

Tiny

Mittwoch, 1. November 2023

19:47

sequence	s	Mary likes to sing	MLTS	s1 s2 s3 s4	
sequence	d	John likes to dance	JLTD		
		s1 → s2	s3 s4		
		d1 d2	d3	d4	
	Mary	John	likes	to sing	dance X

Token Table

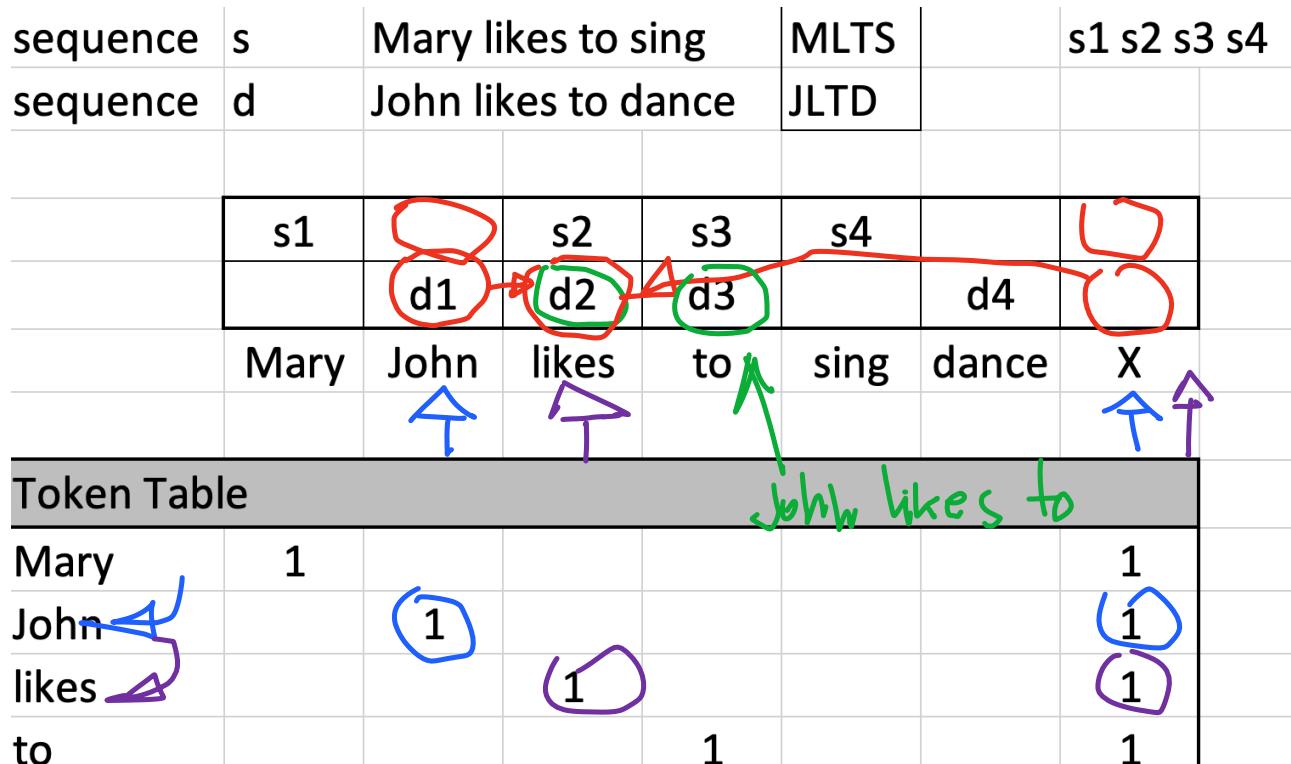
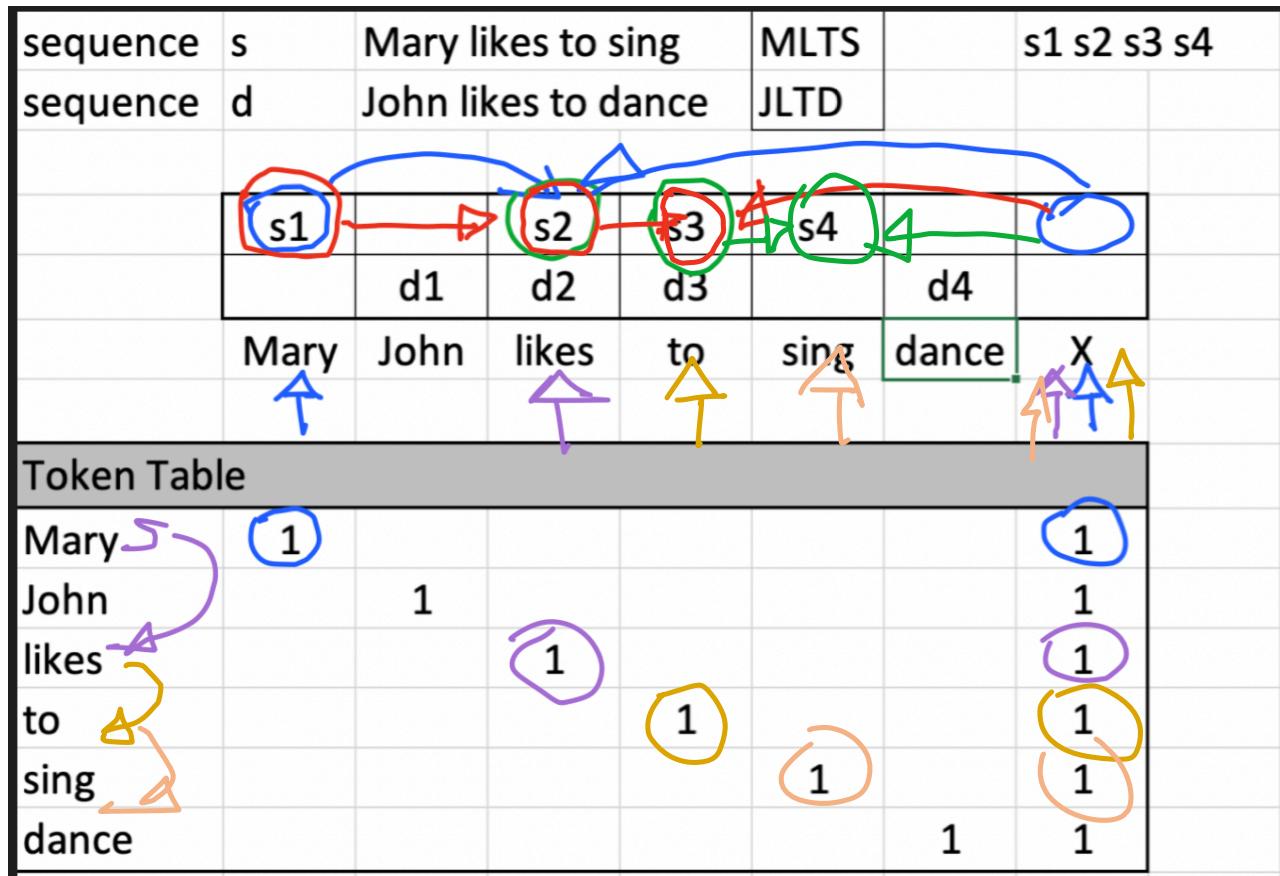
Mary	1	1
John	1	1
likes	1	1
to	1	1
sing	1	1
dance	1	1

