

# Chapter 4

## The 20th Century: Metric Surge to Metric Mirage

Traditionally, the city of Denver Colorado was known as the Queen City of the West, but in more recent times has been dubbed “The Mile High City.” John F. Shafroth (1854-1922), was a Denver resident, became a US Representative, Colorado Governor, and US Senator. He helped found the National Bureau of Standards, now known as NIST. This action earned the praise of Henry Pritchett, president of the Massachusetts Institute of Technology. Shafroth was possibly the best champion of US metric conversion ever to serve in the US legislature.

Shafroth was a great admirer of Benjamin Franklin and his scientific view of the world. He had a nimble and insightful mind. In 1897, members of the British House of Commons challenged the US House of Representatives to a chess match. Robert Bodine of Missouri immediately tried to recruit Shafroth, a known lover of chess. Shafroth protested that he had not earnestly played the game in some time, and tried to excuse himself. Bodine insisted, admitting that when Shafroth had played a young woman in Missouri by postcard, Bodine had secretly dictated her moves, and Shafroth had defeated him. Bodine wheedled Shafroth into joining the team. Shafroth’s biographers describe his chess encounter:

The U.S. players sat at a chessboard in Washington D.C.; the British, at one in London. Moves were transmitted 3,500 miles via the Western Union and Anglo-American companies’ undersea telegraph cable. At the conclusion of the fourth game the British had two victories and the United

States one, with one stalemate. Shafroth opposed John Howard Parnell, brother of Irish statesman Charles Stewart Parnell, in the last match on June, 1, 1897. For fifty-eight moves, the opponents jockeyed their pieces without seeing the whites of one another's eyes. Then, with his position untenable, Parnell gave up and sent congratulations to Shafroth. The victory enabled the United States to even the overall tally at two games apiece with one stalemate, leading to the net result of a draw.

... The cable company also gave Shafroth a gold-plated rook with a piece of cable visible through its glass top. Untroubled by the irony of being a silver man with a gold trophy, he proudly displayed the rook on the fireplace mantle in his Denver home.<sup>[1]</sup>

John Shafroth attempted to pass legislation making the metric system *the* standard of weights and measures for the United States. He is on record as supporting mandatory metric conversion bills from at least 1896 to his death in 1922. For twenty six years, he labored in a gallant attempt to make the metric system the law of the land.

Shafroth managed to maintain his reputation at a time when his political contemporaries were shown to be as corrupt as the Colorado River is long. When, in 1904, Shafroth believed his opponent had won the election, he resigned. This earned him the name "Honest John," which was also sarcastically used by his detractors.

Shafroth's bill to adopt the metric system was favorably reported by unanimous vote of the House Committee on Coinage, Weights and Measures on December 6, 1900. The date when the metric system was to take effect in the US was changed to January 1, 1903. Representative Shafroth asserted that "all the civilized nations except Great Britain and the United States had adopted the metric system, Russia being the last to do so a few weeks ago." *The New York Times* quoted the wording of the metrication bill on December 7, 1900 in their article, *Favor The Metric System*:

That on and after Jan. 1, 1903, all the departments of the Government of the United States in the transaction of all business requiring the use of weight and measurement, except in completing the survey of public lands, shall employ

and use only the weights and measures of the metric system, and on and after Jan. 1, 1903, the weights and measurements of the metric system shall be the legal standard weights and measures of and in the United States.

The proposed bill never made it to The House floor, and vanished with the adjournment of the 56th Congress. Shafroth would introduce the bill again in the 57th Congress, and again on the first day of the 58th Congress.

Shafroth's opponents labeled it "The Metric Force" bill. The Friday, May 16, 1902 issue of *The San Francisco Call* offered its view of the metric legislation:

...it has become known among the opponents of the system as the "metric force bill," and a good deal of opposition has been arrayed against it.

It is quite probable that an attempt to bring about the general use of the metric system in this country by a drastic measure of compulsion would be unpopular and would rouse a discontent that would go far to defeat the desired object, but still it is not easy to see how the improvement can be brought about by any other means. The way to adopt the system is to adopt it, and that can be effected only by governmental action, for it is only through the Government that there can be brought about that wide-spread simultaneous acceptance of the change which is essential to its success. It required legislative act to reform the calendar, to establish a decimal system of currency and to make other improvements of a similar kind. The objection to the so called "force bill" on this subject is therefore invalid. If the metric system be good enough to be adopted at all it should be adopted by law.

