

Move structure: more permutations

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Move structure

When T is repetitive, $\text{BWT}(T)$ is “runny”

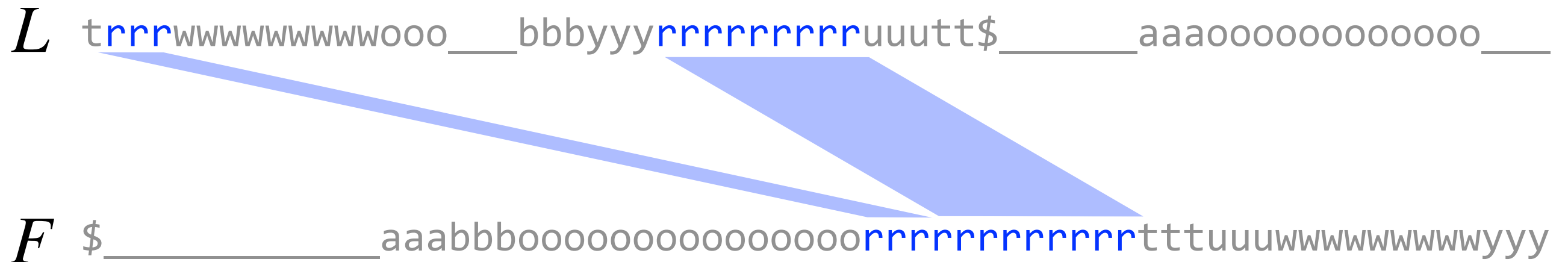
row_row_row_your_boat
row_row_row_your_boat
row_row_row_your_boat\$

↓ BWT

trrrwwwwwwwwwooo__bbbyyrrrrrrrrrrruutt\$__aaoooooooooooo__

Move structure

$LF[i]$ is also “runny”



If $BWT[q] = BWT[q + 1]$, then $LF[q + 1] = LF[q] + 1$

Two positions in the same BWT run move through LF in a **parallel** fashion

A decorative horizontal banner featuring a complex, overlapping geometric pattern of blue lines and shapes, creating a sense of depth and movement. The pattern consists of various shades of blue, from light to dark, forming a series of intersecting lines and polygons that create a dynamic, abstract design. The overall effect is a modern, artistic border that spans the width of the page.

Move structure

Rank	FL	F	L	LF
0	15	# g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$		1
1	0	\$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a t		18
2	9	\$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g	t	19
3	16	\$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a	t	20
4	12	a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	t	21
5	13	a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	t	22
6	14	a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t	t	23
7	18	a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a	c	12
8	20	a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a	c	13
9	24	a t t a c a t \$ # g a t t a c a t \$ g a t t a c g t	\$	2
10	25	a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #	g	15
11	26	a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	g	16
12	7	c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a		4
13	8	c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a	a	5
14	17	c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a	a	6
15	10	g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$	#	0
16	11	g a t t a c g t \$ a t t a c a t \$ # g a t t a c a t	\$	3
17	19	g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a	c	14
18	1	t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c	a	7
19	2	t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c	g	17
20	3	t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c	a	8
21	4	t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a	t	24
22	5	t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a	t	25
23	6	t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a	t	26
24	21	t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$	a	9
25	22	t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g	a	10
26	23	t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g	a	11