sequence	s	Mary likes to sing	MLTS	s1 s2 s3 s4	
sequence	d	John likes to dance	JLTD		
		s1 → s2 → s3 → s4	d1 d2 d3	d4 X	
	Mary	John	likes	to sing	dance X

Token Table

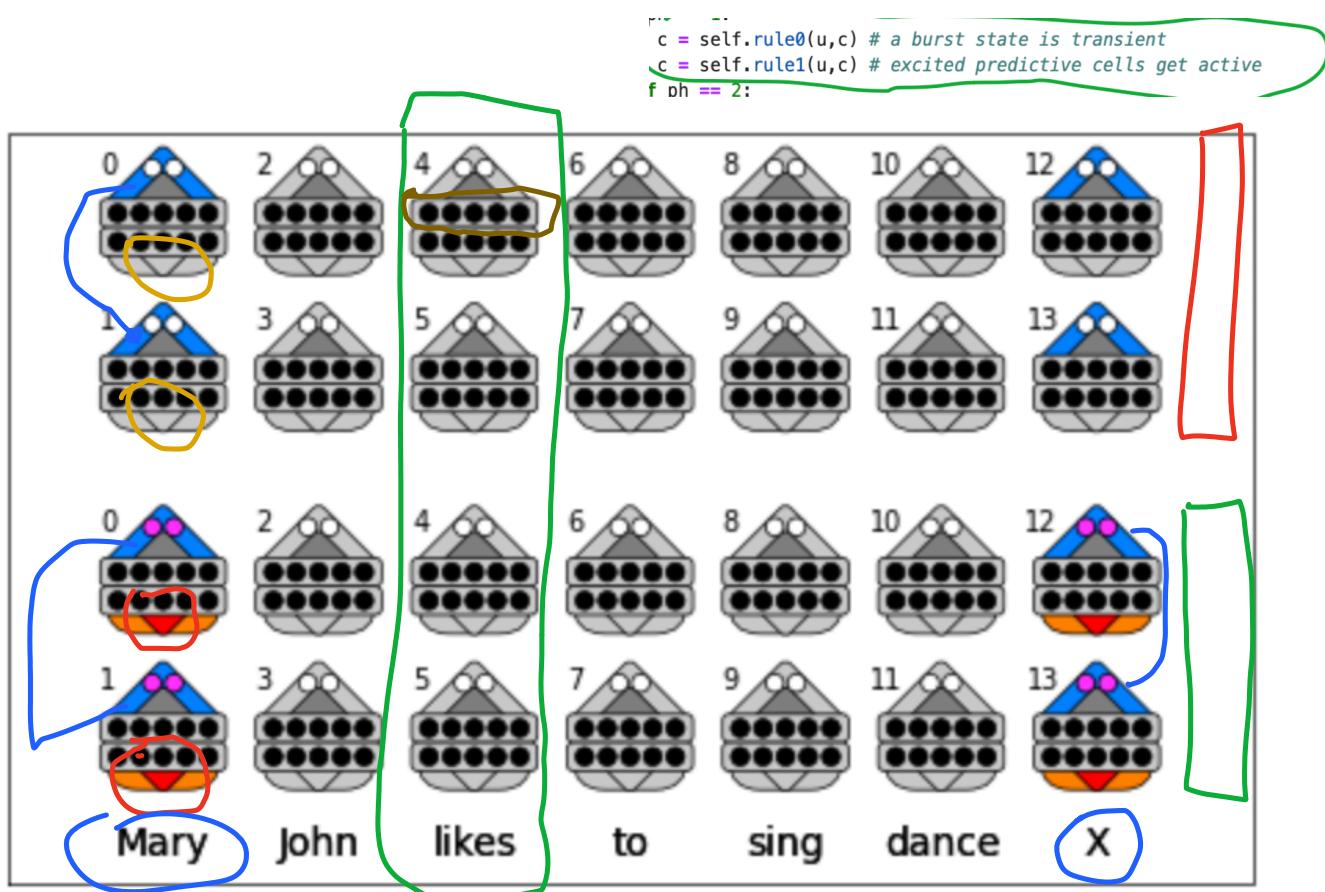
Mary	1	1
John	1	1
likes	1	1

to		1			1	
sing			1		1	
dance				1	1	



sing			1		1	
dance			1		1	

Mary → likes → to → sing
John → dance



```

def phase(self,ph,u,c):                      # cell algo phase `ph`
    if ph == 1:
        c = self.rule0(u,c) # a burst state is transient
        c = self.rule1(u,c) # excited predictive cells get active
    elif ph == 2:
        c = self.rule2(u,c) # excited neurons in non-predictive groups burst
    elif ph == 3:
        c = self.rule3(u,c) # excited bursting neurons get active

```

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    c = self.rule4(u,c) # spiking dendrites of active neurons learn
elif ph == 4:
    c = self.rule5(u,c) # empowered dendritic segments spike
    c = self.rule6(u,c) # spiking neurons get always predictive
    self.transition()
else:
    raise Exception("bad phase")
return c

```

```

c = self.phase(1,u,c,subplot=1);
log(1,index,"after phase 1 (1st row): b = 0, y = u*x",all)

