

# BALANCED WORDS

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## Introduction

'Balanced Words' anagrams to 'An ABCDE's World'. It is certainly that! Ironically, the word 'balanced' is not itself a balanced word, but INTRODUCTION and CONTRARILY are. (In this article, words in capital letters are balanced.) So, what is a balanced word? When the sum of the letters of a word (using A=1, B=2 etc.) is divided by the number of letters in the word, the result is the 'average letter weight' of that word which, in the case of balanced words, is 13.5, halfway through the alphabet between M and N. Balanced words, however, are unique in also achieving the same average letter weight of 13.5 when their letters are alternatively assigned the values Z=1, Y=2 etc. For example, using either parameter, the four-letter word RASP sums to 54 and, when divided by 4, produces an average letter weight of 13.5. RASP is therefore a balanced word:  $R+A+S+P = 18+1+19+16 = 54$  or  $9+26+8+11 = 54$ .

In 'Balance and Beauty' in Beyond Language (Scribners, 1967), Dmitri Borgmann called such words Alphabetically Balanced Combinations, ABCs for short, but in order to avoid confusion with the term 'ABC words', sometimes used when referring to words beginning with the letters ABC, we shall refer to Balanced Words as BWs.

All BWs have an even number of letters. Words with an odd number of letters would require letters equating to other than whole numbers in order to be BWs! The shortest have 2 letters and consist of balanced pairs of letters which are symmetrically positioned in the alphabet, e.g., the word BY composed of B, the second letter from the beginning of the alphabet, and Y, the second letter from the end. The other two-letter BWs are FU, HS (plural of H), IR, LO, OL (in OED), RI, SH, VE and ZA. Each of these words sums to 27 and, furthermore, the sum of every BW is a MULTIPLE of 27, those with 4 letters summing to 54, 6 letters to 81, 8 letters to 108, and so on to INTERCRYSTALLIZATION and UNCONTROVERTIBLENESS, with 20 letters the longest ones found, to 270.

In a list of more than 2400 BWs, there were 6.6% of 4 letters, 19.3% of 6, 27.6% of 8, 24.7% of 10, 13.3% of 12, 5.7% of 14, 2.4% of 16, 0.3% of 18, and 0.1% of 20.

Some BWs seem ENTIRELY suited to their balanced role: TWINHOOD, EQUICONVEX, EQUANIMOUS, ORBITARY, JUXTAPOSED, COINVENTOR, CO-PARTNERY, INTERTWINING and INTERTWINEMENT; others CUSSLEDLY

seem anything but balanced, such as UNEVEN, UNCONVENTIONALLY, MAELSTROMS, UNRHYTHMICALLY, NONPARTNER, DISTORTING, FOOTFAULTS and ERRINGLY.

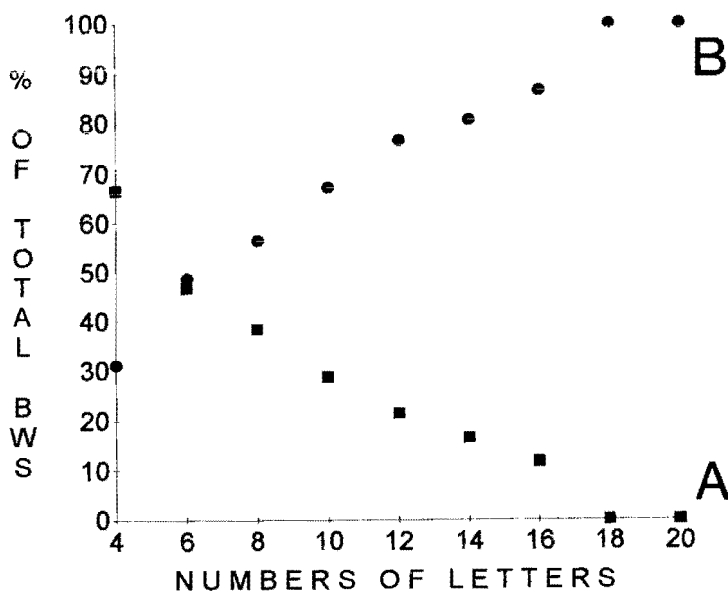
Amongst our BWs we find a number relating to word PLAY: ACRONYMS (in Web3), TRANSPOSAL, COLLOQUIZE, UNCOLLOQUIALLY, ETYMOLOGER, LITERARY, LYRICISM, ANTONYMIES (Web3), CRYPTOGRAPHERS, YCLEPT (a logological favourite) and, la crème de la crème, LOGOLOGY!