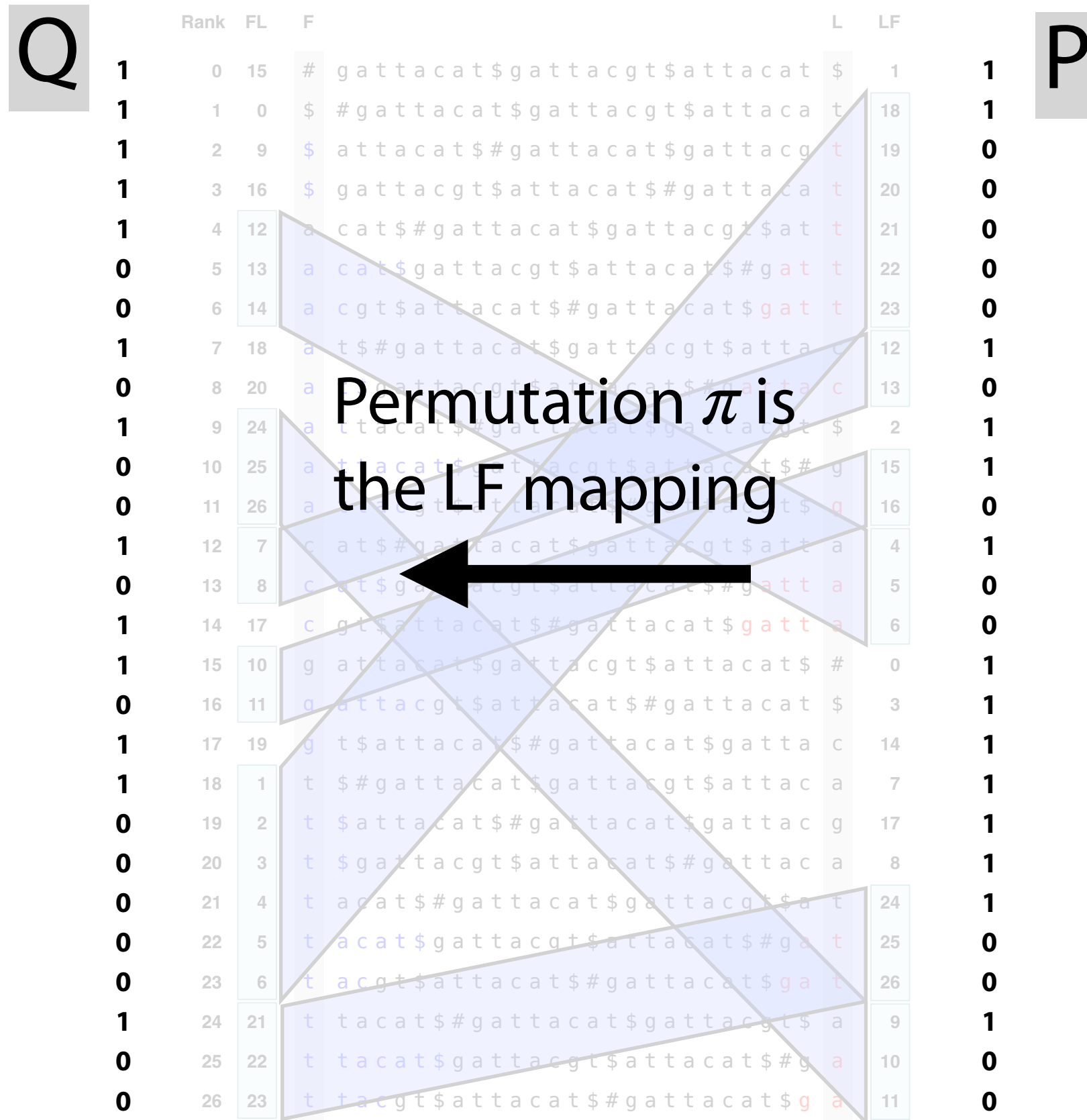
Move structure

Rank	FL	F	L	LF
0	15	# g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$		1
1	0	\$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a t		18
2	9	\$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g	t	19
3	16	\$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a	t	20
4	12	a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	t	21
5	13	a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	t	22
6	14	a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t	t	23
7	18	a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c		12
8	20	a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c		13
9	24	a t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$		2
10	25	a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g		15
11	26	a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$		16
12	7	c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c		4
13	8	c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c		5
14	17	c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c		6
15	10	g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #		0
16	11	g a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$		3
17	19	g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c		14
18	1	t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a		7
19	2	t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g		17
20	3	t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a		8
21	4	t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t		24
22	5	t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t		25
23	6	t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t		26
24	21	t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a		9
25	22	t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a		10
26	23	t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a		11

Move structure

Q		Rank	FL	F	L	LF	P	
1	0	15	#	gattacat\$gattacgt\$attacat\$	1	1	1	
1	1	0	\$	#gattacat\$gattacgt\$attacat	18	1	1	
1	2	9	\$	attacat\$#gattacat\$gattacgt	19	0	0	
1	3	16	\$	gattacgt\$attacat\$#gattaca	20	0	0	
1	4	12	a	cat\$#gattacat\$gattacgt\$at	21	0	0	
0	5	13	a	cat\$gattacgt\$attacat\$#gat	22	0	0	
0	6	14	a	cgt\$attacat\$#gattacat\$gat	23	0	0	
1	7	18	a	t\$#gattacat\$gattacgt\$attac	12	1	1	
0	8	20	a	t\$gattacgt\$attacat\$#gattac	13	0	0	
1	9	24	a	ttacat\$#gattacat\$gattacgt\$	2	1	1	
0	10	25	a	ttacat\$gattacgt\$attacat\$#g	15	1	1	
0	11	26	a	ttacgt\$attacat\$#gattacat\$g	16	0	0	
1	12	7	c	at\$#gattacat\$gattacgt\$attac	4	1	1	
0	13	8	c	at\$gattacgt\$attacat\$#gattac	5	0	0	
1	14	17	c	gt\$attacat\$#gattacat\$gattac	6	0	0	
1	15	10	g	attacat\$gattacgt\$attacat\$#	0	1	1	
0	16	11	g	attacgt\$attacat\$#gattacat\$	3	1	1	
1	17	19	g	t\$attacat\$#gattacat\$gattac	14	1	1	
1	18	1	t	\$#gattacat\$gattacgt\$attacac	7	1	1	
0	19	2	t	\$attacat\$#gattacat\$gattacg	17	1	1	
0	20	3	t	\$gattacgt\$attacat\$#gattacac	8	1	1	
0	21	4	t	acat\$#gattacat\$gattacgt\$at	24	1	1	
0	22	5	t	acat\$gattacgt\$attacat\$#gat	25	0	0	
0	23	6	t	acgt\$attacat\$#gattacat\$gat	26	0	0	
1	24	21	t	tacat\$#gattacat\$gattacgt\$a	9	1	1	
0	25	22	t	tacat\$gattacgt\$attacat\$#ga	10	0	0	
0	26	23	t	tacgt\$attacat\$#gattacat\$ga	11	0	0	

Move structure



Move structure

P

(swapped P & Q)

	Rank	FL	F	L	LF
1	0	15	# g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$	1	1
1	1	0	\$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a t	18	1
1	2	9	\$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g	19	0
1	3	16	\$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a	20	0
1	4	12	a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	21	0
0	5	13	a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	22	0
0	6	14	a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t	23	0
1	7	18	a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c	12	1
0	8	20	a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c	13	0
1	9	24	a t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$	2	1
0	10	25	a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g	15	1
0	11	26	a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	16	0
1	12	7	c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c	4	1
0	13	8	c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c	5	0
1	14	17	c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c	6	0
1	15	10	g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #	0	1
0	16	11	g a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	3	1
1	17	19	g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c	14	1
1	18	1	t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a	7	1
0	19	2	t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g	17	1
0	20	3	t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a	8	1
0	21	4	t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	24	1
0	22	5	t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	25	0
0	23	6	t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t	26	0
1	24	21	t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a	9	1
0	25	22	t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a	10	0
0	26	23	t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a	11	0

