Symmetry of Position

Each row of a particular cipher alphabet is a circular shift of any of the others. Hence, if the relative position of a pair of characters is known in one row, determination of either in another row allows one to fix the position of the other character in that row.

Suppose that as the result of an analysis based upon considerations of frequency, we have assumed the following values in a given cryptogram:

Plain	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Cipher 1					G										Y					V						
Cipner 2					N										G					P						
Cipher 3					L										B					I						
Cipher 4					W										I					Q						

Note that the letter G is common to cipher alphabets 1 and 2. In alphabet 2, we note that N occupies the 10th position to the left of G, and the letter P occupies the 5th position to the right of G. We may therefore place these letters, N and P, in their proper positions in alphabet 1, the letter N being placed 10 letters before G, and the letter P, 5 letters after G. Thus:

Plain	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Cipher 1					G					P					Y					V	N					
Cipher 2					N										G					P						
Cipher 3					L										B					I						
Cipher 4					W										I					Q						

Using the same G, we can also map Y and V into alphabet 2:

Plain	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Cipher 1					G					P					Y					V	N					
Cipher 2				V	N										G					P					Y	
Cipher 3					L										B					I						
Cipher 4					W										I					Q						

Similarly, we can use symmetry of position to compare alphabets 3 and 4:

Plain	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Cipher 1					G					P					Y					V	N					
Cipher 2				V	N										G					P					Y	
Cipher 3					L					W					B					I					Q	
Cipher 4					W					B					I					Q						L