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Honors 213

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## **Art or Science?**

### **Using Mathematics to Determine the Nature of History**

The study of history is among the world's oldest professions. Since the earliest cave paintings tens of thousands of years ago, man has endeavored to record the events and experiences that comprise his past and present. Yet almost from the outset, there has been dispute over how human history should be pursued and understood. History remains unique among academic disciplines because no one, least of all historians themselves, can agree upon its true nature. The plaguing question is whether history is an art or a social science, and as yet neither status has been confirmed. Those who take the first view are the relativists, who assert that the past is understandable only as the most complete set of reference material that exists; that is to say, if no documentation exists, for all practical purposes the event never occurred. As a result of this belief, relativists are just as concerned with human myths and beliefs as with historical fact. At the other end of the spectrum are the positivists, who spurn "interpretations," asserting that history as an absolute exists, and is the only thing that can truly be considered history. To the positivists, what Columbus had for breakfast on that morning in 1492 when land was sighted is just as worthy a historical pursuit as information about the sighting itself. Both of these views have merit; those who hold the first cannot help but see the art in their task, using the sources available to recreate a picture of the past just as would a painter choose the colors at his disposal to reproduce a scene from nature. Obviously, the

historian or artist will lack the full spectrum of information or shades necessary to create an exact picture, but the more sources that are available, the more accurate the work will be. On the other hand, no one can deny that history did occur in a certain way, and that that historical truth is unchanging, lending credibility to the alternate position. These positions, although opposed, have a common foundation in another ancient field: mathematics. Both ideas are rooted in math, and the best possible course for pursuing history, lying somewhere between the two extremes, must likewise be based upon mathematical principles.

Let us begin by explaining what is not meant by history's mathematical basis. It does not mean that every historical event can be predicted mathematically from that which occurred before it, or at least, not by any formula yet conceived. Human civilization has far too many invisible variables for this to be possible. In this way, the scholar must recognize with sadness that no amount of mathematical reasoning could have predicted Napoleon's rise to power. However, there is a good reason for this; in looking at modern life, mathematics can predict with a reasonable degree of certainty how many car collisions will occur in a given area in a given time, based on variables such as time, season, location, etc. Mathematics cannot predict whether or not a given individual will be involved in a car accident in that same period of time. This brings to light the distinction between the general, which can be understood based upon accepted axioms and propositions, and the specific, stand-out cases which are by definition exceptions to the general rule. In short, the great men and women of the past could not have been anticipated mathematically because they were exceptions to the society around

them. However, it would be possible to examine the environmental similarities that produced these great personalities, and to draw axioms from this.

Additionally, history is incapable of speaking to absolutes. One will not find a “for any A, there is...” clause in the field of history. The reason for this should be logically apparent; history is not a closed subject, that is to say, it has not yet reached its conclusion. As a result, something may be true up to the present, but cannot be taken as a historical axiom because it may not hold for some future time. A good example of this comes from historian Robert Stover, who cites that “all matriculated students at the University of Paris are less than 100 years of age.” And even though it can be proven that all current and former students may have met these qualifications, a hundred-year-old individual could enroll tomorrow and still be consistent with the axiom (that no hundred-year-old individual had enrolled in the past), thus making it useless for our purposes.<sup>1</sup> Now that these two preliminary concerns have been dealt with, we may turn our attention to the mathematical basis of the two major schools of historical thought.

“Those not familiar with geometry, do not enter.” Such were the words inscribed above the entrance to Plato’s Academy. But why, when Plato’s school was dedicated to philosophy, rhetoric, music and history as well as mathematics, was geometry a prerequisite for entrance? Even the ancient Greeks recognized the importance of geometry as a foundational discipline, with influences on many other fields of learning. But this recognition did not prevent them from having the same dispute over history that haunts the academic world today. Herodotus of Halicarnassus, rightly called the father of history, composed in the fifth century B.C. what is today regarded as the first true

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<sup>1</sup> Robert Stover, *The Nature of Historical Thinking*, (Chapel Hill: University of North Carolina Press, 1967), p. 11

“history.” It is clear to any reader that Herodotus is a relativist, as he draws from many different bodies of information, many of them completely unreliable. Much important information is imparted in his epic work, especially details of the Persian Wars that would be unavailable elsewhere. But interspersed with this responsible account of history are stories of amazons, impossible creatures and strange societies that today would be regarded as fantasy, not history.

Thucydides, writing only a few decades after Herodotus, was much closer to what we today would call a positivist. Relying primarily on what he had personally witnessed, he sought to create a precise and bias-free history (an impossible task, but in theory the great hope of every historian). Thucydides said of his work, “The absence of romance in my history will, I fear, detract somewhat from its interest; but if it be judged useful by those inquirers who desire an exact knowledge of the past...I shall be content.”<sup>2</sup> And to his credit, Thucydides did a good job of creating a fairly balanced source, especially when compared to his counterpart.

