COMP3270 1920 Chapter 2 Teacher Notes

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How could we end up in that position?

- North(0.8), East(0.1)
- North(0.8), West(0.1)
- West(0.1), North(0.8)

0.8*0.1+0.8*0.1+0.8*0.1 = 0.08 * 3 = 0.24

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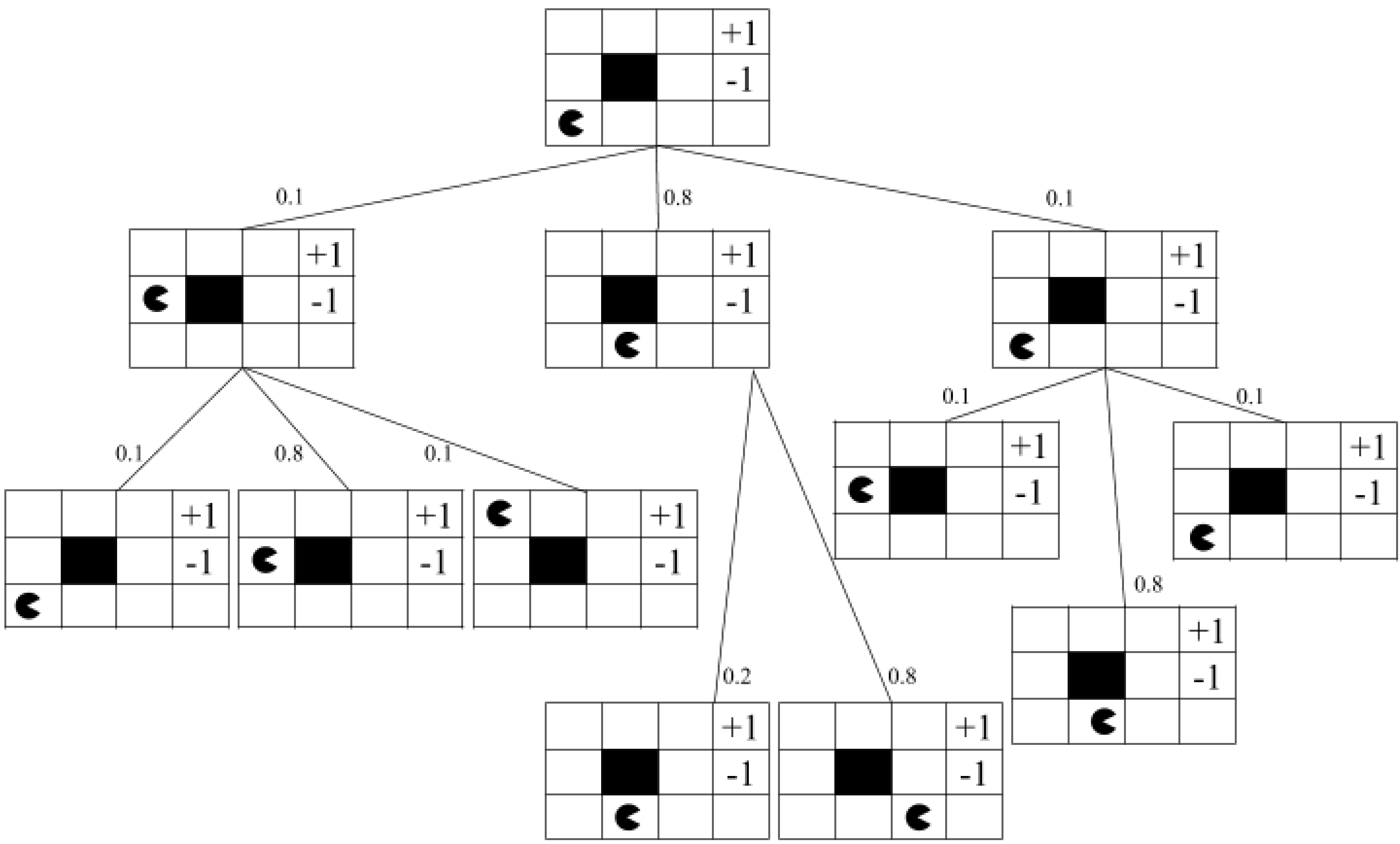

