 are more specific and will be discussed separately in a moment.) Some specific curves of growth apparently show a concave or sigmoid profile instead of a convex one. Gray starts with a convex base. He sees the course of Graeco-Roman history as a rise and fall; this determines the profile of his subsequent economic, social, and political epicycles.

5

For certain purposes it is convenient to assume a straight level base instead of a convex one. This is what Gray has done in his Figure 6, where he is concentrating on creative "culture."

Here the base represents the flow of time—equal distances for equal periods. The elevations represent the total measurable cultural achievement in each period or subperiod as he has previously determined these from the subcreative data. His Figure 7 is a revision of Figure 6, standardizing time.

The point of Figure 6 is to test the reality of his first set of epicycles, the basal formative, developed, florescent, and degenerate. If these are actual epicycles they should show a drop or recession at their junctures, at the point where Era A ends with period b-1 and phase δ -1, and a new Era B begins with c-1 and α -2, and so on. Chronologically, these critical junctures fall at about 490, 350, 135, and (as a terminus) A.D. 330. As each of the basal epicycles contains four superposed epicycles, there should be some drop in every fourth one of these topmost epicycles, irrespective of whether the general course at that moment is ascending or declining.

As to the method of measuring the elevations in diagram 6, Gray uses a method long ago (1937) employed by Sorokin in his *Social and Cultural Dynamics* of multiplying the number of names of creators preserved in the literature or in a given standard reference work by a grade estimated for each. A separate study by Merton and Sorokin on Arab science showed that this method yielded more decisive and probably more significant profiles than mere unweighted counting of names. The principle of Gray's method is certainly well recognized.¹

Gray's postulated drop at the junctures of his main subperiods does appear, and he construes this as validating his epicyclic model. Not having

thought consciously in terms of epicycles, I should not have expected visible recessions in cultural creativity at 490, 350, and 135 B.C. Something evidently did happen around those years. While one might think up other explanations, the computations do fit and thus tend to confirm Gray's model.

6

It is correct that in *Configurations of Culture Growth*, as Gray points out in his footnote 2, I did not formulate any consistent pattern running through the course of each of the arts and sciences examined there. I leaned back to be inductive, and therefore kept separate everything that might be separated. Yet in a diagram on page 690, in a chapter entitled "The Growth of Nations" but which would better have been called "Whole Cultures," I collocated

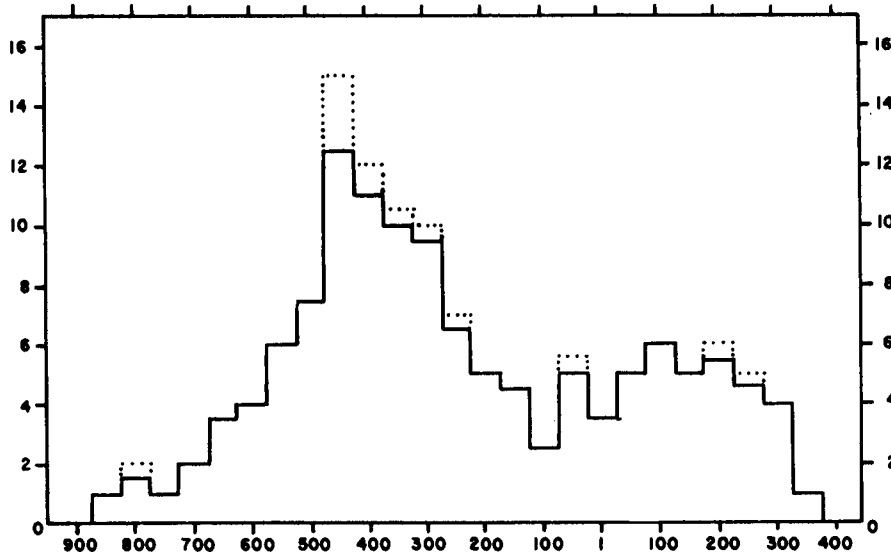


FIGURE 1. Cumulative profile of items in figure on p. 690 of *Configurations of Culture Growth*.

eleven creative activities of the "Hellenic-Roman" culture development from about 550 B.C. to A.D. 350—almost exactly the duration treated by Gray. But while I collocated, I did not then summate. I do that now, in order to compare with Gray's Figure 6.

