HOW BENJAMIN BANNEKER DISCOVERED THE PRINCIPLE OF PROPORTIONALITY IN A MATHEMATICAL PUZZLE: A PEDAGOGICAL.

by Pierre Beaudry, Leesburg Va. Friday, November 07, 2003

Some people said that the design for the city of Washington D.C. came from the heavens; that the French architect, Pierre L'Enfant, determined the location of the House of Congress, and the House of the President, in accordance with a divine plan written in the stars, and that such an orientation was PROPORTIONAL with the design of the policy of MANIFEST DESTINY, which had inspired George Washington, Benjamin Franklin, and Alexander Hamilton in the creation of a true sovereign Republican nation-state on these shores. This is absolutely true. That was the rigorous and conscious intention, and only foolish people believe that the design of Washington D.C. was based on some mystical freemasonic mumbo-jumbo.

Pierre L'Enfant, Andrew Ellicott, and Benjamin Banneker, reached to the heavens for their unalienable rights, and executed these Great Federal Improvements by means of which the Capital City of the United States was made to become, in the small, the historical microcosm of Benjamin Franklin's ideal of human government. Such an accomplishment corresponded to what Gottfried Leibniz had called the principle of "proportionality between reason and power," which he had derived from the principle of the Peace of Westphalia, the {*Advantage of the other*}.

Benjamin Banneker (1731-1806), who was the first African-American inventor, poet, mathematician, and astronomer, had also adopted the same Peace of Westphalia principle. At the request of Andrew Ellicott, he was brought in, at the age of fifty nine, to assist in surveying the plan of Pierre L'Enfant that George Washington had commissioned for the construction of the Capital City, in 1791. The following mathematical puzzle is a sample of the type of PROPORTIONALITY that Banneker was thinking about, when he surveyed the plan for Washington D.C.

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THE BANNEKER PUZZLE OF PROPORTIONALITY.

"DIVIDE 60 INTO FOUR SUCH PARTS, THAT THE FIRST BEING INCREASED BY 4, THE SECOND DECREASED BY 4, THE THIRD MULTIPLIED BY 4, THE FOURTH PART DIVIDED BY 4, THAT THE SUM, THE DIFFERENCE, THE PRODUCT, AND THE QUOTIENT SHALL BE ONE AND THE SAME NUMBER."

Banneker's answer was:

"First part 5.6 increased by 4 = 9.6
Second part 13.6 decreased by 4 = 9.6
Third part 2.4 multiplied by 4 = 9.6
Fourth part 38.4 divided by 4 = 9.6."

In other words, $5.6 + 13.6 + 2.4 + 38.4 = 60$.

Do you know how Banneker was able to derive that? Try to discover how he did it before you read the following imaginary solution.

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**RELIVING THE DISCOVERY OF
BANNEKER'S PUZZLE OF PROPORTIONALITY.**

Imagine that one day, Benjamin Banneker, who was also a clockmaker, and, therefore, knew of the importance of time in all matters of discovery, was meditating on the nature of numbers and found himself totally perplexed. He had asked himself: "Why are there no more than four types of elementary arithmetical operations; that is, addition, subtraction, multiplication, and division?" He was puzzled by these simple mental operations, of which there could be no more than four. He began to investigate what it was that held those four mental functions together, if anything. After a few moments, he figured out that there had to exist some kind of relationship that bound them together: since there was so much harmony among the stars, God could not have created the universe without harmony and proportion in the minds of human beings as well. But what was it that related those operations together?

Treating numbers not as things in and of themselves, but as shadows cast on the dimly lit wall of Plato's Cave, Banneker decided to work his way backward from the shadows, and tried to reach the truth, by inversion into the higher source of light underlying their boundary conditions, outside of the Cave. "Why were there only four operations, and what was holding them together," he kept asking himself? He first looked at the shadows individually and could not see anything. In fact, the more he looked at them individually, that is separately, the more perplexed he became. He began to realize that their unity could not come from within any of these operations as such, but could only be derived from a higher order.