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1. T(c,East,d)=0.8
2. T(c,East,e)=0
3. T(c,East,c)=0.2
4. T(c,East,b)=0
5. T(c,East,a)=0
6. T(c,East,terminal state)=0
7. T(a,Exit,terminal state)=1.0
8. T(a,East,b)=0.8
9. T(a,East,a)=0.2
10. R(a,East,a)=0
11. R(a,Exit,terminal state)=10
12. R(c,East,d)=0

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U([1,2,3]) = 1 + 1 + 0.75 = 2.75
U([3,2,1]) = 3 + 1 + 0.25 = 4.25

Lets change the second sequence and see what happens. [1,2,3] vs [2,1,1]

U([1,2,3]) = 1 + 1 + 0.75 =2.75
U([2,1,1]) = 2 + 0.5 + 0.25 = 2.75

What if we change gamma to 0.9?

U([1,2,3]) = 1 + 1.8 + 2.43 = 5.23
U([2,1,1]) =2 + 0.9 + 0.81 = 3.71

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A1: East

A2: West

10 * gamma^3 vs gamma

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If you up you get +50 but -1 for every year for 100 years.
If you go down you get -50 but +1 for every year for 100 years.

changing gamma is also called changing the horizon.
Smaller gamma means smaller horizon, shorter term focus.

$50 + \sum_{i=1}^{100} -\gamma^i$

$-50 + \sum_{i=1}^{100} \gamma^i$

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It turns out that with discounting the utility of an infinite sequence is finite!

$s=R + R*\gamma + R*\gamma^2 + \ldots + R*\gamma^{n-1}$
$\gamma*s = R*\gamma + R*\gamma^2 + \ldots + R*\gamma^n$
$s-\gamma*s = R - R*\gamma^n$
$s(1-\gamma) = R * 1(- \gamma^n)$
$s = R * (1-\gamma^n) / 1 - \gamma$

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No

Consider [4,3,0,0, …] ~ [4,0,0,0, …]

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V0 = 0
V1 = 0
V2 = 1
V3 = 1
V4 = 10
V5 = 10

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V0(c) = 0
V0(w) = 0
V0(o) = 0

V1(c) = max (1.0*[1.0+1.0*0.0], 0.5*[2.0+1.0*0] + 0.5*[2.0+1.0*0]) = 2
V1(w) = max (0.5*[1.0+1.0*0.0] + 0.5*[1.0+1.0*0.0], 1.0*[-10+1.0*0.0]) = 1
V1(o) = 0

V2(c) = max(1.0*[1.0+1.0*2.0, 0.5*[2.0+1.0*1] + 0.5*[2.0+1.0*2]) = 3.5
V2(w) = max (0.5*[1.0+1.0*2.0] + 0.5*[1.0+1.0*1.0], 1.0*[-10+1.0*0.0]) = 2.5
V2(o) = 0

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$V_0(s) = [0, 0, 0, 0, 0]$

$V_1(s) = [10, 0, 0, 0, 1]$

$V_2(s) = [10, 2, 0, 0.2, 1]$

$V_3(s) = [10, 2, 0.4, 0.2, 1]$

$V_4(s) = [10, 2, 0.4, 0.2, 1]$

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$V_{k+1}(3,3) = 0.8 * (-0.04 + 1.0) + 0.1 * (-0.04 + 0.918) + 0.1 * (-0.04 + 0.660) = 0.9178$