While visiting Washington, Lord Kelvin (1824-1907) appeared before the house committee, and gave a strong endorsement to the bill:

... when attention is given to the fact that there are in different countries and localities sixty different "inches," 135 different lengths of the "foot," 235 different weights for the

“pound,” it will be evident that it would be better for industry and commerce, as well as for science, to have a common uniform system of weights and measurements arranged on the decimal plan and based upon scientific principles.

Fredrick Arthur Halsey (1856-1935) enters the stage as a singular and driven metric opponent who represented the *National Association of Manufacturers*. He obtained a degree in mechanical engineering from Cornell University in 1878. Halsey worked at a drill manufacturing firm for 14 years and then spent the rest of his professional life as editor of the *American Machinist*. He had a broad streak of hostility within his personality which was frequently deployed in his writing and professional encounters. Halsey would spearhead anti-metric opposition beginning in 1902 when he attended a meeting of the American Society of Mechanical Engineers.

Halsey published a monograph titled *The Metric Fallacy* in 1904. This book was produced as a rebuttal to the assertions made by John Shafroth and other metric advocates of the time. A main thesis of this work is that despite what all the metric countries assert, none of them have gone metric and simply continue to use their old systems. Halsey insists that the French and the other 43 countries that claim to have embraced the metric system, are all closet pre-metric system users. The evidence offered by Halsey is a number of letters he received from residents of those countries.

During the metric hearings of the early 1900s, this exchange between John F. Shafroth and Frederick Halsey occurred:

Mr Shafroth: Has any other country adopted our system?

Mr Halsey: It is spreading all over the world.

This was, of course, not true then, and became less true as time marched on. Halsey didn't just assert that metric countries were not metric, he attacked the notion that decimal arithmetic is superior to fractions. Halsey further claims that metric countries cannot get metric fasteners such as screws and bolts, and have to turn to English speaking countries as there is no alternative. Halsey used the tried-and-true polemical method of converting current Olde English lengths into metric, and then reacting with horror at their strange values, and at the

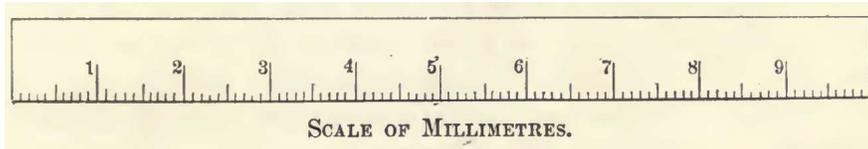


Figure 4.1: Ruler marked in centimeters and divided in millimeters is incorrectly called a millimeter scale by Fredrick Halsey in his book *The Metric Fallacy*. A true millimeter ruler would be marked as 10, 20, 30... instead of 1, 2, 3...

long string of numbers he placed after the decimal point. Of course this is not how metric is used. Metric values tend to be integer numbers and are much simpler than those based on British measures.

Even at this point in time, it was becoming known to serious practitioners of metric, that the centimeter was a complicating factor. It detracted from an optimal use of the new system. In his book *The Metric Fallacy*, Halsey offers an illustration of a “millimeter scale.” This illustration is reproduced in Figure 4.1

A casual inspection of the scale reveals that it is a centimeter rule with millimeter graduations. A true millimeter rule would not have centimeter designations, and his example only served to make the metric system look more complicated.

At that time, Fredrick Halsey was the editor of *American Machinist*, and either this was a willful distraction, or one must question Halsey’s measurement acumen. Halsey stated that the meter was an inaccurate standard, seemingly ignorant of the reasons behind the Mendenhall Order, which had occurred ten years previously. Halsey asserted that old units are never discarded, so adding metric ones would only make matters worse. This same objection had been offered by John Quincy Adams in his report some seventy years earlier.

Halsey then points to a new technological gadget, which in his opinion, will make all the arguments for conversion to metric moot: “It performs all the ordinary calculations of life, except addition and subtraction, so quickly that there is nothing left for the metric system to save.” This new hi-tech device of 1904 is of course, the slide rule, about which Halsey also wrote a book in 1899.

As one might expect, Halsey misses the point. Ease of calculation is but one reason metric is desirable. Making computations easier with

Olde English units does not address their inherent disadvantages. The units which exist are related in an unpredictable and arbitrary manner. The magnitude shifts encountered between pre-metric units, cause conceptual discontinuities, when one has to cognitively relate factors like 2, 3, 12, 16, 1660, 5280 and so on. These non-systematic relationships are inherent in the non-design of the current set of units. Metric is easier, and more accurate to visualize and use. Metric measures form a predictable measurement continuum, from micrometers, to millimeters, to meters, and so on. It's the inherent design disadvantages in the current set of Olde English "intellectual measurement tools," compared to those of metric, which is the problem, not the conversion between them.

