

# MATHEMATICAL EQUIVALENCE

DMITRI A. BORGMANN  
Dayton, Washington

One way of testing words and names to determine whether or not they are really the same despite superficial, outward differences - differences in length, meaning, spelling, and pronunciation, for example - is to score them arithmetically. By assigning numerical values to the letters of the alphabet (A = 1, B = 2, etc.) and adding the values of the letters constituting a word, name, or phrase, we arrive at a single mathematical value for the term of interest to us. That value makes possible a simple, straightforward comparison between different terms. Those with the same numerical total are mathematically equivalent - really the same, that is - despite superficial, distracting differences of the sort mentioned above.

Scoring and comparing words and names produces surprising results, providing us with insights into their secret workings, to which lesser mortals never become privy. As an illustration, let's consider the names of the 50 states of the United States. Their total scores range from only 31 for ALABAMA to 168 for MASSACHUSETTS. Since the scores are scattered over a range of 138 numbers, an even distribution would have them spaced 2.76 numbers apart. Even an irregular distribution ought to include identical values only as an extreme rarity. Actually, however, we find that 20 of the 50 states - an astonishing 40 per cent of the total - are clustered in pairs inside the range from 47 to 156. Though I am no statistician, this clustering strikes me as a highly unlikely chance occurrence:

South Carolina, West Virginia = 156  
Connecticut, North Dakota = 127  
New Mexico, New York = 111  
Kentucky, Minnesota = 110  
Tennessee, Wyoming = 106  
California, Maryland = 88  
Arizona, Arkansas = 84  
Delaware, Texas = 69  
Florida, Kansas = 65  
Nevada, Ohio = 47

Adding to the overall improbability of this finding are ancillary facts about the paired states. Two of the pairs - ARIZONA and ARKANSAS, NEW MEXICO and NEW YORK - consist of alphabetically consecutive state names. A third pair, DELAWARE and TEXAS, matches the second geographically smallest state with the second geographically largest state - a delightful, yet improbable, balance.

The equivalences just noted can be enhanced considerably by liberalizing the membership rules of the 50 Club. CALIFORNIA and MARYLAND become a trio when we add KEEWATIN, one of the three districts in Canada's Northwest Territories. Similarly, DELAWARE and TEXAS become a trio with the addition of MEXICO, a country bordering serendipitously on TEXAS. Furthermore, a wholly new series of matched pairs and trios surfaces:

The United States, The Virgin Islands = 190  
 Mississippi, United States, Virgin Islands = 157  
 Saskatchewan, Wisconsin = 125  
 Columbia, Oklahoma = 76  
 Manitoba, North = 75  
 Alberta, Island = 59  
 Dakota, Indiana = 52  
 America, Rhode, Utah = 50  
 Guam, Maine = 42

These enhancements more than double the number of names that are matched, increasing them from 20 to 42. They also show that, in defiance of one of Euclid's postulates, the part can be equal to the whole: MISSISSIPPI, part of the UNITED STATES; OKLAHOMA, part of COLUMBIA. Also noteworthy is the fact that two groups are only one point apart, giving us five different names each of which is precisely half a point distant from 156.5. A little less remarkably, another four names are exactly half a point away from 75.5.

The modest expansion of 50 Club membership permitted here also serves to extend the limits of our original 31-168 numerical value range. CANADA decreases the lower bound from 31 to 24; its NORTH-WEST TERRITORIES increase the upper bound from 168 to an astonishing 298.

As interesting as the foregoing discoveries are, they must be regarded as at the periphery of logological concern, or, at least, as constituting an isolated valley somewhere within the Land of Logology. The numerical equivalence principle can, however, be applied to one of logology's central concerns. Like scientists, logologists are forever seeking the unity presumed to underlie the infinite diversity in the outward appearance of the objects in their world. Over the years, logologists have studied reversals (DESSERTS = STRESSED), demonstrating that opposite readings of the same letter sequence both produce equally valid words. They have found opposite meanings ensconced in a single word (TEMPER means both to harden and to soften). Conversely, they have found seemingly opposite words to have identical import (TO BEST and TO WORST both mean to get the better of someone). They have found words of apparently opposite meaning are mutual transposals and, therefore, really the same (ANARCHIST = ARCHSAINT). In the same way, phrases of antithetical meaning have proved to be mutual anagrams (A TRAGEDY = RATED GAY). In other efforts, they have constructed word ladders connecting antonyms (WARM, ward, word, cord, COLD). Using synonym chains, they have established perfect equivalences between seemingly opposite words (BLACK = dark = obscure = hidden = concealed = snug = comfortable = easy = simple = pure = WHITE).