### Tilting the Balance

In 'Balance and Beauty', Borgmann noted that most balanced words "...show a preponderance of letters from the last half of the alphabet." How true! 61% had more than half their letters from the N-Z half of the alphabet, 35% had equal numbers of letters from both halves and in only 4% did more than half the letters fall within the A-M range. Thus BWs have an overwhelming SUSCEPTIBILITY to 'favour' letters from the second half of the alphabet. But why? In any set of words, including BWs, one would expect to find more of the commonly occurring letters than the less commonly occurring ones. Using Arne Zettersten's average letter frequency analysis (see David Crystal's The Cambridge Encyclopedia of Language (Cambridge Univ. Press, 1984)), the seven most commonly occurring letters in the N-Z half are, in decreasing order of frequency, TONSRUP, and it so happens that these letters occupy seven of the eight positions immediately to the right of the midpoint of the alphabet. This is in contrast to the seven most commonly occurring letters in the A-M half, EAIHLDC, only three of which (IHL) occupy one of the corresponding eight positions immediately to the left of the alphabet's midpoint, the remaining four (EADC) filling four of the first five places in the alphabet. This may be the explanation for the preponderance of N-Z letters in BWs, more of them being needed to create balance because the commonly occurring ones are not sited at the end of the alphabet. Only in the case of the rather atypical four-letter BWs are there more words with equal numbers of letters from both halves of the alphabet than with a preponderance of N-Z letters (twice as many!). Despite their bias toward N-Z letters, NONION, a mathematical term defined as 'the general linear vector function involving nine constants', was the only BW of length greater than 4 which had only a single letter from the A-M half of the alphabet.

The accompanying graph shows well-defined trends regarding the length of BWs and their alphabetical letter weighting. The percentage of the total number of BWs with equal numbers of A-M and N-Z letters decreases as word length increases (A). Conversely, the percentage of the total number of BWs with more than half their letters from the N-Z half of the alphabet increases with word length (B). The two lines are, virtually, mirror images and this is a direct result of the percentage of BWs with the majority of their letters in the A-M half of the alphabet being so very low, reaching a maximum of only 5.1% in the BWs with 8 letters. However, the smoothness of the two curves is due solely to the more or less regular steps by which the percentages of the total

increase and decrease, and has nothing to do with the small percentages of predominately A-M words.



### Clusters

Whether a BW is A-M letter weighted, N-Z weighted or equally weighted, there occur special BWs most, or all, of whose letters from one half of the alphabet (and in some cases from both halves) occur as a single cluster. Six adjacent N-Z letters are to be found in PROTOTheme, seven in UNTROUNced, and a maximum of nine in the twelve-letter PROSOPOTocia. The number of words from which to choose is much smaller when A-M clusters are considered. These include GILGuy, MAMMut, KILEys (and sKEILy) and WEEKLy with four-letter clusters, tusKLIKE, twILIGHT, stELLIFy and stICKILy with five-letter clusters, and unSEEMLILy with a six-letter cluster. In the fourteen-letter unrHyTHMICALLY seven of the eight A-M letters occur together. The sixteen-letter poLyPhyLEtICALLY and the twenty-letter IntErCrystALLizAtIon each have nine A-M letters, the most found in any BW, though in neither do they occur as a cluster.

Some BWs with equal numbers of letters from either half of the alphabet are extra-special in that the A-M letters make up the first half of the word and the N-Z letters the second half: GLArry, MAHzor, JEALousy, EMICtory and HEMELytron. In others, the roles are reversed: oxtAIL, tyPHIC, runKLE, surFLE, outWEIGH, proxIMAL, snowLIKE and soupLIKE.