They are not equal systems. Olde English is not even a system when compared with metric. The pre-Imperial, medieval Olde English measures used in the US, are but a jumble of units with arbitrary and capricious values. Using some manner of slide rule to convert between Roman Numerals and Arabic ones, does not negate that fact that the former are cumbersome and inefficient, and the latter are streamlined and efficient. This is just as true with the intrinsically efficient nature of the metric system when it is compared to Olde English measures.

Halsey also seems to conveniently forget that slide rules use decimal numbers—which he railed against in his congressional testimony. It is a strange omission for a man who wrote a book on slide rules.

Fredrick Halsey denied that any government had a right to tell a person what measurement system they must use when manufacturing a product.

One problem is, that the metric hearings, held from the dawn of the twentieth century to those in 1996, were presided over by politicians and people who have never used or studied the history of the metric system. These uninformed congressmen are then tasked with evaluating the merits of the metric system. Their intellectual vacuum is then filled with visceral emotions and nescient beliefs about metric, which in turn become policies.

During the metric system hearings held from 1904-1906, this exchange occurred between Representative John W. Gaines (1860-1926) of Tennessee, and Herbert Davidson. Mr. Davidson was involved in the manufacture of Library Supplies. This involved woodwork, ironwork, printing, and any other trade which was required by his company to supply libraries of the day:

Mr. Gaines. ...when I went to school my teacher very properly, I think, skipped me over the metric system, and they did not teach it then. Would we not all have to go to school and learn the metric system before we could know whether or not we were getting true measure according to the old standard?

Mr. Davidson. I think that a person of ordinary intelligence who gave five minutes to the subject of the metric system would be able to comprehend it. [Laughter.]

Mr. Gaines. How long have you studied it?

Mr. Davidson. I must say that I never spent fifteen consecutive minutes over it.

Mr. Gaines. Well, you are an expert by nature.

(Mr Davidson then attempts to explain the metric system to Mr. Gaines)

Representative Gaines could not seem to accept the simplicity of the metric system and later continued his incredulous inquiry:

Mr. Gaines:. Now, I do not want to weary the committee with my continuing colloquy; I just want to find out how we are to equip our people with sufficient information to enable them to know how to swap one plan for another, Mr. Chairman. Then I shall end this colloquy. Where did you learn the metric system?

Mr. Davidson. By putting a rule in my pocket and using it the same as I would a foot rule...

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Mr. Davidson. Why, I chose to use the metric system is because it impressed me as being simpler.

Mr. Gaines. When did you first undertake to study the metric system?

Mr. Davidson. I say I never studied it.

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Mr. Gaines. .... The people of the United States, at all events would have to first learn the metric system before they could use it. Now, this is what I am trying to find out---they would have to learn the difference between a foot and a meter and a yard and a meter and a pound and a meter, and so on. They would have to do that certainly.

Mr. Davidson. They would have to gain some knowledge of the

metric system; but it all appeals [appears?] to me, sir, as being so exceedingly simple that I cannot comprehend the intelligence that can not understand what a meter is, what a liter is, and what a kilo is.

Mr. Gaines. But you must remember that we are not all college graduates, unfortunately for us; and I take it that you are.

Mr. Davidson. Neither am I.

When John Shafroth was up for reelection in 1918, he had a number of negatives haunting his campaign, and embraced some issues the public just didn't care about. The authors of *Honest John Shafroth* relate: "Nor did most voters take an interest in adoption of the metric system or changing the date of the president's inauguration, two of the senators pet projects."<sup>[2]</sup> The other problem which hobbled Shafroth was the 1918 flu epidemic. He was unable to go out, shake hands, and circulate. The flu had already killed one of his political detractors, Denver Mayor Robert W. Speer. John Shafroth's opponent was well financed, and able to run numerous newspaper ads. Shafroth would narrowly lose the 1918 election, which ended his political career. Shafroth had earlier resigned from the metric committee when it became obvious it had been stacked with anti-metric members, so by that point in time, the metric system had already been rendered a non-issue. Four years later, John Shafroth died in Denver Colorado.