Then, he started looking at them two by two, and that is when he saw the first relationship emerge, which he thought was important. He had discovered that addition was the inverse of subtraction just like multiplication was the inverse of division. Banneker continued to try to resolve the puzzle, and he saw that the differences between these four operations were all similar, and meaningful, when they were considered together; but that they were all different, and meaningless, when they were considered individually and separately! He was in awe before that strange fact, and became filled with joy in discovering that the whole thing could only be understood, and made sense of, when the four operations were actually bounded together. Banneker had discovered the boundary conditions of scientific knowledge. He had discovered what Leibniz had discovered before him, which is that "all beauty consists in harmony and proportion." This represented also the discovery of principle of {spherics} by Pythagoras.

Banneker was overjoyed. He had discovered that numbers were nothing but expressions of proportional relationships of the human mind, as different from the animal, and that these relationships related to different forms of physical action, different powers. Then, imagine that he chose a self-generating minimum solution: he chose 4 to be the number equal to the sum of 4, equal to the difference of 4, equal to the product of 4, and equal to the quotient of 4. Banneker was able to derive the following solution:

The sum is $\qquad 0 + 4 = 4$
The difference is $8 - 4 = 4$
The product is $\quad 1 \times 4 = 4$
The quotient is $\ 16 \div 4 = 4$

"This," said Banneker, "gives you a sum of all of these operations which is 16 + 1 + 8 + 0 = 25." Banneker then realized that, in order to confirm that his hypothesis worked for any other number whatsoever, and was universally valid, he needed to discover the PROPORTIONALITY between his two first experiments. That was the leap to the higher order that he was seeking to accomplish. And that is: 60 is to 9.6 as 25 is to 4, or 60 : 9.6 :: 25 : 4 = 6.25! In other words, apply the proportional result of 6.25 to any number, and the BANNEKER PUZZLE OF PROPORTIONALITY can be solved for that given number.

HOW TO TEST THE BANNEKER EXPERIMENT YOURSELF.

Take any number, say, 50, from which you want to find four different parts, which shall satisfy the BANNEKER PROPORTIONALITY. First take the number of your choice in relationship with the ratio of the proportion, that is 50 : 6.25 = 8. This number 8 is the ONE AND THE SAME NUMBER which will be the result of an INCREASE by 4, of a DECREASE by 4, of a MULTIPLE by 4, and of a DIVISION by 4, of four different parts whose sum will total 50. Now, proceed by inversion, for each and all four operations.

What part of 50 divided by 4 will give you 8? The answer is the inverse, that is, 8 x 4 = 32.

What part of 50 multiplied by 4 shall give you 8? The answer is the inverse, that is, 8/4 = 2.

What part of 50 subtracted by 4 will give you 8? The answer is the inverse, that is, 8 + 4 = 12.

What part of 50 added to 4 will give you 8? The answer is again the inverse, that is, 8 - 4 = 4.

The four parts you were looking for are: 32 + 2 + 12 + 4 = 50.

THE POLITICAL GENIUS OF THE AMERICAN CONSTITUTIONAL REPUBLIC

It was through the completion of the plan of the city of Washington that Banneker became the living proof that the popular prejudices of his time could be changed, and that the city of Washington D.C. could truly become the city where all men, regardless of color, would be able to live freely and participate in demonstrating the truth of the Declaration of Independence, that "all men are endowed with certain unalienable rights."

Nothing can be more fitting, in showing the compelling reality of this inalienable necessity of freedom, than to restate the quality of cognitive courage and insight that Benjamin Banneker had demonstrated when he wrote to Thomas Jefferson, then Secretary of State, urging him that he free himself of his own slaves. This letter of August 19, 1791 reflects fully the idea of proportion between the passion of reason and the political power of ideas that Lyndon LaRouche has been advocating. It is also a beautiful example of Banneker's method of inversion applied to the principle of the Peace of Westphalia of 1648, the principle of the {*Advantage of the other*}. Here is the gist of Banneker's masterful intervention:

