A Mathematical Relationship between the Hindu-Arabic Numeral System and the English Language

Jack A. Fuller, PhD
Professor of Decision Analysis, College of Business and Economics
West Virginia University, PO Box 6025, Morgantown, WV 26506-6025
United States of America

Kori N. Woodrum
College of Business and Economics, West Virginia University
PO Box 6025, Morgantown, WV, USA 26506-6025
United States of America

Abstract

This current research effort will explore one perceived mathematical relationship between the English language used in the United States and the Hindu-Arabic Numeral System. The examination looks at two identified factors to determine if they are in correspondence and the nature of the relationship. The two factors are the number of syllables necessary to enunciate each cardinal number in American English and the Hindu-Arabic number itself. The analysis examines in detail the denoted relationship in lower-valued sets of numbers from one through 100 and randomly-selected higher valued sets of ten-digit numbers in the thousands and millions. The outcome identifies the algorithm that ties the two factors together. The purpose of the research is to examine one aspect of the mathematical architecture upon which the American English system is structured.

Keywords: English language, Hindu-Arabic Numerals, Arabic numerals, numerals, European digits, Mathematics-English relationship, mathematical architecture

INTRODUCTION

There appears to be an unusual but consistent relationship between the English language used in the United States and the Hindu- Arabic Numeral System, also known

as Arabic numerals, or European digits (in Unicode). [1] The Arabic numeral system is a decimal system using the following cardinal digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. [2]

PROPOSITION

1. Start with any number that follows a number with a nine as the last digit.
2. Count the number of cumulative syllables used to describe the numeral words in the following set of ten numbers.
3. The cumulative total number of syllables necessary to enunciate each number in sequence used in any set of ten digits that ends with a nine as the last digit will be evenly divisible by ten.

For example, when counting the numbers one through nine (*N.B.* The number preceding the syllable name refers to the number of cumulative syllables necessary to reach that number. The second entry is the syllable name when reaching that cumulative count.)

1. One 2. Two 3. Three 4. Four 5. Five 6. Six 7. Se- 8. ven 9. Eight <u>10. Nine</u>

As shown, there are ten syllables used in counting from one to nine.

Continue with this pattern in counting from the number ten (the next number following our last number containing a nine as the last digit) to nineteen.

11. Ten 12. E- 13. le- 14. ven 15. Twelve 16. Thir- 17. teen 18. Four- 19. teen

20. Fif- 21. teen 22. Six- 23. teen 24. Se- 25. ven- 26. teen 27. Eigh- 28. teen

29. Nine- <u>30. teen</u>

It takes a cumulative total of thirty syllables to state the numbers from one to nineteen: ten syllables to reach the number nine and an additional twenty syllables to reach the number nineteen. Each grouping of cumulative syllables is evenly divisible by ten.

The following sets of ten numbers further validate the proposition:

<u>20s</u>

31. Twen- 32. ty 33. Twen- 34. ty- 35. one 36. Twen- 37. ty- 38. two

39. Twen- 40. ty- 41. three 42. Twen- 43. ty- 44. four 45. Twen- 46. ty-

47. five 48. Twen- 49. ty- 50. six 51. Twen- 52. ty- 53. se- 54. ven

55. Twen- 56. ty- 57. eight 58. Twen- 59. ty- <u>60. nine</u>

30s

61. Thir- 62. ty 63. Thir- 64. ty- 65. one 66. Thir- 67. ty- 68. two 69. Thir- 70. ty- 71. three 72. Thir- 73. ty- 74. four 75. Thir- 76. ty- 77. five 78. Thir- 79. ty- 80. six 81. Thir- 82. ty- 83. se- 84. ven 85. Thir- 86. ty- 87. eight 88. Thir- 89. ty- <u>90. nine</u>