From 1888 to 1902, it was believed by most metric proponents that the metric system was inevitable, and obviously superior as a measurement system. But in 1902, as it appeared to be gaining ground in the legislature, a backlash began against the metric system, which became more pronounced as time passed. The Congressional committee members had been unanimous in their belief that the metric system should be adopted, but by 1904, the members began to fragment, and ultimately no legislation was passed. John Shafroth would resign his position that year, very probably because he saw there was no possibility of moving forward with a metric bill, then or in the future.

The impetus for metrication at that time was because it became obvious that the metric system was sweeping the industrialized world. Twenty seven countries had adopted the metric system by 1907; France, Portugal, Belgium, The Netherlands, Chile, Mexico, Spain, Italy, Brazil, Peru, Uruguay, Romania, Austria, Germany, Serbia, Turkey, Norway,

Sweden, Switzerland, Hungary, Japan, Argentina, Finland, Paraguay, Denmark, Iceland and The Philippines had all officially become metric countries. This fact became hard to ignore. The next metric campaign in the US took place in the early 1920s. By 1921, Costa Rica, The Dominican Republic, and Russia had all become metric for a total of 30 countries.

An ephemeral public interest in the metric system took place during World War I. It was realized that exports to France needed to be in metric, and US soldiers there would have to conform to metric in order to function. The War Department embraced metric during WWI, but lost interest after signing the armistice on November 11, 1918. By 1920, the War Department repealed all the metric accommodations it had incorporated during the war, and ordered the US military to go back to using “customary British units.”

In 1916, *The Metric Association* was formed to promote the metric system and educate the public. This organization would become known as the *American Metric Association* during the 1921 metric hearings. It exists to this day after changing its name to the *US Metric Association* in 1974. *The World Trade Club* was created in 1919 to advocate for the adoption of the metric system.

The anti-metric *American Institute of Weights and Measures*, was pragmatic, and effective. It was fathered by Frederick A. Halsey and Samuel S. Dale in 1916. They had been quiescent since the collapse of the 1906-07 pro-metric campaign. The pair were reawakened when pro-metric discussions for a new drive to adopt the metric system in the US came to their attention at the beginning of the 1920s. Mr Halsey called the headquarters of the *American Metric Association* and stated with certainty that: “We have killed the metric system before and we will kill it again.”

The metric hearings of 1921 were presided over by Chairman Senator Charles L. McNary (1874-1944) of Oregon. During the hearings, a major concern of the Chairman, which he emphasized over and over, was his view that any time limit or deadline to require metrication was a bad idea. Metrication in ten years was just too restrictive and onerous. He argued that any metric transition should be open-ended. There was an apparent acceptance that metrication, if it occurred at all, would be without any government mandate, or timeline. It was stated by those testifying for a metric switch-over that a deadline must be set. They

cited the experience of other countries as evidence:

Mention was made of the time that it would take to do this. I am informed that in Sweden they enacted a similar act; that at the end of 10 years the metric system was to be in force and the only system in force. Then nobody thought anything about it until the ninth year. Consequently, they made a rush and the change was made in one year.

It was pointed out, that with legislation, Germany only took two years to implement the metric system. Allowing for a long protracted period of “transition” would only create a protracted period of procrastination. David A. Molitor, Civil and Consulting Engineer testified that:

The United States Government had this experience when the railroads were ordered to equip all freight cars with automatic couplers and continuous brakes. The railroads did nothing toward complying with the law until the allotted five years had expired. The time was then extended two years and seven months, during the last year of which most cars were equipped.

In the United States, between 1890 and 1917, 230,000 railroad employees were killed and over two million injured on the job. Clearly the dangers of being a brakeman, before the introduction of the Westinghouse Air Brake, was still fresh in the public’s mind, and an instructive parable.

John Hord of US Internal Revenue had been tasked to convert the Philippine Islands to metric. Here is what he had to say:

Mr. Hord. My experience with the metric system was in the Philippines during the years 1906 to 1910. There was a law enacted by the Philippine Commission in August, 1906, making the use of metric weights and measures obligatory in the islands. At that time I was collector of internal revenue for the islands, and the enforcement of the law was placed in the internal revenue bureau.

The Chairman. The system was enforced upon the people there through enactment of a statute?

Mr. Hord. Yes, sir.

The Chairman. What was the period of transition allowed by the statute?

Mr. Hord. About seven months. The law was enacted August 8, 1906, and took effect January 1, 1907.

The Chairman. Was there any complaint against its enforcement or was it generally accepted in the seven months?