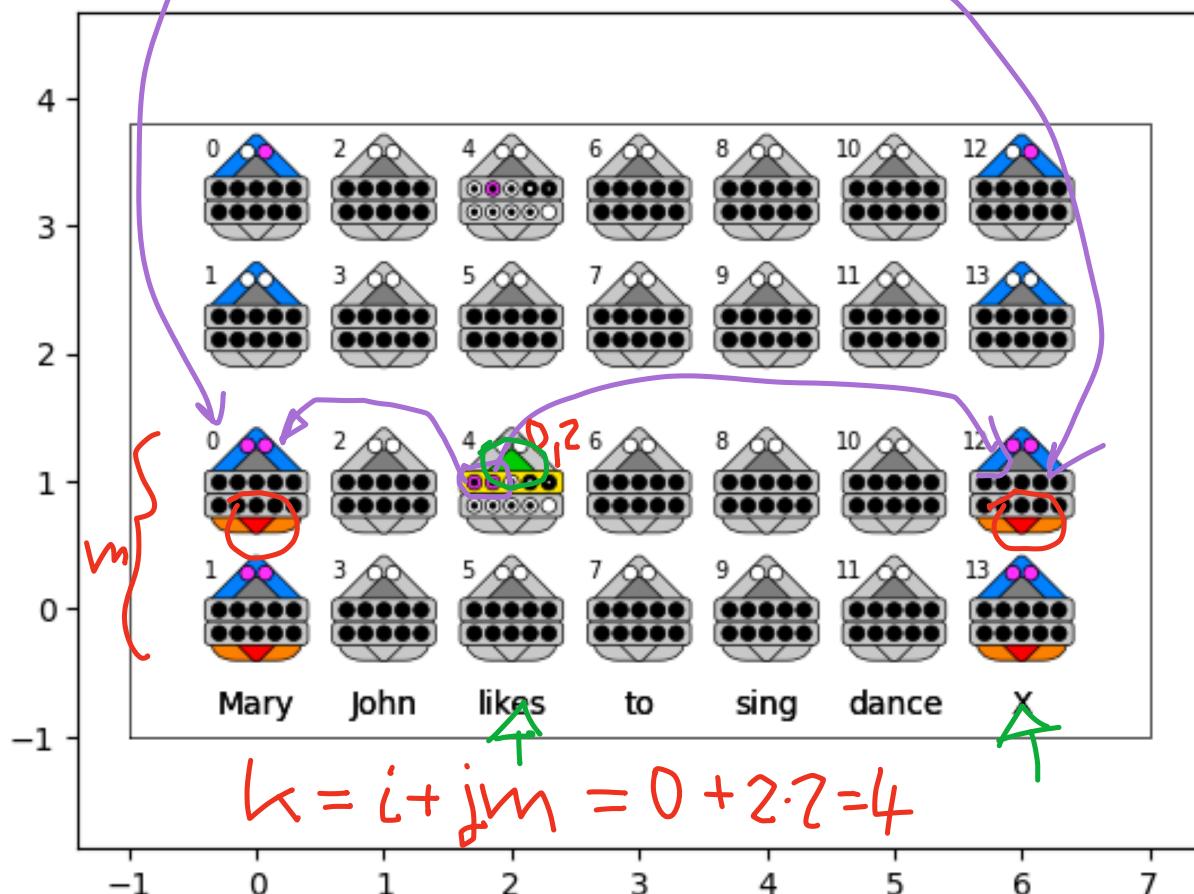
c = self.phase(2,u,c)
log(2,index,"after phase 2: b = u*(sum(v)==0)",all)

#c = self.phase(3,u,c,subplot=2)
c = self.phase(3,u,c)
log(3,index,"after phase 3: y = u*(x|b), P' = sat(P+y*L)",all)

#c = self.phase(4,u,c,subplot=3)
c = self.phase(4,u,c,subplot=2)
log(4,index,"after phase 4 (2nd row): x = max(S(c,P)), L' = L(c,S(c,P))",all)
return c

```

K4: #[0 12 8 9 10: 6 7 8 9 10]
P4: #[0.5 0.5 0.5 0.3 0.1; 0.5 0.5 0.5 0.5 1]
c: [1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1]