Knowing, then, that the ancient Greeks both acknowledged the link between geometry and history (as evidenced by Plato making the former a prerequisite for the study of the latter) and recognized multiple possible approaches to the discipline, we may examine how each discipline fits into a mathematical framework. The first view is positivism, which appeals to all those who like the idea that a definite past occurred. Deeply concerned with “the causes and effects of human events and actions,”<sup>3</sup> this school parallels a basic mathematical (and especially geometrical) principle: nature obeys a given set of rules, and mathematics is mankind’s attempt to describe those rules. Now,

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<sup>2</sup> Robert B. Strassler, ed., *The Landmark Thucydides*, (New York: Simon and Schuster, 1996), p. 16

<sup>3</sup> Stover, p. 4

there are some small problems with this idea, as some mathematical models are not meant to represent our natural environment at all. But at its most basic, geometry is one of our best shots at describing consistent behavior in our world.

However, while positivism as an ideal sounds nice, its failure comes from the fact that it allows for little understanding of history, because almost all of our understanding comes from sources other than direct perception. To accept positivism completely is to settle for nothing less than exactly what occurred, but it is also to lose access to whatever that might be. It is to lose all the inferences we can draw from Martin Luther's *Ninety-five Theses*, from William the Conqueror's *Domesday Book*, and of course from our ancient Greek historians (for even if Thucydides had recorded only what he observed, and those observations happened to be completely accurate, as soon as his work enters someone else's hands it becomes a relativist source). For in a truly positivistic view of history, primary sources cannot be accepted, as they are necessarily flawed. In short, if the goal is historical understanding, positivism inevitably fails.

At the other end of the spectrum, relativism also finds its root in mathematics, but in the more practical aspect of it. It treats our sources themselves as axioms (or pieces of axioms), thus necessitating the redefinition of the entire system when a new axiom is introduced. Under this view, history (which the reader will recall to be that which is described by the sources, not absolute history) is in a state of constant change. This is equivalent to the manner in which whole new fields of geometry were created when Euclid's parallelism axiom was proven independent of neutral geometry. Indeed, relativism provides the most complete picture of history possible from the available

sources. Relativism begins to break down, however, when it heads in one of its two logical directions: revisionism and skepticism.

Revisionism is what occurs when accepted history is changed (or revised) not based upon the acquisition of new primary source material, but by modern reinterpretations of previously available sources. This is a dangerous field of history, for revisionism is often influenced excessively by the culture and time period from which it stems. From school districts changing their accepted curriculum in order to avoid offending minority groups to governments using the past to encourage national pride or values, revisionism tends to go hand-in-hand with propaganda. For example, during World War One, “Washington’s Farewell Address and Monroe’s Doctrine have been...used to sanction both isolationism and, within a very brief interval, interventionism and internationalism as well.”<sup>4</sup> It seems obvious at first glance that history which changes to suit the needs of the people manipulating it is not history at all, yet revisionism is a trap into which many well-meaning historians have fallen.

But if one takes relativism too far in the other direction, another problem results: skepticism. While the ill-effects of the abuse of skepticism are not as readily perceived as are those of revisionism, the system itself is no less flawed. The basic idea of skepticism is to take to the extreme the primary principle common to each view of pursuing history, “you must not say anything, however, true, for which you cannot produce evidence.”<sup>5</sup> Unfortunately, it is the nature of history that not only is source material always questionable, one can never resolve these questions with one hundred percent certainty. This is a problem that plagues geometry as well, for although a given

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<sup>4</sup> C. Vann Woodward, “On Believing What One Reads,” appearing in Robin W. Winks, ed., *The Historian as Detective: Essays on Evidence*, (New York: Harper and Row, 1968), p. 28

statement can be proved or disproved by the axioms available, one can never be sure if those axioms apply completely to our world. Thus, whichever direction we lean within the field of relativism, it fails to achieve for us the pure history we desire.

It is clear that both of the primary schools of thought within the field of history are fundamentally similar to geometric mathematics, and yet both fall short of achieving the goal of “good history.” But since one view strays too far from the practical concern of presenting a coherent picture of history, while the other position moves too far in the opposite direction, away from an absolute history, one does not require a knowledge of calculus to see that the ideal position must lie somewhere between the two endpoints of the spectrum. A rational approach would be to assert the fact that absolute history exists, while at the same time trying to acquire a mental picture near to that history through the compilation and analysis of source material. Pinpointing the exact nature of this “middle ground” of interpretation is beyond the scope of this paper, but it seems consistent that it too must be mathematical. How, then, is history to be defined? It is “neither an art nor a science in the usual meanings of the words,”<sup>6</sup> but rather a unique blending of the two. Historical knowledge requires hypothesis, testing (inasmuch as history can be tested; that is, through its sources), and then application of brush to canvas. But the underlying certainty is that history, with its evidentiary proofs and search for a larger pattern, is a fundamentally mathematical pursuit.

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<sup>5</sup> Robin G. Collingwood, “The Limits of Historical Knowledge,” appearing in Winks, p. 518

<sup>6</sup> Woodward, p. 24