Q

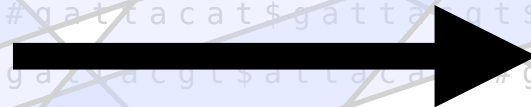
Move structure

P

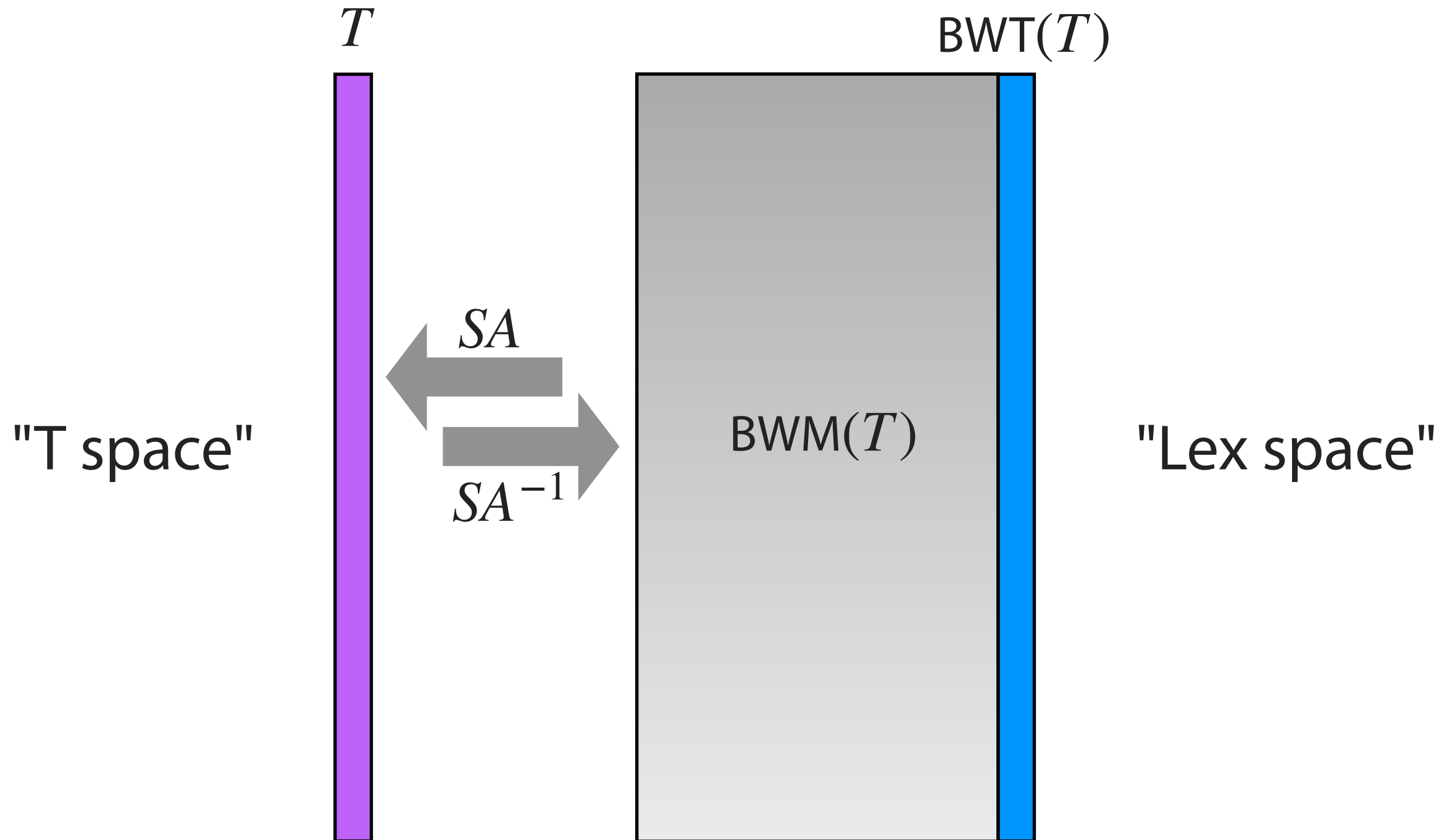
(swapped P & Q)

	Rank	FL	F	L	LF		Q
1	0	15	# g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$	1	1	1	1
1	1	0	\$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a t	18	1	1	1
1	2	9	\$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g t	19	0	0	0
1	3	16	\$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a t	20	0	0	0
1	4	12	a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	21	0	0	0
0	5	13	a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	22	0	0	0
0	6	14	a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	23	0	0	0
1	7	18	a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c	12	1	1	1
0	8	20	a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c	13	0	0	0
1	9	24	a t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$	2	1	1	1
0	10	25	a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	15	1	1	1
0	11	26	a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	16	0	0	0
1	12	7	c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c	4	1	1	1
0	13	8	c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c	5	0	0	0
1	14	17	c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c	6	0	0	0
1	15	10	g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #	0	1	1	1
0	16	11	g a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	3	1	1	1
1	17	19	g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c	14	1	1	1
1	18	1	t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a	7	1	1	1
0	19	2	t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g	17	1	1	1
0	20	3	t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a	8	1	1	1
0	21	4	t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	24	1	1	1
0	22	5	t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	25	0	0	0
0	23	6	t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t	26	0	0	0
1	24	21	t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a	9	1	1	1
0	25	22	t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a	10	0	0	0
0	26	23	t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a	11	0	0	0

