Playfair Key Matrix

- a 5X5 matrix of letters based on a keyword
- fill in letters of keyword (sans duplicates)
- fill rest of matrix with other letters
- e.g., using the keyword MONARCHY

M	O	N	A	R
C	H	Y	B	D
E	F	G	I/J	K
L	P	Q	S	T
U	V	W	X	Z

Encrypting and Decrypting

- plaintext is encrypted two letters at a time
  1. if a pair is a repeated letter, insert filler like 'X’
  2. if both letters fall in the same row, replace each with letter to right (wrapping back to start from end) S -> T, T -> L
  3. if both letters fall in the same column, replace each with the letter below it (again wrapping to top from bottom) M -> C, E -> L
  4. otherwise, each letter is replaced by the letter in the same row and in the column of the other letter of the pair

5. **Decrypting of course works exactly in reverse. Can see this by working the example pairs shown, backwards.**

Playfair Encryption

Plain Text: "INSTRUMENTSZ"

Encrypted Text: GATLMZCLRQTX

Encryption:

I –> G

N -> A

S -> T

T -> L

R -> M

U -> Z

M -> C

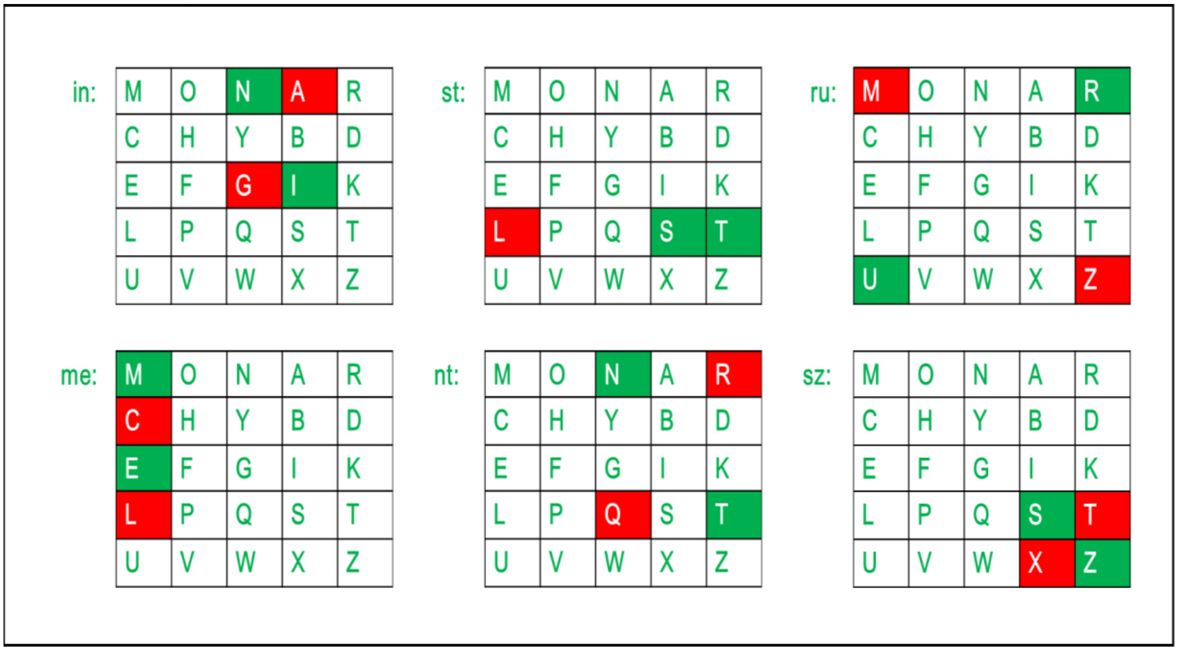
E -> L

N -> R

T -> Q

S -> T

Z -> X



in:

M	O	🟩N	🟥A	R
C	H	Y	B	D
E	F	🟥G	🟩I	K
L	P	Q	S	T
U	V	W	X	Z

st:

M	O	N	A	R
C	H	Y	B	D
E	F	G	I	K
🟥L	P	Q	🟩S	🟩T
U	V	W	X	Z

ru:

🟥M	O	N	A	🟩R
C	H	Y	B	D
E	F	G	I	K
L	P	Q	S	T
🟩U	V	W	X	🟥Z

me:

🟩M	O	N	A	R
🟥C	H	Y	B	D
🟩E	F	G	I	K
🟥L	P	Q	S	T
U	V	W	X	Z

nt:

M	O	🟩N	A	🟥R
C	H	Y	B	D
E	F	G	I	K
L	P	🟥Q	S	🟩T
U	V	W	X	Z

sz:

M	O	N	A	R
C	H	Y	B	D
E	F	G	I	K
L	P	Q	🟩S	🟥T
U	V	W	🟥X	🟩Z

Playfair Decryption

Plain Text: "gatlmzclrqtx"

Decrypted Text: instrumentsz

Decryption: (red)-> (green)

ga -> in

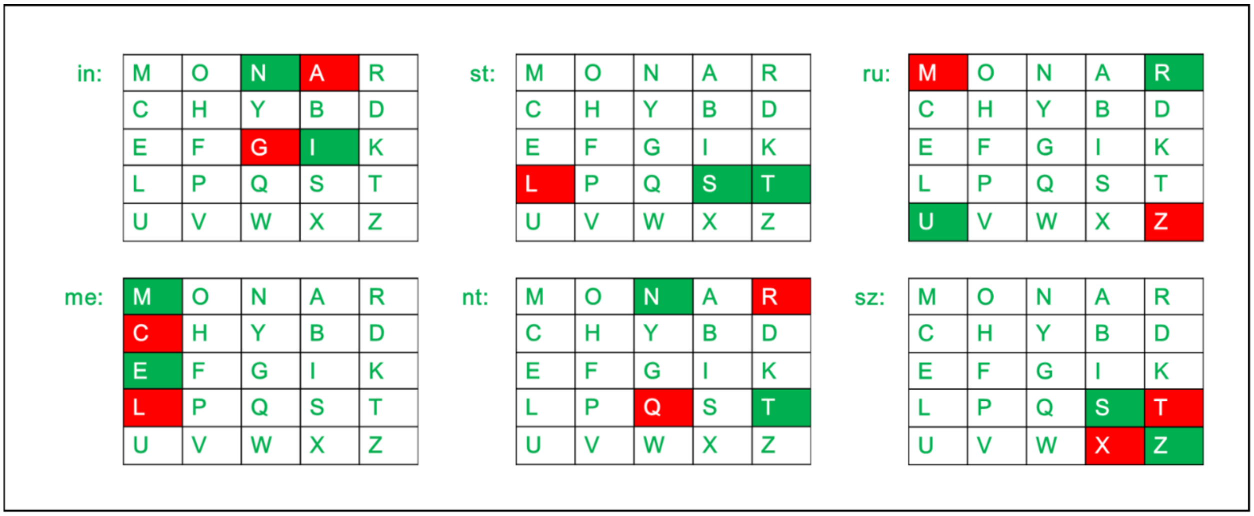
tl -> st

mz -> ru

cl -> me

rq -> nt

tx -> sz



in:

M	O	🟩 N	🟥 A	R
C	H	Y	B	D
E	F	🟥 G	🟩 I	K
L	P	Q	S	T
U	V	W	X	Z

st:

M	O	N	A	R
C	H	Y	B	D
E	F	G	I	K
🟥 L	P	Q	🟩 S	🟩 T
U	V	W	X	Z

ru:

🟥 M	O	N	A	🟩 R
C	H	Y	B	D
E	F	G	I	K
L	P	Q	S	T
🟩 U	V	W	X	🟥 Z

me:

🟩 M	O	N	A	R
🟥 C	H	Y	B	D
🟩 E	F	G	I	K
🟥 L	P	Q	S	T
U	V	W	X	Z

nt:

M	O	🟩 N	A	🟥 R
C	H	Y	B	D
E	F	G	I	K
L	P	🟥 Q	S	🟩 T
U	V	W	X	Z

sz:

M	O	N	A	R
C	H	Y	B	D
E	F	G	I	K
L	P	Q	🟩 S	🟥 T
U	V	W	🟥 X	🟩 Z