BOOK ONE CHAPTER FIVE

SOCIAL PRIORITIES PROGRESSIVISM

The social priorities in the US are progressivism.

The origins of progressive thinking has to do with optimism in the future based on successes in the past. The scientific revolution, and specifically the chemical revolution provided the launch point for the soaring optimism of the US during the 20th Century.

Why were scientific advances happening so quickly? If you can remember back to first order progressive thinking, first order principles are needed in order to create engineering solutions that take advantage of smart uses of materials.

These first order principles were created in the Era of the Enlightenment, specifically with Atomic Theory. In the last chapter Liebig was able to come up with his Law of the Minimum by having an understanding of matter that was fundamentally correct. Having such a fundamentally correct understanding of matter was a worlds first. The Greeks had tried to theorize the nature of matter using their intuitions, but they fell short, because reality is a lot stranger than it seems on the surface. The Greeks got the intuitive part of Atomic Theory right: matter is made of tiny atoms. However, the less intuitive part of “types of atoms”, or elements, was impossible to deduce. By knowing the second part of Atomic Theory, matter is made of elements, Liebig was able to make additional deductions that were useful.

How was Atomic Theory discovered? It was discovered during the chemical revolution. A key part of this chemical revolution was the evolution of how scientists worked (which happened throughout Europe and the US). As science evolved, scientists developed new toolkits.

In my definition of a “toolkit” is a very broad definition, and means resource. Thus, we find ourselves in the early Nineteenth Century. Empiricism, or careful measurement, is improving the toolkit of chemists to pursue research, leading to the Chemical Revolution.

The Royal Society, and its counterpart in France the “Academie Francais” had done relatively nothing for the hundred years before the Chemical Revolution. French: The Academy of Sciences traces its origin to Colbert's plan to create a general academy. He chose a small group of scholars who met on 22 December 1666 in the King's library, and thereafter held twice-weekly working meetings there. The first 30 years of the Academy's existence were relatively informal, since no statutes had as yet been laid down for the institution. In contrast to its British counterpart, the Academy was founded as an organ of government. The Academy was expected to remain apolitical, and to avoid discussion of religious and social issues (Conner, 2005, p. 385).

It was not until Lavoisier and Cavendish gave a new understanding of chemical reactions, around 1796, that chemists got a better understand of what chemistry is. The discovery that mass was conserved in chemical reactions, the Law of Conservation of Mass, made Sir Humphrey Davy declare in his *Elements of Chemical Philosophy*, that chemistry is all processes that involve change “such as metallurgy dyeing, and the manufacture of glass or porcelain”. He even stated the changing of the colors of leaves in autumn was a chemical reaction.

On 25 April 1801, Davy gave his first lecture on the relatively new subject of 'Galvanism' to the Royal Society, later he was chosen to head a prominent lab of the Royal Society as head chemist. The discovery of new elements by Sir Humphrey Davy, potassium and sodium in 1807 and calcium, strontium, barium, magnesium and boron the following year, established his position of one of the scientific greats. These provided the Empirical tool for the chemical toolkit.

Thomas Dalton and atomic Theory

These early chemists got Empirical tools that only improved.

Electrolysis showed that common acids could be broken apart into elements, by using electrodes from the first battery: the “Galvanic Pile”.

Atomic theory Edit

The most important of all Dalton's investigations are those concerned with the atomic theory in chemistry. While his name is inseparably associated with this theory, the origin of Dalton's atomic theory is not fully understood.[12] It has been proposed that this theory was suggested to him either by researches on ethylene (olefiant gas) and methane (carburetted hydrogen) or by analysis of nitrous oxide (protoxide of azote) and nitrogen dioxide (deutoxide of azote), both views resting on the authority of Thomas Thomson.[13] However, a study of Dalton's own laboratory notebooks, discovered in the rooms of the Lit & Phil,[14] concluded that so far from Dalton being led by his search for an explanation of the law of multiple proportions to the idea that chemical combination consists in the interaction of atoms of definite and characteristic weight, the idea of atoms arose in his mind as a purely physical concept, forced upon him by study of the physical properties of the atmosphere and other gases. The first published indications of this idea are to be found at the end of his paper "On the Absorption of Gases by Water and other Liquids"[11] already mentioned. There he says:

Why does not water admit its bulk of every kind of gas alike? This question I have duly considered, and though I am not able to satisfy myself completely I am nearly persuaded that the circumstance depends on the weight and number of the ultimate particles of the several gases.

The main points of Dalton's atomic theory were:

Elements are made of extremely small particles called atoms.