```

class Layer:
    def __init__(self, mon, G, K, P, xlabel=None):
        m, n, d, s = K.shape
        cells = []
        self.eta = 0.5
        self.theta = 2
        self.delta = (0.2, 0.2)
        # synaptic threshold
        # spiking threshold
        # learning deltas

```

```

K4: #[ 0 12 8 9 10; 6 7 8 9 10]
P4: #[ 0.5 0.5 0.5 0.3 0.1; 0.5 0.5 0.5 0.5 1]
c: [1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1]
u: [1, 0, 0, 0, 0, 1]
c: [1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1]

```

cell[0] at begin

```

k0: 0 , g: [0 1] , eta: 0.5
K0: [ 0 1 2 3 4; 5 6 7 8 9]
P0: [ 0 0 0 0 0; 0 0 0 0 0]
b0: 0 v0: [0 0]
s0: [0 0] (||E||=0, theta:2)
u0: 0 , y0: 0 , x0: 0

```

cell[4] at begin

```

k4: 4 , g: [4 5] , eta: 0.5
K4: [ 0 12 8 9 10; 6 7 8 9 10]
P4: [ 0.5 0.5 0.5 0.3 0.1; 0.5 0.5 0.5 0.5 1]
W4: [ 1 1 1 0 0; 1 1 1 1 1]
u4: 0 y4: 0 , x4: 0

```

cell[4] after phase 1 (1st row): b = 0, y = u*x

```

V4: [ 0 1 0 0 0; 0 0 0 0 0]
E4: [ 0 1 0 0 0; 0 0 0 0 0]
u4: 0 , y4: 0 , x4: 0
c: [0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1]

```

cell[4] after phase 2: b = u*(sum(v)==0)

```

V4: [ 0 0 0 0 0; 0 0 0 0 0]

```

```

E4: [ 0 0 0 0 0; 0 0 0 0 0]
u4: 0 , y4: 0 , x4: 0
c: [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0]

```

cell[4] after phase 3: $y = u*(x|b)$, $P' = \text{sat}(P+y*L)$

```

V4: [ 1 0 0 0 0; 0 0 0 0 0]
E4: [ 1 0 0 0 0; 0 0 0 0 0]
u4: 0 , y4: 0 , x4: 0
c: [1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0]

```

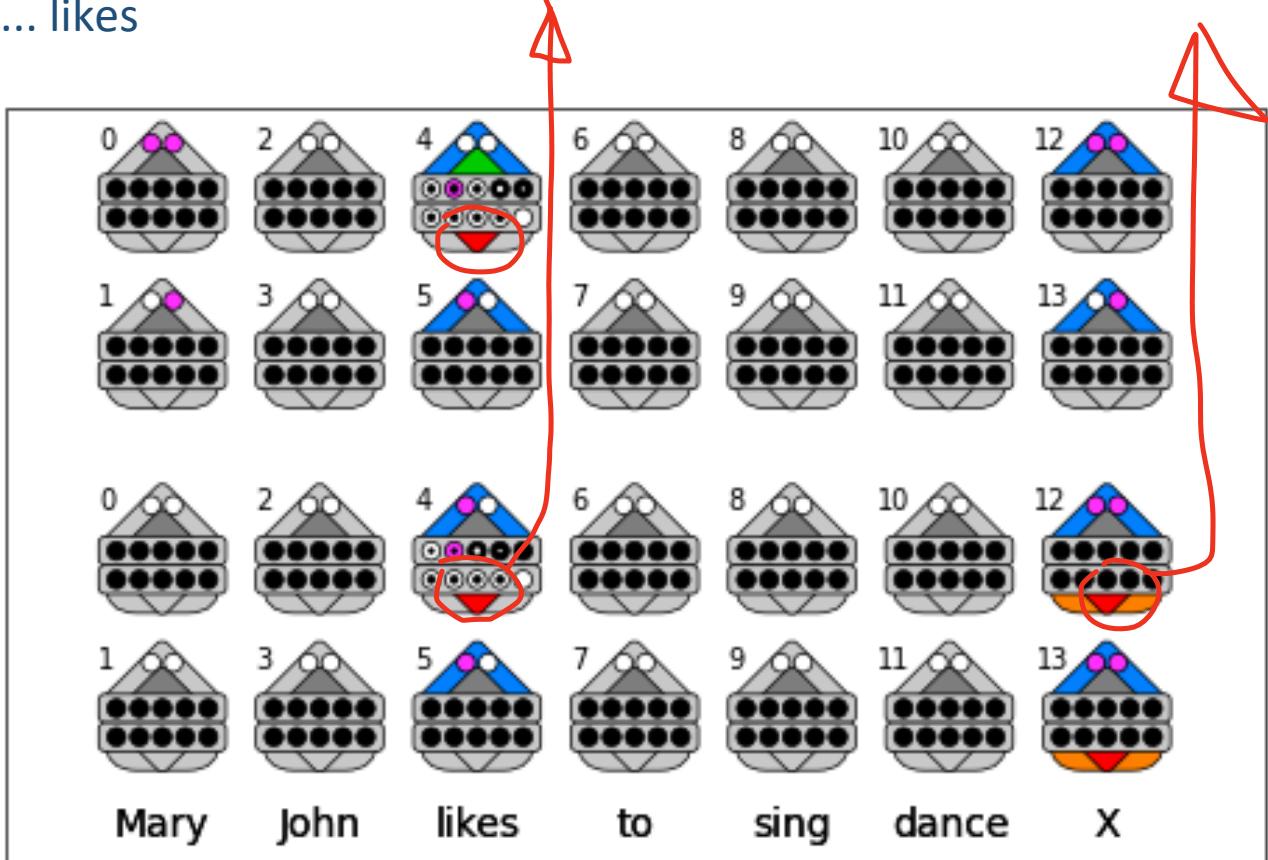
cell[4] after phase 4 (2nd row): $x = \max(S(c, P))$, $L' = L(c, S(c, P))$

