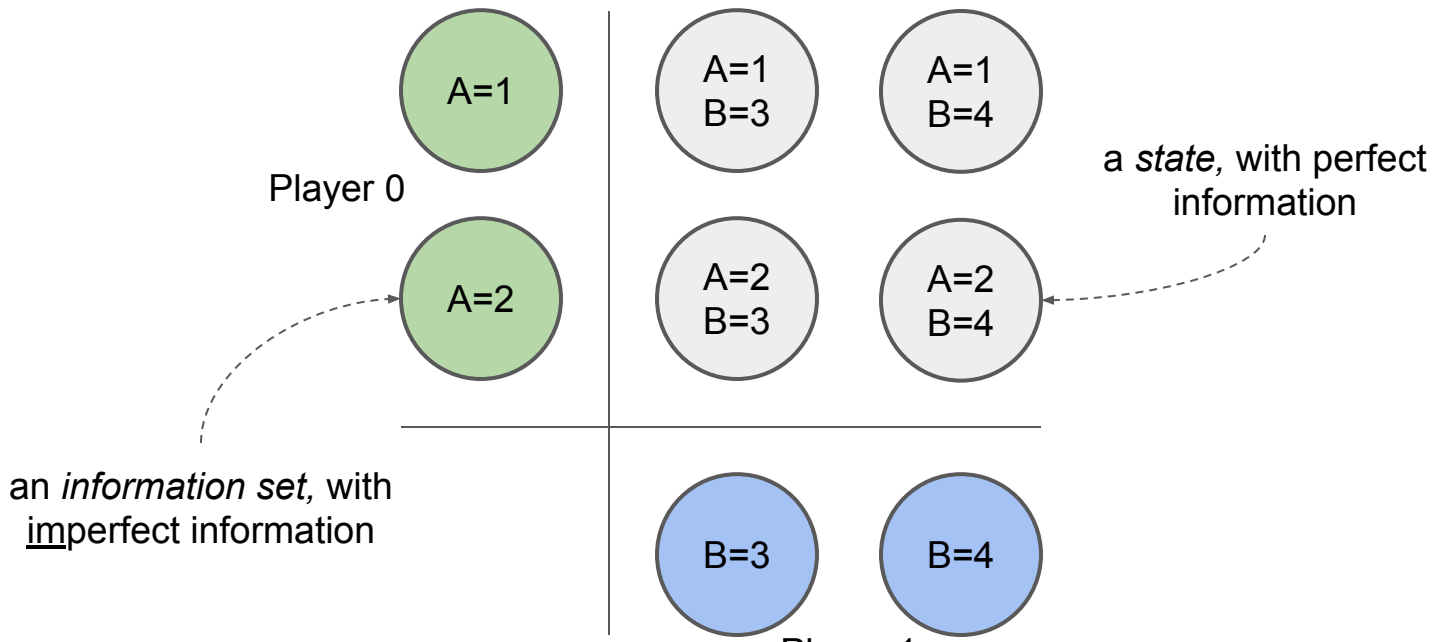
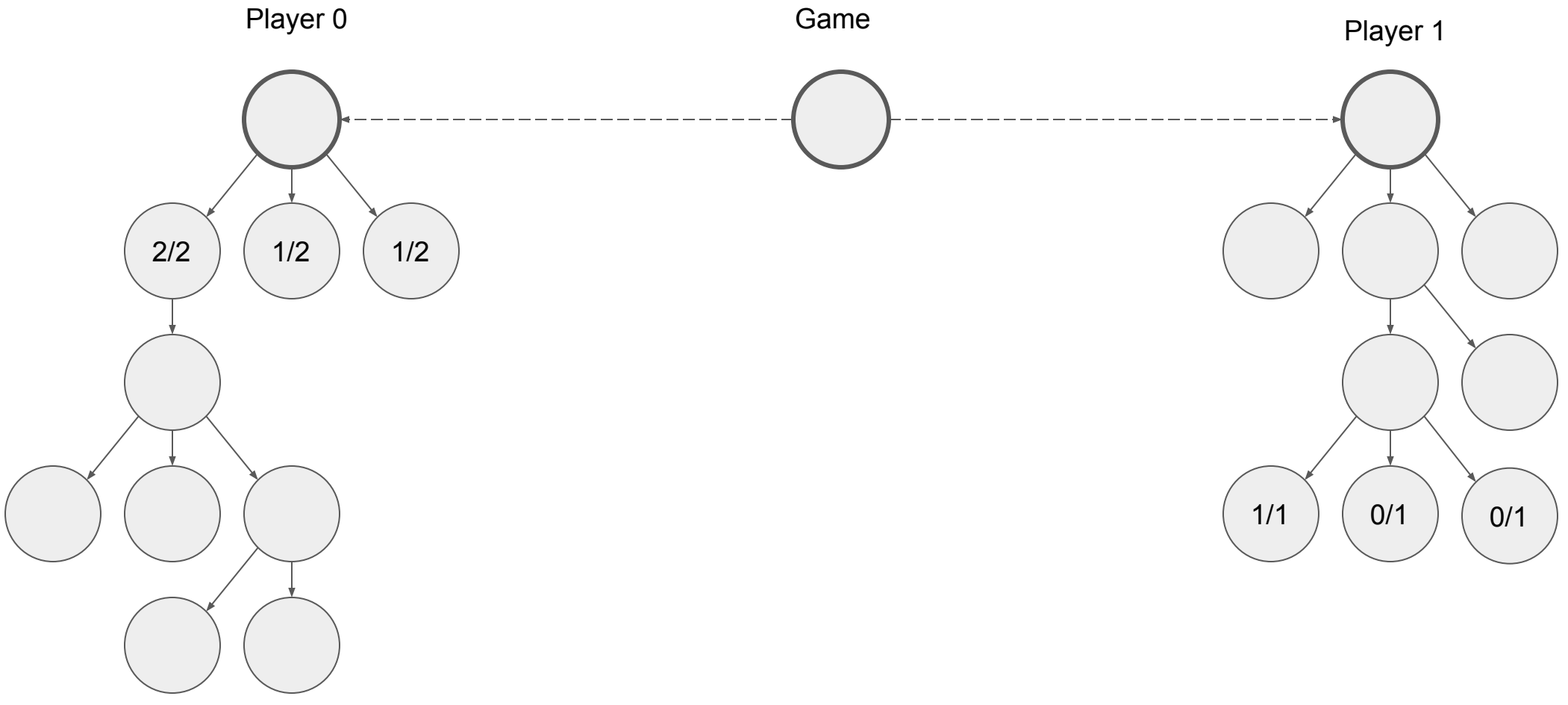
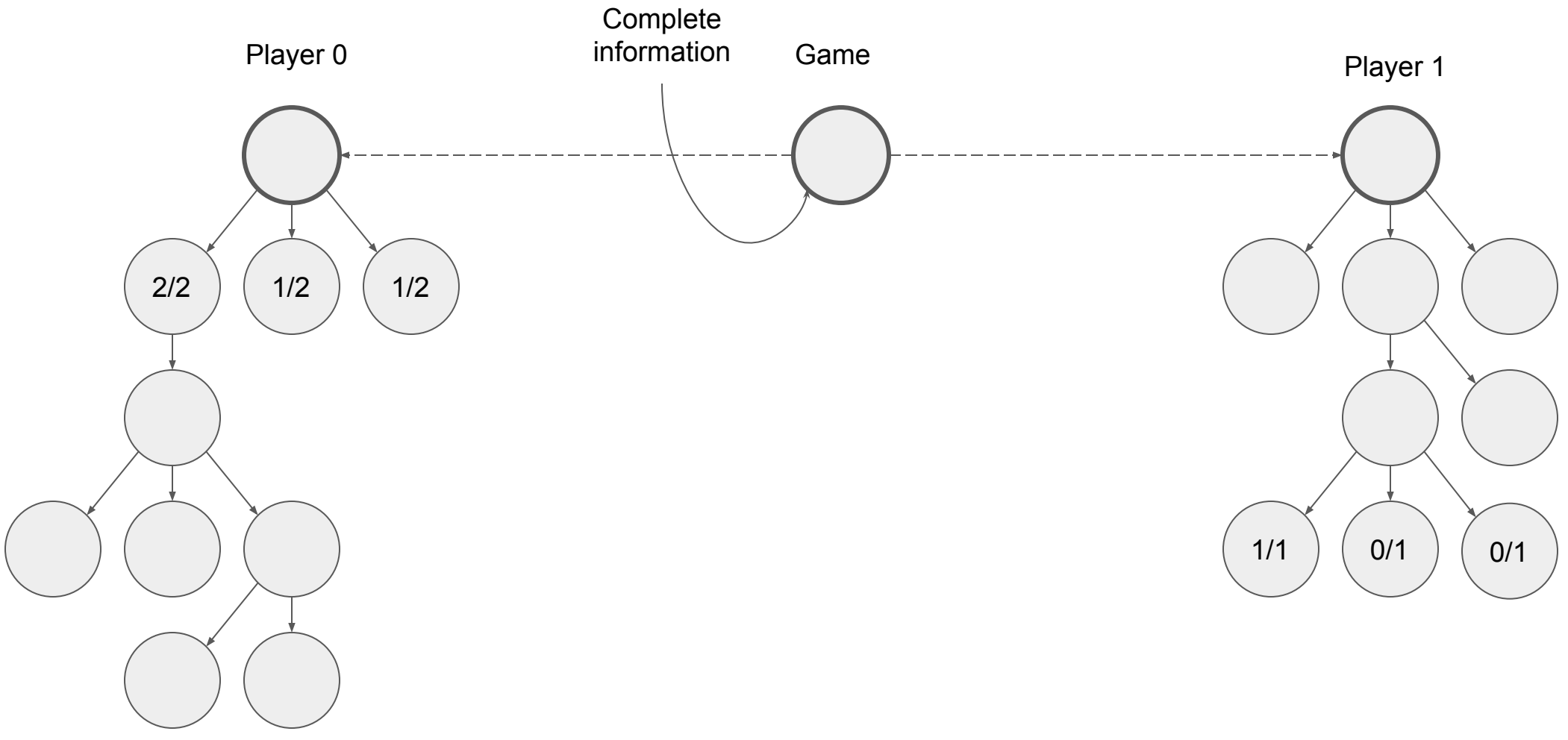
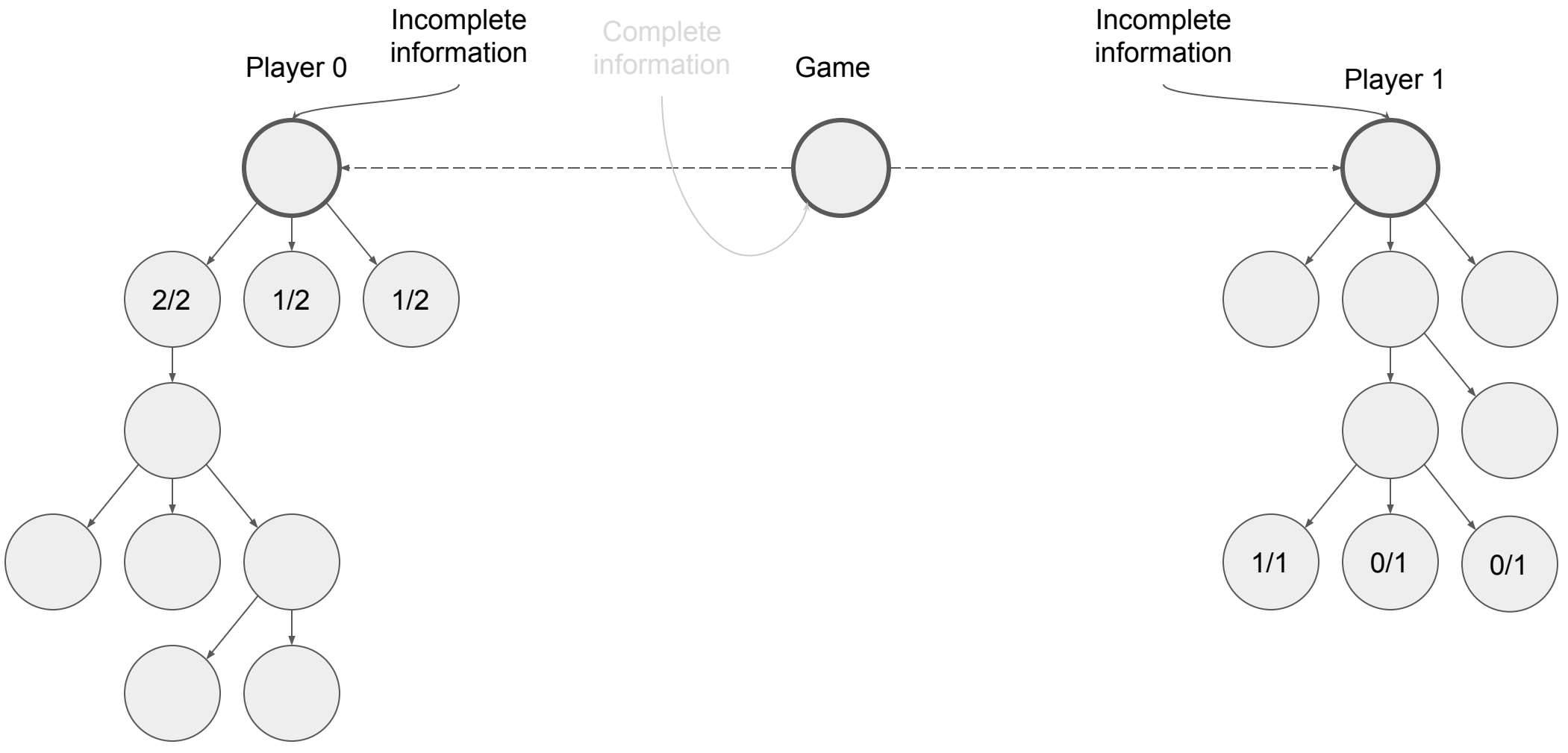

A=1
A=1
B=3
A=1
B=4
Player 0
a *state,* with perfect information
A=2
A=2
B=3
A=2
B=4
an *information set,* with imperfect information
B=3
B=4
Player 1



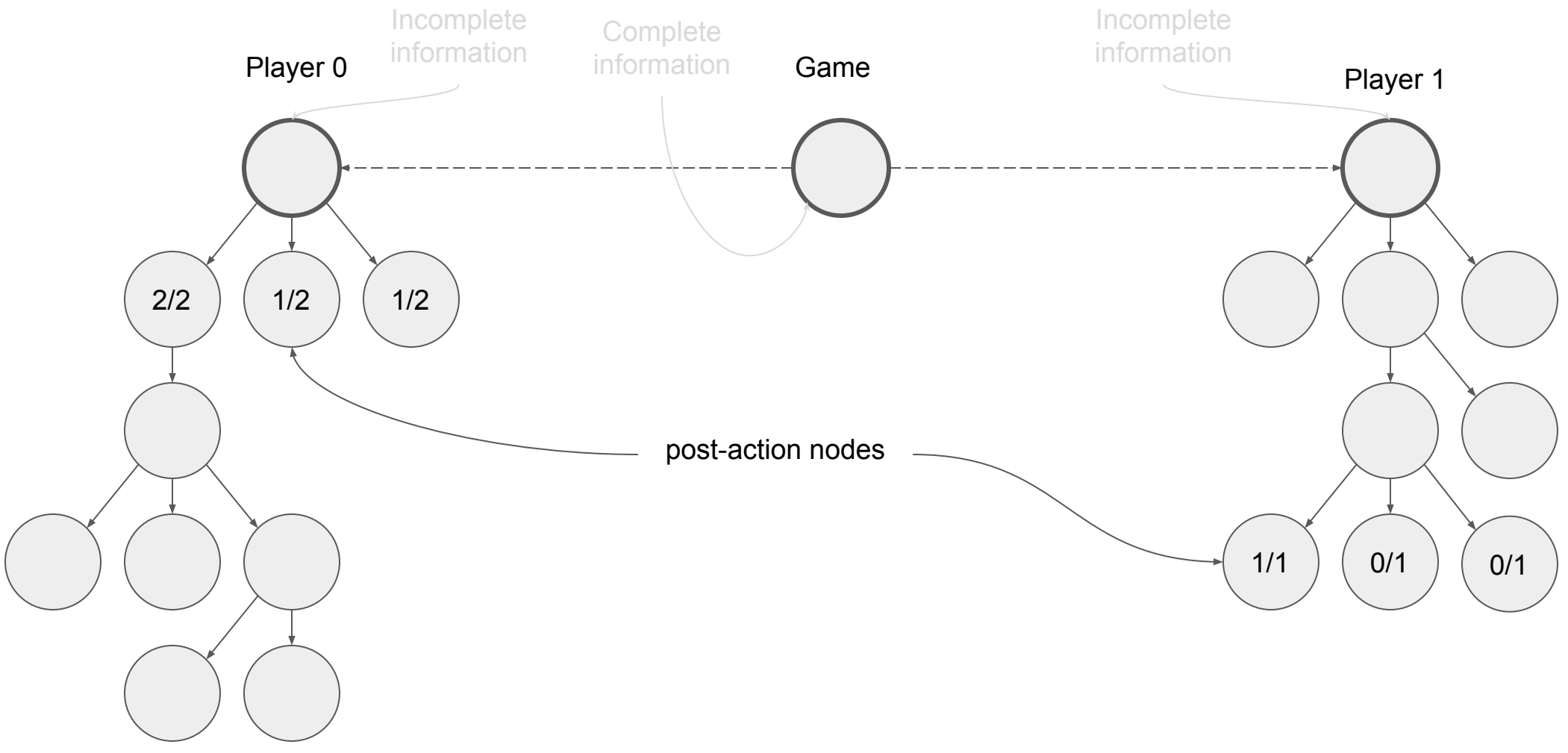
Each player has a separate tree



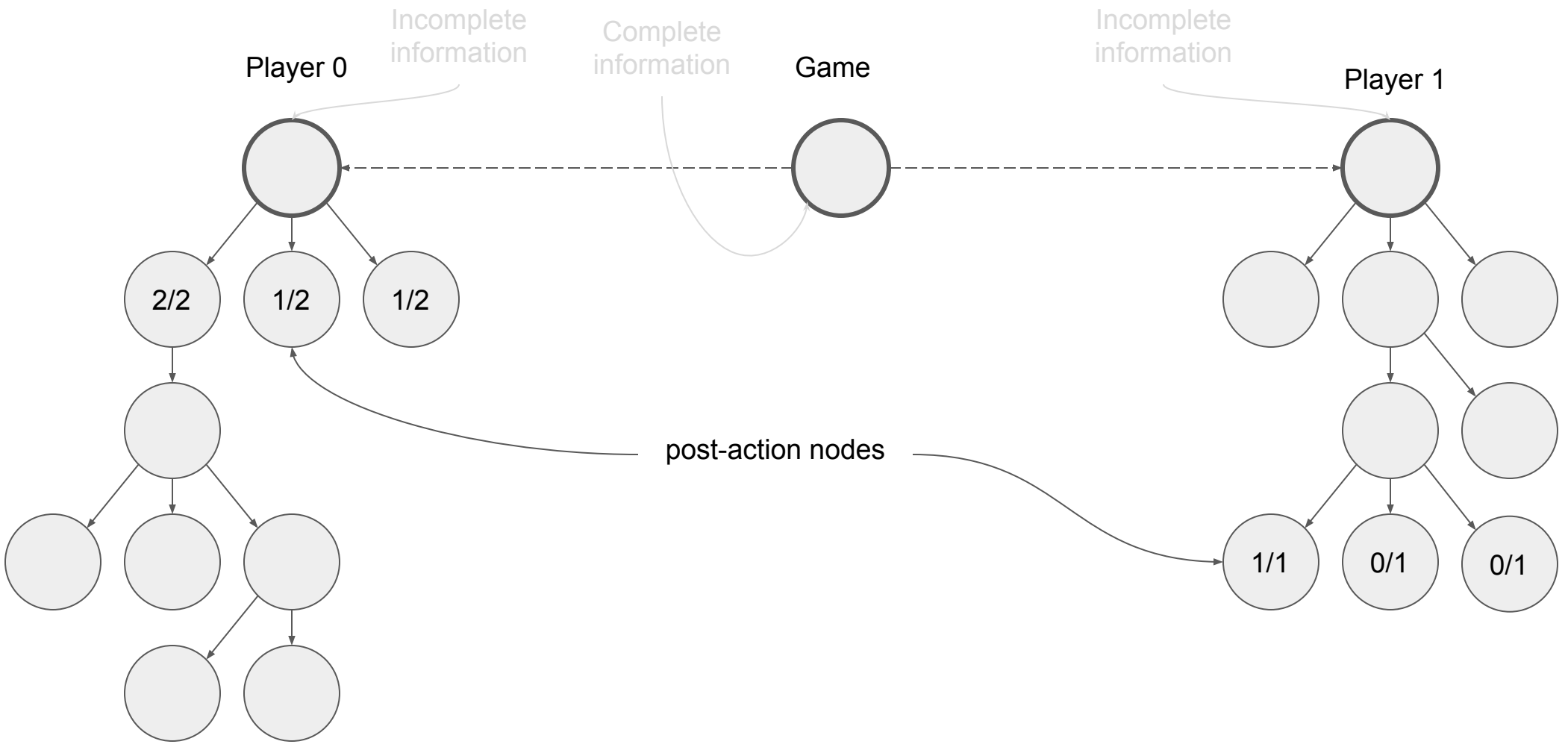
We simulate a game (the game itself has perfect information)