{"…*Sir, I have long been convinced, that if your love for your Selves, and for those inesteemable laws which preserve to you the rights of human nature, was founded on Sincerity, you could not but be Solicitous, that every Individual of whatsoever rank or distinction, might with you equally enjoy the blessings thereof, neither could you rest Satisfied, short of the most active diffusion of your exertions, in order to [change] their promotion from any State of degradation, to which the unjustifiable cruelty and barbarism of men may have reduce them.*

"Sir, I freely and Cheerfully acknowledge, that I am of the African race, and in that colour which is natural to them of the deepest dye, and it is under a Sense of the most profound gratitude to the Supreme Ruler of the universe, that I now confess to you, that I am not under the State of tyrannical thralldom, and inhuman captivity, to which too many of my brethren are doomed; but that I have abundantly tasted of the fruition of those blessings which proceed from that free and unequalled liberty with which you are favored and which I hope you will willingly allow you have

received from the immediate hand of that Being, from whom proceedeth every good and perfect gift.

"Sir, Suffer me to recall to your mind that time in which the Arms and tyranny of the British Crown were exerted with every powerful effort, in order to reduce you to a State of Servitude, look back I entreat you on the variety of dangers to which you were exposed, reflect on that time in which every human aid appeared unavailable, and in which even hope and fortitude wore the aspect of inability to the Conflict, and you cannot but be led to a Serious and grateful Sense of your miraculous and providential preservation; you cannot but acknowledge, that the present freedom and tranquility which you enjoy, you have mercifully received, and that it is the peculiar blessing of Heaven.

"This Sir, was a time in which you clearly saw into the injustice of a State of Slavery, and in which you had just apprehensions of the horrors of its condition, it was now Sir, that your abhorrence thereof was so excited, that you publicly held forth this true and invaluable doctrine, which is worthy to be recorded and remember'd in all Succeeding ages. "We hold these truths to be Self evident, that all men are created equal, and that they are endowed by their creator with certain unalienable rights, that among these are life, liberty, and the pursuit of happiness."

"Here Sir, was a time in which your tender feelings for your selves had engaged you thus to declare, you were then impressed with proper ideas of the great valuation of liberty, and the free possession of those blessings to which you were entitled by nature; but Sir how pitiable is it to reflect, that altho you were so fully convinced of the benevolence of the Father of mankind, and of his equal and impartial distribution of those rights and privileges which he had conferred upon them, that you should at the Same time counteract his mercies, in detaining by fraud and violence so numerous a part of my brethren under groaning captivity and cruel oppression, that you should at the Same time be found guilty of that most criminal act, which you professedly detested in others, with respect to yourselves.

"Sir, I suppose that your knowledge of the situation of my brethren is too extensive to need a recital here; neither shall I presume to prescribe methods by which they may be relieved; otherwise than by recommending to you and all others, to wean yourselves from these narrow prejudices

which you have imbibed with respect to them, and as Job proposed to his friends "Put your Souls in their Souls stead," thus shall your hearts be enlarged with kindness and benevolence toward them, and thus shall you need neither the direction of myself or others in what manner to proceed herein…}" (Benjamin Banneker, August 19, 1791 Letter to Thomas Jefferson.)

Thus, Benjamin Banneker was not making the case only for his "black brothers", but he was also making the case to free Jefferson of his own attachments to slavery. This was Banneker's most passionate moment of the sublime. He rightly saw Jefferson as a slave of his own "narrow prejudices," and was trying to help him to overcome it by becoming himself a true free human being. In the process of doing that, Banneker transformed himself and demonstrated the true nature of the American Constitutional Republic; because, in addressing Jefferson, as he did, he broke with his own shackles of mental fears. Banneker set the example for all of us, in {*Freely and Cheerfully acknowledging*} that in science, as in politics, the essential is to passionately and proportionately experiment with the {*Advantage of the other*}, even when the other might not respond in kind. That is the reason why politics and science are so much fun: because they work so harmonically and beautifully well together.

FIN

SOLUTIONS OF THE BANNAKER PUZZLE WITH ONLY WHOLE NUMBERS.

