Political Arithmetic: Social Science, Scientific Revolution, Political Founding[*]

by
W. B. Allen
Michigan State University
Department of Political Science
allenwi@msu.edu

If we define social science by what "social scientists" do, it appears amorphous and unsystematic. We debate the systems and approaches of social science, and their methods range from the merely quantitative to the merely narrative. Our question becomes, what is the relation between the scientific revolution, legislation, and social science. Alexander Hamilton demonstrated that it is rather elements of bias than limitations in "the sciences of morals and politics" that confound men. Montesquieu justified the application of strict measurement in the formulation of laws or policies. Therefore social science is precisely the application of strict calculations to variable subjects.

Social Scientists also disagree as to what constitutes the primary object of social science study, whether the organizing principle or end of society, the changing arrays of social institutions, the component parts of society, or some combination of these – whether the interactions of persons or the structure of opinions. A particular phenomenon allows us to escape this contention of errors. No public policy – law or regulation – is enacted or promulgated today without being buttressed by generous portions of social science research and statistics. Social science is in government, and we may take the services social sciences perform in politics and pleadings as our model.

What do we mean by the scientific revolution? Is it the Enlightenment in general – the wholesale attempt to apply Newtonian mechanics to human things across the board? Is it Sir William Petty's idea of deriving an exact calculation of the worth of a human being? Or, is it merely the generalized confidence that progress in understanding is the source of the amelioration of human circumstances?

Our best guide, doubtless, is George Boole, whose *Laws of Thought* explains the underlying differences between strictly arithmetic relations and logical relations. The limitation that renders the problem of elimination in algebra very clear – and limited – establishes a condition that "has no place in Logic as a science." (9) The reason is that "our knowledge of the laws upon which the science of the intellectual powers rests, whatever may be its extent or its deficiency, is not probable knowledge." (4) For in laws of the mind, "the general truth is seen in the particular instance, and it is not confirmed by repetition of instances." (4) Boole concludes, finally, that

> The mathematical laws of reasoning are, properly speaking, the laws of *right* reasoning only, and their actual transgression is a perpetually recurring phænomenon. Error, which has no place in the material system, occupies a large one here. We must accept this as one of those ultimate facts, the original of which it lies beyond the province of science to determine. We must admit that there exist laws which even the rigour of their mathematical forms does not preserve from violation. We must ascribe to them an authority the essence of which does not consist in power, a supremacy which the analogy of the inviolable order of the natural world in no way assists us to comprehend…

And let it finally, as a consequence of this hypothesis, be granted that the phænomena of incorrect reasoning or error, wheresoever presented, are due to the interference of other laws with those laws of *right* reasoning is the product. Still it would remain that there exist among the intellectual laws a number marked out from the rest by this special character, viz., that every movement of the intellectual system which is accomplished solely under their direction is *right*, that every interference therewith by other laws is not interference only, but *violation*. It cannot but be felt that this circumstance would give to the laws in question a character of distinction and of predominance. They would but the more evidently seem to indicate a final purpose which is not always fulfilled, to possess an authority inherent and just, but not always commanding obedience. (428-429)

Three sources illustrate the nature of this central question in statistics. I will enumerate them briefly and then consider their implications for the matter at hand.

First, Aristotle's description of Hippodamus of Miletus (Apostle, 55, 1267b22 et seq.) deliberately questions the relation between rational design and political necessity (Apostle, 207, 1130b23 et seq.):

Hippodamus…wishing to learn about the whole of nature, was the first of those who, without political experience, tried to say something about the best form of government. He invented the art of planning cities and laid out the streets of Piraeus.

He proposed to construct a city "divided into three parts," adopting three kinds of laws, having a single supreme court, with regular rules and procedures for trials, and providing honors for "anyone who discovers something which is beneficial to the state." Now Aristotle criticized the proposal to honor new inventions (Apostle 57, 1268b23) as something that "sounds pleasing to the ear but not trustworthy to be laid down as a law; for it may lead to false accusations and perhaps to political disturbances." He had in mind seductive proposals for change counter to the true interest of the community. More particularly, though, Aristotle argued,

Changes in other sciences have certainly been of benefit. Thus in medicine and gymnastics, and in all arts and faculties departure from tradition was beneficial; so [one may argue], since political science should be posited as being one of them, [it should be] clear that political science, too, must be like the other [sciences]… In general men seek what is good and not [necessarily] what comes from tradition… Besides it is not better to leave unchanged even written [laws], since in a political system, as in the other arts, it is impossible to have all facts written with accuracy; for what is written must be universal [in nature], whereas actions are concerned with individuals. It is evident from these facts, then, that at certain times some laws must be changed.