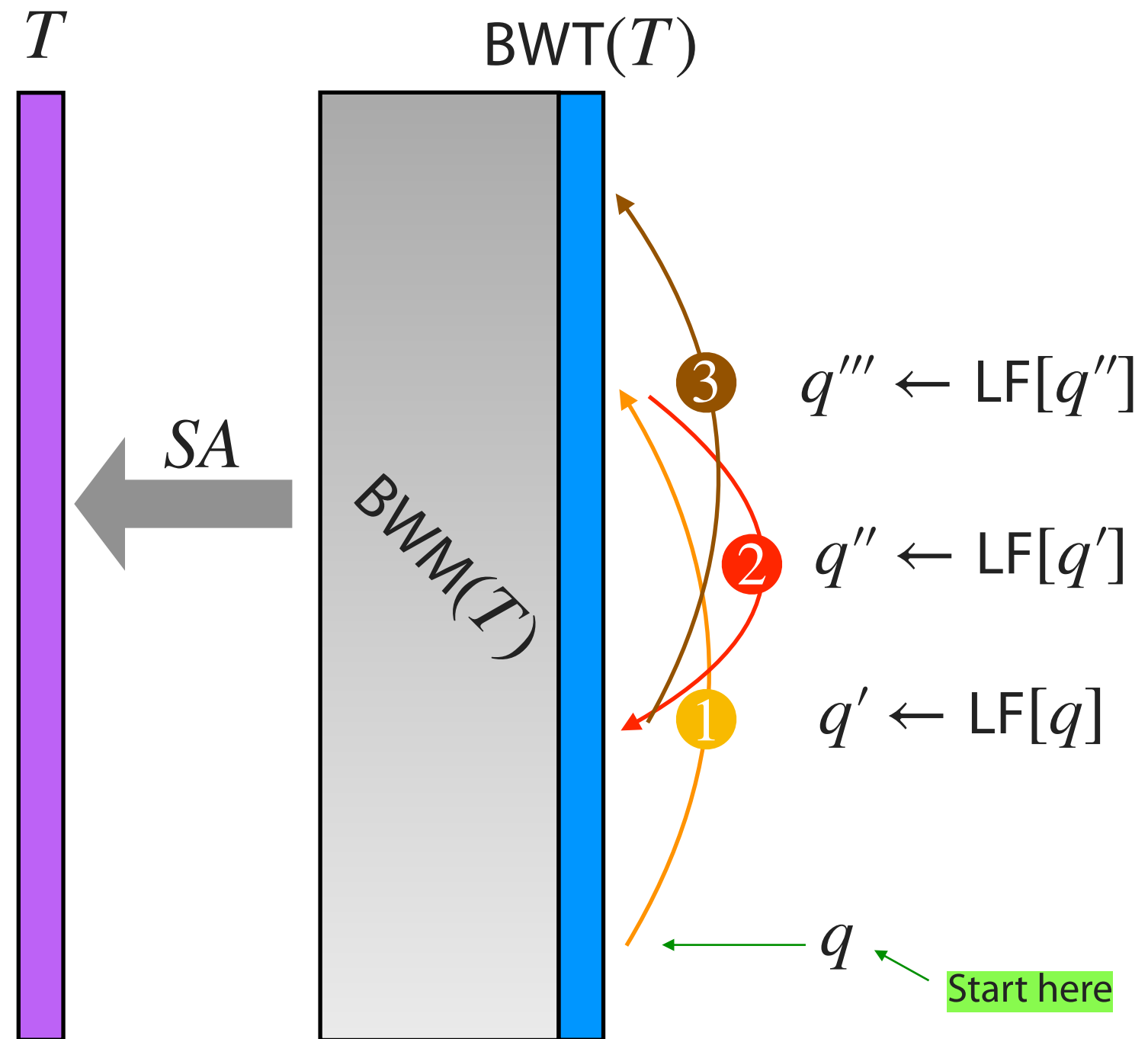
Permutation π is
the FL mapping
(AKA Ψ)