Each player can only observe their part of the game

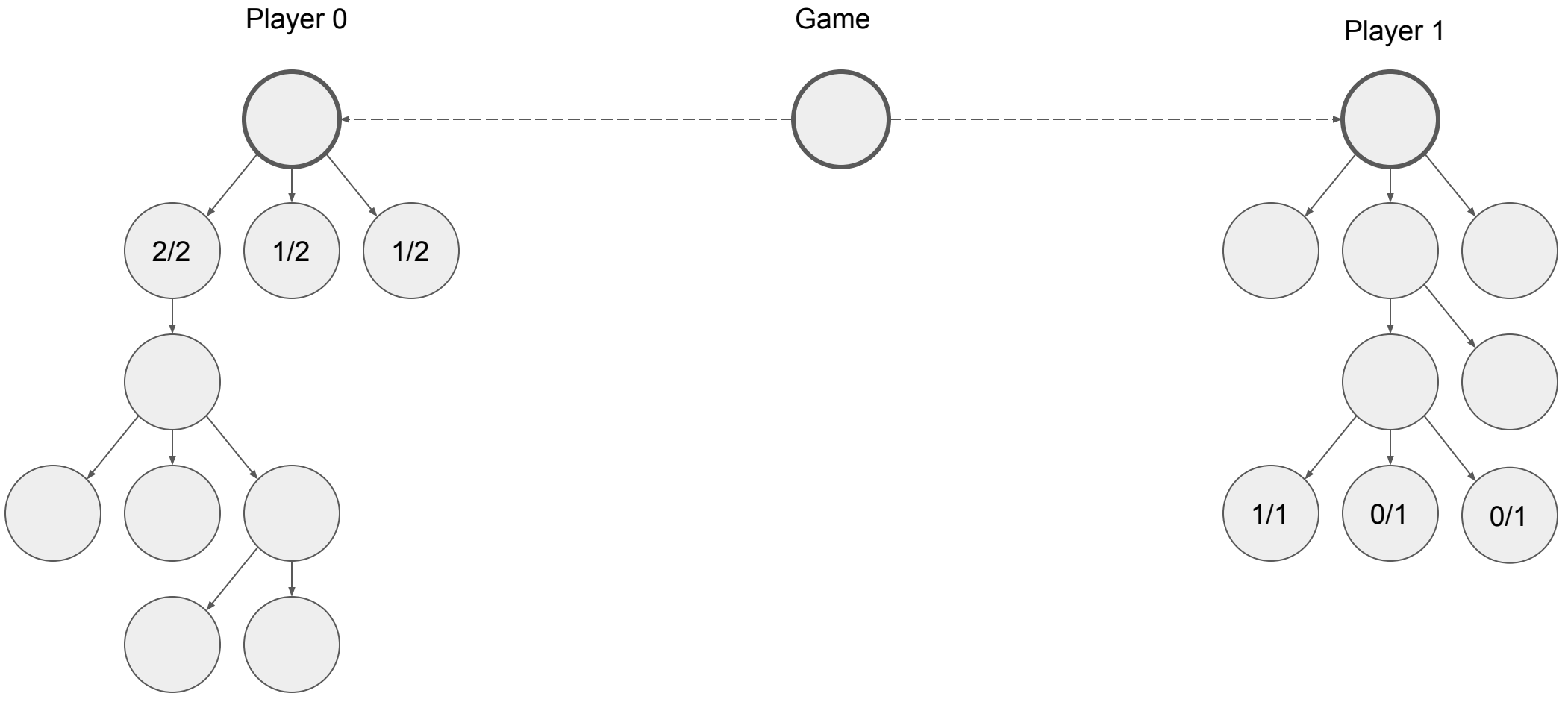


The tree distinguishes between neutral-nodes and post-action-nodes

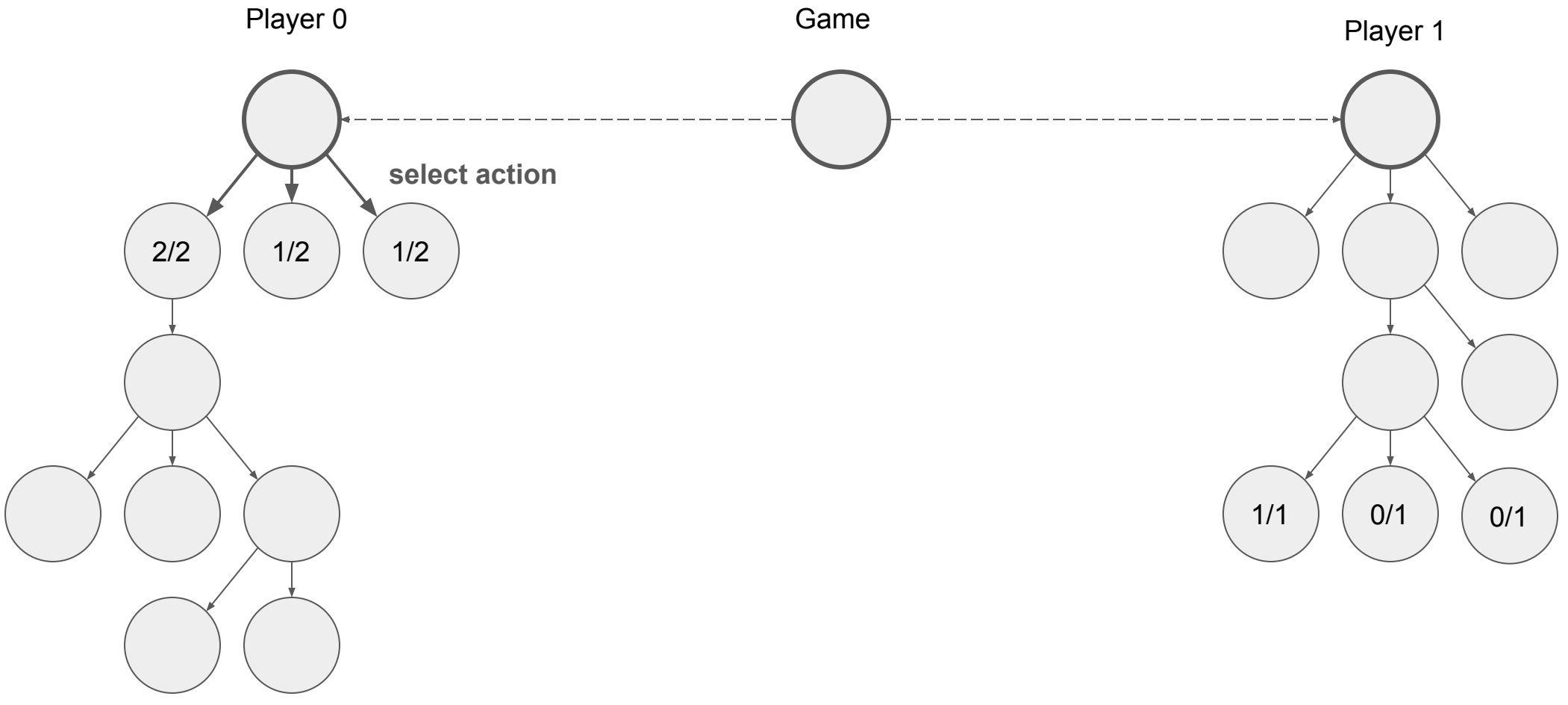


The tree distinguishes between neutral-nodes and post-action-nodes
We only need to keep track of win statistics for post-action nodes.

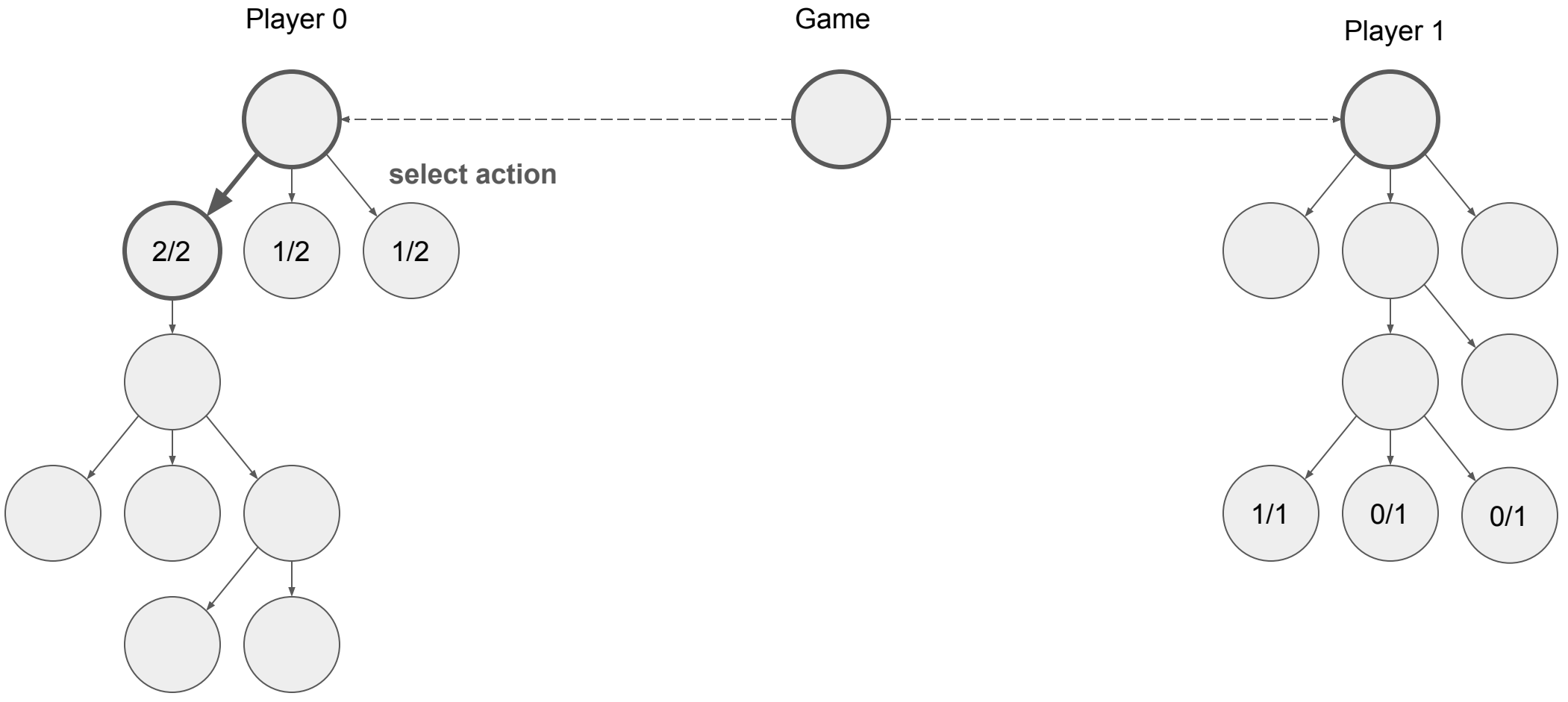
(actions are selected based on the UCB of the child post-action-nodes, UCB requires win statistics)



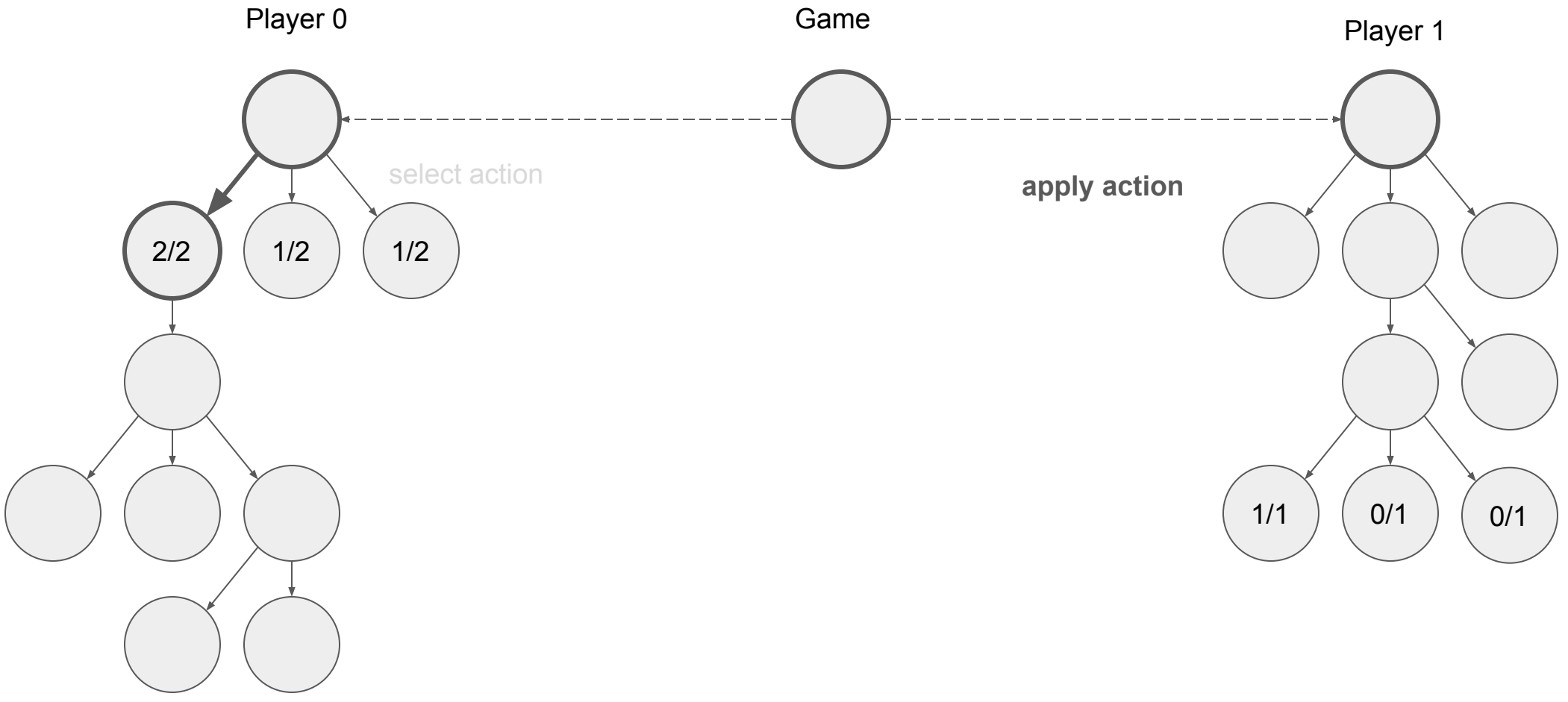
Start the game!



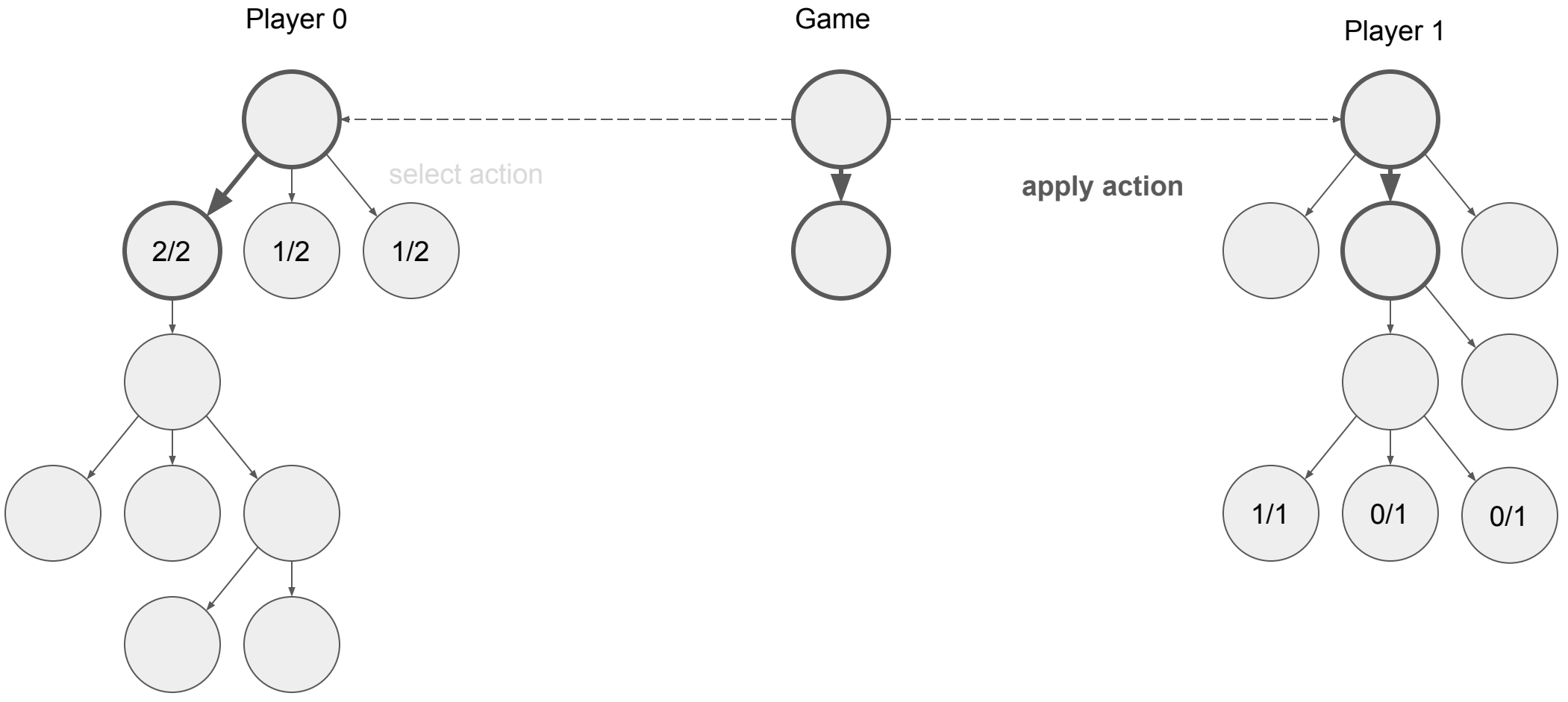
Player 0 selects the action with the highest UCB