They have proved that each letter of the alphabet can function either as a silent letter or as a sounded letter not represented in the word's spelling (the silent G in GNOME and the sounded G in EXIST, for instance). In these and many other ways, logologists have pushed the search for unity in diversity to its ultimate limits, establishing that even diametric opposites are really the same.

The numerical equivalence principle follows in the footsteps of its illustrious, revered predecessors. What it shows is that words opposite one another in meaning - pairs of antonyms - are numerically equal and, therefore, essentially the same. A list of equivalent antonym pairs follows:

hide, bare = 26  
 heat, cold = 34; pale, dark = 34  
 ohm, mho = 36  
 duck, drake = 39  
 lock, key = 41  
 gift, loan = 42  
 brick, frame = 43; felt, saw = 43  
 apex, nadir = 46  
 buy, sell = 48; wild, docile = 48  
 laugh, weep = 49  
 thick, thin = 51; seemed, were = 51  
 skin, pelt = 53  
 dozed, woke = 54  
 parched, soaked = 55  
 attack, repel = 56  
 casual, causal = 57  
 inches, miles = 58  
 decigram, dekagram = 60  
 praise, condemn = 68  
 unite, untie = 69  
 sperm, ovum = 71  
 concord, discord = 72  
 Jesus, Lucifer = 74; shirt, blouse = 74; marital, martial = 74  
 genius, moron = 75  
 butter, margarine = 86  
 decistere, dekastere = 88  
 summer, winter = 89  
 consent, dissent = 90; hectogram, centigram = 90  
 spirit, darkness = 91  
 androphobia, gynaephobia = 103  
 androcratic, gynaecratic = 106  
 lionhearted, fainthearted = 111  
 hectoliter, centiliter = 115

Three of the antonym pairs listed are accidental metalleges or transposals (CASUAL-CASUAL, UNITE-UNTIE, MARITAL-MARTIAL), and one pair is an intentional reversal (OHM-MHO). Included in the list are strongly contrasting pairs such as DUCK-DRAKE, LOCK-KEY, and SKIN (of a human)-PELT (of a lower animal). A 41st pair has been omitted because it might be too controversial: for 106, a sec-

ond example is INFINITY (the largest finite number, or the limit of finite numbers) and ALEPH-ZERO (the smallest transfinite number). Pairs of entirely unrelated words (GENIUS-MORON) are qualitatively superior to words partly the same (LIONHEARTED-FAINT HEARTED). The three pairs of metric units included are opposites in the sense of being reciprocals (10 and 1/10; 100 and 1/100).

The antonym-pair examples displayed in this article were found manually, in the course of a tedious, random search for them. A computer equipped with lists of thousands of antonym pairs would be capable of making a much more thorough and fruitful search. Any volunteers? If you manage to obtain the LOAN of a computer, treat it as a GIFT and keep it - as you now know, a loan and a gift are the same thing!

Editor's Note: As a statistician, I was intrigued by Dmitri's claim that it is highly unlikely to encounter 20 states out of 50 with matching letter-sum values. The average value of the state letter-sums is 94, and the standard deviation is 36. I drew 50 random variables from a Gaussian (bell-shaped) probability density function having these specifications, and found that 18 participated in matches. In three repetitions of this experiment, I obtained 17, 14 and 21 matches, from which I conclude that the probability of 20 or more matches in 50 tries is not particularly small (about 0.25).

### THE STORY BEHIND THE WORD

*Etymologies appear to be a never-ending source of interest to the reading public, prompting a large flow of books on this topic. Morton Freeman's latest entry, The Story Behind the Word (ISI Press, 1985; \$14.95 paperback and \$18.95 cloth-bound), gives capsule histories of 435 words from abracadabra (possibly an elongation of the Gnostics' high priest, Abrasax) to zenith (from the Arabic samt arras, "way over the head"). He often cites questionable etymologies that make good stories, such as the claim that Canada comes from the Spanish phrase aca nada, meaning "nothing there", uttered by an explorer looking northward from a bluff. Similarly, he labels as doubtful the origin of posh as an acronym of Port Out Starboard Home, describing the shady-side cabins on British steamships to India. However, none of this is likely to deter the average reader seeking to be entertained rather than be meticulously informed of the provenance of a word.*