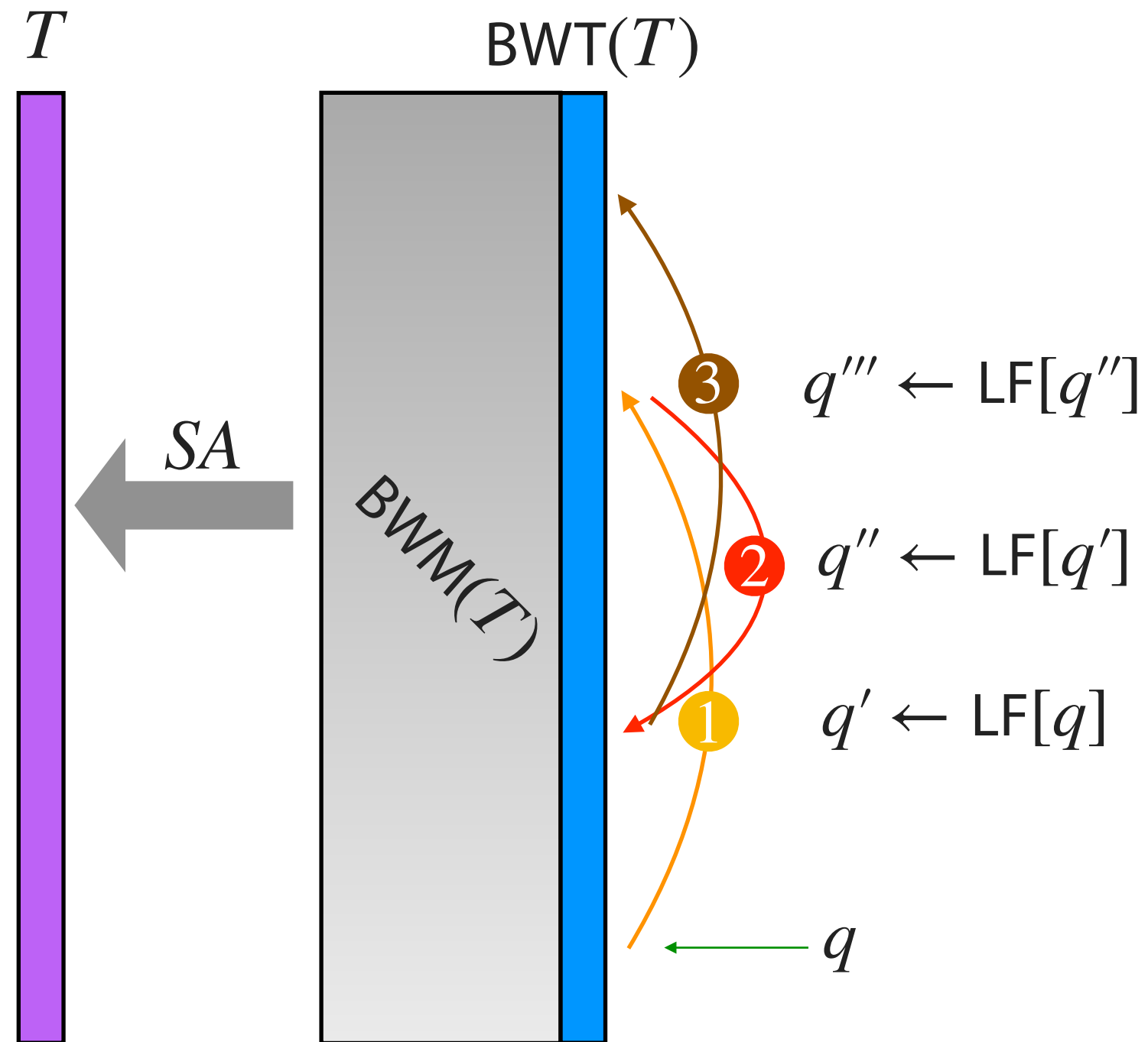
Fundamental movements



Fundamental movements: LF



Fundamental movements: LF

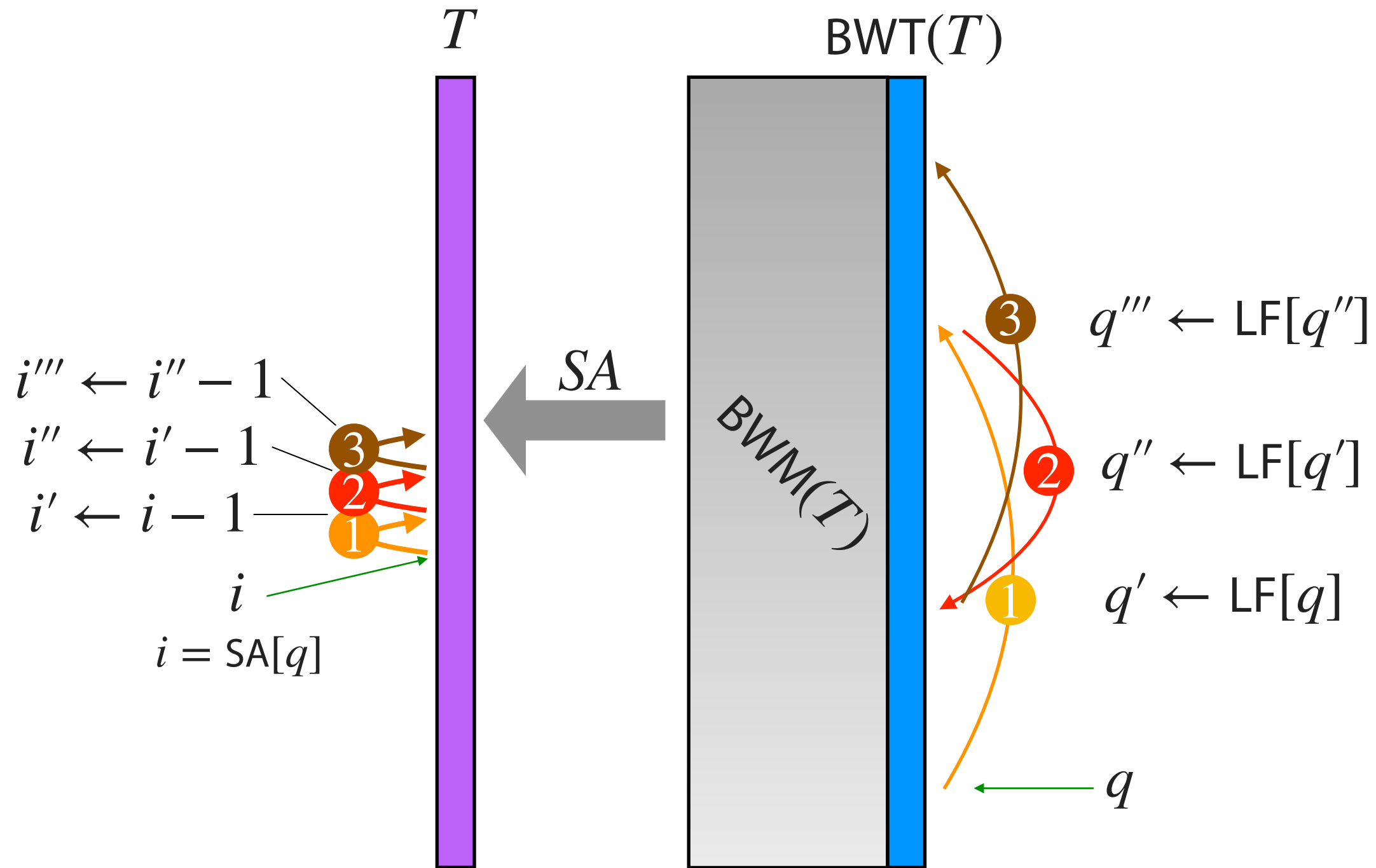


An LF step
(in lex space)...