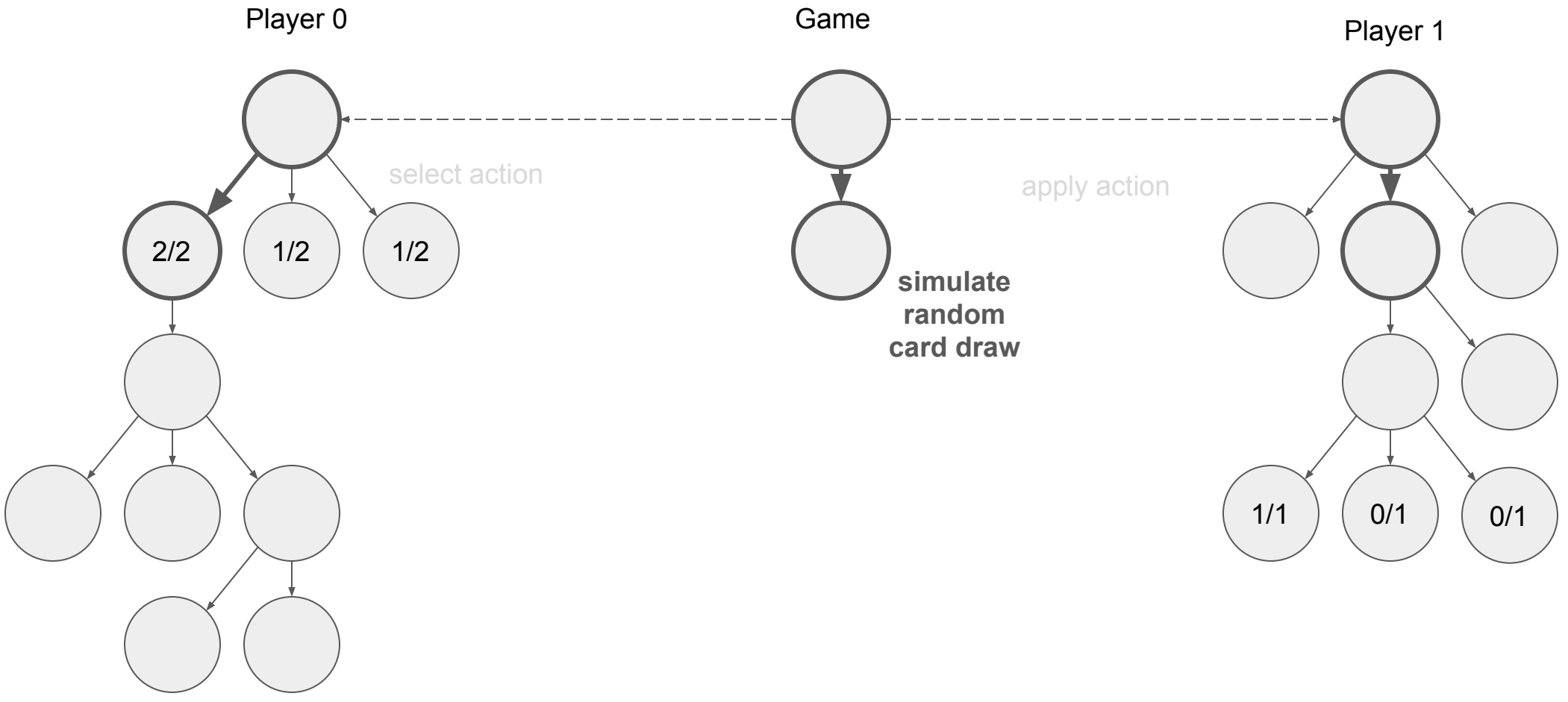
Player 0 selects the action with the highest UCB



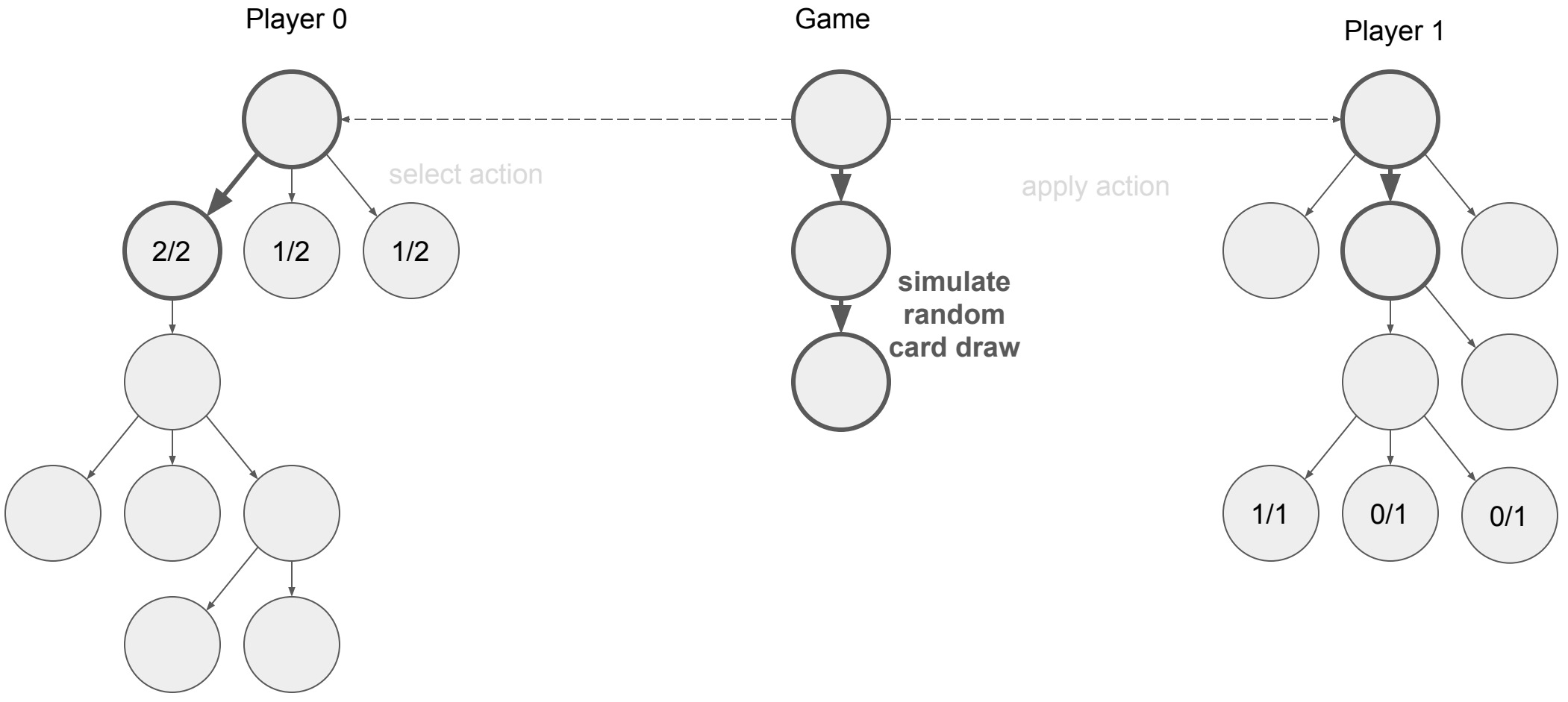
Apply Player 0’s action to the simulation of the game and the tree of Player 1



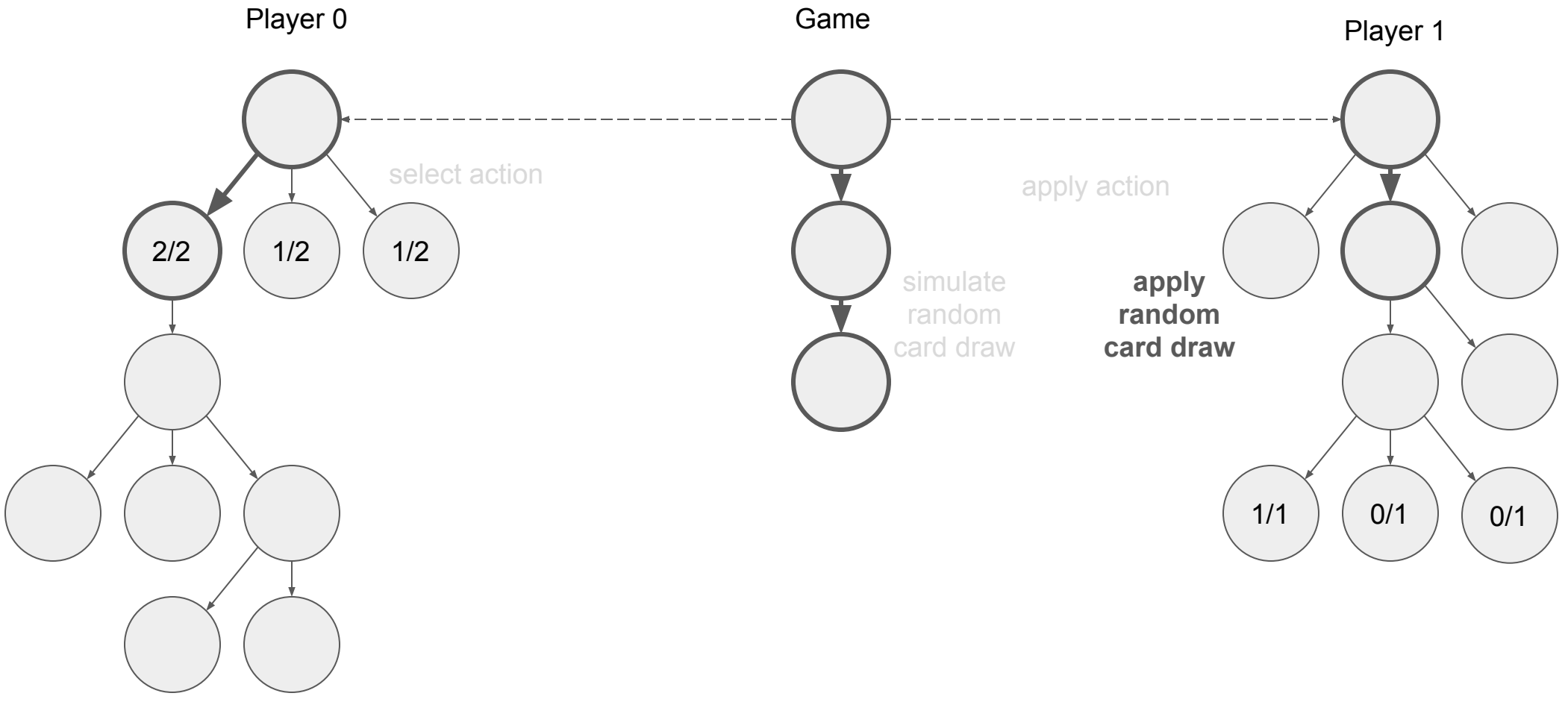
Apply Player 0’s action to the simulation of the game and the tree of Player 1



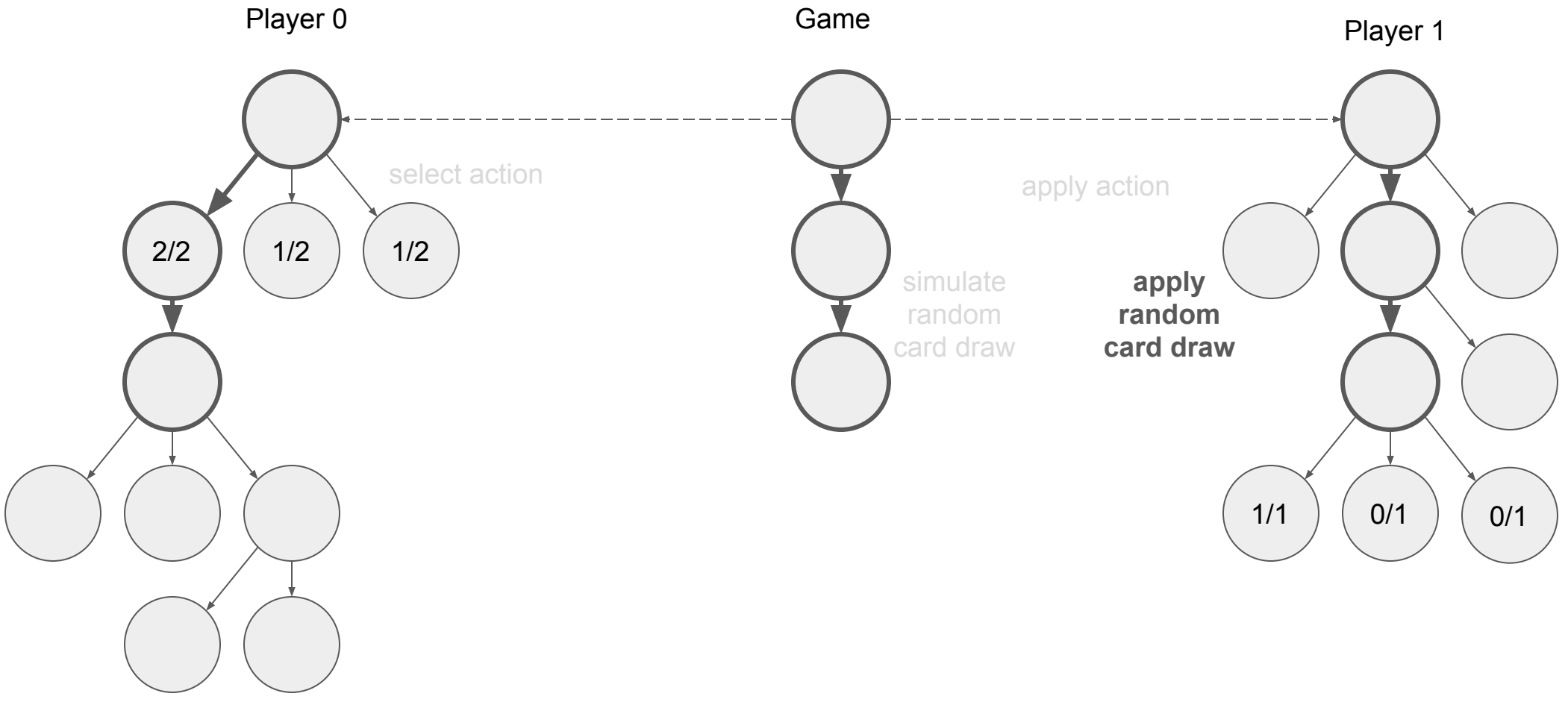
Randomly draw a card for player 1



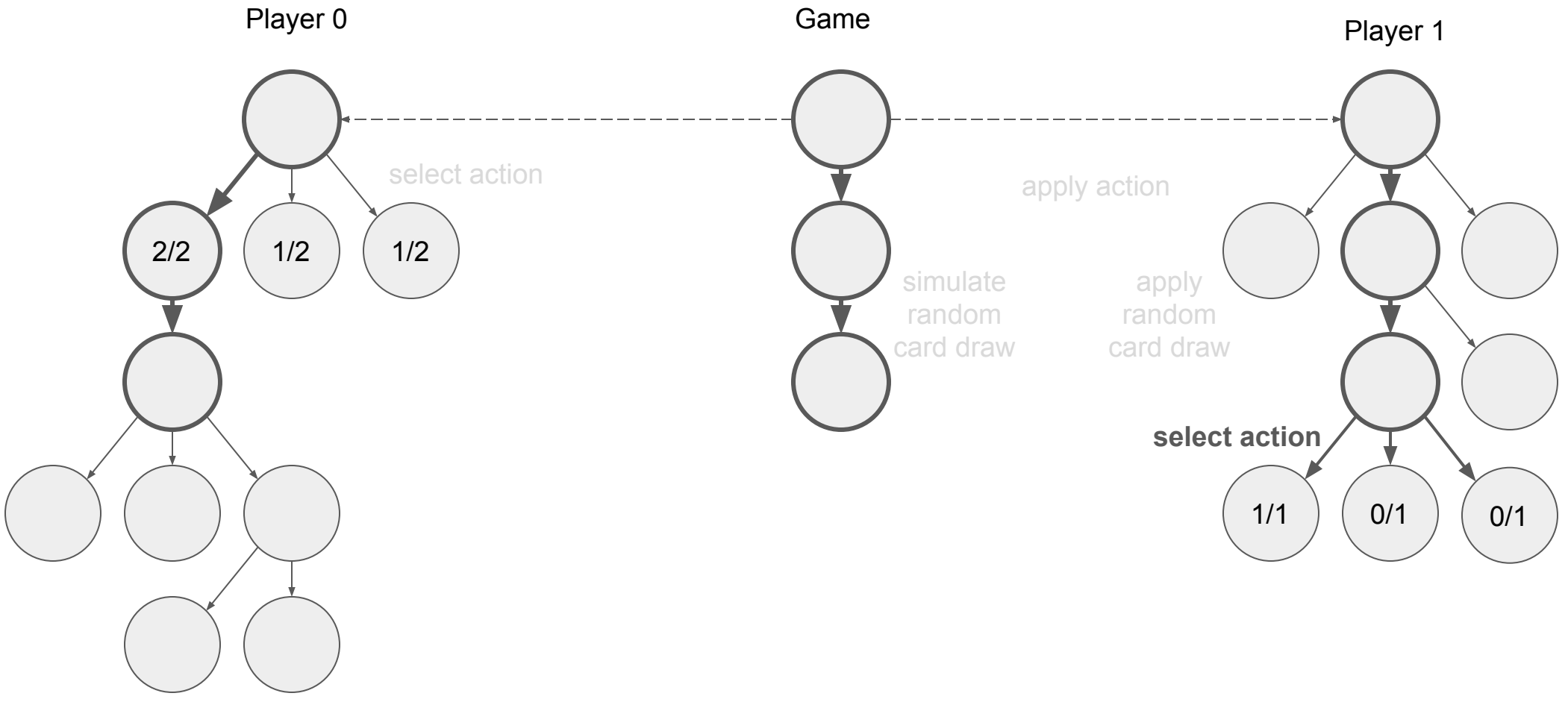
Randomly draw a card for player 1



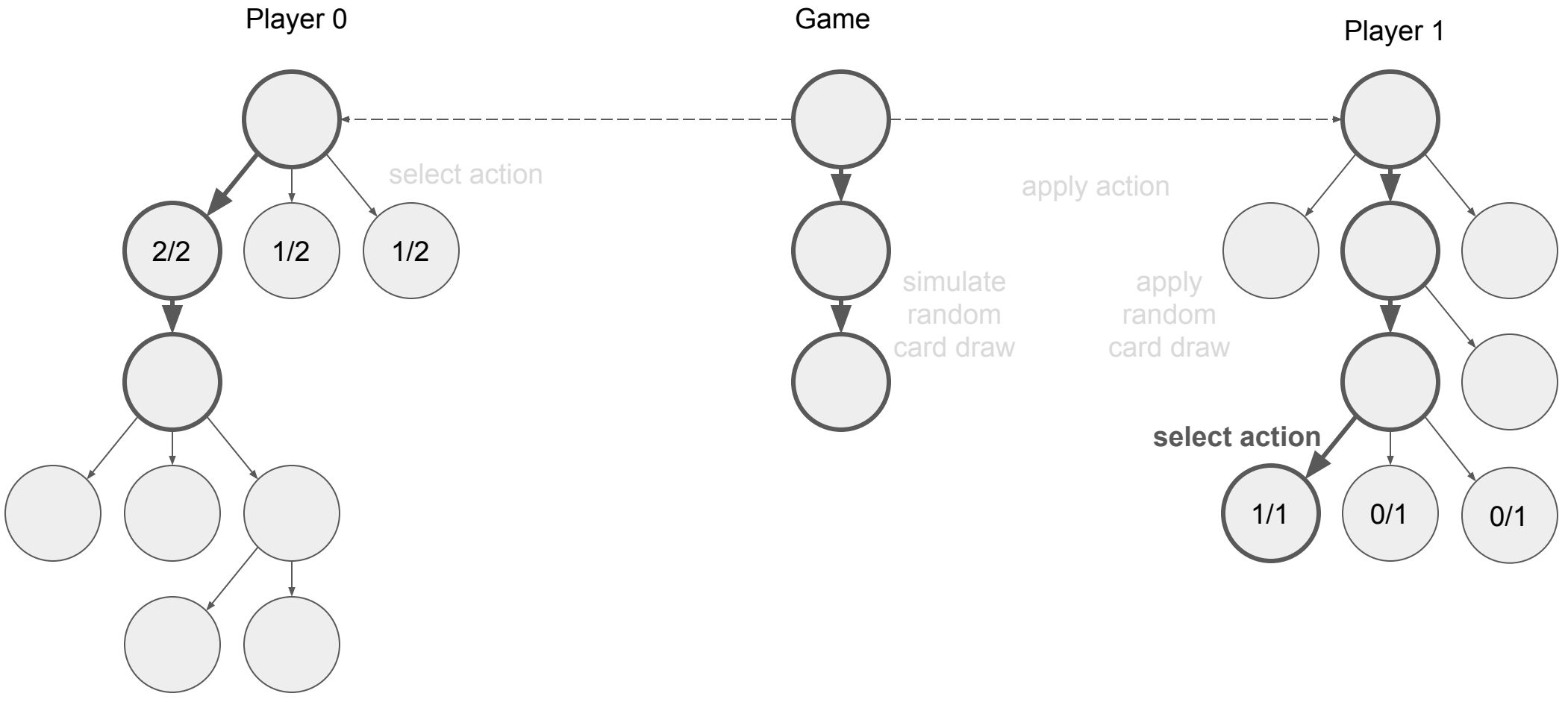
Traverse to the next node based on the newly drawn card for Player 1



