

When using stream ciphers with one key and no salt, they can be thought of as a One-time pad with key reuse. Thereafter algorithm is subject to the same attack as OTP:

$$E(A) = A \text{ xor } C$$

$$E(B) = B \text{ xor } C, \text{ where } C - \text{key, } A \text{ and } B - \text{plaintext, } E(A) \text{ and } E(B) - \text{ciphertext.}$$

Then:

$$E(A) \text{ xor } E(B) = (A \text{ xor } C) \text{ xor } (B \text{ xor } C) = A \text{ xor } B \text{ xor } C \text{ xor } C = A \text{ xor } B$$

This means that to decrypt message B , it is enough to pick the right message A . This can be done by iterating over words and n-grams since we know that this is a natural language. When we cross them with $A \text{ xor } B$ we should get the same readable text.

For our ciphertext, we can make the assumption that this is a poem because it has an author and is divided into verses. Therefore, to decrypt it, it is necessary to proxy all lines with one line. Then, if we choose this line correctly, we should get the meaningful text in the remaining 15 lines. Since there are 15 lines combined with one, the probability of getting a meaningful text in 15 lines at once with an incorrectly guessed line is quite small. To iterate over the lines you can use ready-made [datasets](#) or parse some [data source](#) containing a lot of poems. Next, it is enough to check all the available poems until we find a suitable one. Decrypted poem:

*If you can make one heap of all your winnings
And risk it on one turn of pitch-and-toss,
And lose, and start again at your beginnings
And never breathe a word about your loss;
If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And so hold on when there is nothing in you
Except the Will which says to them: 'Hold on!'*

*If you can talk with crowds and keep your virtue,
Or walk with Kings — nor lose the common touch,
If neither foes nor loving friends can hurt you,
If all men count with you, but none too much;
If you can fill the unforgiving minute
With sixty seconds' worth of distance run,
Yours is the Earth and everything that's in it,
And — which is more — you'll be a Man, my son!*

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