$$SA[LF[q]] = SA[q] - 1$$

...moves to the left
by 1 in T space

Fundamental movements: LF

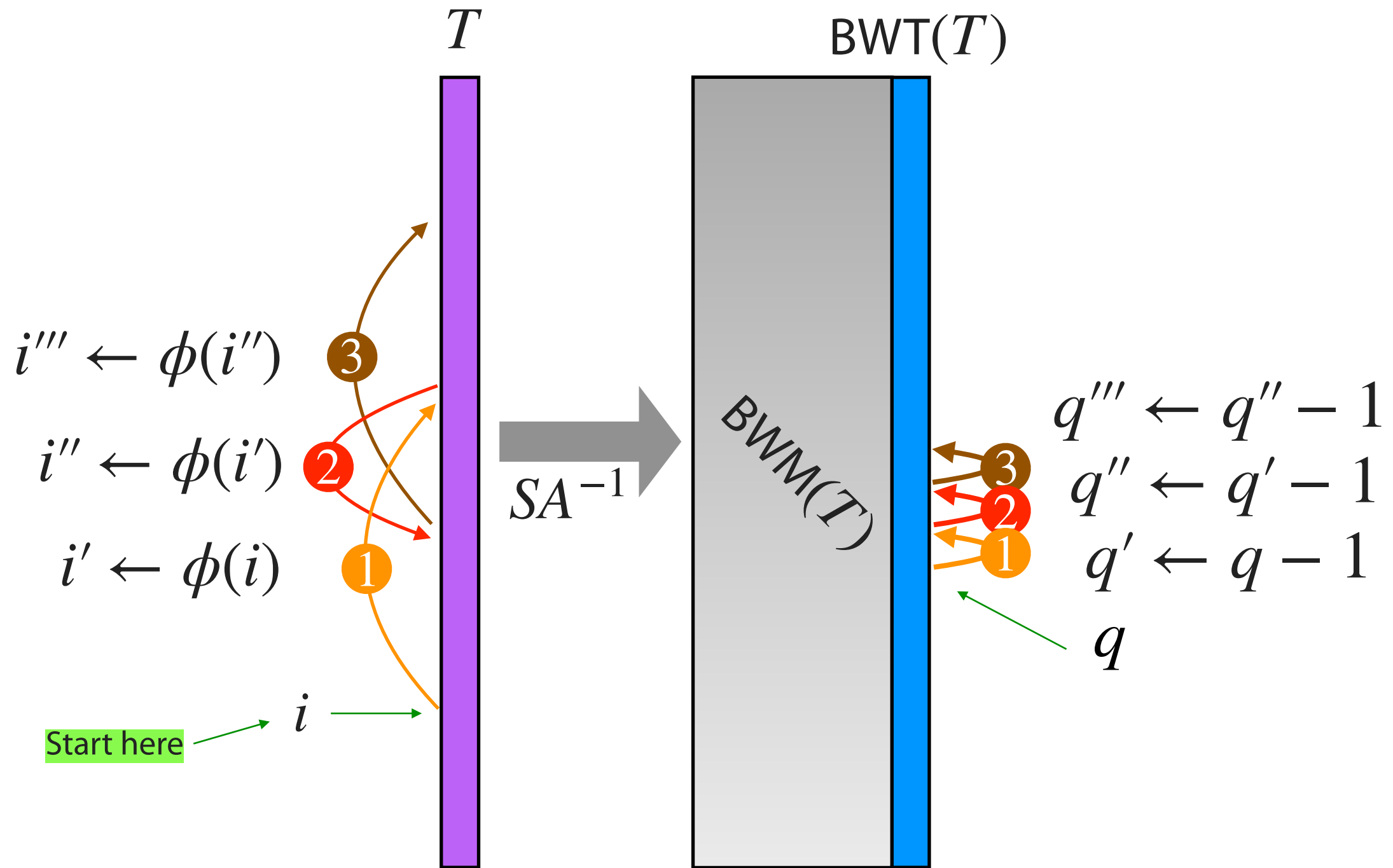


An LF step
(in lex space)...

$$SA[LF[q]] = SA[q] - 1$$

...moves to the left
by 1 in T space

Fundamental movements: ϕ



$$SA^{-1}[\phi(i)] = SA^{-1}[i] - 1$$

Other permutations

Rank	FL	F	L	LF
0	15	# g a t t a c a t \$ g a t t a c g t \$ a t t a c a t	\$	1
1	0	\$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a t	t	18
2	9	\$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g	t	19
3	16	\$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a	t	20
4	12	a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	t	21
5	13	a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	t	22
6	14	a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t	t	23
7	18	a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a	c	12
8	20	a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a	c	13
9	24	a t t a c a t \$ # g a t t a c a t \$ g a t t a c g t	\$	2
10	25	a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #	g	15
11	26	a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	g	16
12	7	c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a	a	4
13	8	c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a	a	5
14	17	c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a	a	6
15	10	g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$	#	0
16	11	g a t t a c g t \$ a t t a c a t \$ # g a t t a c a t	\$	3
17	19	g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a	c	14
18	1	t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c	a	7
19	2	t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c	g	17
20	3	t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c	a	8
21	4	t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a	t	24
22	5	t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a	t	25
23	6	t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a	t	26
24	21	t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$	a	9
25	22	t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #	g	10
26	23	t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	g	11