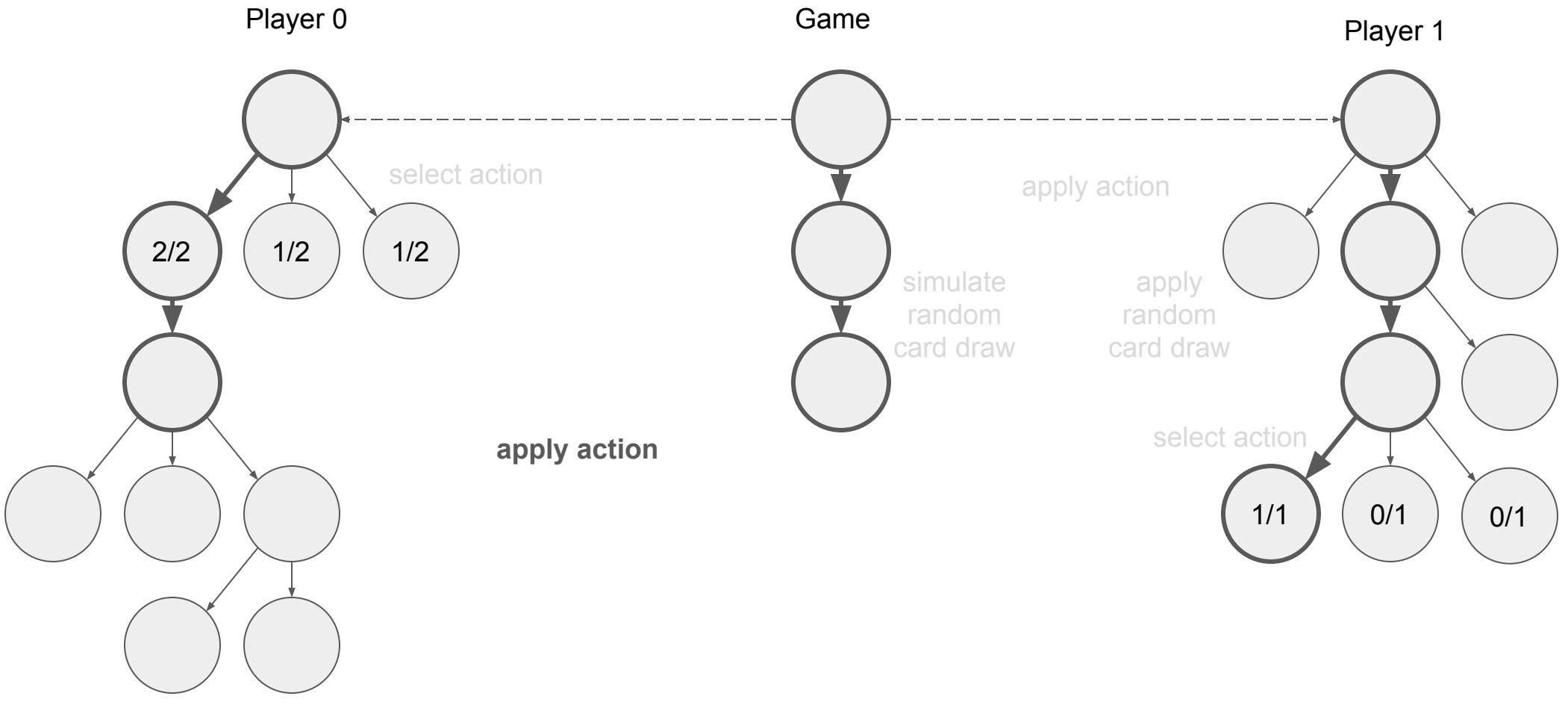
Traverse to the next node based on the newly drawn card for Player 1



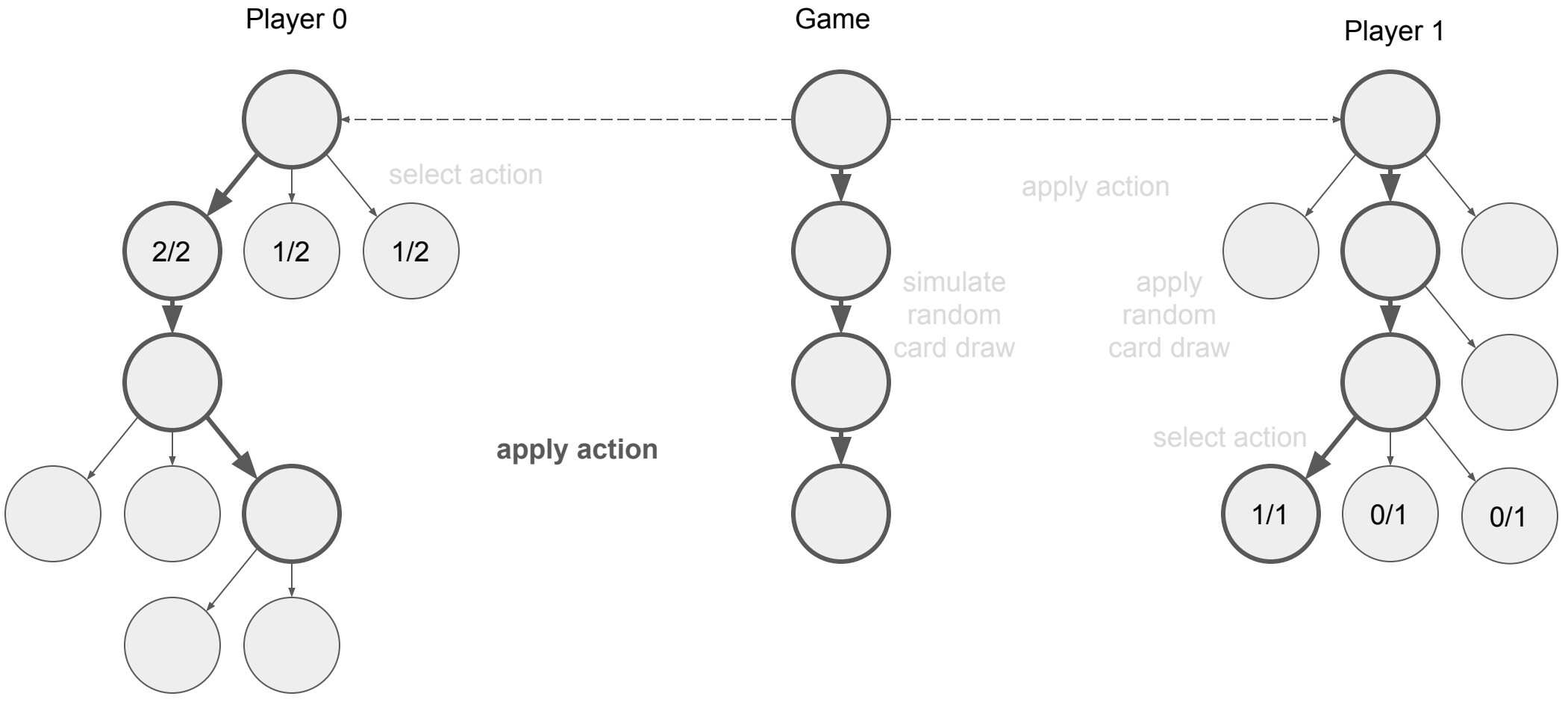
Player 1 selects the action with the highest UCB



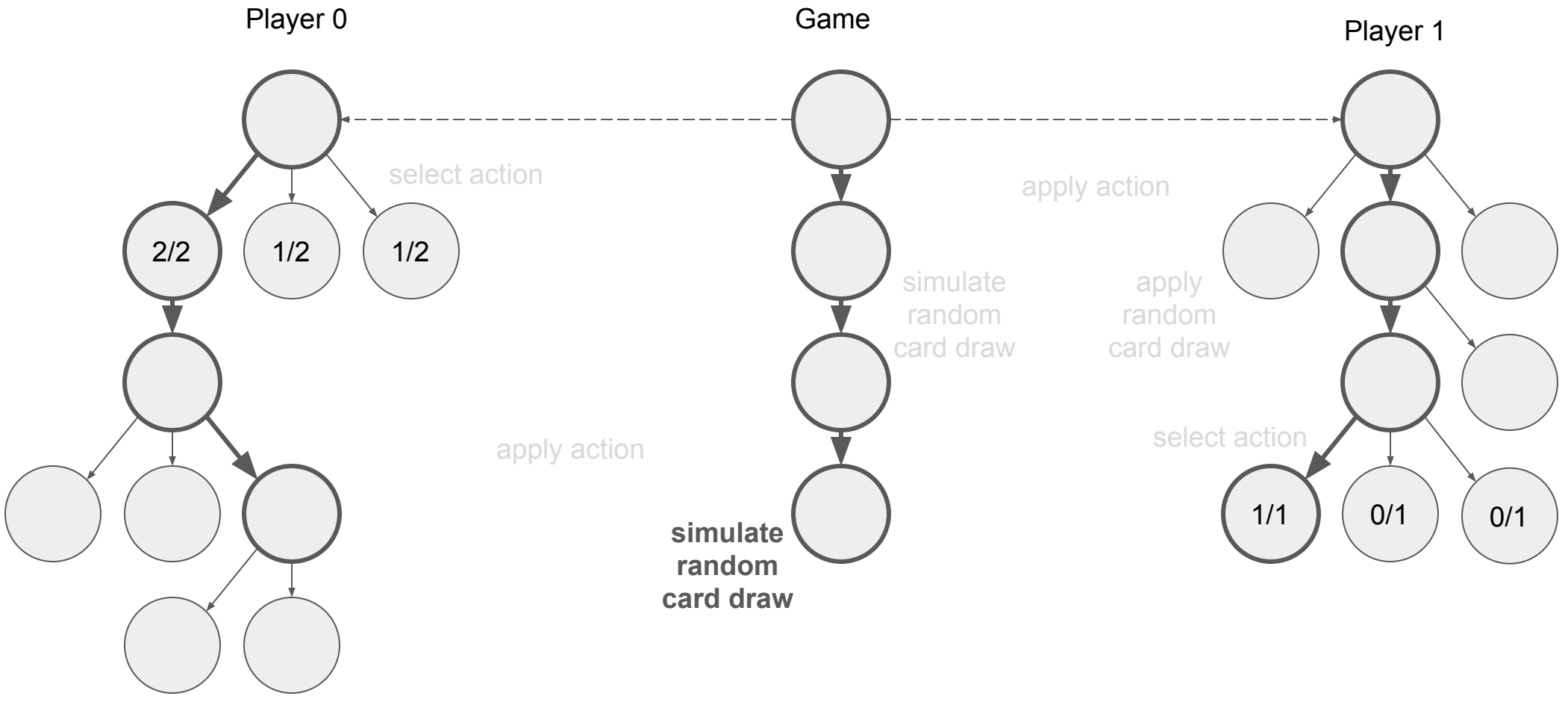
Player 1 selects the action with the highest UCB



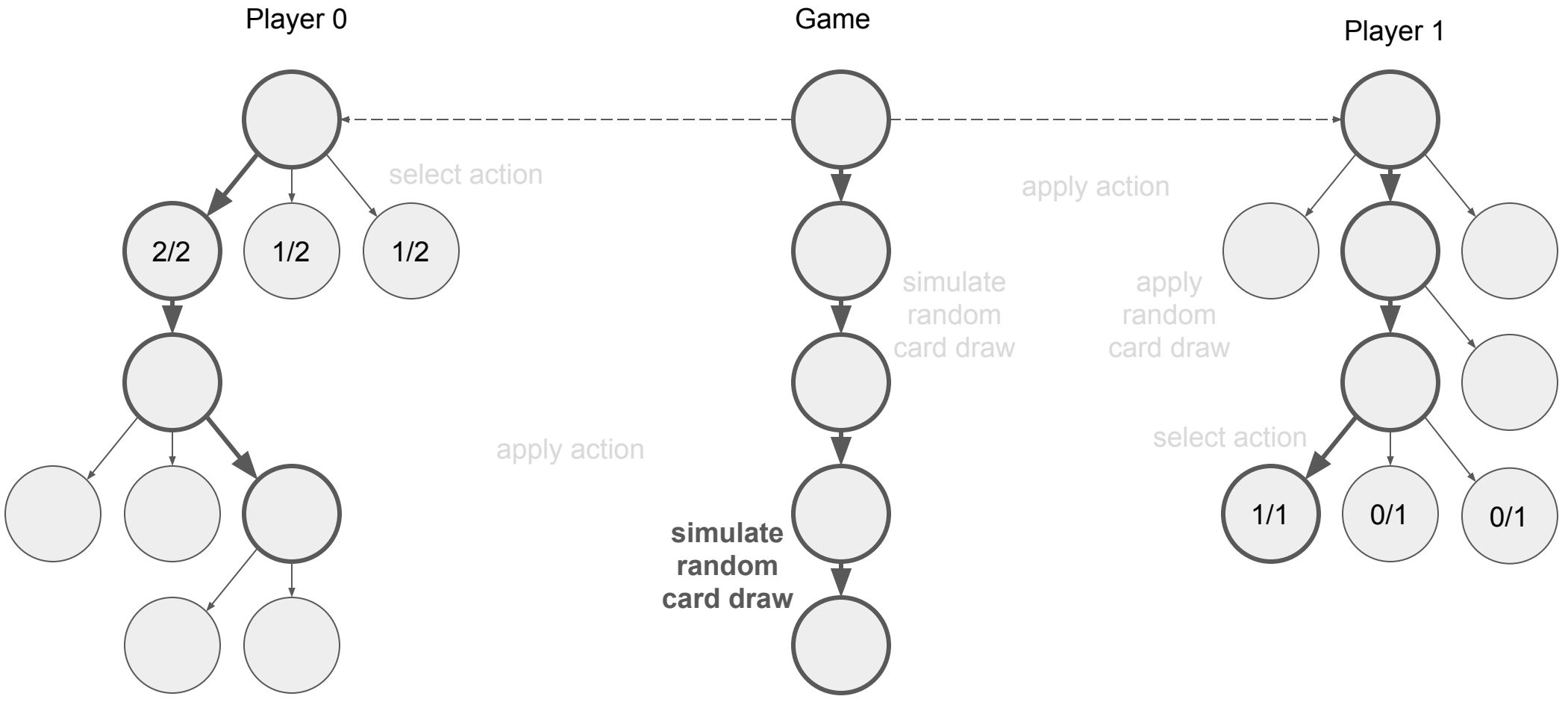
Apply Player 1’s action to the simulation of the game and the tree of Player 0



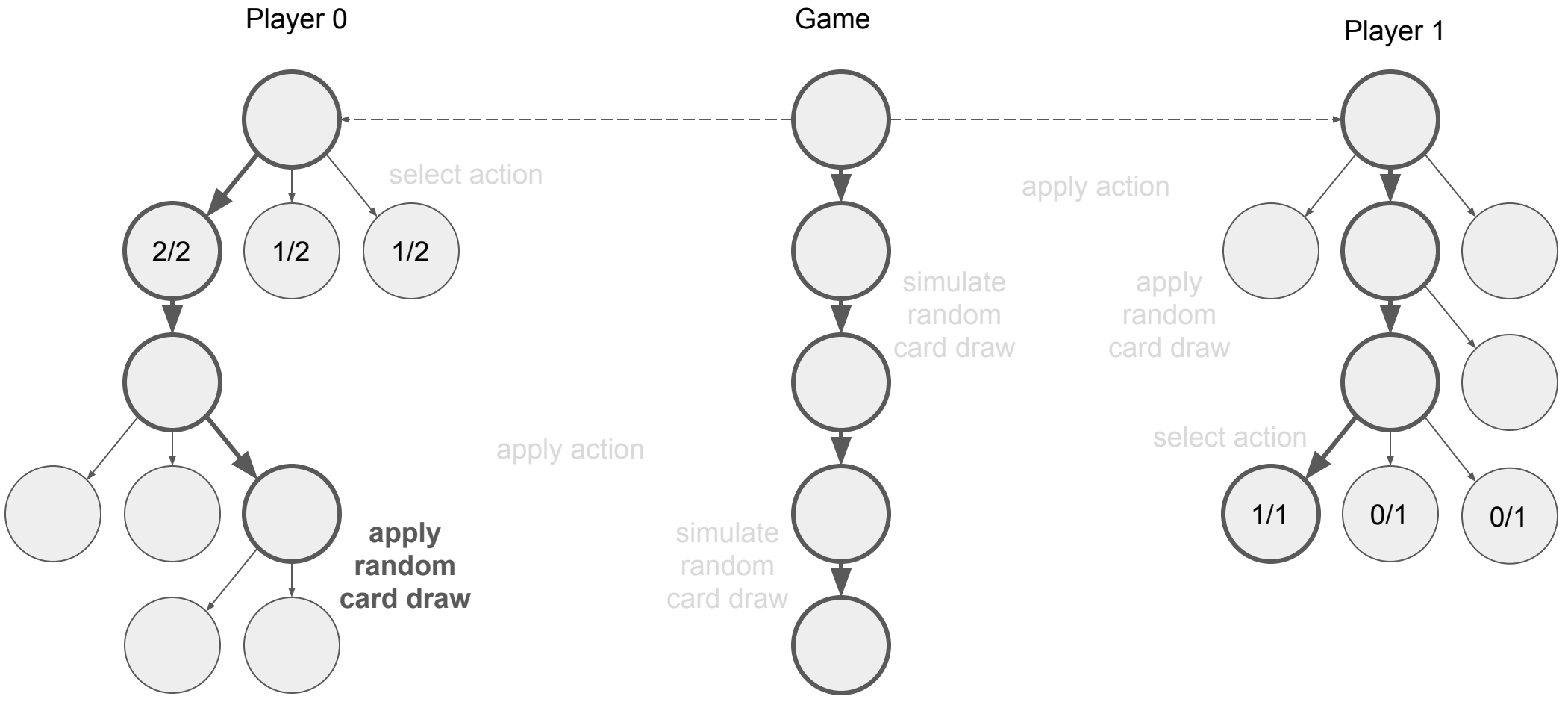
Apply Player 1’s action to the simulation of the game and the tree of Player 0