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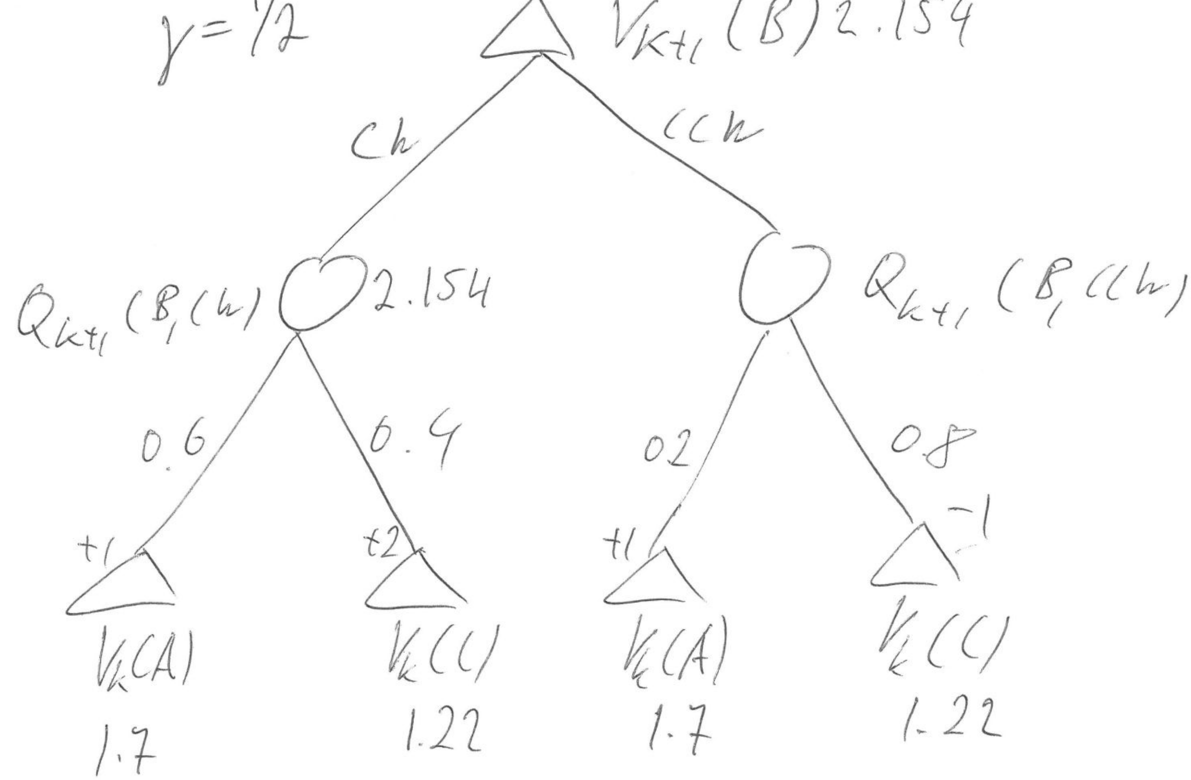
$\gamma = 1/2$



$$\underbrace{1.11}_{0.6[1+\frac{1}{2}\cdot 1.7]} + 1.044 = 2.154$$

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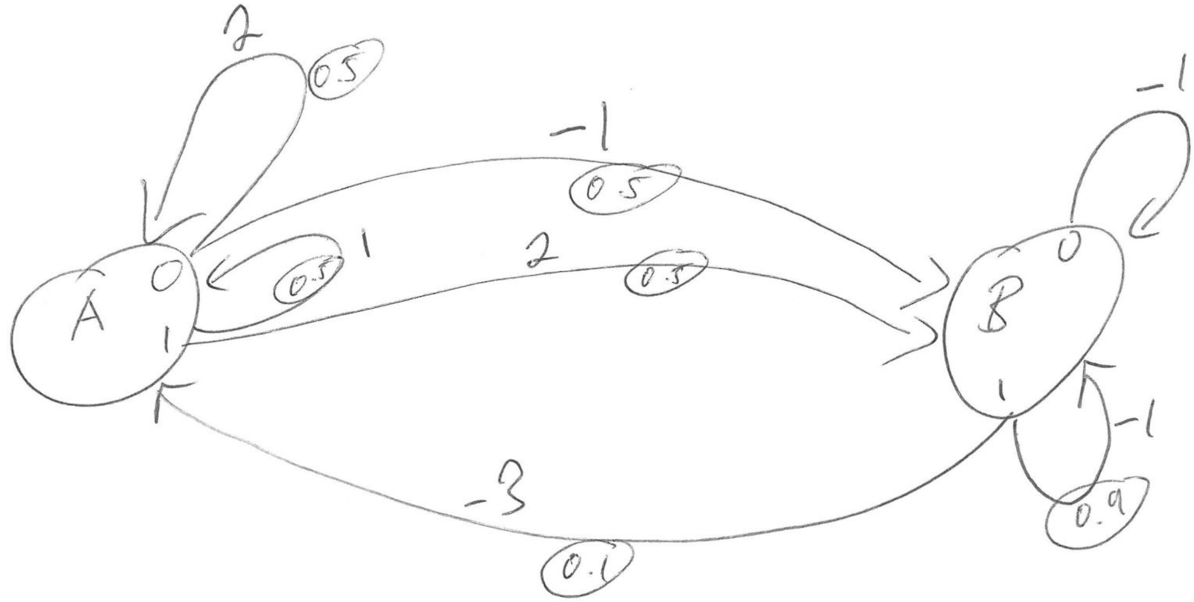