Mr. Hord. None whatever. The only delay, as I stated, was caused by our failure to get the standards quick enough.

The US metric conversion of the Philippines was done in seven months. It is interesting and curious that the US did not impose its measurement units on the Philippines.

It was also pointed out that:

In 1894 the Congress passed a law requiring that in the medical services of the United States the metric system should be solely employed and gave one year for the change. It went into effect on the 1st day of January, 1895, since which date no transaction in medicine, no prescription has been written except in the metric system. It apparently caused no disorder or confusion and could not possibly do so because of its extreme simplicity.

One person who testified, provided an accurate view of a possible future for the US, which is indeed the current situation: "I have not any question whatsoever but what we will ultimately have the metric system and be forced to it by the rest of the world, but I hate to see the American people be the last in the procession."

Chairman McNary opined over and over that he could not see how this system could help the farmer, or the common person. This of course begs the question that if one has not experienced and used the metric system themselves, they are in no position to judge the merits of the metric system. The Chairman could only assert what he believed to be true about the metric system. Despite the overwhelming amount of pro-metric testimony at the hearings, Chairman, Charles L. McNary, argued that metric should be voluntary and gave his reason thus:

The Chairman. If the thing is uneconomical, then the great law or the science of commerce ought to adjust it. It does in other things. Why does it not operate in this field if everybody is losing by it, from the packer to the consumer? Why does it not correct itself?

Thus began an argument against the metric system based on Market Darwinism. Market Darwinism is a belief that commerce somehow is a natural environment which is analogous to nature itself. Scientific evolution of species clearly show that biological creatures evolve to an effective state, but not necessarily an optimum one. Biological evolution uses what exists, and if it has utility for another purpose, it will use that existing “hardware” for another purpose. Engineers recognize that biological evolution is a series of “kludges” which “repurpose” hardware for another purpose. Market Darwinists assume that commerce and its products slowly evolve toward perfection, independent of evidence to the contrary. A clear example of this view was aired in the 1921 hearings by William Wilson:

The final test must be the survival of the fittest under the law of natural selection. Whatever legislators do, the ultimate result must be in harmony with that law. We are entirely willing to leave the solution of the issues between these two systems to the orderly processes of evolution in American industry and trade.

In previous testimony, it was argued that US Olde English measurements had brought the prosperity which blossomed after the Civil War. Changing to the metric system could endanger this prosperity from the confusion it might cause. It was also deemed that the expense of metrification would be a contributing factor to a reduction in prosperity. Thus, the phenomenal growth rate achieved by the US during this period was implied to have been produced by the use of English weights and measures. And the reason for this belief is summarized by Robert Zupko:

Its superiority was apparent also because of its fundamental units, such as the inch, foot, pound, ton, quart, and gallon developed from the eternal process of natural selection of the most appropriate units, and not as the result of a rigid inflexible, and uncompromising plan. As in the British Isles, Darwinianism was used by even the most unsuspecting of individuals and groups.

...

And since compulsory laws were required, the metric system had no advantage that would lead people to adopt it

voluntarily. (The experience of more than a hundred nations since the early 1800s made this claim meaningless)<sup>[3]</sup>

These Market Darwinism arguments can be traced to Herbert Spencer (1820-1903) who is associated with the idea of Social Darwinism, and coined the phrase “survival of the fittest.” Spencer was anti-metric, but not because he wanted to preserve the current set of weights and measures, it was because he desired a base 12 (duodecimal) system of measurement. He saw the adoption of the metric system as producing a barrier to this much better system he envisioned.

Anti-metric persons picked and chose from Spencer’s ideas to create the notion of Market Darwinism, or when less wedded to economics, Technical Darwinism. It was argued that the current set of weights and measures had been perfected through centuries of evolution and were therefore much better for human use. The very fact that the metric system required compulsory laws and government intervention was proof that the system could not “stand on its own,” and was therefore inferior.

Samuel Dale explicitly invoked this argument:

We now have a system that has resulted from a *process of natural selection* since man first began to measure and to weigh. It is a part of our language, gauges our ideas of length, breath and thickness of every object, and is bound intricately and inextricably to all our complicated industries.<sup>[4]</sup>

Another common argument was that there were always more pressing issues in the US than measurement reform.

The 1921, metric hearings ended, and no legislation was passed.

By now, the metric system was no longer just an alternative system of measurement, with obvious apolitical mathematical virtues; it was instead morphed into a political proxy, and then caught in a philosophical struggle over government power, and the form the US political economy should be allowed to take. It became an item on a checklist, and you must oppose it if you believed that government should have no role in regulating industry. Mandated metrication was opposed, because any government mandate was opposed.