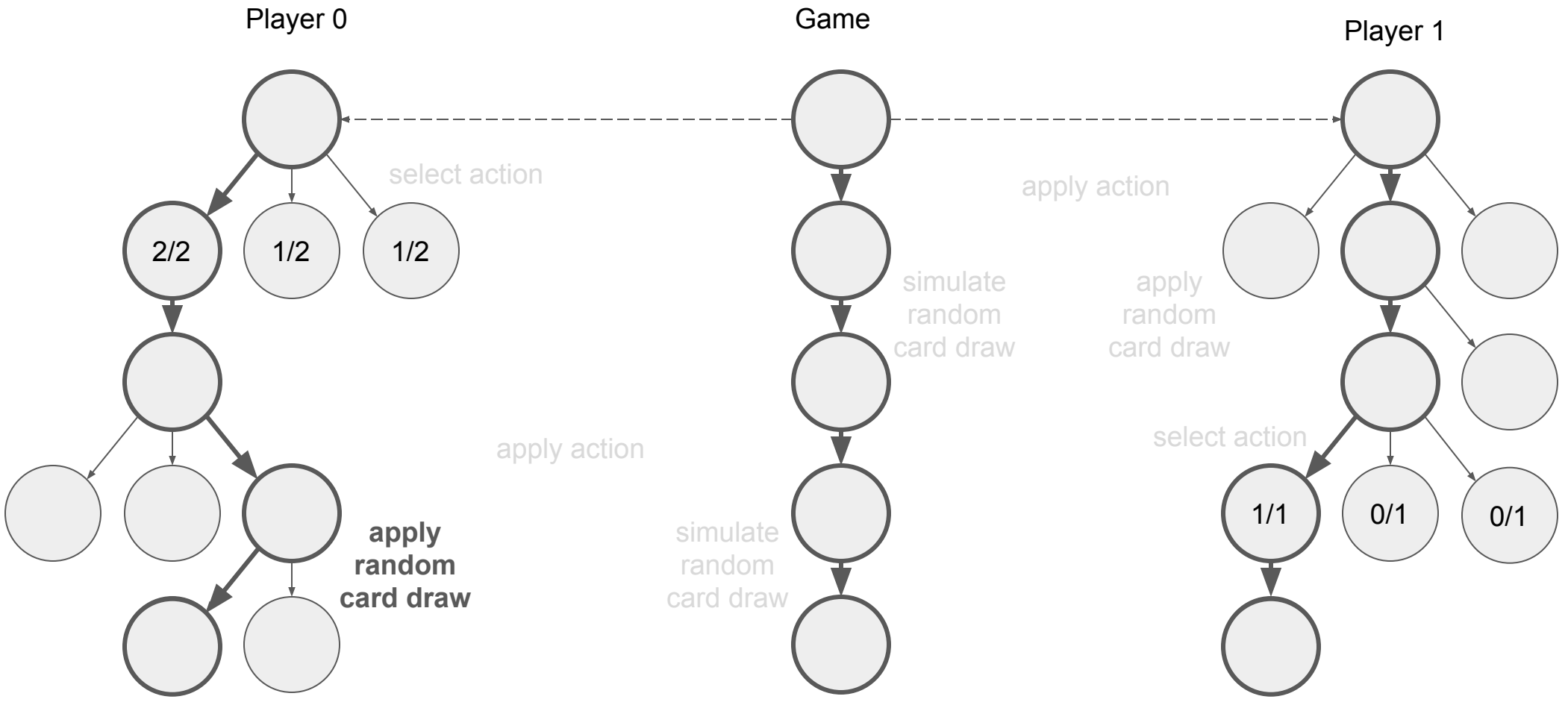
Randomly draw a card for player 0



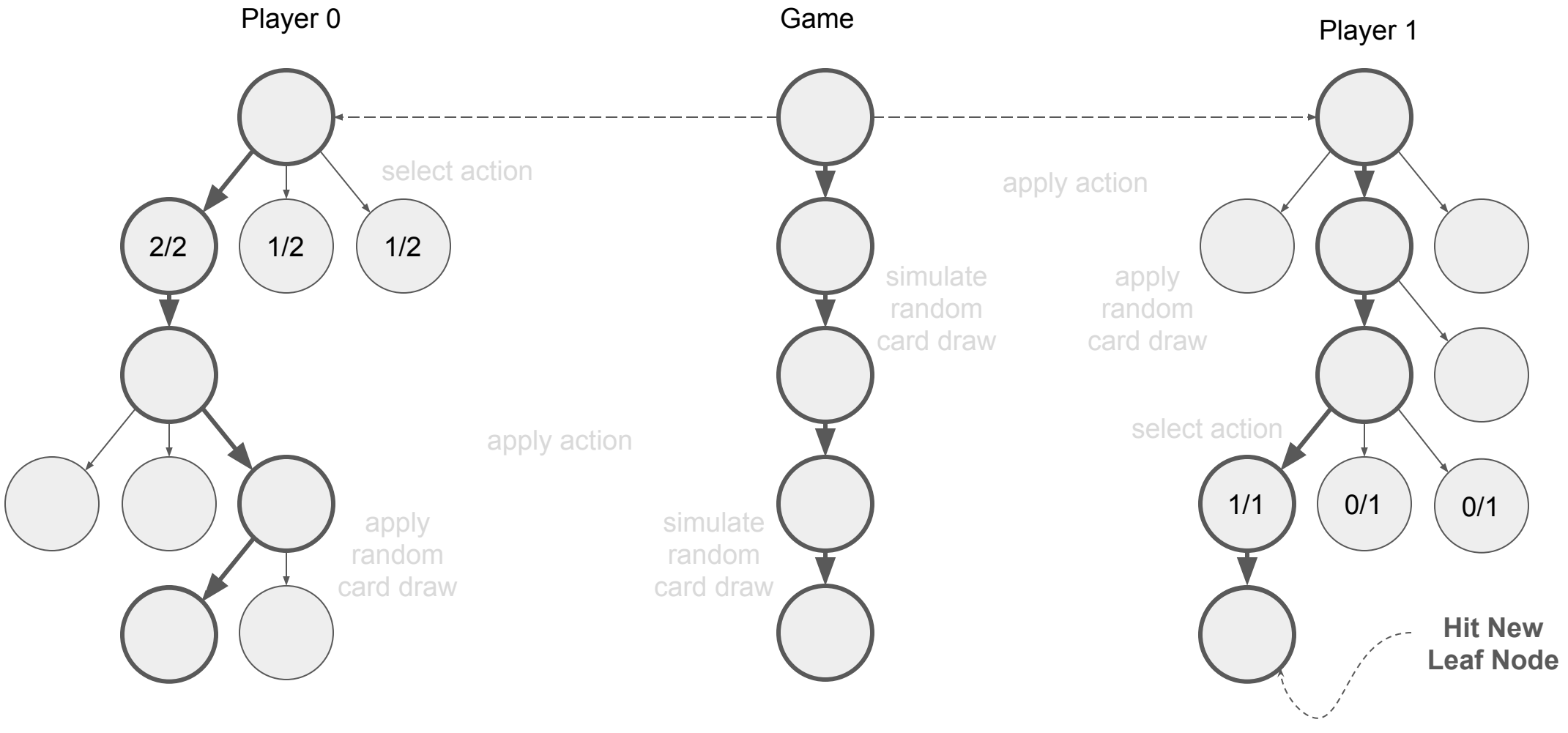
Randomly draw a card for player 0



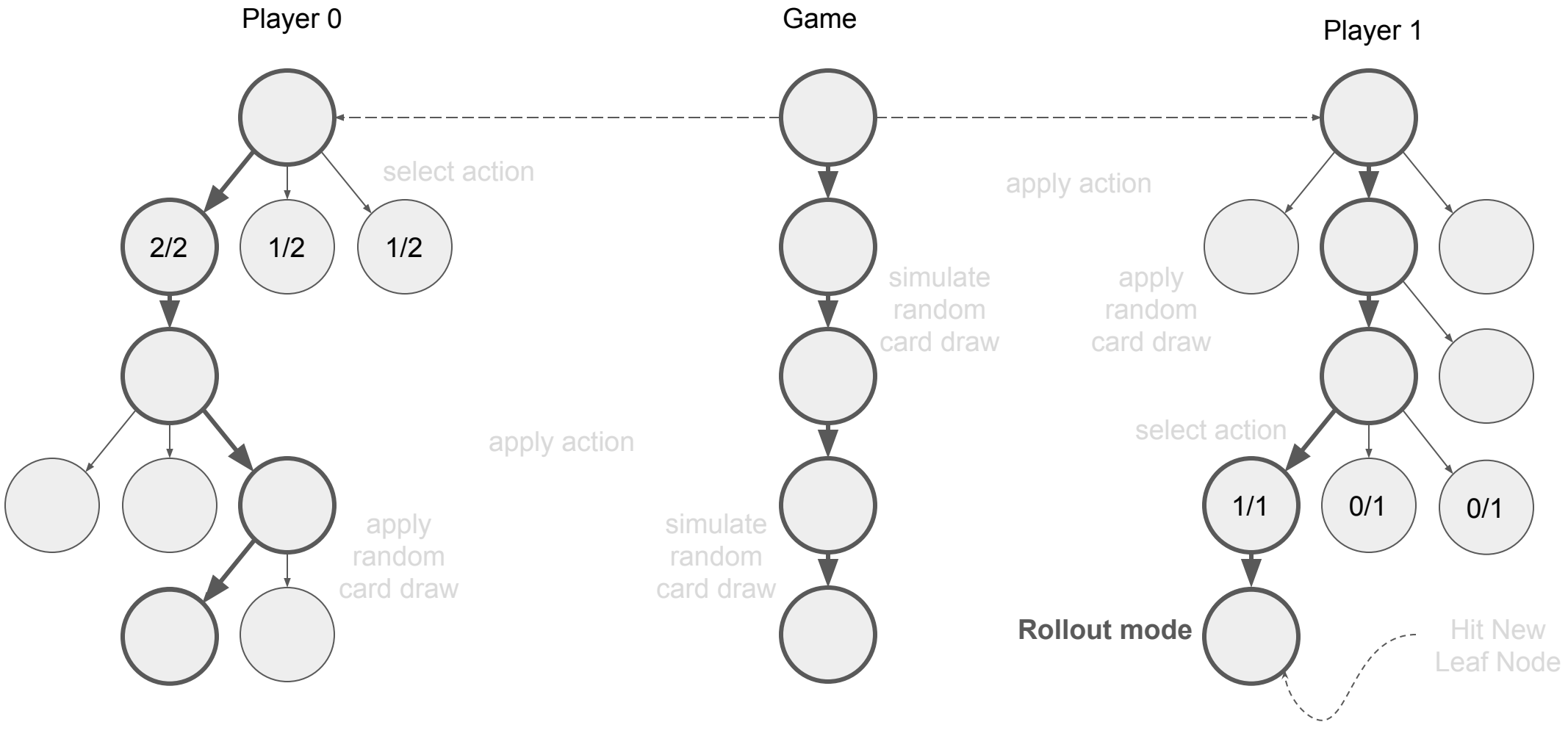
Traverse to the next node based on the newly drawn card for Player 0



Traverse to the next node based on the newly drawn card for Player 0



When a new leaf node is sprouted (a neutral node), the tree is set to ‘rollout mode’.
Pick random actions
Don’t sprout new nodes



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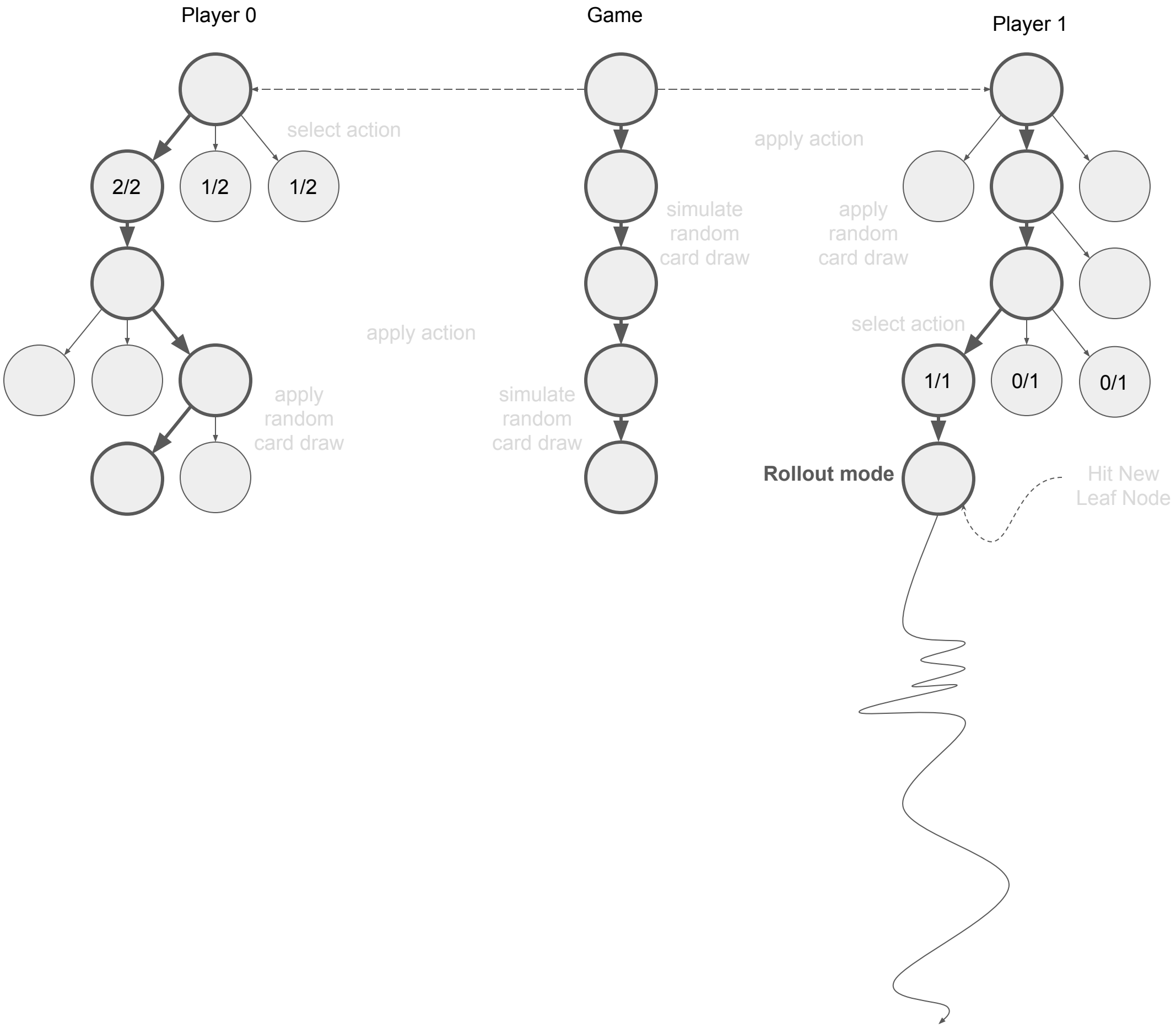
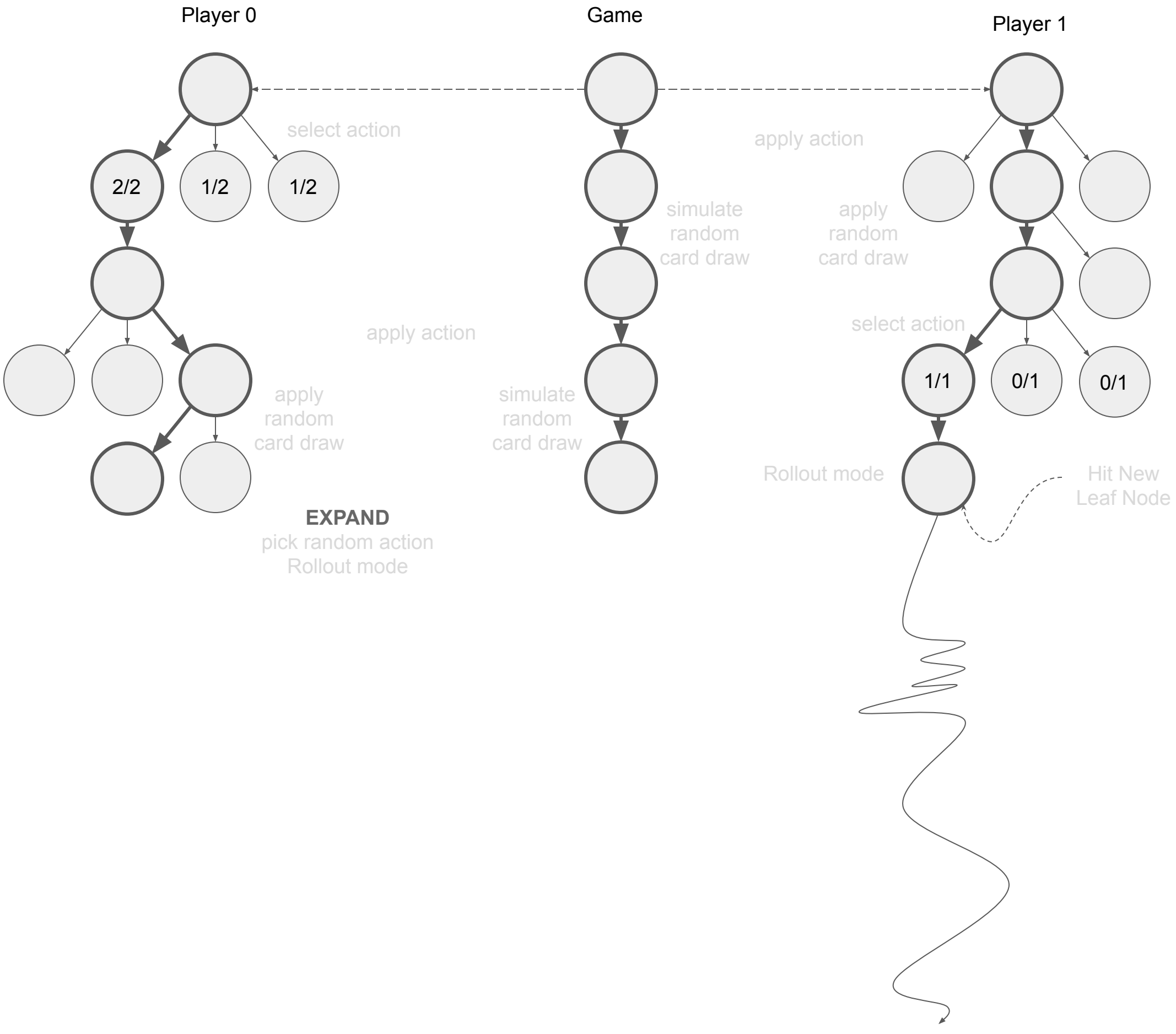
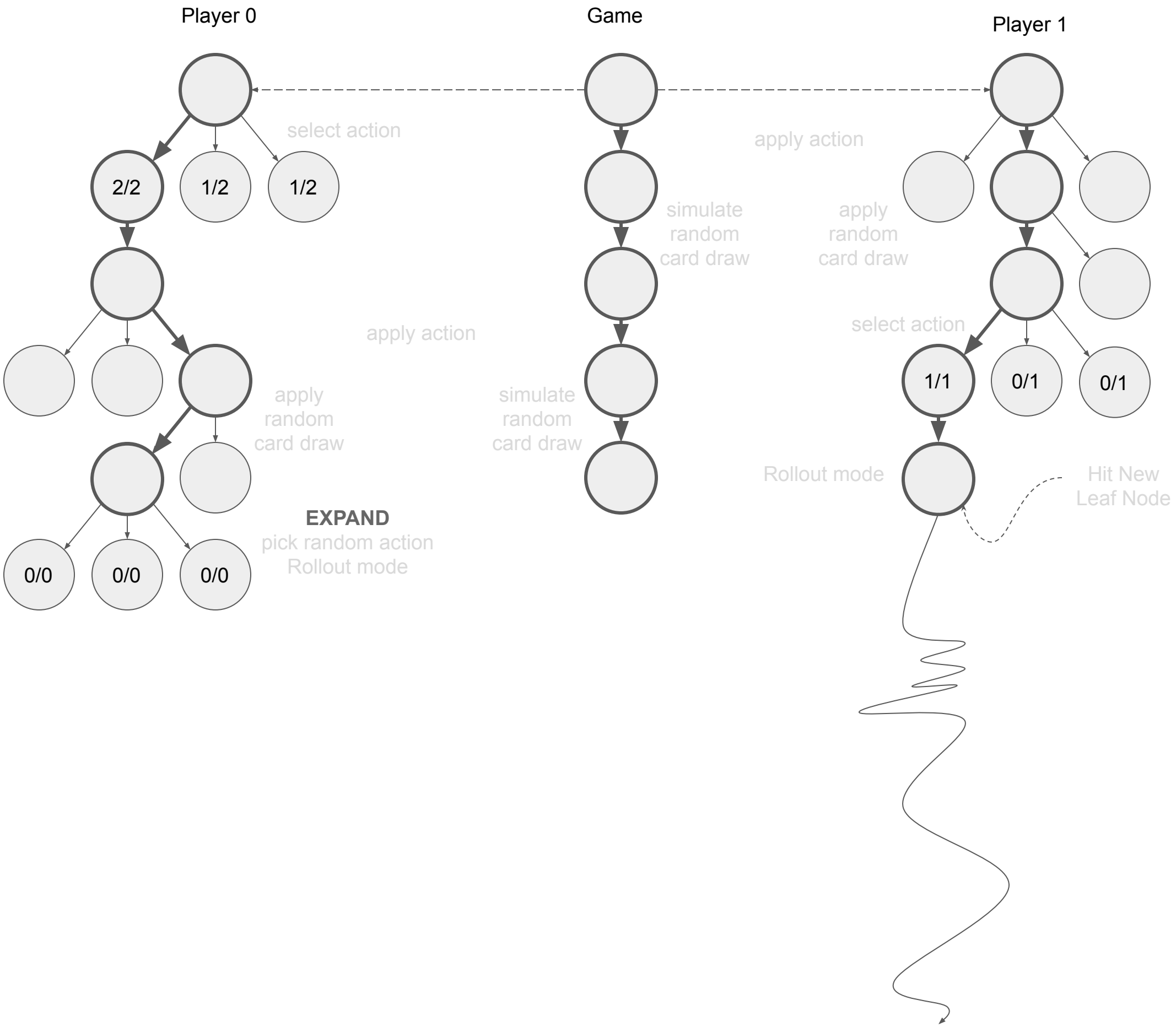


