

A simple test for monoalphabetic substitution

English: MISSISSIPPI
Monoalphabetic: RDFDFDFDOD
Vigenere : PQJLLAJBSXZ

In English or monoalphabetic encrypted text we observe:

$$p_{AA} + p_{BB} + p_{CC} + \dots + p_{ZZ} \approx .027$$

While in polyalphabetic cyphertext we should observe:

$$P(\alpha\alpha \text{ occurs in random cyphertext}) = \frac{1}{26} \approx .038$$

We should note (of course) that this only works for reasonably large amounts of text.