On the other hand, if the situation is examined from a different point of view, one might think that great caution should be taken [before making a change]. For whenever the benefit from a change is small, getting into the habit of changing laws readily is an evil. So it is evident that some errors [i.e., small errors] made by lawgivers or rulers should be left unchanged; for the benefit received from a change will not be as great as the harm done by acquiring the habit of disobeying rulers.

As for the use of the arts [sciences] as examples, it is false; for changing an art is not similar to changing a law. (Apostle, 55-58, 11267b23-1269a29)

Aristotle reasons, in sum, that the effect of a law accrues less from the direct benefit of the law than from acquiring the habit of obedience to law, which alone makes law potentially beneficial to men. Much later in his *Politics* he makes the point emphatically, returning to Hippodamus, the urban city planner who, applying principles of social utility and pleasantness, introduced a "modern" practice of laying cities out in geometrically inspired straight lines. Aristotle pointed out, however, that those cities had the inconvenience of affording invaders easy ingress, when compared with the old, haphazardly laid out cities of

ancient times. A mixture of adornment and military security deserved higher priority than abstract beauty. (Apostle, 207, 1330b25)

The second example comes from Enlightenment philosopher Charles de Montesquieu, who argued that the difference in calculating just holdings based on a geometric progression would differ materially from such calculations based on an arithmetic progression. (Montesquieu 2331-233) His point was to make evident that specific forms of calculation were necessary to determine the just course of policy under differing constitutions. Thus, it emerged that the applicability of strict calculations was contingent on a number of factors, beginning with the constitution and extending as far as a people's *moeurs*. His argument involved contrasting Plato's strictly calculated distribution of wealth in *The Laws* with a Mandevillean provision based on infinite increase. Plato's strictly arithmetic formula established four classes of wealth, beginning with a first and then making each succeeding class exactly the double of the prior. Montesquieu, to the contrary, calculated the initial level of wealth as "physical necessity" or "zero" and then observed a geometrical progression that made the goal infinitely distant and, at the same time, continually redefined the starting point. Montesquieu was applying the principle borrowed from Mandeville, and cited in the footnote to his discussion "Concerning Luxury:"

> In a great town, said the author of *The Fable of the Bees*, vol. I, p. 133, folk dressed above their social condition, in order to be esteemed better than they were by the many. That is a pleasure for a weak mind, nearly as great as that of accomplishing one's desires. (Montesquieu 233)

The calculations appropriate to social welfare, therefore, are to be founded in the objectives of the particular polity. An abstract formula would apply in this case no better than in the case of Hippodamus's city planning. Thus, Montesquieu explains the wisdom to be found in Alexander Hamilton's apothegm. Moreover, like Hamilton, Montesquieu makes the qualifying observation while yet justifying the application of strict measurement in the formulation of laws or policies.

The third example, accordingly, is that of Alexander Hamilton's famous discussion of political and ethical judgment. The American founder famously quoted that, "in political arithmetic, two and two do not always make four."

> [Taxes on consumption] prescribe their own limit; which cannot be exceeded without defeating the end proposed – that is an extension of the revenue. When applied to this object, the saying is as just as it is witty, that "in political arithmetic two and two do not always make four." If duties are too high they lessen the consumption – the collection is eluded; and the product to the treasury is not so great as when they are confined within proper and moderate bounds. (Cooke 134)

The bearing of this observation, in the middle of the original statement of what has since come to be called "supply side economics," would be mistakenly taken to mean that arithmetic plays no role in political judgment. For Hamilton also argued that the "maxims in ethics and politics" are of the "same nature" as the "maxims in geometry." (Cooke 194) As he proceeded to demonstrate that it is rather elements of bias than limitations in "the sciences of morals and politics" that confound men, he provided a means for us to assess the question of social science's character conformably with the goal of judging it "in action."