### Truly Balanced

Following in the tradition of the Orwellian adage that "all animals are equal but some animals are more equal than others", so it is that all BWs are balanced but some BWs are more balanced than others. The letters comprising certain BWs are distributed in such a way that the sum of those in the left half of the word

is equal to the sum of those in the right half. Thus we have a letter-value equation and a Truly Balanced Word (TBW). In the case of the eight-letter EXPIATOR (total sum 108) we have  $E+X+P+I = A+T+O+R$  because  $5+24+16+9 = 1+20+15+18 = 54$ . Because BWs with six, ten, fourteen or eighteen letters sum to odd numbers, the search for TBWs is restricted to BWs with integral multiples of four letters. Such TBWs included LOVE, CHRYSLER (car), FLOURISH, OPERATOR, PUNCTUAL, ABSTRUSENESS, PRESERVATION and UNCONVENTIONALLY. Some TBWs, split into their equally-weighted halves, produce two new BWs: LOSH into LO and SH, EYESTONE into EYES and TONE, FISTNOTE into FIST and NOTE, HYPEROPE into HYPE and ROPE, PLAYPENS (Web3) into PLAY and PENS, SPARTANS into SPAR and TANS, and SHARPSHOOTER into SHARPS and HOOTER.

### Balanced Pairs

A select group of BWs are wholly constructed from balanced pairs of letters, those pairs which occur symmetrically in the alphabet (see Introduction). These Balanced Pair Words (BPWs) include REVIVE with the pairs IR and VE (twice), FLOURISH with FU, LO, RI and SH and the ten-letter OVERSLIGHT (and its transposal OVERLIGHTS) with VE, LO, IR, GT and SH. In some cases the balanced letter pairs are arranged in a pattern within the word; in WIZARD the pairs WD, IR and ZA have a symmetrical arrangement, as also have the pairs in HOVELS and HIVERS. HOVELS goes a stage further in the symmetry stakes, the individual letters of its two halves, H to O to V and E to L to S exhibiting seven-step sequences. In other cases the pairs occur in sequence, as SH, IR and AZ in SHIRAZ and the same three pairs in reverse in ZARISH (in OED, under Tsarish). Other such pair sequence words include EVOLVE, SHRIVE (and its transposal SHEVRI), and the eight-letter RIVERISH. As well as being a BPW, RIVERISH is also a TBW ( $R+I+V+E = R+I+S+H = 54$ ). In contrast to all these BPWs, certain BWs are devoid of even a single balanced pair of letters; the longest of these include INCAUTIOUSNESS and PLEASURELESSLY.

### Partners in Balance

Each partner of some word pairs is constructed from the letters which balance those of its partner word. Such pairs can be called Balanced Partners (BPs), the two words acting numerically as a single balanced unit with an average letter weight of 13.5. The words themselves are not necessarily balanced; they need not even be an even number of letters. BLIP (Web3) and YORK, with a combined total of 108, are balanced partners, the letters BLIP having their balanced counterparts in YORK. In this instance the balanced letter pairs occur in matching positions in each word. This is also true for ALL-ZOO and WRY-DIB, but, by reversing the order in which the pairs occur, WRY finds another partner in BID. WILD-WORD and PORN-MILK are similarly partner reversals.

Most balanced partners have at least some of their balancing letters in matching positions. In GROOVY and BILLET the positions match, apart from the first and last pairs which are reversed, whilst in LIFTS and ROUGH the last three pairs match. However, in just a few partners, such as ZION-MARL and BILK-ROPY, none

of the pair positions match and into this last category also falls that rarely encountered sequel to "Mutiny On The Bounty", namely "The BLIGH STORY".

So far we have avoided partners which themselves include one or more pairs of balanced letters. The LO pair occurs in both HOLLY and BOOLS (partner reversals), in WOOL-DOLL and GOLF-LOUT, and is joined by the VE pair in GLOVES-LOVETH (see the Bible) where both partners encapsulate LOVE, itself a BW.

To conclude this section, we bring you a romantic story entitled "The Case of the Reverse-NONREVERSE Partners". It all started at a dance with a pretty BW called POLK ('to polka') who was composed of balanced letter pairs which were symmetrically arranged! In our usual gallant manner, we proceeded to construct a partner reversal for the lonely lady and came up with...POLK! Yes, her soul mate! POLK and POLK were made for each other. Next, the handsome POLK half of this unlikely duo was persuaded to perform an exhibition 'twist', enabling us matchmakers to construct a lovely partner reversal for his alter ego KLOP and, in this, we succeeded beyond our wildest dreams. The resulting tautonymic twosome intertwined and became KLOP-KLOP (Web3, variant of clop-clop), a BW which, as it happens, could well be applied to our polkaing pair! The story ends when, to round off the evening, we discovered a clever BW act, an adjective and a noun, who conjured up a WIZARD WIZARD for the cabaret.

