

30 December 1954

Dr. Samuel S. Wilks
 1 Campbellton Circle
 Princeton, New Jersey

Dear Sam:

Thank you very much for your note of 20 December. I realize that you wrote it under a considerable handicap if you picked up some sort of a bug in Washington, for I'm just getting over a rather difficult time with it myself.

I thought I'd have your note typed up and enclose herewith a copy thereof. The answer you got is off a bit, it seems quite clear, because of a rather simple but unfortunate error in arithmetic. When you multiplied $(.05)(.09)(.06)(.10)(.02)$ you put down the answer as 648×10^{-10} when it should have been 6480×10^{-10} .

The proper correction has been made, however, and unless you should want to go into this with further refinement, don't bother with it at all. The correction, I take it, would lead you to wish to modify your statement "If the word BACON were actually found in this search, I would regard it as a significant event," for the lower limit is now .013 instead of .0013. However, should you wish to write me further, why not consider the 100,000 lines as being in the form of a circular scroll, so that you could consider the probability that BACON will appear in spaces 1-5, 2-6, 3-7, ... up to 99,996-100,000, 99,997-1, 99,998-2, 99,999-3, and 100,000-4. In short you could consider there being a total of 100,000 places for the word to appear instead of 99,996. Of course, this latter statement cannot be strictly true, because suppose the word BACON happens to appear in spaces 1-5; then obviously it cannot appear in spaces 2-6, 3-7, 4-8, nor 5-9. But for my purposes perhaps one should disregard this exclusivity factor and just say that we will assume there are 100,000 spaces in which the word BACON could appear. It makes the calculation a bit easier.

What happens, now, if (like most of the Baconians) I say that any permutation of the five letters A, B, C, N, and O will be counted as an appearance of the word BACON? obviously, the probability goes up by a factor of 120, so that the chances of finding BACON or some permutation of A, B, C, N, and O are much better now than before. Of course I'll find many "BACONS" that way. I'll find many more, also, if I'm allowed to juggle any permutation and combination of these five letters, such as BA and CON; or AB, ON, and C; or B, AC, and NO, etc, etc.

Well, don't let me trouble you with such speculations. What I ought to do is get out a little handbook on probability and statistics for Shakespeare-Bacon cryptographers!

With best wishes to you for the New Year and with reiterated thanks, I am,

Sincerely,

WILLIAM F. FRIEDMAN

KNCL:
a/s