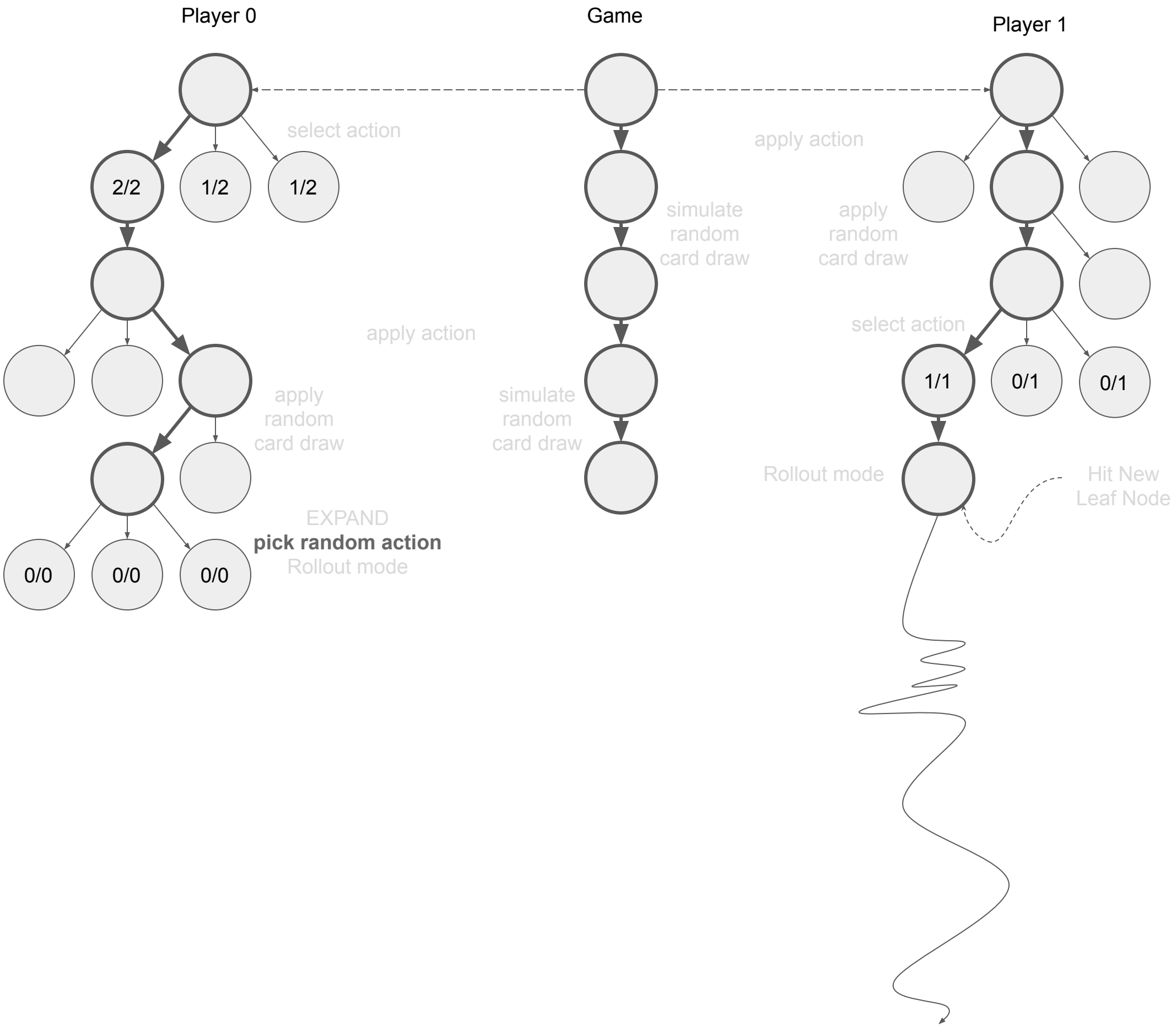
When a new leaf node is sprouted (a neutral node), the tree is set to ‘rollout mode’.
Pick random actions
Don’t sprout new nodes



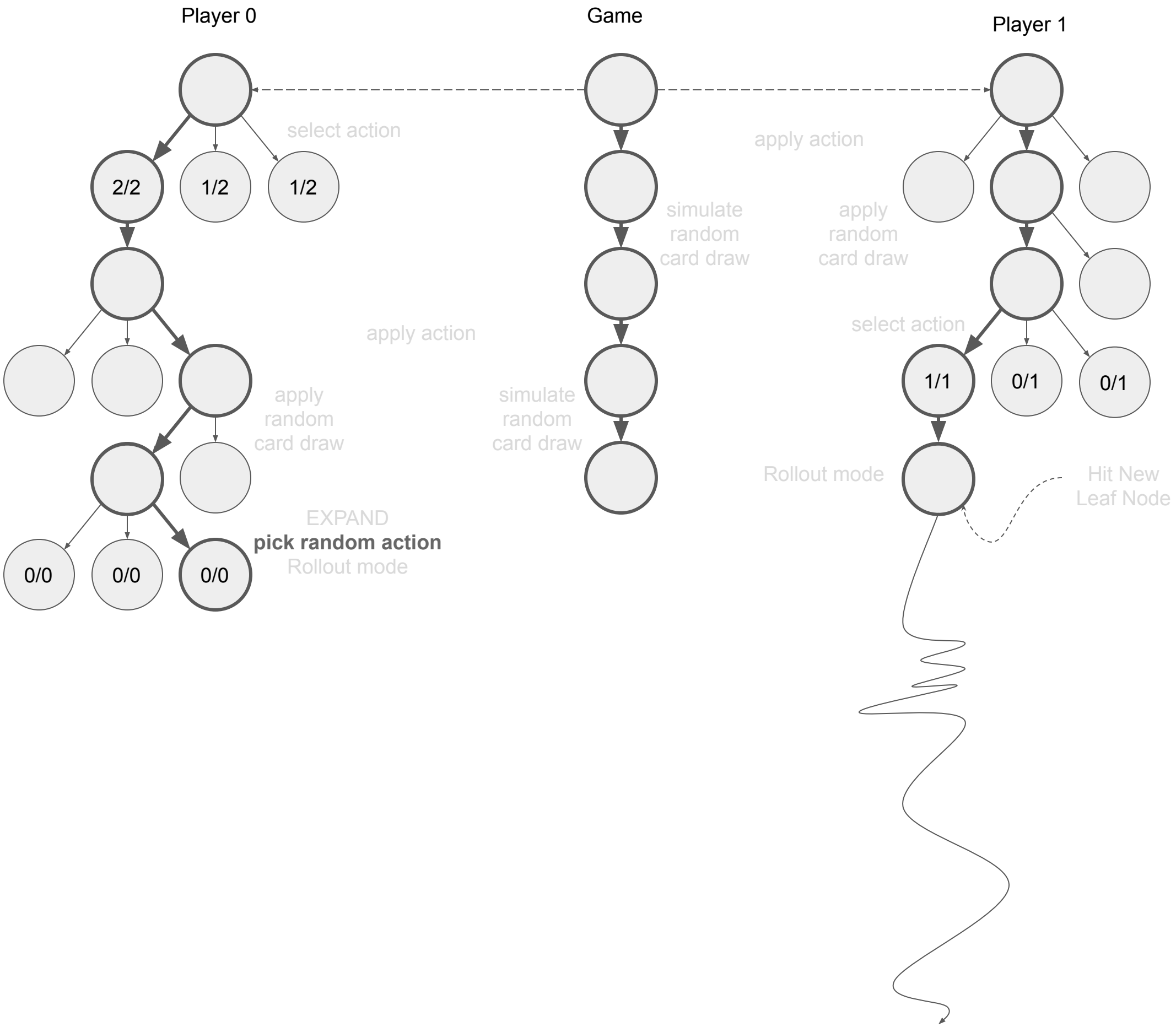
When a leaf neutral node is selected which must sprout a post-action-node;
expand the node
pick random action
put tree to ‘rollout mode’



When a leaf neutral node is selected which must sprout a post-action-node;
expand the node
pick random action
put tree to ‘rollout mode’



When a leaf neutral node is selected which must sprout a post-action-node;
expand the node
pick random action
put tree to ‘rollout mode’



When a leaf neutral node is selected which must sprout a post-action-node;
expand the node
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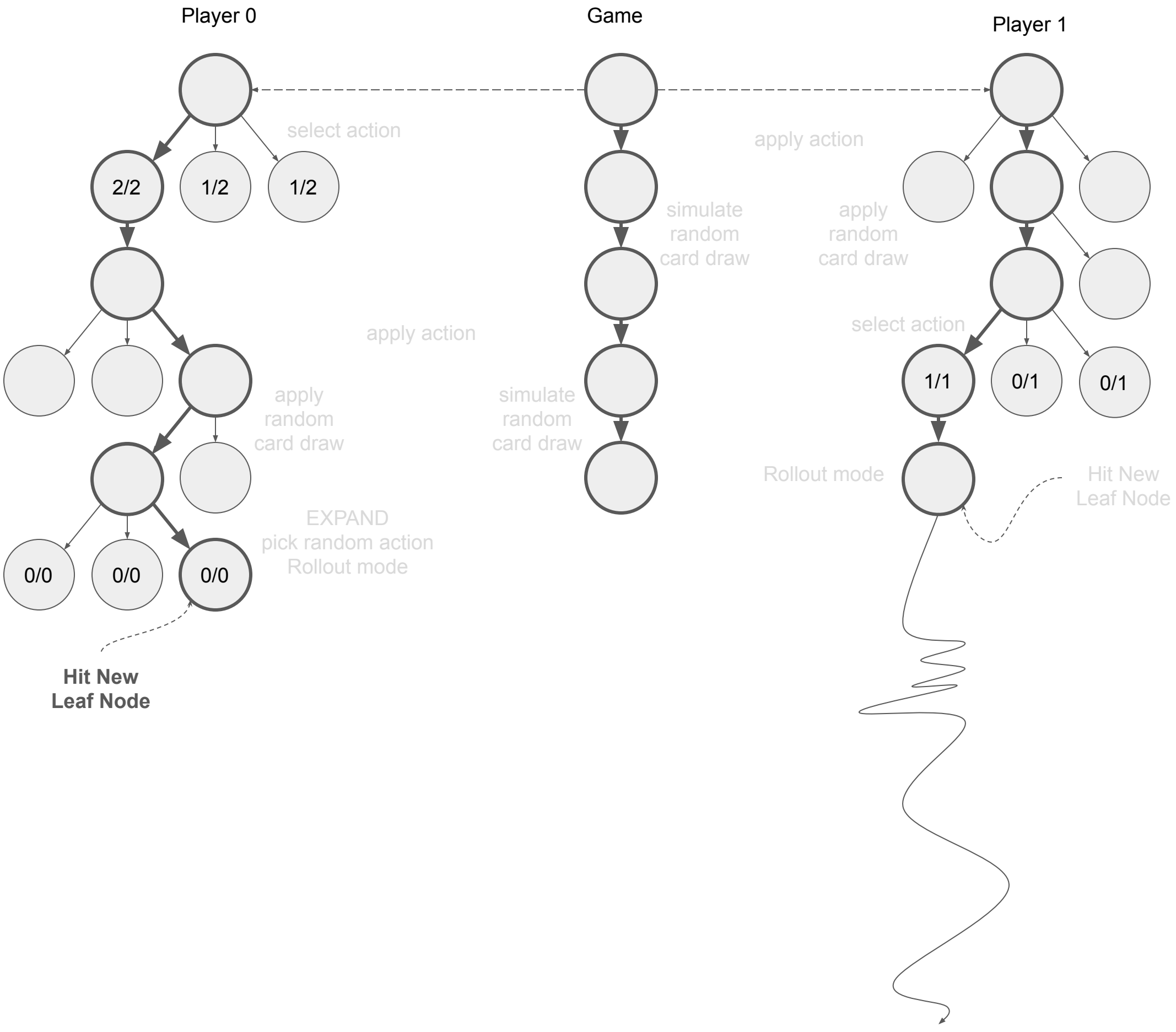
put tree to ‘rollout mode’



When a leaf neutral node is selected which must sprout a post-action-node;
expand the node
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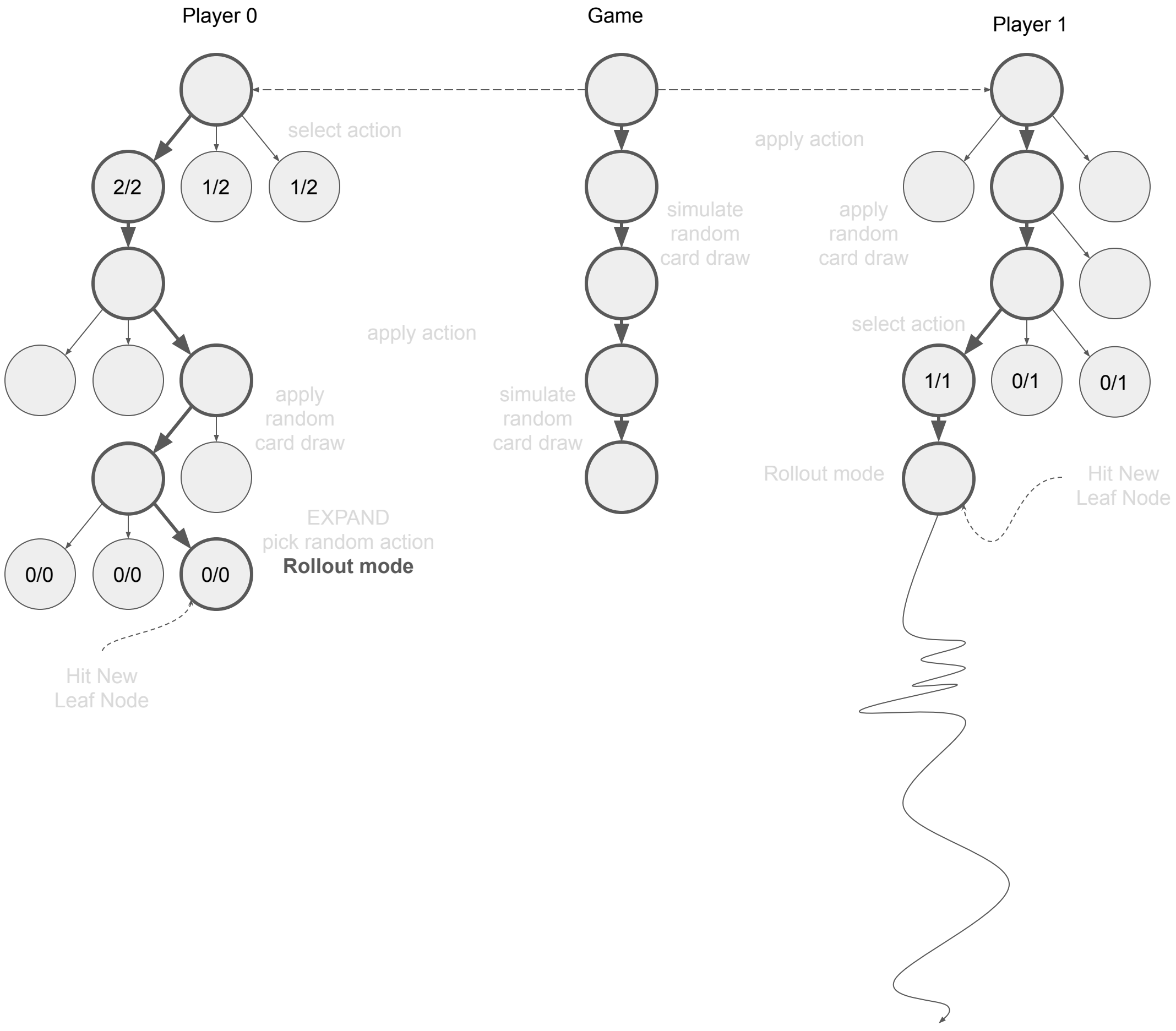
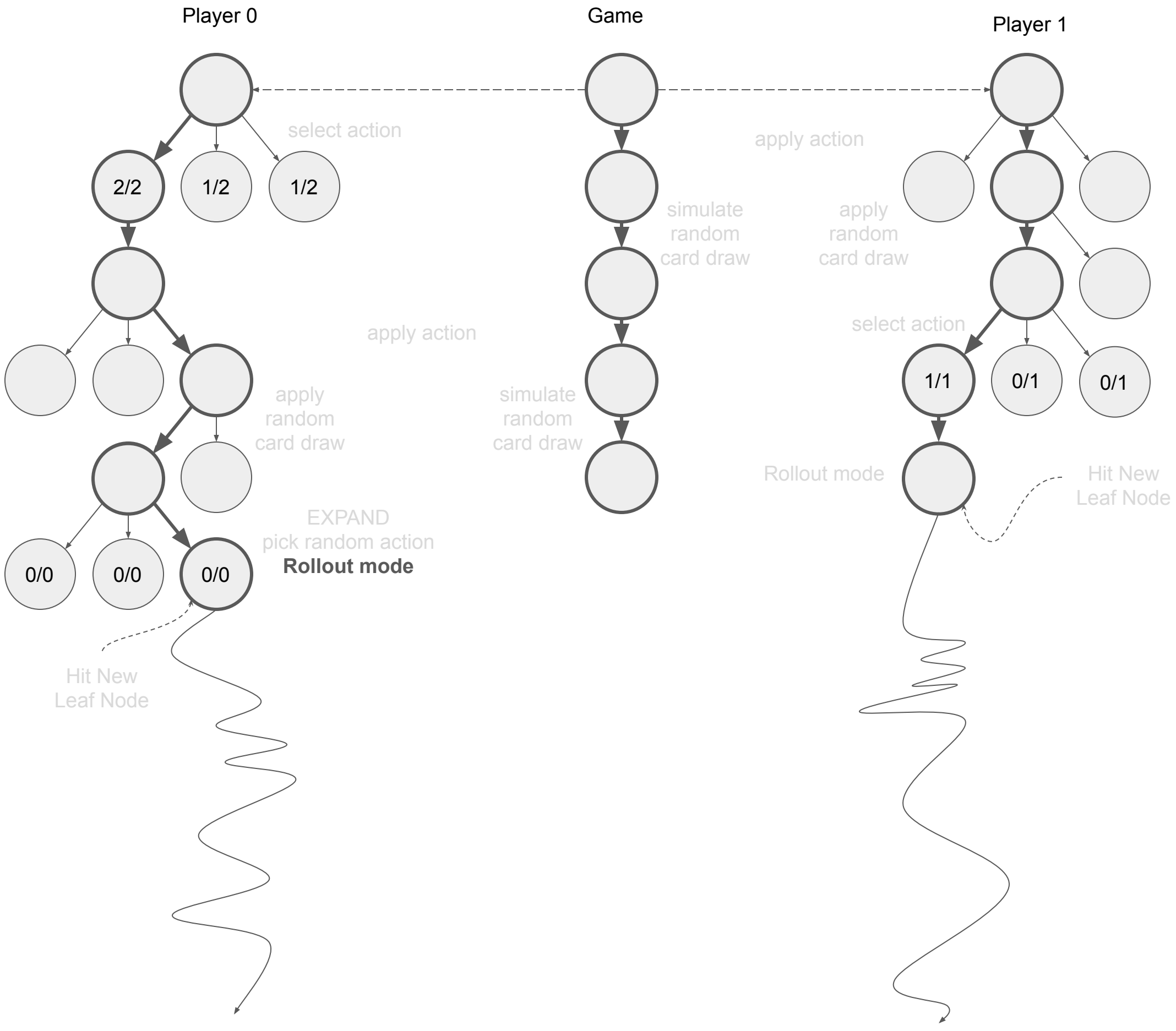
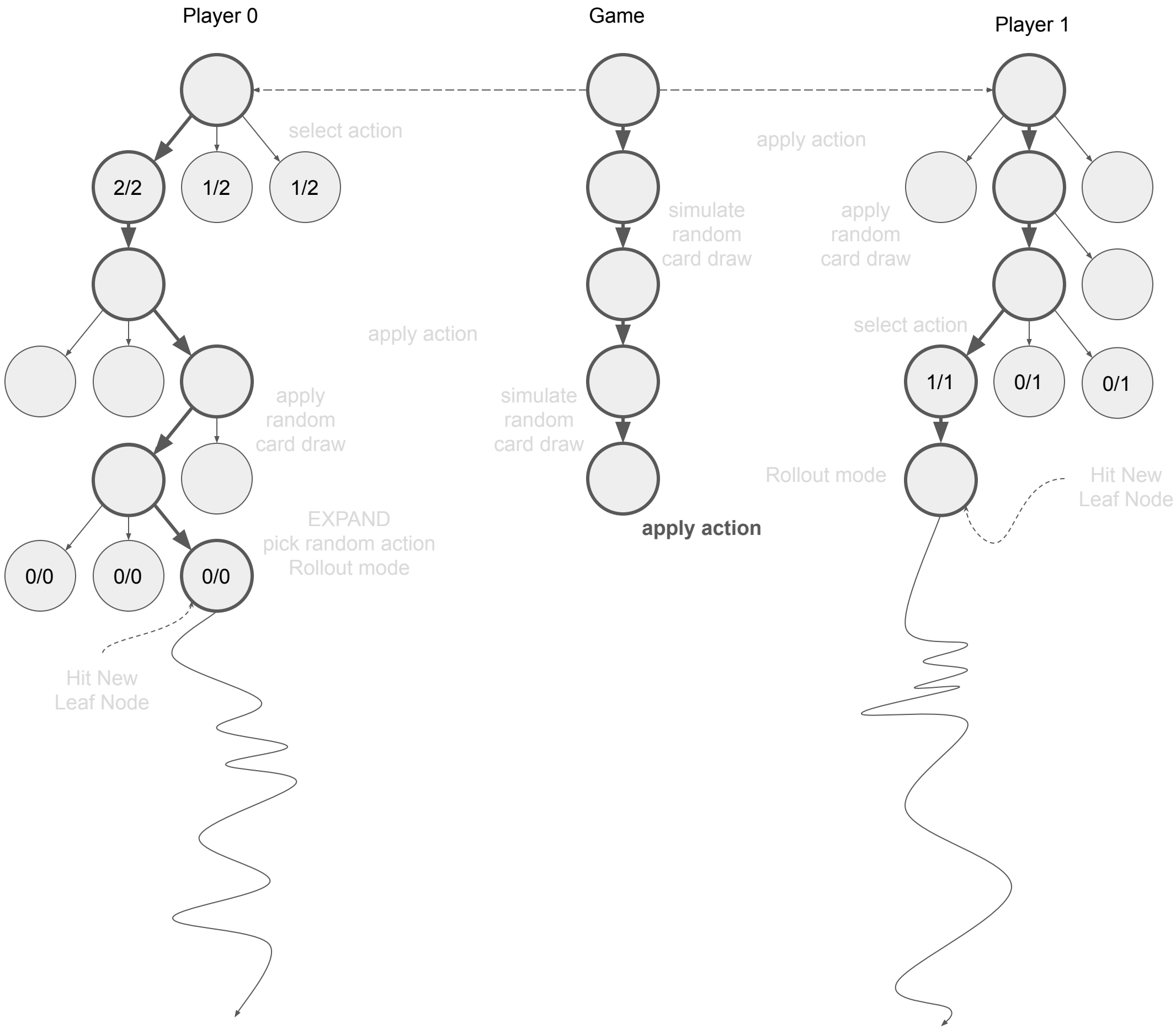
put tree to ‘rollout mode’