### One, Two, Three

In the Truly Balanced section, we saw how certain BWs could be split, their halves forming two new, equally-weighted BWs such as SHARPSHOOTER = SHARPS + HOOTER. Some other BWs, when split, form two new BWs which are not equally-weighted, e.g., SLUBBY = SLUB + BY and EYESTRAINS = EYES + TRAINS. There exists a third class of BWs, each of which incorporates a new BW which is not so obvious. The two parts of this new BW are separated by an even number of intervening letters, the removal of which serves to bring together the ingredients which form the new, hitherto split, BW. At its simplest this involves the removal of a single balanced letter pair. For example, the removal of ZA from our friend the WIZARD forms the BW WIRD (WIZARD - ZA = WIRD). Similarly, SHIVER - VE = SHIR and QUINOLINES - OL = QUININES. A two-stage removal is also possible: VIROLE - IR = VOLE and VOLE - OL = VE (or VIROLE-VIRE-VE). Four and six letters, respectively, are removed in DOZINESSES - ZINE = DOSSES and MARIOLATROUS - OL-ATRO = MARIUS. Finally, by doing the impossible and decompressing NONCOMPRESSION we are able to remove an eight-letter BW from within a fourteen-letter BW to reveal a six-letter BW, NONCOMPRESS - COMPRESS = NONION.

### A Can of Worms

Some BWs play a particular role in the field of Word Worms, a logological concept introduced in the August 1993 **Word Ways** by the editor. The idea is to trace out words from a three dimensional alphabet template. The model is a 3x3x3 lattice of 27 equally

sized cubes, a central blank cube surrounded by its 26 alphabet neighbours. These are arranged in three layers as follows:

A B C	J K L	R S T
D E F	M . N	U V W
G H I	O P Q	X Y Z

The result for a particular word is a word worm, a series of connected straight lines in three dimensional space, rather like molecular structures. The shape of the worm depends on the length of the lines, their relative positions and the angles between them. Even single-letter words make a worm; any word of four or more letters almost certainly has its unique geometric worm shape! Such a system of worm casts offers immense scope - partially-interlocking (mating?) worms, foreign language worms and, in the future, maybe even some form of three-dimensional worm lexicon.

The BW ROIL forms a rectangular worm, FOUL and VIER form variations of a rhomboid, EYES and VIVA resemble bow ties, being worms which intersect internally as well as forming closed loops ("biting their own tails"), whilst TAXI traces out two-thirds of the edge of a tetrahedron. The majority of words form worms which have the same number of line segments as letters in the word, but the worms of some words fold back on themselves one or more times, forming worms made up of fewer observable lines than the number of letters in the word. Two-letter BWs (SH, ZA, BY etc.) form single-line worms; for example, H folds back along the line taken by S. Other fold back worms include those constructed from longer BWs in which the balanced letter pairs are either in sequence or symmetrically arranged, the first forming spiked worms and the second out-and-back worms. LOVE, for example, folds back twice to its tail forming a double spike, and SHRIVE forms a triple spike, whilst our friendly WIZARD has a three-line out-and-back configuration. Thus these three particular worms have only half the number of lines as letters in the words from which they are derived.

Some worms, formed by BWs such as EYES and VIVA, bite their own tail, forming a closed loop. Such closed-loop worms may or may not intersect internally; the number of closed-loop worms devoid of internal intersections decreases as word length increases. Three of the seven examples of 14 letters or more happen to be BWs: HYSTEROTHECIUM (Web3), SEMIBITUMINOUS and ULTIMOGENITARY.

\* \* \*

So far, we have been concerned with the various weighted arrangements of the letters in BWs. Let us now identify those BWs having other interesting logological properties. To start with, they include many **isograms** (words in which every letter is different), the longest ones being SULPHOVINATE and UNHOSPITABLY. Another twelve-letter BW, ISOVOLUMINAL, is the longest in which consonants and vowels alternate, unless we admit the sixth vowel Y, in which case we find the fourteen-letter SERONEGATIVITY (Web 3). The relatively rare doubled letter pairings II and HH are present in OPIISM, TOXIINFECTIOUS and ROUGHHOUSING, whilst the ten-letter UNTATTOED is the only BW with two adjacent pairs

of doubled letters. The only BW composed exclusively of Roman numeral letters appears to be IXIL, although LIXIVE, a chemical term, almost makes it. A few BWs consist entirely of letters having vertical symmetry - AMOY, MATT, MAYO, VIVA, TAXI, MAMMUT - but there are no BWs with all letters having horizontal symmetry.