I have ruled on my 1944 collocation diagram vertical lines for each century and half-century, and then counted how many Greek (solid line) and Roman (broken line) creative pursuits were successfully active in each 50-year moment. If an activity was marginally productive (dotted line in the original), I counted that as half a point; and for each culmination of an activity (asterisk) I added another half point. The result is Figure 1 herewith. Considering that I might have rated culminations somewhat lightly, I have added broken line extensions which show the profile with culminations counted at a full instead of a half unit.

Gray's Figure 6 and my figure may not be compared for detail off-hand and

outright. While they both show the course of Graeco-Roman creative culture, they use somewhat different immediate materials and process them differently. There is also the difference pointed out in my footnote 1, above. My 50-year moments are more than an average life-work span, but less than a full life time, and are all alike. Gray's vary from 25 to 200 years. His are a summation of all available creative names, weighted; mine, a summation of my judgments as to when certain activities were and were not genuinely creative. The scales of time and achievement are also arbitrarily different.

Nevertheless, certain intrinsic agreements and disagreements appear.

On the matter of the juncture recessions, one or two of Gray's do not show as such in my profile. Instead of the epicycle A drop from 525 to 490 followed by a new rise, my profile has a sharp rise—the steepest of all—at 475, but no drop before.

Gray's drop at 405–350 is modest, the rise beginning at 350 even more so. My time units are different, but the one that encloses the juncture, 375–325, shows a modest recession both before and after.

Gray's third recession, for era C, ending at 135, is followed by a greater rise at 50 B.C. It is approximately paralleled in my diagram by a sharp drop at 125 and sharper rise at 75. Considering the nonconformity of our time periods, this is a substantial correspondence.

In short, of Gray's three junctural drops-and-rises, my profile shows both drop and rise in one case, only the rise in a second instance, neither in the third. Considering the differences in our processing, this seems as much likeness as could be expected.

As for general distribution of recessions, Gray's profile patterns symmetrically according to his four basic subcycles:

3 rise, 1 fall/2 rise, 2 fall/2 rise, 2 fall/1 rise, 3 fall.

By contrast, my profile falls into two parts. The first is 700–800 years long, and consists of 8 consecutive ascents² and then 7 consecutive descents. The second or mainly Roman half of the profile runs for 450 years, rises much less high, and consists of 4 rises and 6 falls, somewhat irregularly interspersed except for 4 consecutive terminal declines. The irregularity in the Roman part of the profile seems to be due mainly to Greek resurrections falling in the same period: the strictly Roman contributions by themselves would group more concentratedly into a "normal" curve briefer and lower than the Greek curve.

There is one difference between our two diagrams which is due to basic differences in approach. Gray's periods are of unequal length, their tempo first accelerating and then decelerating markedly. This change of tempo toward and away from the culmination seems significant and probably true. Gray's periods express economic, social, and political conditions. He brings in creative culture mainly in order to validate his cycles and epicycles, through the fact of the course of the creativity fitting these. I do not start in with cycles or set periods, and proceed to examine cultural productivity alone and in terms of convenient equal time units. The two procedures are really quite dissimilar.

Hence the intrinsic correspondences of our two diagrams, as compared with their formal differences, are really considerable.

As for Gray's general attack on the problem, it seemed to me at first to be somewhat artificial and elaborate, due especially to its consistent symmetry, as shown most fully in his Figure 5. However, most of us probably also tend to have some expectation that the diagram portraying the course of a civilization will come out more or less symmetrical. After all, "normal" distribution curves or polygons are symmetrical. Gray has simply carried this assumption farther. If he has carried it too far, and his model is artificially over-elaborate, it will break down as it is set against more and more of the phenomena. So far as it continues to fit them without forcing, it will gradually come to be accepted. Quite likely, fit and acceptance will prove to be partial and subject to improvement.