```

P4: [ 0.5 0.5 0.5 0.3 0.1; 0.5 0.5 0.5 0.5 1]
V4: [ 1 1 0 0 0; 0 0 0 0 0]
E4: [ 1 1 0 0 0; 0 0 0 0 0]
S4: [ 1 1 1 1 1; 0 0 0 0 0]
L4: [ 0.2 0.2 -.2 -.2 -.2; 0 0 0 0 0]
s4: [1 0] (||E||=2, theta:z)
u4: 0 , y4: 0 , x4: 1
c: [1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1]

```

... likes



cell[4] at begin

k4: 4 , g: [4 5] , eta: 0.5
K4: [0 12 8 9 10; 6 7 8 9 10]
P4: [0.5 0.5 0.5 0.3 0.1; 0.5 0.5 0.5 0.5 1]
W4: [1 1 1 0 0; 1 1 1 1 1]
E4: [1 1 0 0 0; 0 0 0 0 0]
S4: [1 1 1 1 1; 0 0 0 0 0]
L4: [0.2 0.2 -0.2 -0.2 -0.2; 0 0 0 0 0]
b4: 0 , v4: [0 0]
s4: [1 0] (|||E|||=2, theta:2)
u4: 0 , y4: 0 , x4: 1

cell[4] after phase 1 (1st row): b = 0, y = u*x

V4: [0 1 0 0 0; 0 0 0 0 0]
E4: [0 1 0 0 0; 0 0 0 0 0]
S4: [0 0 0 0 0; 0 0 0 0 0]
s4: [0 0] (|||E|||=1, theta:2)
u4: 1 , y4: 1 , x4: 1
c: [0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1]

cell[4] after phase 2: b = u*(sum(v)==0)

V4: [0 0 0 0 0; 0 0 0 0 0]
E4: [0 0 0 0 0; 0 0 0 0 0]
b4: 0 , v4: [1 0]
u4: 1 , y4: 1 , x4: 1
c: [0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0]

cell[4] after phase 3: y = u*(x|b), P' = sat(P+y*L)

u4: 1 , y4: 1 , x4: 1

cell[4] after phase 4 (2nd row): x = max(S(c,P)), L' = L(c,S(c,P))

P4: [0.7 0.7 0.3 0.1 0; 0.5 0.5 0.5 0.5 1]
V4: [0 1 0 0 0; 0 0 0 0 0]
W4: [1 1 0 0 0; 1 1 1 1 1]
E4: [0 1 0 0 0; 0 0 0 0 0]
L4: [0 0 0 0 0; 0 0 0 0 0]
u4: 1 , y4: 1 , x4: 0
c: [0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1]