BWs include their fair share of **AEIOU words** (each of the five vowels occurs once only):

8 letters: OUTRAISE (OED), SAUTOIRE (Funk & Wagnalls)

10 letters: AUTOSEXING (Web3), EQUISONANT, MOUSTERIAN, PEPTO-NURIA, PLESIOSAUR, VASIFEROUS

12 letters: FORMULARIZER (Web3), MOUNTAINLESS, MYRSINACEOUS, NONPURGATIVE, NUGATORINESS, PORTLIGATURE (The Complete Word Games Dictionary), PRECARIOUSLY, SULPHOVINATE

14 letters: LARYNGOFISSURE, PASSIONFULNESS, SUPERSONICALLY (Web 3), ULTRAMODERNIST

16 letters: COUNTERTHWARTING

There being many BW **transposals**, we will confine ourselves to those letter sets which produce the most for a given word length:

4 letters: TANS, ANTS, STAN, NATS, SANT

6 letters: ENTERS, ENTRES (OED), ERNEST, NERTES (Web3), NESTER, RENETS, RENTES, RESENT, SENTRE, SERTEN (OED), STREEN, STRENE, TENSER, TERNES

8 letters: PRONATES, PROTEANS, PATERSON, PATRONES, OPERANTS, PARSONET (the last two being TBWs), plus another set of six

10 letters: NEPHROLOGY, PHRENOLOGY, plus three other sets

12 letters: PHYTOGENESIS, PYTHOGENESIS

16 letters: IMPRESSIVENESSES, PERMISSIVENESSES

There appear to be no balanced **palindromes**, LUNULA being a near-miss. Internal palindromic sets of three to five letters are not UNCOMMON, but those with six or seven letters are rare. ESSE is by far the most common four-letter set, especially in words like the BW PERSUASIVENESSES. The most common five-letter sets are based on the RE\*ER configuration, where \* is usually S or V (PRESERVATION, REVERIFY). There are three five-letter sets which consist of only two different letters, those in PHOTOTONIC, HOMOMORPHIC and MISPOSSESSED. Two unusual sets of this length are found in AMYLOLYTIC and HOMOEOMEROUS. Three BWs have six-letter sets, REGRETTERS and BRUNETTENESS (note overlapping ENE) and UNDERPRESSER (note overlapping ERPRE). Seven-letter sets are the RAREST, found only in EXCITOMOTION and MISINTERPRETER (note overlapping RETER and ISI). In the latter, all but M and N are palindromically involved!

Palindromic sets in some BWs have special ATTRIBUTES regarding either their relative positions or their content. Some sets abut, as in NONRESERVE (and its transposal NONREVERSE), HYPERPARASITISMS and IRRITATINGLY. Other BWs have sets at their beginning and end, such as ELETROLYSIS and METEMPSYCHOSIS. The set in UNDERPRESSER is a transposal of that in REPERCUSSION. Other sets consist of balanced letter pairs: COLLOQUIZE, UNCOLLOQUIALLY, MAZZARDS and IRRITATINGLY.

Most BW **reversals** have four letters: AXON-NOXA, GIRT-TRIG, HOOP-POOH, KLOP-POLK, KNIT-TINK, NOTE-ETON, OIKS-SKIO (OED), RAPS-SPAR, SLAV-VALS (Web3) and STAN-NATS. Only three six-letter ones were found: LEVINS-SNIVEL, SNIPER-REPINS (OED) and SINNET-TENNIS.

Balanced whole word **tautonyms** are few. Each half of these words, of COURSE, sums to a whole number so this excludes all the BWs with 6, 10, 14 etc. letters which have odd number totals. LOLO, ZAZA (1938 film), BY-BY, FUFU (OED), SH-SH and AZAZ (Bible) are duplications of two-letter BWs. Eight-letter tautonyms are represented by KLOP-KLOP which we met earlier, and by POOH-POOH, used in the context 'don't poohpooh the idea'. TORA! TORA! TORA!, a 1970 film title, is a triple BW tautonym.

Some BWs start with tautonymic letter sets: PIPINGLY, UNUNITED, KUKUPA, KOKOON. Others end with such sets: SILVERER (and SLIVERER). OUTSINGING, OVERSWINGING, PHTHISIS. Others have internal sets, such as LIVERERS, PREREQUISITE, PETITION, ANTHROPOPOLITH (OED), SAURURACEOUS, QUININES, CREATOTOXISM and MISPOSSESSED. PHOTOTONIC and HOMOMORPHISM offer a choice of tautonymic sets from within their palindromic arrangements. Second-order reduplications, in which one letter in the second half of a word differs from the corresponding letter in the first half, are represented by RAZZLE-DAZZLE.