Atoms of a given element are identical in size, mass, and other properties; atoms of different elements differ in size, mass, and other properties.

Atoms cannot be subdivided, created, or destroyed.

Atoms of different elements combine in simple whole-number ratios to form chemical compounds.

In chemical reactions, atoms are combined, separated, or rearranged.

Dalton proposed an additional "rule of greatest simplicity" that created controversy, since it could not be independently confirmed.

When atoms combine in only one ratio, "..it must be presumed to be a binary one, unless some cause appear to the contrary".

For elements that combined in multiple ratios, their combinations were assumed to be the simplest ones possible. Two combinations resulted in a binary and a ternary compound.[15] This was merely an assumption, derived from faith in the simplicity of nature. No evidence was then available to scientists to deduce how many atoms of each element combine to form compound molecules. But this or some other such rule was absolutely necessary to any incipient theory, since one needed an assumed molecular formula in order to calculate relative atomic weights. In any case, Dalton's "rule of greatest simplicity" caused him to assume that the formula for water was OH and ammonia was NH, quite different from our modern understanding (H2O, NH3).

Despite the uncertainty at the heart of Dalton's atomic theory, the principles of the theory survived. To be sure, the conviction that atoms cannot be subdivided, created, or destroyed into smaller particles when they are combined, separated, or rearranged in chemical reactions is inconsistent with the existence of nuclear fusion and nuclear fission, but such processes are nuclear reactions and not chemical reactions. In addition, the idea that all atoms of a given element are identical in their physical and chemical properties is not precisely true, as we now know that different isotopes of an element have slightly varying weights. However, Dalton had created a theory of immense power and importance. Indeed, Dalton's innovation was fully as important for the future of the science as Antoine Laurent Lavoisier's oxygen-based chemistry had been.

Atomic weights Edit

Dalton proceeded to print his first published table of relative atomic weights. Six elements appear in this table, namely hydrogen, oxygen, nitrogen, carbon, sulfur, and phosphorus, with the atom of hydrogen conventionally assumed to weigh 1. Dalton provided no indication in this first paper how he had arrived at these numbers.[citation needed] However, in his laboratory notebook under the date 6 September 1803[16] there appears a list in which he sets out the relative weights of the atoms of a number of elements, derived from analysis of water, ammonia, carbon dioxide, etc. by chemists of the time.

It appears, then, that confronted with the problem of calculating the relative diameter of the atoms of which, he was convinced, all gases were made, he used the results of chemical analysis. Assisted by the assumption that combination always takes place in the simplest possible way, he thus arrived at the idea that chemical combination takes place between particles of different weights, and it was this which differentiated his theory from the historic speculations of the Greeks, such as Democritus and Lucretius.[citation needed]

The extension of this idea to substances in general necessarily led him to the law of multiple proportions, and the comparison with experiment brilliantly confirmed his deduction.[17] It may be noted that in the paper "On the Proportion of the Several Gases in the Atmosphere", read by him in November 1802, the law of multiple proportions appears to be anticipated in the words: "The elements of oxygen may combine with a certain portion of nitrous gas or with twice that portion, but with no intermediate quantity", but there is reason to suspect that this sentence may have been added some time after the reading of the paper, which was not published until 1805.[11]

Compounds were listed as binary, ternary, quaternary, etc. (molecules composed of two, three, four, etc. atoms) in the New System of Chemical Philosophy depending on the number of atoms a compound had in its simplest, empirical form.

He hypothesized the structure of compounds can be represented in whole number ratios. So, one atom of element X combining with one atom of element Y is a binary compound. Furthermore, one atom of element X combining with two elements of Y or vice versa, is a ternary compound. Many of the first compounds listed in the New System of Chemical Philosophy correspond to modern views, although many others do not.

Various atoms and molecules as depicted in John Dalton's A New System of Chemical Philosophy (1808).

Dalton used his own symbols to visually represent the atomic structure of compounds. These were depicted in the *New System of Chemical Philosophy*, where Dalton listed twenty elements and seventeen simple molecules.

**History of Corporations**

The history of the United States is related to the history of corporations. The first corporation was the Virginia Company.

However, according to Noam Chomsky in his book *Class Warfare*, corporations did not attain the kind of power they have today until the late nineteenth and early twentieth century through key legal decisions made in the United States.

Corporations gave an advantage when it came to aggressively taking intellectual capital and using it to the advantage of the country as a whole. This is because corporations follow market rules of efficiency and are competitive with each other. This means that, in general, corporations are leaders when it comes to progressivism and professionalism (the two identifiers of whether a country can make good use of intellectual capital).