Variation with 25

0   plus 4 = 4
8 minus 4 = 4
1   multi. 4 = 4
16 divid. 4 = 4

Variation with 50

4   plus 4 = 8
12 minus 4 = 8
2 multi. 4 = 8
32 divid. 4 = 8

Variation on 75

8 plus 4 = 12
16 minus 4 = 12
3   multi. 4 = 12
48 divid. 4 = 12

Variation with 100

12 plus 4 = 16
20 minus 4 = 16
4 multi. 4 = 16
64 divid. 4 = 16

Variation with 125

16   plus 4 = 20
24 minus 4 = 20
5   multi. 4 = 20
80 divid. 4 = 20

Variation on 150

    20   plus 4 = 24
    28 minus 4 = 24
    6   multi. 4 = 24
    96 divid. 4 = 24

Variation on 175

    24   plus 4 = 28
    32 minus 4 = 28
    7   multi. 4 = 28
    112 divid. 4 = 28

Variation with 200

    28 plus 4 = 32
    36 minus 4 = 32
    8 multi. 4 = 32
    128 divid. 4 = 32

Variation with 225

    32   plus 4 = 36
    40 minus 4 = 36
    9   multi. 4 = 36
    144 divid. 4 = 36

Variation with 250

    36   plus 4 = 40
    44 minus 4 = 40
    10 multi. 4 = 40
    160 div. 4 = 40

Variation with 275

    40   plus 4 = 44
    48 minus 4 = 44
    11 multi. 4 = 44

176 divid. 4 = 44

Variation with 300
      `44 plus 4 = 48
   52 minus 4 = 48
   12 multi. 4 = 48
  192 divid. 4 = 48

Variation with 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300.etc

Variation with 15750

2516   plus 4 = 2520
2524 minus 4 = 2520
630   multi. 4 = 2520
10080 divid. 4 = 2520.

Variation with 120

15.2 plus 4 = 19.2
23.2 min. 4 = 19.2
4.8 multi. 4 = 19.2
76.8 divid. 4 = 19.2

Variation with 240

34.4 plus 4 = 38.4
42.4 minus 4 = 38.4
9.6 multi. 4 = 38.4
153.8 divid. 4 = 38.4

Variation with 32

1.12 plus 4 = 5.12
9.12 minus 4 = 5.12
1.28 multi. 4 = 5.12
20.48 divid. 4 = 5.12

Variation with 65*

6.4 plus 4 = 10.4
14.4 minus 4 = 10.4
2.6 multi. 4 = 10.4
41.6 div. 4 = 10.4

Variation with 63*

6.08 plus 4 = 10.08
14.08 minus 4 = 10.08
2.52 multi. 4 = 10.08
40.32 div. 4 = 10.08

*Thus, the proportionality whereby 63 is to 10.08 as 65 is to10.4.

Variation with 256

36.96 plus 4 = 40.96
44.96 min. 4 = 40.96
10.24 multi. 4 = 40.96
163.84 divid. 4 = 40.96

Variation with 16

-1.44 plus 4 = 2.56
6.56 min. 4 = 2.56
0.64 multi. 4 = 2.56
10.24 divid. 4 = 2.56

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PANTAGRUEL shed tears as big as ostriches' eggs.

The laughter of RABELAIS is proportional to the pathos of
EURIPIDES: thank God…

The CRESSETS were males and the LANTERNS were females.

BANNEKER IN LANTERNLAND.

'View yon majestic concave of the sky!
Contemplate well, those glorious orbs on high-
These Constellations shine, and Comets blaze;
Each glitt'ring world the Godhead's pow'r displays!'

Banneker, Almanac for 1794.

"EPITAPH TO A WATCH MAKER."

HERE lies, in a horizontal position,
        The outside case of
Peter Pendulum, Watch-Maker
Whose abilities in that line were an honour
        To his profession.
Integrity was the main spring,
        And prudence the regulator
O all the actions of his life,
        Humane, generous and liberal,
        His hand never stopped
Till he had relieved distress,
So nicely regulated were all his motions
That he never went wrong,
        Except when set a going,
            By people
        Who did not know

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                    His key:
              Even then he was easily
                    Set right again
        He had the art of disposing his time
                    So well,
              That his hours glided away
              In one continual round
              Of pleasure and delight,
        Till an unlucky minute put a period to
                    His existence.
              He departed life
              Wound up
        In hope, of being taken in hand
                    By his Maker,
        And of being thoroughly cleaned, repaired,
                    And set a going
        In the world to come.
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          B. Banneker, Almanac of 1797.