BWs are the SOURCE of a number of SUPERB **antonyms** including SUMMERWARD and WINTERWARD. Another pair, HOMOEOMEROUS and HETEROMEROUS, are concerned with the arrangement of algal cells in the thallus of lichens. Two other perfect antonym pairs, REVERSIBLY-IRREVERSIBLY and ROTATIONALLY (Web3)-IRROTATIONALLY, depend upon the exclusion and inclusion of the IR balanced letter pair. Other near-perfect pairs are ARREST-RESUME, BOYISHNESS-MATURENESS and SUCCESSIVELY-NONCONSECUTIVELY. There are few noteworthy BW **synonyms**, NOTE-TONE being the best.

Finally, we examine some BW configurations which might well qualify for inclusion in a GEOMETRY book: Pyramid Words, a Word Square, and a Word Circle.

**Pyramid Words** (words with multiples of letters in the frequencies 1, 1:2, 1:2:3, 1:2:3:4 etc.) are rare in the world of BWs which, having an even number of letters, immediately rules out the patterns 1 and 1:2. SENSES (and its transposal, NESSES), KOKOON and NONION were the only ones found, all with the pattern 1:2:3. As ALWAYS, there are near misses, the ten-letter pyramid word 'rereserves', for example, summing to 134, just one short of the required 135! A slight recompense came in the form of ORTHOPYRAMID, a BW incorporating the word 'pyramid'.

M U S A            SQUARE being a BW, it is appropriate that we  
U R A N            should construct a word square composed exclusively  
S A N T            of BWs. MUSA is a herb genus, URAN a monitor lizard,  
A N T S            and SANT (variant of 'sunt') is the pod of the acacia  
                     tree. Of interest to the NATURALIST, this square PRO-  
VIDES a biological theme of two plant BWs and two animal BWs!



V                    When the letters of the two BWs VOLE and VIRE  
 E            O        (an arrow feathered so as to acquire a **rotary** mo-  
 R            L        tion!) are arranged clockwise in a circle, in order,  
                          the circle can act as an anticlockwise SOURCE of  
 I            E        four Truly Balanced Words. The last two letters  
                          of each TBW form the first two letters of the succeed-  
                          ing TBW. STARTING with the letter V at the top  
 of the circle, and proceeding in an anticlockwise direction, we  
 can UNDO the OVERLAPS to reveal, in order, the following TBWs:

VERI a centipede  
 RIVE to tear, to be split  
 VELO a velocity of one foot per second  
 LOVE

This circle has the added delight that, again anticlockwise, it  
 spells 'I'VE LOVER'. It also transposes to 'I REVOLVE'. All of  
 which goes to show that LOVE makes the words go round!

### THE STORY OF WEBSTER'S THIRD

Remember the firestorm of criticism that accompanied the  
 publication of Webster's Third in 1961? Although the diction-  
 ary was generally praised by professional linguists and  
 lexicographers, it was raked over the coals by journalists,  
 writers and self-appointed mavens of good usage, particularly  
 with regard to its paucity of labels identifying words as  
 slang, colloquial or substandard. To what extent should  
 a dictionary prescribe language use as well as merely report  
 on actual usage without editorialization? *The Story of Web-  
 ster's Third* (Cambridge University Press, 1994; \$29.95) by  
 Herbert C. Morton is a fascinating account of the world of  
 dictionary-making which, like linguistics (see *The Linguistics  
 Wars*, reviewed Nov 1993), seems to be cursed with polemics  
 and partisanship. (Is this because every writer fancies  
 himself a lexicographer? As W.N. Francis once said "No one  
 would ask an airline pilot, no matter how skillful, to review  
 an encyclopedic work on aerodynamics.") The book places  
 the Webster's Third controversy in a broader setting:

- the history of the Merriam-Webster company
- a mini-biography of the Third's editor-in-chief, Philip Gove
- the science (and art) of dictionary-making.

To get an overview of lexicography during the last one hun-  
 dred years, two books are must-reads: *The Story of Webster's  
 Third* and *Caught in the Web of Words* (1977), the latter  
 the story of James Murray, the creator of the Oxford English  
 Dictionary.