Throughout the 1920s, Secretary of Commerce Herbert Hoover (1874-1964) was a person dedicated to the idea of standardization. He saw standardization as a key to improving the efficiency of the United States.

His idea of Simplified Practice was to be applied throughout the economy. Brick dimensions, grades of asphalt, the weight of bread, lumber dimensions and even the sizes of shoes were of interest to Hoover. One would have thought that Secretary of Commerce Hoover would have supported the metric system without pause, but that was not the case.

Herbert Hoover may have lauded the idea of standardization, but he rejected any thoughts of government mandates for standardization. He believed that laws and regulations should be based on the unanimous agreement all the parties involved. Unanimous agreement is a condition that has never been seen in human existence, yet is proudly touted as the only method to implement US standards. Like Charles McNary, Hoover would only support the “voluntary adoption in commerce” of national standards.<sup>[5]</sup>

Historian Charles F. Treat refers to the period from 1933 to 1958 as *The Doldrums*. The Great Depression had decreased available money, and it was argued that implementing the metric system would be an undue burden on US industry. Even when money had been plentiful, US industry fought metric, so metric loses in either situation. The prevailing political sentiment of this time period was isolationist, and contributed to the rejection of a measurement system which was seen as foreign. It was believed that the US was a morally superior place when compared with other nations. Clearly the system we had used to achieve this lofty position was the best, and it was up to other nations to realize this truth.

In 1937, a bill was introduced which had been drafted by the National Bureau of Standards. It had no provision for metric conversion, but instead only proposed to legally adopt the *standards* of the metric system, while making the Olde English *units* the legal ones for use in the US. These English units would be defined in terms of the metric standards. The inch would be the legal unit, but be defined as a fraction of a meter. In this case it would be defined as 254/10,000 of the length of the meter. This proposal was forwarded because the US Congress has never legislated official legal units for the US as prescribed by the Constitution. US weights and measures have remained in legal limbo to this day.

This bill was essentially a legislative attempt to put the “Adams Doctrine” on weights and measures into Law. John Quincy Adams argued that the Constitution gave Congress the power to fix the weights and

measures, but not to decide their proportions between one another. The “Adams doctrine” however was flawed from a practical point of view, and would have been violated by the passage of the proposed act. After all, if the historical problem posed by Adams was fixing the inch to the yard, and the pound to the ounce legally. Engineering and science would progress to the point where the conversion factors between *Olde English units* became technically untenable. This finally became obvious, and in 1959 their relationship would have to be redefined, which violated the “Adams Doctrine.” To fix the weights and measures *is* to also decide their proportions. JQA’s reasoning in 1831 was just one more bit of diplomatic sophistry dressed up as inviolable law. In Adams’ view, because the word fix was used, the Constitution would have to be amended to change the proportions between legacy US measures, and what was done in the 1959 Anglo-Saxon compromise would be unconstitutional.

The rationale for the 1937 bill was explained by the Director of the National Bureau of Standards, Dr. Lyman Briggs:

It seems strange, 150 years after the founding of this Republic, that legislative action should be necessary to fix the value of the inch and pound with which we are so familiar. Nevertheless, the fact is that we have never had a statute which defines the way in which these units should be determined.<sup>[6]</sup>

World War I illustrated to the soldier on the ground in Europe, the lack of international weights and measures uniformity. They could see it in the incompatibility of ordinance they experienced on a daily basis. The simplicity of metric units was clearly visible to them. It spurred an interest in metric system adoption after the war.

World War II by contrast, created a situation where overseas allies were existentially dependent upon US made supplies for their war effort, and there was little complaint from them. In November 1945, *The Chillicothe Constitution* pointed out that for the duration of World War II, “. . . the standard meter and kilogram were carefully stored in the Bank of Bethesda, Md., just outside of Washington. This was for fear of a bombing raid on the bureau of standards. . .” The Missouri newspaper also informed its readers:<sup>[7]</sup>

Those who have been urging that the U.S.A. adopt the metric system probably don’t realize it, but the meter and

the kilogram have been the standard measurement of the bureau of standards for 50 years.

...

But the bureau of standards has no standard foot or standard pound. It uses the metric system entirely and calculates the foot and the pound equivalents from meters and kilograms.