For instance, in his Part II, Gray points out that Periclean Athens and Alexandria of the Museum are accepted as the "golden periods" of Antiquity, and that they are the only phases which show congruence of developed and florescent cycles, unmarred by formative or degenerate sectors. True, and striking. But is it "proof" other than in the sense that these four qualities, and their recurring sequences in the several levels of cycles, were presumably (or might have been unconsciously) chosen so as to fit these "golden periods"? Rather would it be confirmation if the remainder of Table 4 and Figure 6, outside the golden ages, showed substantially equally good fit.

More convincing are Gray's specific remarks on Plato and Aristotle—on opposite sides of the greatest juncture in Antiquity; one in the shadow of dying epoch, period, and phase, the other in the dawn of new ones; whence much of their antithesis. Or again, his point that the public men and writers of the late Roman republic were at once delimited and held down by their larger era being degenerate imperial, yet they were filled with the buoyant optimism of a formative subculture which Rome was shaping to take over the lead in the greater civilization which had overtaken it.

I assume throughout that the cycles and epicycles are not to be construed as causal entities in their own right, but as the qualitative and temporal (and spatial) forms in which economic-social-political and creative factors are expressed.

7

One other point needing comment is Gray's limiting himself—wisely, no doubt—to one civilization, in view of the question inevitably arising as to whether his epicyclic model is applicable to other civilizations—or perhaps better, how far may it be applicable?

It is clear that certain of his fundamental substantive properties, like the agrarian-industrial or city state-superstate polarities, may have to be replaced by different concepts in model-building for other civilizations. Thus, China and Egypt just never had any city-state organization (it has been conjectured for Egypt, but evidence still seems to be lacking). Mesopotamia had city-

states and empires, but the latter were singularly transitory and fluctuating. Islamic culture emerged as a superstate, but in a time and place of marginal residual city-states. In Western civilization the city-state was a somewhat transient and localized phenomenon.

Again there is the fact that China, India, and Egypt never emerged from agrarian dominance, but contrarily Western culture began as fully agrarian, yet even by Renaissance times probably had already become more industrialized than any other.

Cycles and epicycles may be determinable in other cultures, but their qualitative content thus promises to be pretty different.

Another consideration on which cycles and epicycles impinge is the contour profile of major civilizations—the repetitive pulses of Egypt, the meteoric uprush and long decline of Islam, as against the near-symmetry of the course of Classical Antiquity. Epicycles would evidently be applicable quite differently in these three cases. I have suggested elsewhere that our implicit notion of the rise and fall of civilizations as an assumed generic phenomenon has probably been much influenced by the hypertypical case of Classic Antiquity. What we see there concentratedly, we tend to look for elsewhere; but it comes complicated elsewhere by recurrences, skewness, open ends, or sudden death by extraneous violence.

All these matters are beyond the scope of Gray's paper, and he did well to leave them out. But so far as his model is significant and useful, there will be temptation to apply it elsewhere, and my warning is that it will probably not transfer outright. On the other hand, such features as may prove to transfer to other cultures without undue modification will thereby be further validated as interpretations of the Graeco-Roman civilization.

NOTES

¹ When Gray first showed me Figure 6, the horizontal width of his columns was equal: that is, $\alpha-1$ of his Table 4, 200 years long, was represented by a column equally broad as period $\beta-2$, 25 years long. So far as the fact of drops at the epicyclic junctures was concerned, this variability is of course irrelevant. But it confused me by making me suspect some other significance which Gray did not intend, because it is so usual to represent time as proportional to distance in diagrams of this sort; so Gray altered Figure 6 to its present form. In this form it cannot be used for certain other representations. For instance the present level of 5 in $\alpha-1$ actually represents a rating of 4 for Homer and 1 for Arctinus—which would give a hump just before 750 nearly as high as now but only a fifth as wide, followed by a very minute rise just before 550. In short, Figure 6 schematically adds together all ratings occurring within an ultimate epicycle irrespective of the length, and is therefore not comparable with diagrams summing only the individual ratings of one generation or moment. But this in no way impairs its validity for the purpose for which it is employed. Figure 7 represents a correction of this representation of time.

² Interrupted only soon after its beginning by a modest post-Homeric drop.