Why was the United States able to develop rapidly at all, as opposed to the countries of Latin America? The are many items of comparison between Latin America and the US and Canada, but reason may be a view towards long term development (professionalism and progressivism in government), and that the US was well positioned to use intellectual capital due to its cultural proximity to England, which allowed a cultural exchange between the two countries to happen rapidly. In fact, the US had completely depended on Europe for its intellectual capital before the Nineteenth Century.

Like England, which was ready for the flood of immigrants towards its principal cities from the countryside, the US was well positioned to take advantage of the flood of immigration to the city of New York that the steamship afforded. New York was able to prosper because of its immigrant population, and they helped the city economically.

**High Income Per Capita grows New Industries**

As I mentioned in the last chapter, high income per capita does not necessarily lead to inflation. The volume of money in the economy (money supply) and the number of jobs in the economy will increase via the multiplier effect. A rich person living in a city can expect to be able to pay for all his services via specialists who are not part of his household as different economic niches serve the millions of people in the city.

Once all the economic niches in a city have become filled, a way to get into business is to start a “start up” that provides some utility to everyone. The best example of this is the ice industry, an industry that predated the electric industry.

The use of ice was known, and rich people had ice houses which preserved ice into the summer and was used to cool drinks. However, once the ice industry got started, and ice became available in high qualities to everyone who was willing to pay for it, the utility provided to society was not just the utility of being able to enjoy a refreshing drink, but expanded into an economic benefit. Butchers and fishermen were particularly keen on adopting the technology because it translated into less waste and more profits. The efficiency of refrigeration has been adopted around the whole world.

However, who thought of creating this industry in the first place? It was a guy who was willing to break the rules of tradition, who started shipping ice all around the Caribbean and into South America.

??? started out on his farm. He was trying to figure out what his land was good for. Finally he went down to the lake and started chopping ice into blocks. Haven't other countries developed ice industries like in the movie Frozen? Maybe, but he developed efficiencies of scale that the infrastructure allowed him to prosper. Thus, his ability to succeed was based on the forward thinking and progressive government's development of infrastructure.

As we know from the “Walmart Principle”, higher efficiencies lead directly to more total income (revenues – expenses). This meant that income per capita and wealth both rose within the city of New York. The economic equivalent on the scale of a nation state is to directly increase the GDP of the nation state.

With science in full swing, new engineering solutions became available for new niches and industries. The battle of Westinghouse and Edison to electrify the city of New York, is one such industry. The US was able to take the intellectual capital which was developed in Europe and create new industries.

Electrification, which happened rapidly all over the US, came to signify economic progress. The consumer market for electrical goods quickly grew. The US consumers have been infatuated with tech ever since. This has led to economic growth in two ways: first, the energy sector has developed out of thin air to become a major industry as electricity has become commoditized; second, the consumer market for electric goods has created jobs out of thin air. The jobs that were created from the money flowing into these industries were high paying jobs, such as electrical engineers and developers. Asian countries, which were able to make inroads into the worldwide market of consumer goods after World War II, saw consumer goods manufacturing in their countries increase due to their culture of perfectionism. Consequently, one can surmise that this industry leads to economic growth, growth in income per capita, and growth in the value of a countries currency relative to other currencies.

One can also use electrification (percent of a country connected to an electrical source) as a benchmark of development for developing countries. Electricity lets citizens of these countries rely less on natural capital to heat, cool or pump. Units of electricity are fed into electrical devices and provide the utility that people need in order to heat their houses, cool their food, and pump their water. Less natural capital is drained, which also improves GDP according to modern measurements of GDP which take into account stocks of natural capital.

The problem that these developing countries have right now is that their economy has not become as commoditized, and people depend almost completely on their own natural capital. This means that the poorest of the poor are completely dependent on whatever subsistence they can get from their land. A good example is Madagascar, the least developed country in the world. There are very few jobs in Madagascar, and no one outside of the main city is connected to the electrical grid. It would simply not pay for the electric company to send electric lines out to them, because these poor people cannot pay for their electricity use.

To transition from natural capital to commoditized world you need to have a strong consumer market. To have a strong market you need strong consumers. To have strong consumers you need people to have money. Electrification would be a first step towards modernization and this transition.

Meanwhile in the US, the high status as tech has been able to drive technology forward. The Space Race solidified the relationship between being high technical and being high status, and the electrical consumer market has continued to attain new benchmarks of efficiency or utility, evolving from cathode ray tubes to transistors.