Fredrick Halsey may have published *The Metric Fallacy*, and have been relentless in his anti-metric crusade, but in the 21st century, he is but an obscure figure, and mostly forgotten. This is not so for an anti-metric Englishman whose prose are still discussed on a daily basis in the US. This Englishman is George Orwell (1903-1950). His books *1984* and *Animal Farm* are still debated, discussed, and influential.

Christopher Hitchens in his book *Why Orwell Matters* states:

And he had a strong conviction that the metric system – which was to become such a toxic issue in England in the early years of this millennium – was somehow ill-suited to humans, let alone Englishmen.<sup>[8]</sup>

Orwell conceded that for industrial and scientific purposes the metric scheme was necessary. However:

The metric system does not possess, or had not succeeded in establishing, a large number of units that can be visualized. There is, for instance, effectively no unit between the metre, which is more than a yard, and the centimeter, which is less than half an inch. In English you can describe someone as being five feet three inches high...but I have never heard a Frenchman say, He is a hundred and forty-two centimeters high; it would not convey any visual image.<sup>[9]</sup>

Orwell's literary objections consisted of the fact that measurements such as the pint, quart, foot and so on are much shorter to pronounce than liter, meter and such. These are the same objections offered in the 19th century by defenders of Anglo-Saxon measures. His statement that "a large number of units" are somehow needed is contrary to clarity, it is what existed before the establishment of the metric system. One could

avoid measuring anything altogether by establishing an infinite number of measurement units.

Hitchens then relates that:

... he [Orwell] was protesting to his agent that the American publishers of Nineteen Eighty-Four had, at the proof stage, rendered all his metric measurements into the old form: The use of the metric system was part of the buildup and I don't want it changed if avoidable. It's easy to see why. When Winston Smith goes slumming with the proles in Chapter Eight, he gets into a futile conversation with an addled old man whose memory – so crucial to Winston – is a wreck except for unimportant details:

“I arst you civil enough, didnt I? said the old man, straightening his shoulders pugnaciously. You telling me you aint got a pint mug in the ole bleeding boozzer?”

And waht in hells name is a pint? said the barman, leaning forward with the tips of his fingers on the container.

Ark at im. Call isself a barman and dont know what a pint is! Why, a pints the alf of a quart and theres four quarts to the gallon. “Ave to tach you the A, B, C, next.” Never eard of em, the barman said shortly. “Litre and half litre – thats all we serve.”

Hitchens then observes: “... Orwell succeeds in depicting a sodden deracinated people who have been forcibly alienated from the familiar things that were near and dear to them.”

Orwell's anti-metric position, is a version of a common problem to which many scholars succumb, and to which they are blind. Scholars will take a thesis for a particular circumstance and apply it outside of the environment in which its application makes sense. Further, the everyday interaction with common measurements, leads one to believe they are as expert as anyone else on the subject, without any investigation or study. One doubts that Orwell ever used measurements in ways which might have contradicted his comfort concerning his competence in understanding them. This is a view which is commonly held by the public, and Orwell is able to persuade them by using their default viewpoint, and then enlisting his most enduring thesis.

What was the thesis of Orwell's that acted like a literary version of *The Blob*, and finally oozed over the metric system? It is the idea that the control of language was the weapon used by Big Brother to enslave the population. Big Brother was slowly eliminating words that could express complicated human emotions and societal ideas. Big Brother was distilling the dictionary down from a massive tome, to a pamphlet. The purpose of this was to make the public less and less articulate, and unable to express themselves. This was the means by which he would reduce humanity to a useful primate, somewhere just above a chimpanzee using sign language, but much more pliable for enslavement. Orwell seems to simply apply his thesis to measurement units. If a group is trying to eliminate numerous measurement units, then it's the same activity, with the same sinister purpose, as was done with literature. He equates literature with scientific measurement. More measurement units good, less measurement units bad. This is the most false of false analogies one could make, and demonstrates the hubris which can befall literary beacons when they venture into the world of technology—even if it doesn't look like technology to them.

Orwell is also a good example of what C.P. Snow famously called "The Two Cultures" in 1959. Snow saw two groups, which can be broadly called literary intellectuals and scientific intellectuals, existing with a deep intellectual chasm between them. Orwell's claim that metric may be useful for science, but is anathema for the public at large epitomizes this intellectual schism. Orwell is clearly in the literary camp, and appears to be almost scientifically illiterate. Whereas society may have a fractal nature, the mass of a ball bearing does not; it has one value. The idea that assigning a multitude of unequal units to describe a ball bearing's mass, will in turn, increase ones understanding of the value of its mass, is anathema to a common understanding of the quantity. Engineering and science rely on consistent, singular, and universally accepted measurement to function. Without a measurement consensus, scientific endeavors would grind to a halt as no one could repeat experiments.