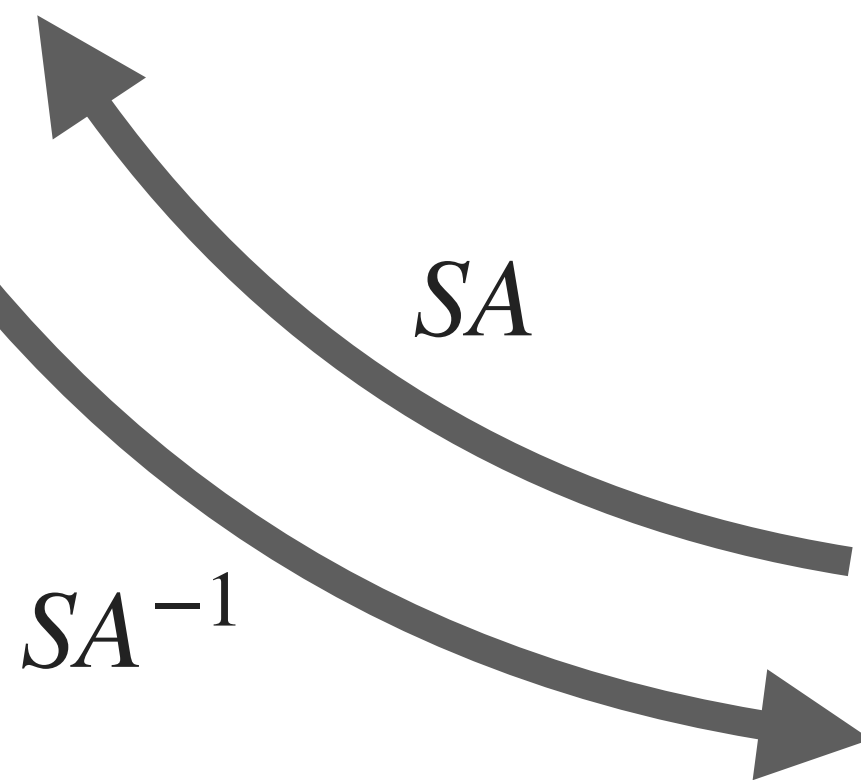
Other permutations

T	g	a	t	t	a	c	a	t	\$	g	a	t	t	a	c	g	t	\$	a	t	t	a	c	a	t	\$	#
Off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
ϕ	14	18	19	20	21	22	23	16	17	0	1	2	3	4	5	9	24	25	6	12	7	8	10	13	15	26	11
ϕ^{-1}	9	10	11	12	13	14	18	20	21	15	22	26	19	23	0	24	7	8	1	2	3	4	5	6	16	17	25

Rank	FL	F	L	LF
0	15	# g a t t a c a t \$ g a t t a c g t \$ a t t a c a t	\$	1
1	0	\$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a t	t	18
2	9	\$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g	t	19
3	16	\$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a	t	20
4	12	a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	t	21
5	13	a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	t	22
6	14	a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t	t	23
7	18	a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a	c	12
8	20	a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a	c	13
9	24	a t t a c a t \$ # g a t t a c a t \$ g a t t a c g t	\$	2
10	25	a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #	g	15
11	26	a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	g	16
12	7	c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t	a	4
13	8	c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t	a	5
14	17	c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t	a	6
15	10	g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$	#	0
16	11	g a t t a c g t \$ a t t a c a t \$ # g a t t a c a t	\$	3
17	19	g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a	c	14
18	1	t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c	a	7
19	2	t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c	g	17
20	3	t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c	a	8
21	4	t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a	t	24
22	5	t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a	t	25
23	6	t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a	t	26
24	21	t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$	a	9
25	22	t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #	g	10
26	23	t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$	g	11

Other permutations

T	g	a	t	t	a	c	a	t	\$	g	a	t	t	a	c	g	t	\$	a	t	t	a	c	a	t	\$	#	
Off	n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
ϕ	T	18																										
ϕ^{-1}		9	10	11	12	13	14	18	20	21	15	22	26	19	23	0	24	7	8	1	2	3	4	5	6	16	17	25