CURIOSITY.

Behold ye Christians! And in pity see
Those Afric sons which Nature formed free;
Behold them in a fruitful country blest,
Of Nature's bounties see them rich posess,
Behold them here from torn by cruel force,
And doomed to slavery without remorse,
This act, America, thy sons have known;
This cruel act, relentless they have done.

B. Banneker.

      If the swine grubs the soil by turning its head towards the north, the winter will be very cold. Take notice that the weather of the 24 and 25th of November will determine the coldness of January.

"You may easily know what sort of winter it will be, by observing the last days of the moon between November and December; for as they prove, so will the winter." Almanac for 1795.

HOW "GOING ALONG TO GET ALONG" KILLED THE NATION

There were several other greenspins like that. EPISTEMON explained that in LANTERNSPEAK, a GREENSPIN meant an opinion concocted by a famous banker who kept telling the whole world about the good news of the economy, when everything was really bad.

PLAYING BY THE RULE OF THE GAME

STICK AND SHADOW

"Stop making those waves," said Stick to Shadow, "You are making me dizzy."

SOME MORE JINGLING QUESTIONS

Then, he asked me this silly question: "Why is your nose invisible?" "Oh, come on, that is silly," I said, " my nose is not invisible." And, he replied: "If it is not true, then, how come your nose in always in front of your eyes and you never notice it?" That jingling question totally boggled my mind. I just could not answer. Can you?

ON FLATLAND

Secondly, Flatland represents an excellent clinical case of the British reductionist view of science, that is, the school of Newton, Hume, Locke, Russell, and others. In his introduction, Ganesh Hoffmann, formulates the scientific implications of Abbott's book in the following manner: "Much has happened to our ideas of space and time since Flatland came into being. But despite all of the talk of a fourth dimension, the fundamentals of dimensionality have not changed. Long before the advent of the theory of relativity, scientists thought of time as an extra dimension. In those days, they regarded it as a solitary, isolated dimension that kept aloof from the three dimensions of space. In relativity, time became inextricably intermingled with space to form a truly four dimensional world; and this four-dimensional world turned out to be a curved one." Here is the rub! Or, should I say: "THE WARP!" This is a typical British misconception of curvature as WARPED PHYSICAL SPACE-TIME. As we shall see, in LANTERNLAND, the reason why the so-called FLATLAND PEOPLE cannot understand the higher dimensionality of so-called SPACELAND, is because they are kept prisoners in the bottom of PLATO'S CAVE, and the notion of space they are offered to considered is WARPED.

Thirdly, the epistemological cause of this WARP lies in the fact that the axioms, postulates, definitions, and theorems, which are developed by Abbott, are all inherently false, from the word go, for the simple reason that they are fixed. His underlying false assumption is that the universe is ENTROPIC and is based on a set of fixed laws. As a result NO BEING ANYWHERE CAN MAKE AXIOMATIC CHANGES. Boy, is this guy in trouble, or what? To make things worse, the ENTROPIC assumption that he defends is what has always been the basis for the oligarchical view of the world:

NO CHANGE.

ON THE HEAVENS

The expanded spheres, amazing to the sight,
Magnificent with stars and globes of light,
The glorious orbs which heaven's bright host compose,
The imprison'd sea that restless ebbs and flows,
The fluctuating field of liquid air,
With all the curious meteors hovering there,
And the wide regions of the land, proclaim
The Power Divine that rais'd the mighty frame.

Benjamin Banneker, Almanac for 1792.

'View yon majestic concave of the sky!
Contemplate well, those glorious orbs on high-
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Till he had relieved distress,
So nicely regulated were all his motions

That he never went wrong,
	Except when set a going,
		By people
	Who did not know
		His key:
	Even then he was easily
		Set right again
He had the art of disposing his time
		So well,
	That his hours glided away
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