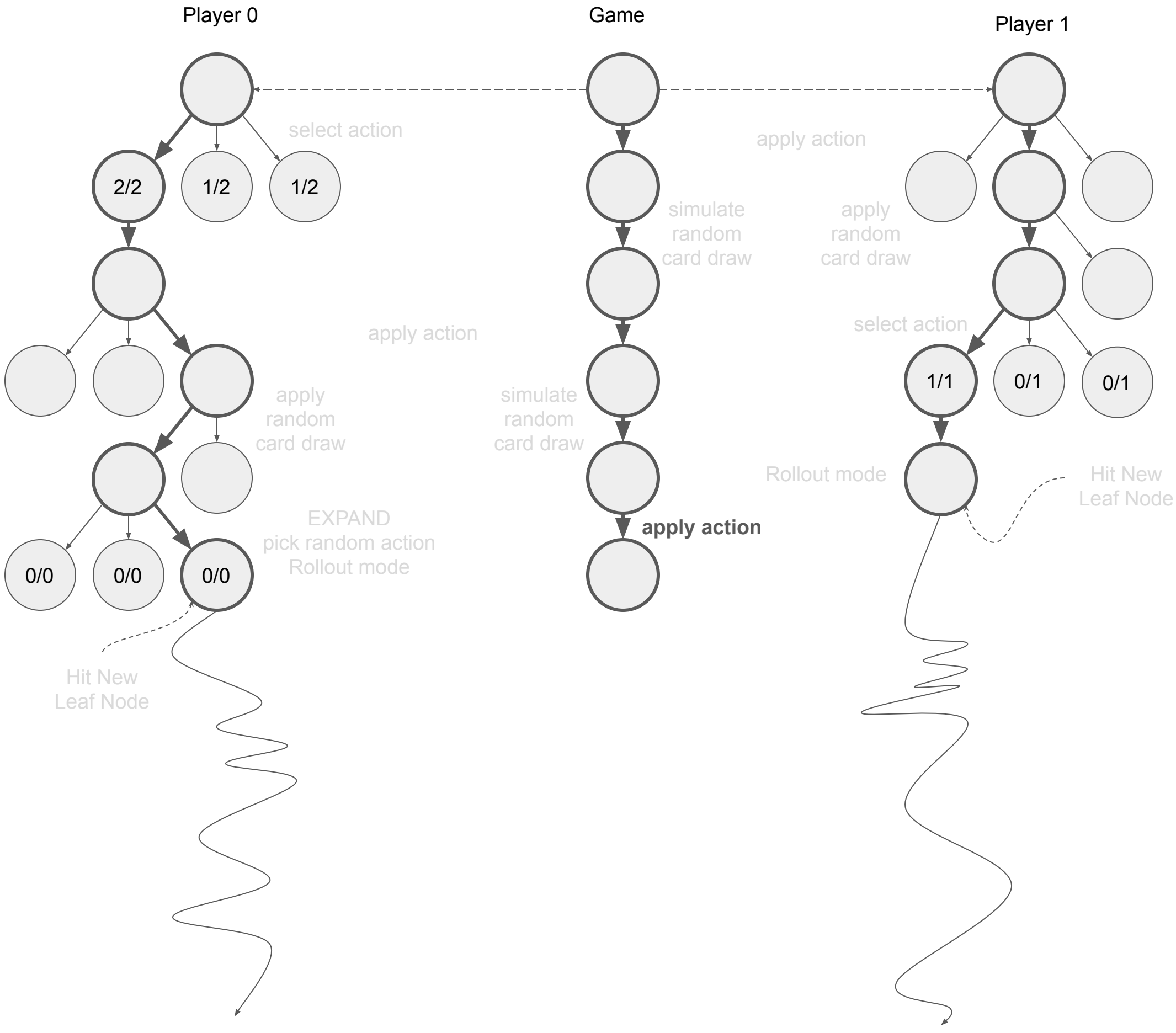
Put tree to ‘rollout mode’
Pick random actions
Don’t sprout new nodes



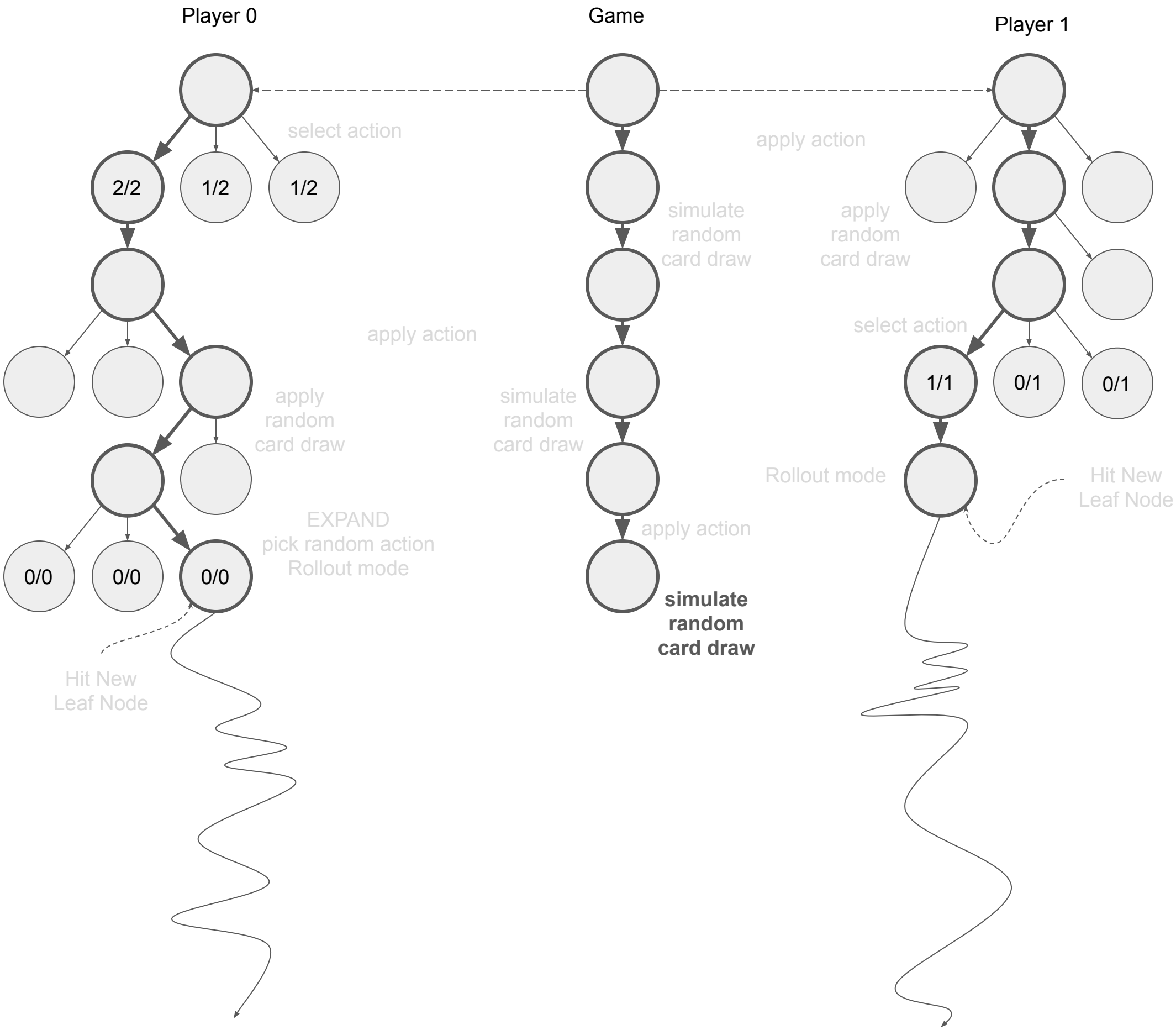
Put tree to ‘rollout mode’
Pick random actions
Don’t sprout new nodes



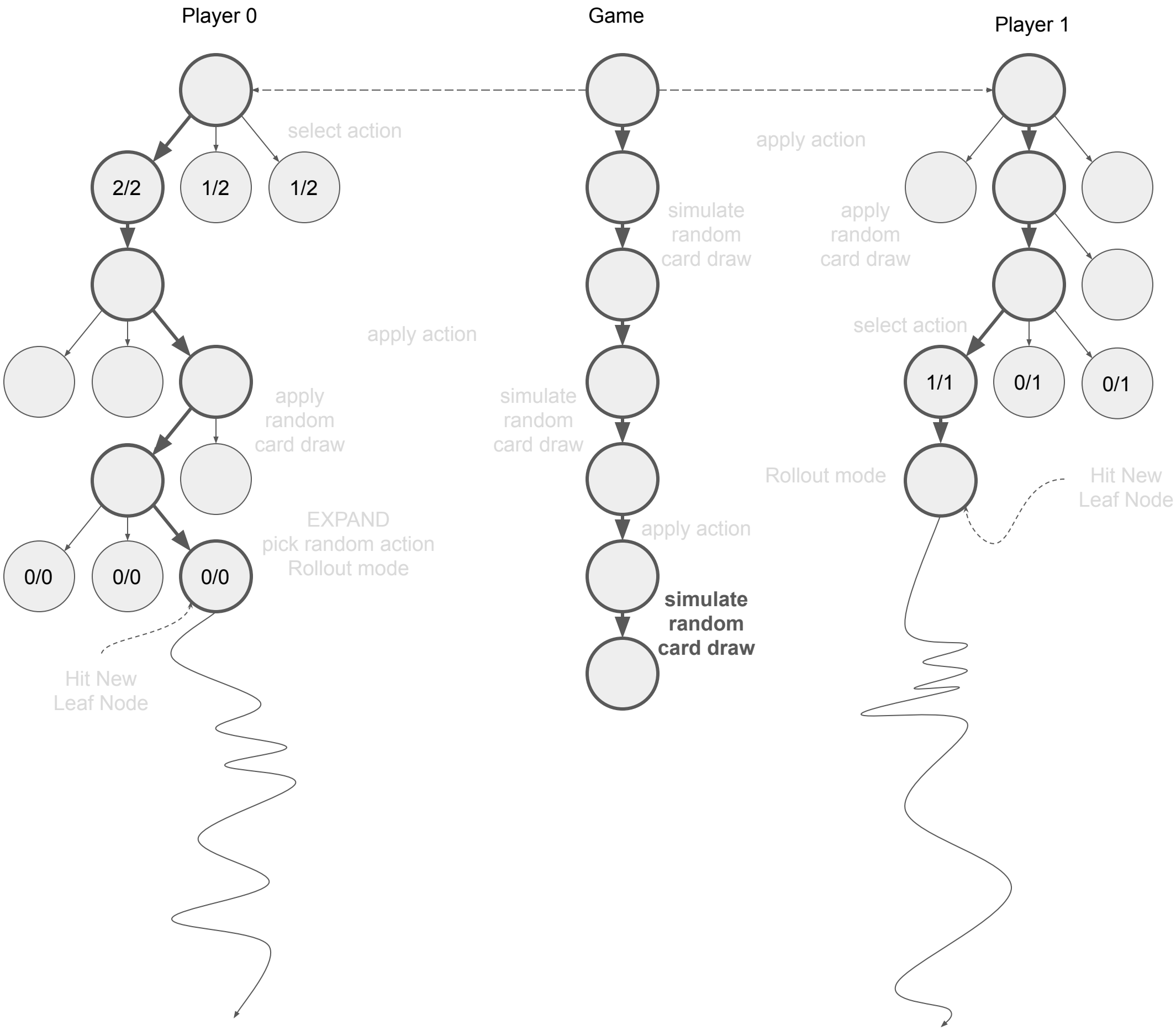
Apply Player 0’s random action to the simulated game



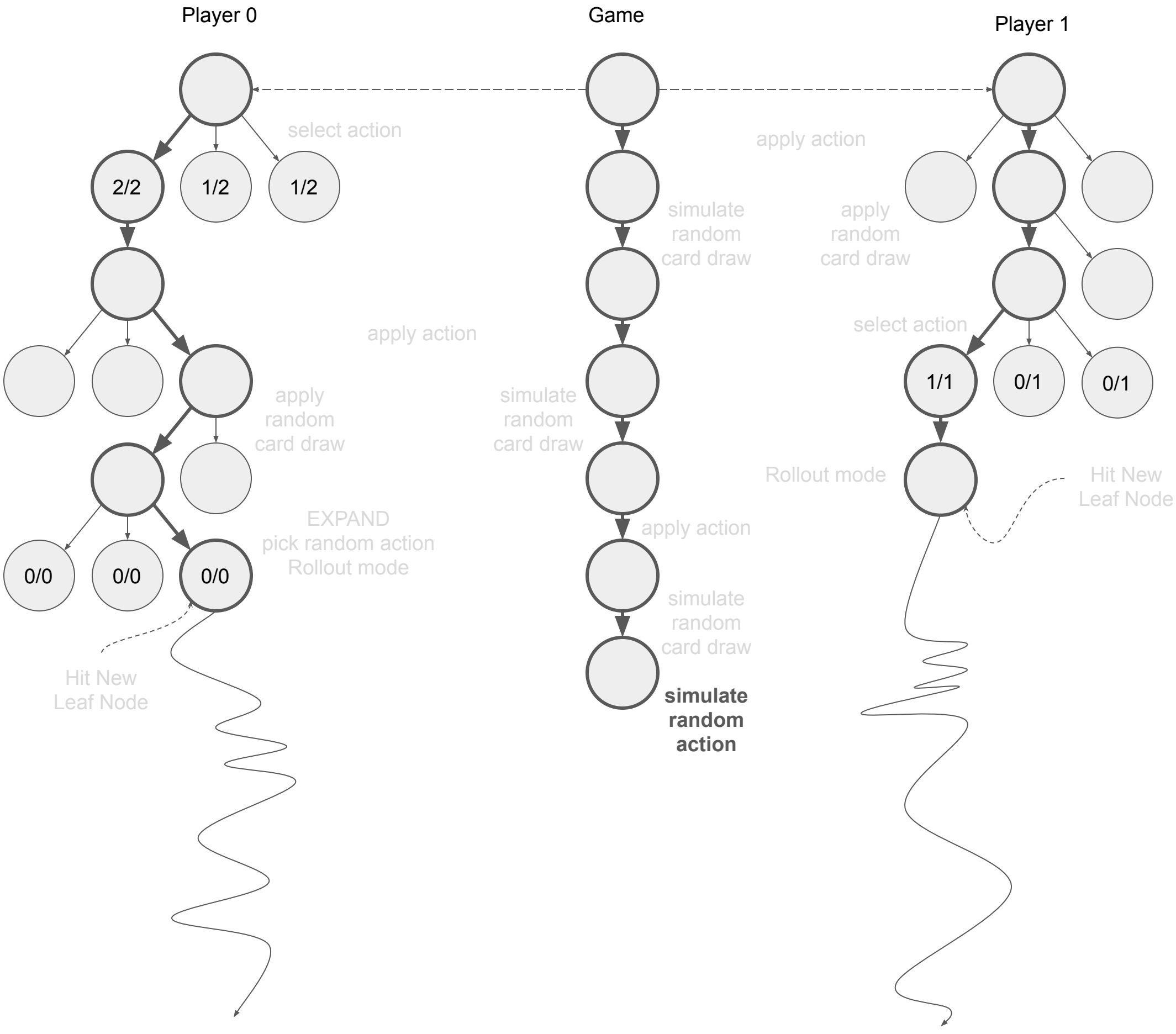
Apply Player 0’s random action to the simulated game