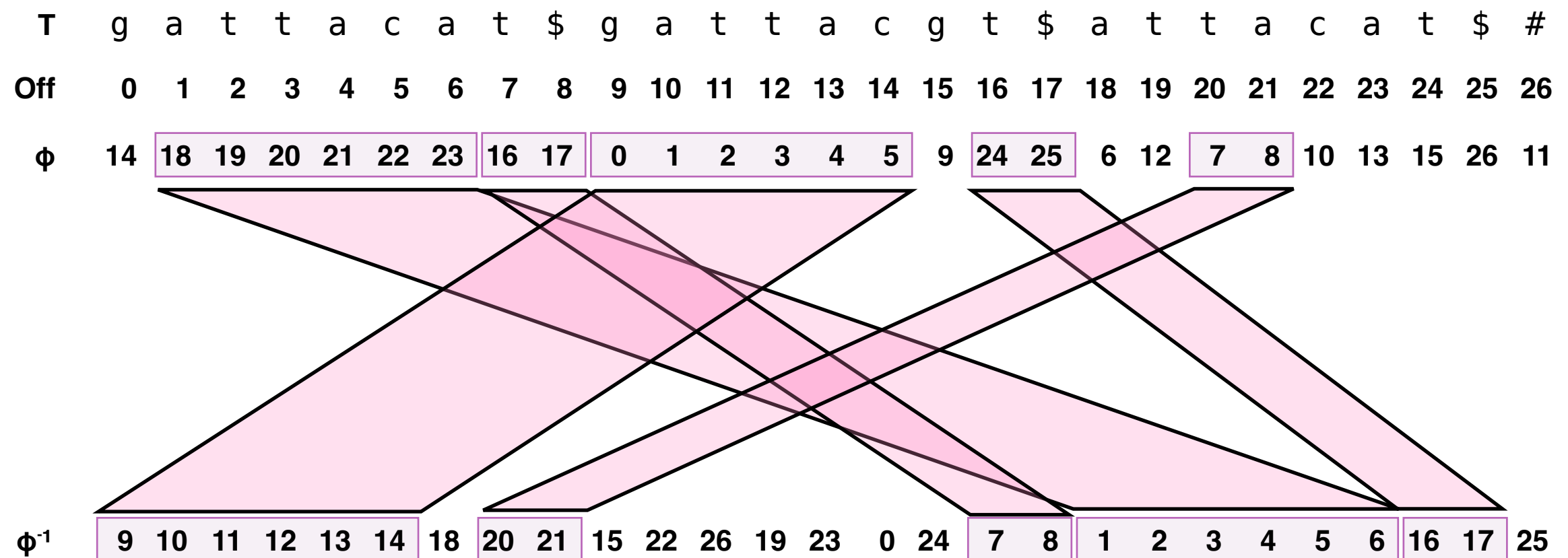


Rank	FL	F	L	LF
0	15	# g a t t a c a t \$ g a t t a c g t \$ a t t a c a t	\$	1
1	0	\$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a	t	18
2	9	\$ a t t a c a t \$ # g a t t a	t	19
3	16	\$ g a t t a c g t \$ a t t a c g t \$ a t t a c a	t	20
4	12	a c a t \$ # g	t	21
5	13	a c a t \$ g a	t	22
6	14	a c g t \$ a t	t	23
7	18	a t \$ # g a t	c	12
8	20	a t \$ g a t t	c	13
9	24	a t t a c a t	\$	2
10	25	a t t a c a t	g	15
11	26	a t t a c g t	g	16
12	7	c a t \$ # g a	a	4
13	8	c a t \$ g a t	a	5
14	17	c g t \$ a t t	a	6
15	10	g a t t a c a	#	0
16	11	g a t t a c g	\$	3
17	19	g t \$ a t t a	c	14
18	1	t \$ # g a t t	a	7
19	2	t \$ a t t a c	g	17
20	3	t \$ g a t t a	a	8
21	4	t a c a t \$ #	t	24
22	5	t a c a t \$ g	t	25
23	6	t a c g t \$ a	t	26
24	21	t t a c a t \$	a	9
25	22	t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g	a	10
26	23	t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g	a	11

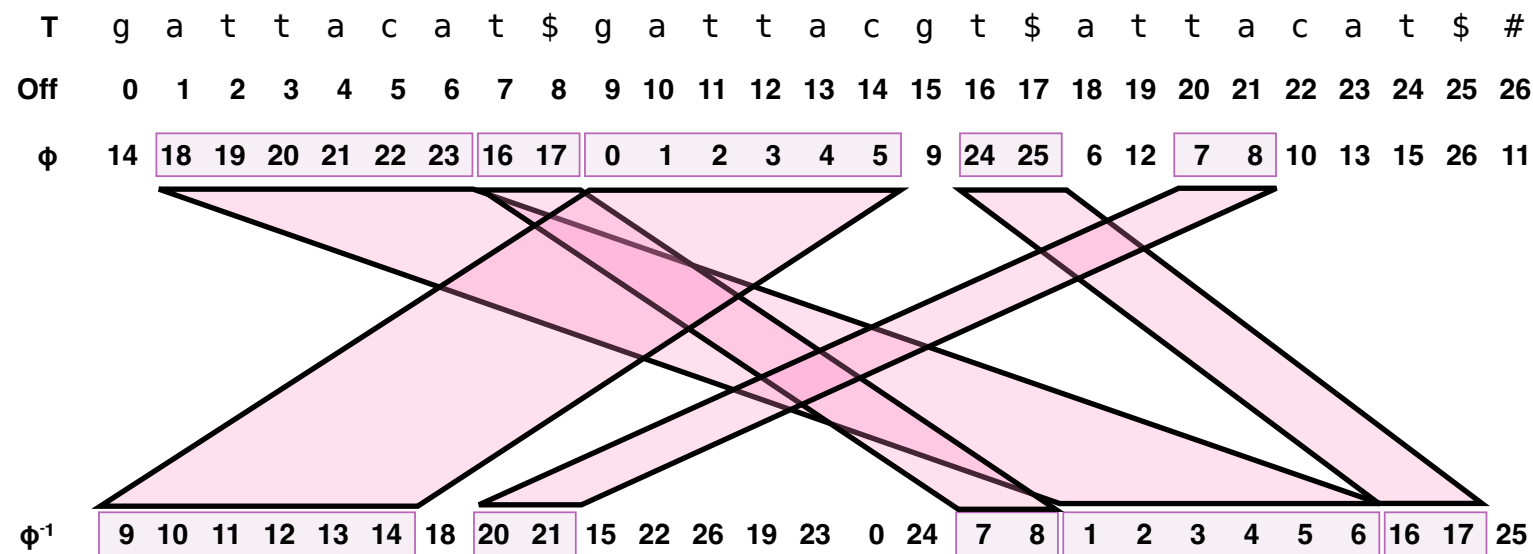
$BWT(T)$

$BWM(T)$

Other permutations



Move structure



π can be LF, FL (Ψ), ϕ or ϕ^{-1}

Or any other “runny permutation”

	Rank	FL	F	L	LF
0	15	#	g a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$		1
1	0	\$	# g a t t a c a t \$ g a t t a c g t \$ a t t a c a t		18
2	9	\$	a t t a c a t \$ # g a t t a c a t \$ g a t t a c g t	t	19
3	16	\$	g a t t a c g t \$ a t t a c a t \$ # g a t t a c a t	t	20
4	12	a	c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t	t	21
5	13	a	c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t	t	22
6	14	a	c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t	t	23
7	18	a	t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c		12
8	20	a	t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c		13
9	24	a	t t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$		2
10	25	a	t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g		15
11	26	a	t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g		16
12	7	c	a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t t a		4
13	8	c	a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t t a		5
14	17	c	g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a		6
15	10	g	a t t a c a t \$ g a t t a c g t \$ a t t a c a t \$ #		0
16	11	g	a t t a c g t \$ a t t a c a t \$ # g a t t a c a t \$		3
17	19	g	t \$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c		14
18	1	t	\$ # g a t t a c a t \$ g a t t a c g t \$ a t t a c a		7
19	2	t	\$ a t t a c a t \$ # g a t t a c a t \$ g a t t a c g		17
20	3	t	\$ g a t t a c g t \$ a t t a c a t \$ # g a t t a c a		8
21	4	t	a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a t		24
22	5	t	a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a t		25
23	6	t	a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a t		26
24	21	t	t a c a t \$ # g a t t a c a t \$ g a t t a c g t \$ a		9
25	22	t	t a c a t \$ g a t t a c g t \$ a t t a c a t \$ # g a		10
26	23	t	t a c g t \$ a t t a c a t \$ # g a t t a c a t \$ g a		11