Morse code vs. Ternary Huffman

February 6, 2023

1. Take 3 minutes to quietly analyze the comparison of Morse code and a ternary Huffman code. Write down any observations here.

2. How many words of each length are there?

ℓ	1	2	3	4	5	6	7
Morse							
Ternary Huffman							

3. If you were born in January through June, compute the average length of the Morse code. If you were born in July through December, compute the average length of the ternary Huffman code.

4. What is the average length of the code you *didn't* compute? (Ask a classmate.)

5. What do you notice about the average lengths compared to the length of the longest codeword?

6. Given the physical limitations of the transmission of an electrical/visual pulse, i.e. $\Sigma = \{\bullet, -, space\}$, how well do you think this would this Huffman code work in practice?

E	0.12702	2	2
T	0.09056	2	2
A	0.08167	3	2
O	0.07507	3	2
I	0.06966	3	2
N	0.06749	3	3
S	0.06327	4	3
H	0.06094	4	3
R	0.05987	4	3
D	0.04253	4	3
L	0.04025	4	3
C	0.02782	4	3
U	0.02758	4	3
M	0.02406	4	3
W	0.0236	5	3
F	0.02228	5	4
G	0.02015	5	4
Y	0.01974	5	4
P	0.01929	5	4
B	0.01492	5	4
V	0.00978	5	5
K	0.00772	5	5
J	0.00153	5	6
X	0.0015	5	6
Q	0.00095	5	7
Z	0.00074	5	7

Figure 1: English letter frequency (second column) compared to Morse code lengths with space (third column) and an optimal ternary Huffman code (rightmost column). Courtesy of Vic Reiner.