> In disquisitions of every kind there are certain primary truths or first principles upon which all subsequent reasonings must depend. These contain an internal evidence, which antecedent to all reflection or combination commands the assent of the mind. Where it produces not this effect, it must proceed either from some defect in the organs of perception, or from the influence of some strong interest, or passion, or prejudice. Of this nature are the maxims in geometry… Of the same nature are these other maxims in ethics and politics, that there cannot be an effect without a cause; that the means ought to be proportioned to the end; that every power ought to be commensurate with its object; that there ought to be no limitation of a power destined to effect a purpose, which is itself incapable of limitation. There are other truths in [ethics and politics], which if they

> cannot pretend to rank in the class of axioms, are yet such direct inferences from them, and so obvious in themselves, and so agreeable to the natural and unsophisticated dictates of common sense, that they challenge the assent of a sound and unbiased mind, with a degree of force and conviction almost equally irresistible. (Cooke 194)

Hamilton continued with the observation that the "objects of geometrical inquiry" do not activate "the unruly passions of the human heart." Accordingly men embrace not merely simple but even "abstruse paradoxes" without resistance; whereas "in the sciences of morals and politics men are found far less tractable."

In each example, we see the interaction of human intentions – including moral intentions – and rational design. Observe, however the relationships that shine through the differences that are apparent in Aristotle, Montesquieu, and Hamilton. Montesquieu highlighted that relationship in *Spirit of the Laws* when he returned to Mandeville very much later to insist upon the argument that "fashions are an important object: at the risk of rendering the mind frivolous [infantile], people ceaselessly increase the branches of fashions commerce." (Montesquieu 570) Where Montesquieu made use of the love of fashion to incentivize human communities in the interest of liberty, Aristotle acknowledged its weight while seeking to limit its power. And Hamilton argued that the people's authority in any legitimate regime would necessarily expose them to the sway of mere fashion in the form of "interests, passions, or prejudices." Each also seems to say, however, that there are solid calculations about human welfare and community that must nonetheless be made. Accordingly, the work of politics seems to engage those who undertake very largely in the work of trying to mate reason to the inevitable presence of fashion. When such work is undertaken, it is reasonable to suppose that sometimes the outcomes will sound more like arithmetic, while at other times the outcomes will sound more like fashion. When the former occurs, two and two will indeed make four; when the latter occurs to say two plus two will amount to saying anything but four. In each case the calculation is equally rigid.

> Hamilton sounded almost like Aristotle when he summed up his argument:
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> To a certain degree it is right and useful, that this [skepticism of novel moral axioms] should be the case. Caution and investigation are a necessary armour against error and imposition. But this untractableness may be carried too far, and may degenerate into obstinacy, perverseness or disingenuity. Though it cannot be pretended that the principles of moral and political knowledge have in general the same degree of certainty with those of mathematics; yet they have much better claims n this respect, than to judge from the conduct of men in particular situations, we should be disposed to allow them. The obscurity is much oftener in the passions and prejudices of the reasoner than the subject. (Cooke 195)

Weigh the significance of heading a discussion of taxation with such a treatise as this. It is explained by the observation that the government here being proposed and defended (a novelty, of course, representing a substantive change from the old ways) is going to have to win the people's affections in order to act with energy. It will have to enlist the prejudices of the community on the side of taxes, among other things. That is, it will have to build Aristotle's habit of obedience. It will also have to assure citizens that they will prosper. That is, it will have to deliver on Montesquieu promise of wealth sufficient to make paying taxes a benefit.

This is a government that will be controlled only by the "public good" and "the sense of the people." That expression, "the sense of the people," reveals why it is so critical that we understand that we have to deal with people's passions, prejudices, and interests. It is from such murky materials that "the sense of the people" must be collected or mined. Now, it may well be said that the work of the social scientist can be none less subject to the restraints upon rational design than the work of the legislator. Thus, political arithmetic, to be meaningful, must denote as much the bringing of politics to arithmetic as the bringing of arithmetic to politics. (Allen, 163-164)

We may conclude, therefore, that social science is precisely the application of strict calculations to variable subjects. In the spirit of Boole we can account for the divergences in calculations of apparently the same underlying phenomena (voting, for example) by identifying the divergences in the subjects to which or to whom the calculations apply. Taking statisticians themselves as an example, we may observe that a negative correlation exists between the degree of confidence they can express in their calculations applied to political subjects, on the one hand, and the extent to which those subjects prove responsive to calculations, on the other hand. The result on standard axes is that we balance uncertainty and confidence at the point of intersection of those two lines, enabling us to say that "x" marks the spot.

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