40s

91. For- 92. ty 93. For- 94. ty- 95. one 96. For- 97. ty- 98. two 99. For-

100. ty- 101. three 102. For- 103. ty- 104. four 105. For- 106. ty- 107. five 108. For- 109. ty- 110. six 111. For- 112. ty- 113. se- 114. ven 115. For- 116. ty- 117. eight 118. For- 119. ty- <u>120. nine</u>

50s

121. Fif- 122. ty 123. Fif- 124. ty- 125. one 126. Fif- 127. ty- 128. two 129. Fif- 130. ty- 131. three 132. Fif- 133. ty- 134. four 135. Fif- 136. ty- 137. five 138. Fif- 139. ty- 140. six 141. Fif- 142. ty- 143. se- 144. ven 145. Fif- 146. ty- 147. eight 148. Fif- 149. ty- <u>150. Nine</u>

Continuing the calculation forward to further sets of ten numbers brings the same result. (*e.g.* There are a total number of 30 cumulative syllables required to enunciate the numbers in each ten-number sequence ending in sixty-nine, [or 89, or 99] and 40-syllables to articulate the ten cardinal numbers in the sequence ending in 79. As with all previous examples above, the total number of cumulative syllables necessary to enunciate each number in sequence in a set of ten numbers, that ends with a nine as the last digit, is evenly divisible by ten.)

The results are the same if much larger sets of cardinal numbers are used. For example, begin with the random number 11, 320 (the number immediately following a number with nine as its last digit: *i.e.,* 11,319) and count the number of cumulative syllables required to state each number in sequence through to the number 11,329:

(***N.B.*** – and omitting the cumulative number of syllables required to reach the number 11,319)

11,320s

1. E- 2. le- 3. ven- 4. thou- 5. sand- 6. three- 7. hun- 8. dred- 9. twen- 10. ty 11. E- 12. le- 13. ven- 14. thou- 15. sand- 16. three- 17. hun- 18. dred- 19. twen- 20. ty- 21. one 22. E- 23. le- 24. ven- 25. thou- 26. sand 27. three- 28. hun- 29. dred- 30. twen- 31. ty- 32. two 33. E- 34. le- 35. ven- 36. thou- 37. sand- 38. three- 39. hun- 40. dred- 41. twen- 42. ty- 43. three 44. E- 45. le- 46. ven- 47. thou- 48. sand- 49. three- 50. hun- 51. dred- 52. twen- 53. ty- 54. four 55. E- 56. le- 57. ven- 58. thou- 59. sand- 60. three- 61. hun- 62. dred- 63. twen- 64. ty- 65. five 66. E- 67. le- 68. ven- 69. thou- 70. sand- 71. three- 72. hun- 73. dred- 74. twen- 75. ty- 76. six 77. E- 78. le- 79. ven- 80. thou- 81. sand- 82. three- 83. hun- 84. dred- 85. twen- 86. ty- 87. se- 88. ven 89. E- 90. le- 91. ven- 92. thou- 93. sand- 94. three- 95. hun- 96. dred- 97. twen- 98. ty- 99. eight 100. E- 101. le- 102. ven- 103. thou- 104. sand- 105. three- 106. hun- 107. dred- 108. twen- 109. ty- 110. Nine

1,000,170s

A total of 100 cumulative syllables were used for the sequence of 1,000, 170 through 1,000,179.

7,777,770s

A total of 230 cumulative syllables were needed to enunciate each number in the 10-number set beginning with 7,777,770.

As consistently demonstrated in the above examples, whether or not using smaller-valued or larger-valued sequences, the total number of cumulative syllables necessary to complete any sequence of ten numbers in which the final number has a last digit of 9 is evenly divisible by ten.

The proposition proffered above has now been shown by multiple examples to be correct. To repeat this proposition:

1. Start with any number that follows a number with a nine as the last digit.

2. Count the number of cumulative syllables used to describe the numeral words in the following set of ten numbers.

3. The cumulative total number of syllables necessary to enunciate each number in sequence used in any set of ten digits that ends with a nine as the last digit will be evenly divisible by ten.

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