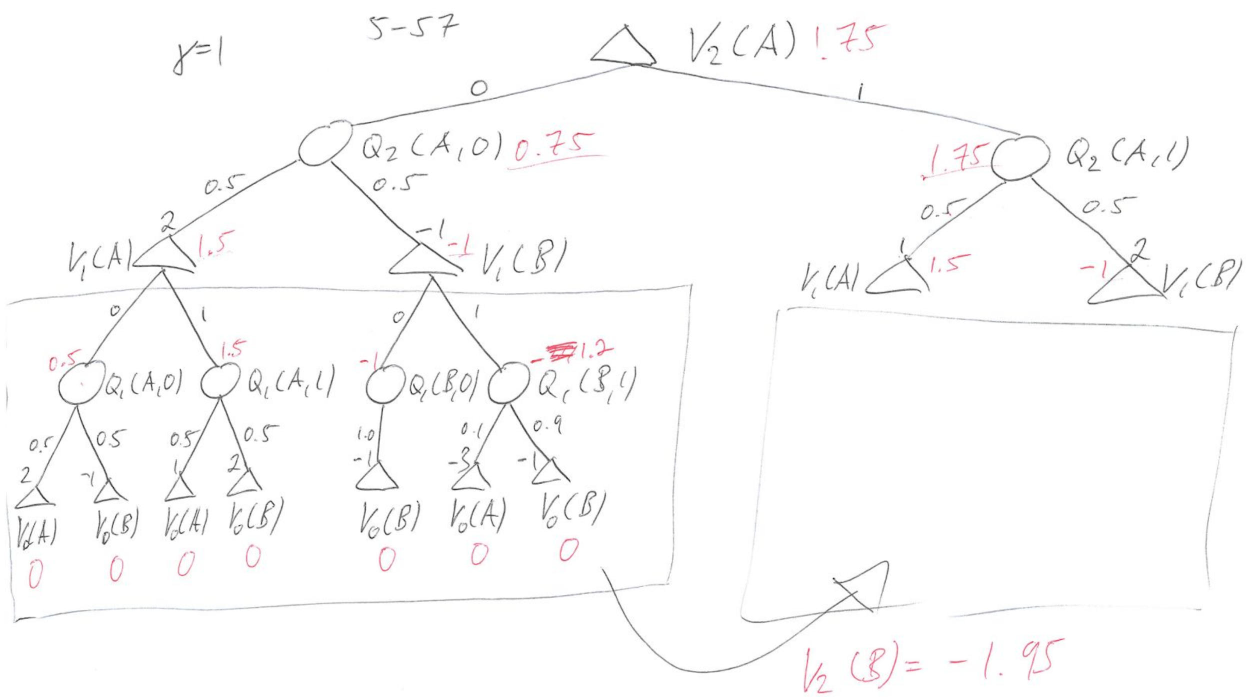

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0.8 * 0.9 * (-10) + 0.1 * 0.9 * (-8.7) + 0.1 * 0.9 * (-7.9) = -8.7

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0.8 * 0.9 * 100 + 0.1 * 0.9 * (-10) + 0.1 * 0.9 * (-10) = 70.2

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For pi:
a = 0.0, b = 0.0, c = 0.0, d = 0.0, e = 0.0

For pi':
a = 10.0, b = 10.0, c = 10.0, d = 1.0, 1.0

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$V^{Pli}(a) = 10$
$V^{Pli}(b) = 9$
$V^{Pli}(c) = 0$
$V^{Pli}(d) = 0$
$V^{Pli}(e) = 1$

exit
left
left
right
exit