Orwell was apparently ignorant of how important an agreement upon a single standard value of length is for the reproduction of scientific experiments. Technical advancements in the 18th century brought about an acute need for scientists to have agreed upon standards. In 1742, The Royal Society recognized this problem, and created a pair of standard bars with engraved British measures. These two bars were then sent to

France, where they were also given the markings of measures used by the French. One bar remained in Paris, and the other was sent back to The Royal Society. According to Ronald Zupko “These bars were exchanged between England and France so that measurements made for scientific purposes in one country could be expressed accurately in terms of the weights and measures of the other.”<sup>[10]</sup> Unit proliferation is the enemy of clarity, not its midwife. Orwell did not understand this elementary point about measurements.

Orwell stated: “Political language is designed to make lies sound truthful and murder respectable, and to give an appearance of solidity to pure wind.” He did not realize that this is also what is done with unit proliferation, and the choice of multiple measurement units in place of a single, accepted, metric one.

Mr Orwell did not do humanity a favor by embracing, manifesting and promoting his idea of “Englishness” through measurement units. He did not help Britain, and his influence on thinking in the US, which is considerable, has certainly made matters worse. Even worse, he has created an “intellectual refuge for measurement scoundrels,” mantled within anti-authoritarian literature. Orwell may have exceptional and important observations about human society, but is feckless when it comes to understanding quantitative measurement.

But Orwell leaves us with a very slight puzzle about his view of the metric system, In his 1941 essay *England Your England*, he also said this:

One has only to look at their methods of town planning and water supply, their obstinate clinging to everything that is out of date and a nuisance, a spelling system that defies analysis, and a system of weights and measures that is intelligible only to the compilers of arithmetic books, to see how little they care about mere efficiency.

In the context of this essay, which appears to have been written as a semi-patriotic paeon of praise for England as the Nazis rained bombs upon his nation. I think he might be using this statement to tap into some type of “English Pride,” in the same manner that some Americans express the belief that our Olde English measurements are what make us “unique” and “exceptional.” I doubt Orwell’s statement on weights and measures is a condemnation of them. It is more likely a

dog-whistle statement to the British, which is meant to endear them to themselves during a time of crisis. Either way, George Orwell did not understand that a measurement system is not the same as a vocabulary. A vocabulary maps words with the infinite variety of human emotions and metaphor they experience. A measurement system maps numbers to a single reality in nature. The reduction of vocabulary reduces the ability of a population to express itself socially. The proliferation of measurement units decreases the ability of a population to describe the physical world in a coherent manner. The metric system was created in response to exactly this problem. The physical world is not the same as the emotional world. Mr Orwell dealt with the latter, but clearly had little understanding of the former, or he would have embraced the metric system without reservation, instead of conspiring with those in power to promote its delay.

## References

- [1] Leonard, S.J, Noel, T.J. & Walker, D.L. *Honest John Shafroth A Colorado Reformer* Colorado Historical Society Denver 2003 pp 27-28
- [2] Leonard, S.J, Noel, T.J. & Walker, D.L. *Honest John Shafroth A Colorado Reformer* Colorado Historical Society Denver 2003 page 129
- [3] Zupko, Robert E. *Revolution in Measurement*, The American Philosophical Society 1990 Page xx
- [4] Vera, Hector, *The Social Life of Measures – Metrication in the United States and Mexico, 1789-2004* PhD Thesis September 2011
- [5] *The Social Life of Measures – Metrication in The United States and Mexico, 1789–2004*, PhD Thesis, September 2011 pp 292-294
- [6] *US Congress, House of Representatives, Committee on Coinage, Weights, and Measures Weights and Measures Standardization*, “Hearings ... on H.R. 7869.” 75th Congress, 1st Session, August 12, 1937
- [7] *The Chillicothe Constitution* “Metric Standards ” Chillicothe, Missouri, Wednesday, November 14, 1945 page six
- [8] Hitchens, C. *Why Orwell Matters* Basic Books 2002 page 128
- [9] Hitchens, C. *Why Orwell Matters* Basic Books 2002 page 128-129
- [10] Zupko, R.E. *Revolution in Measurement: Western European Weights and Measures Since the Age of Science* American Philosophical Society 1990 page 71