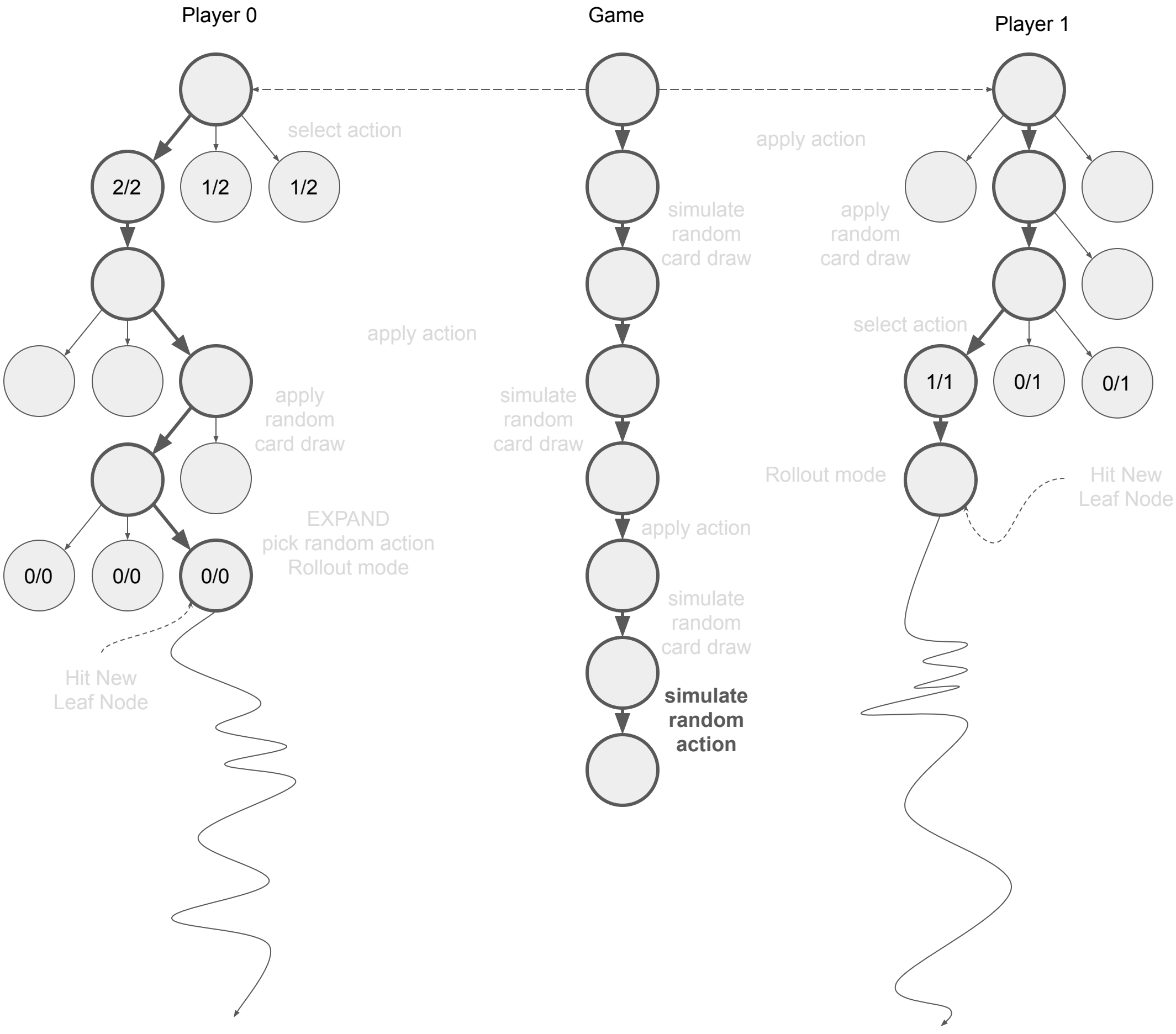
Simulate a random game



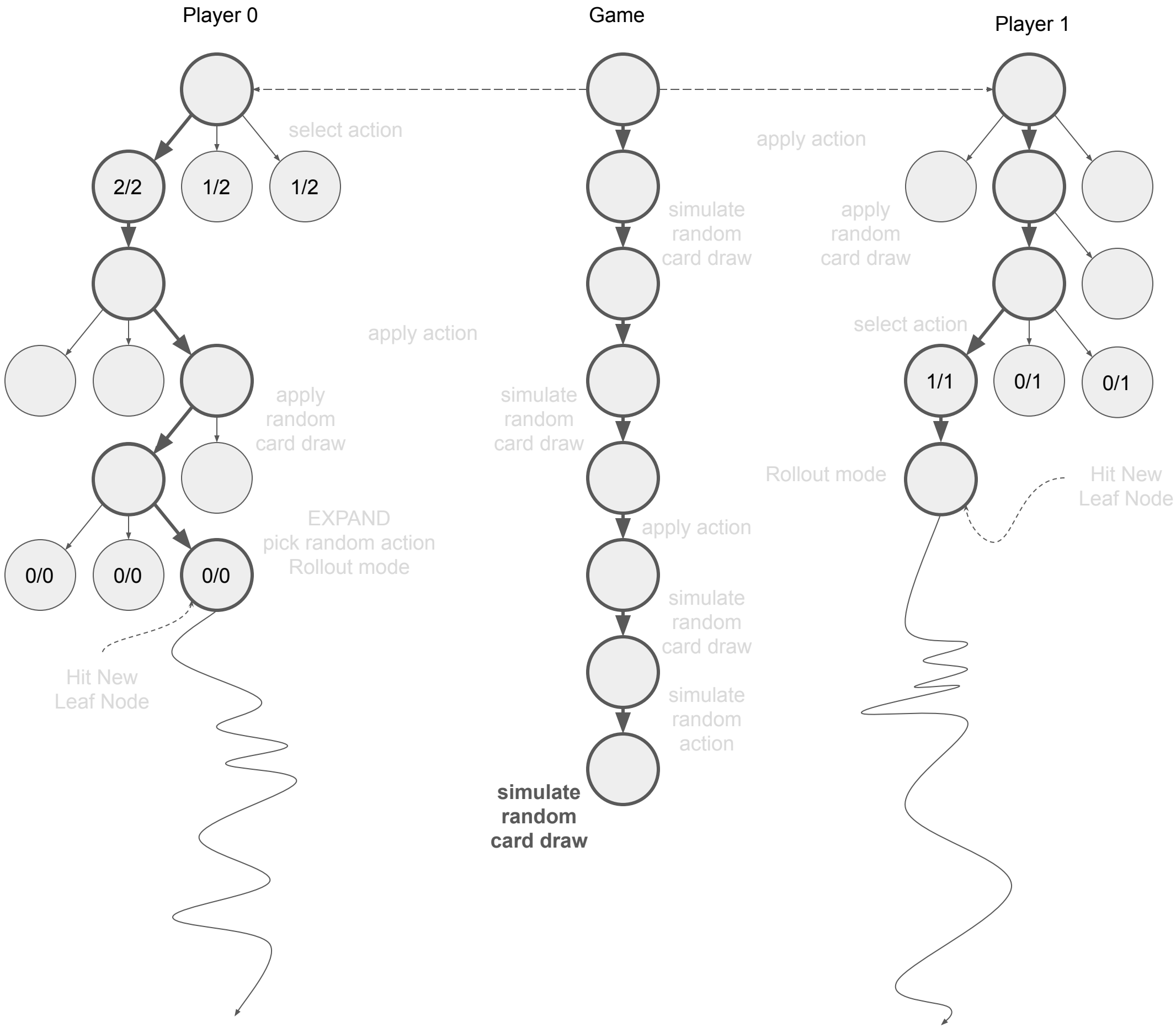
Simulate a random game



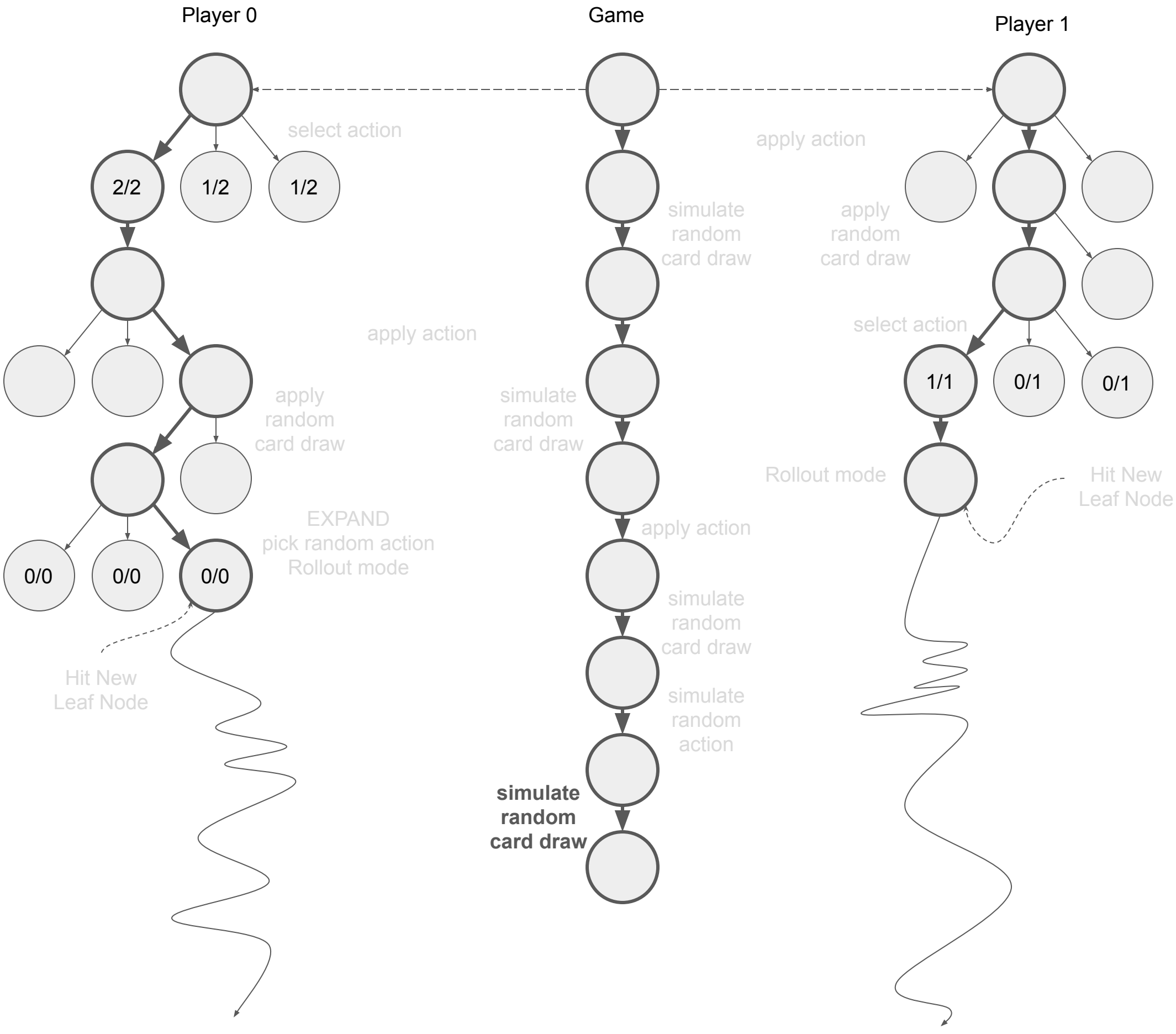
Simulate a random game



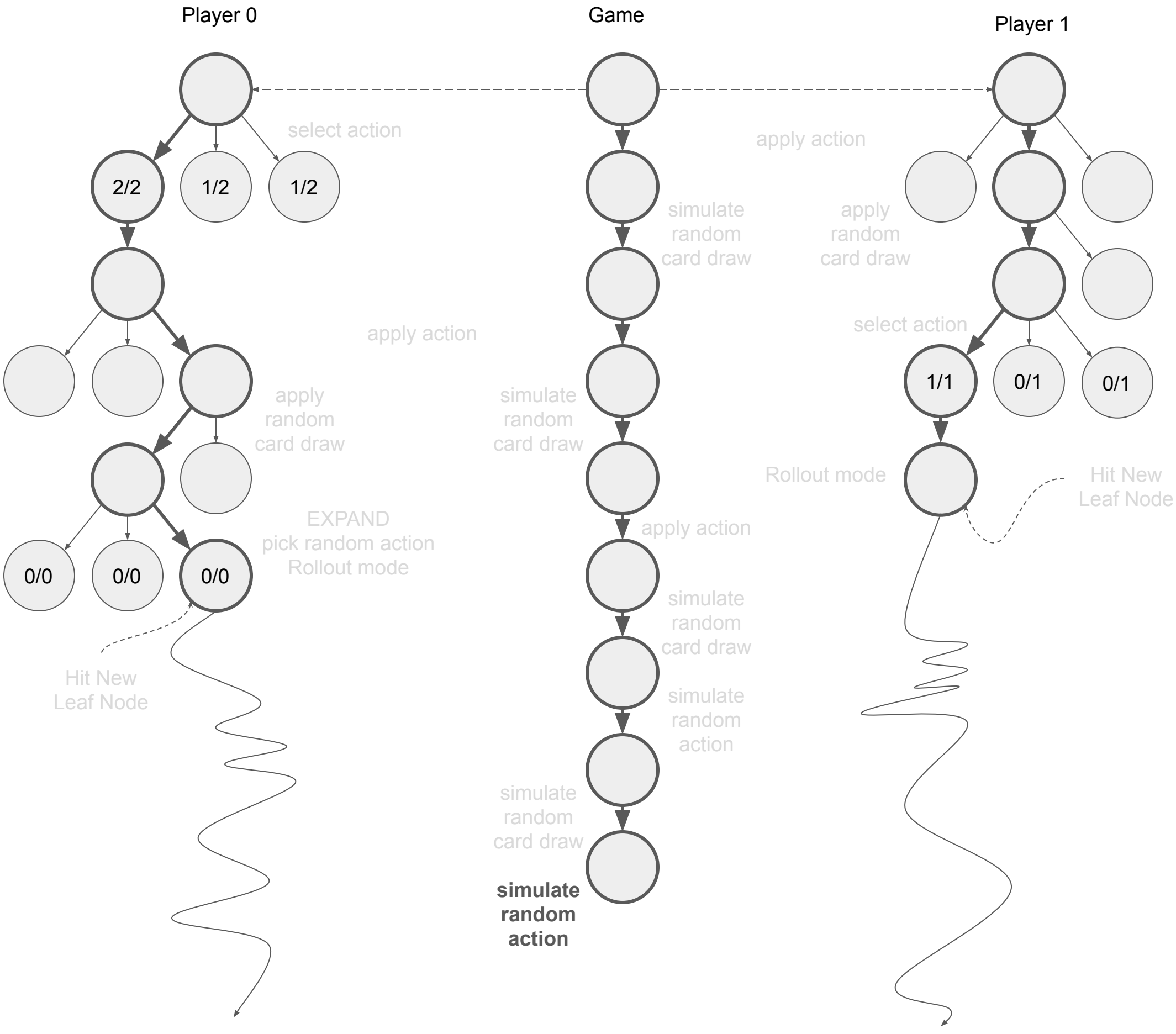
Simulate a random game



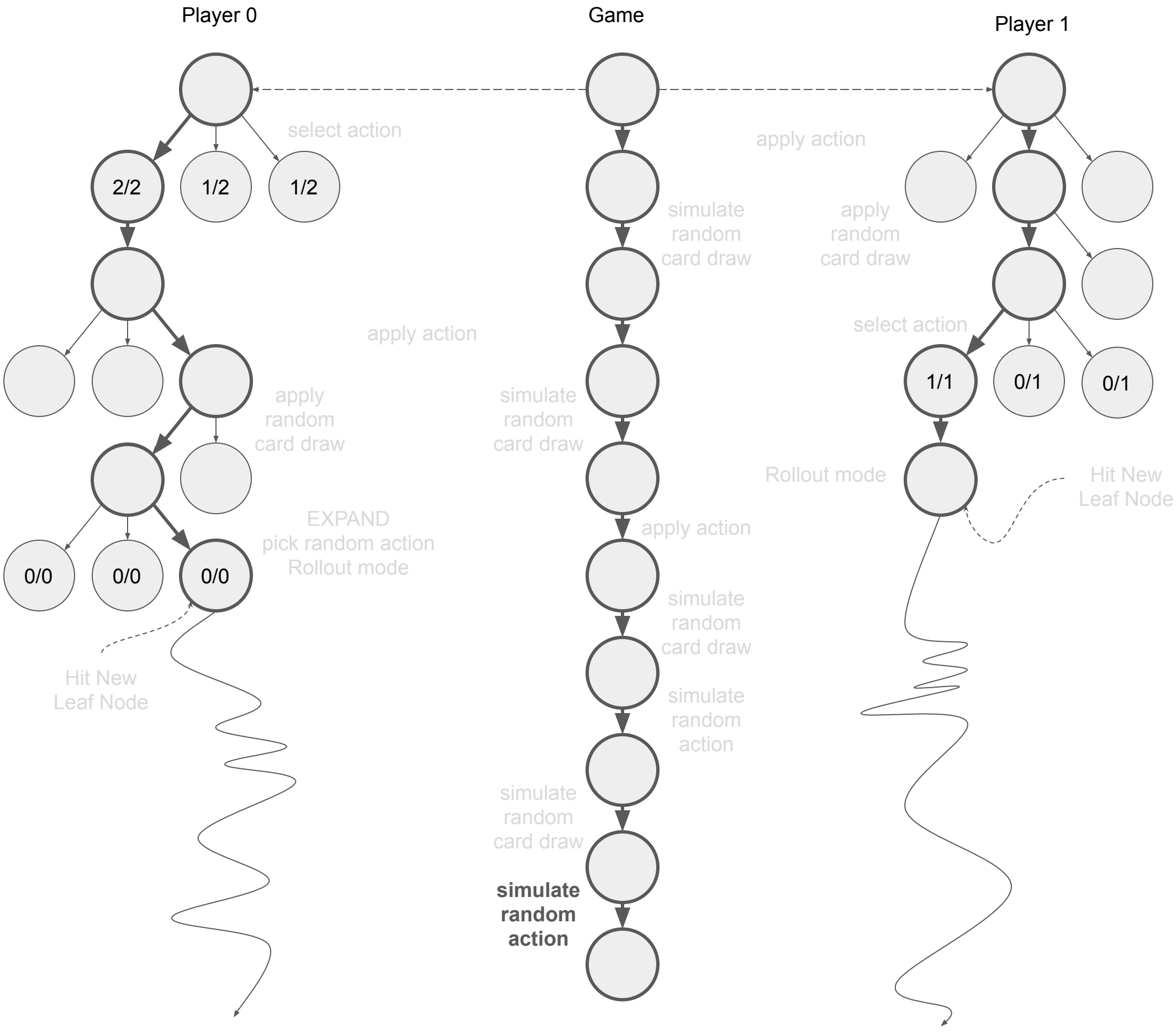
Simulate a random game



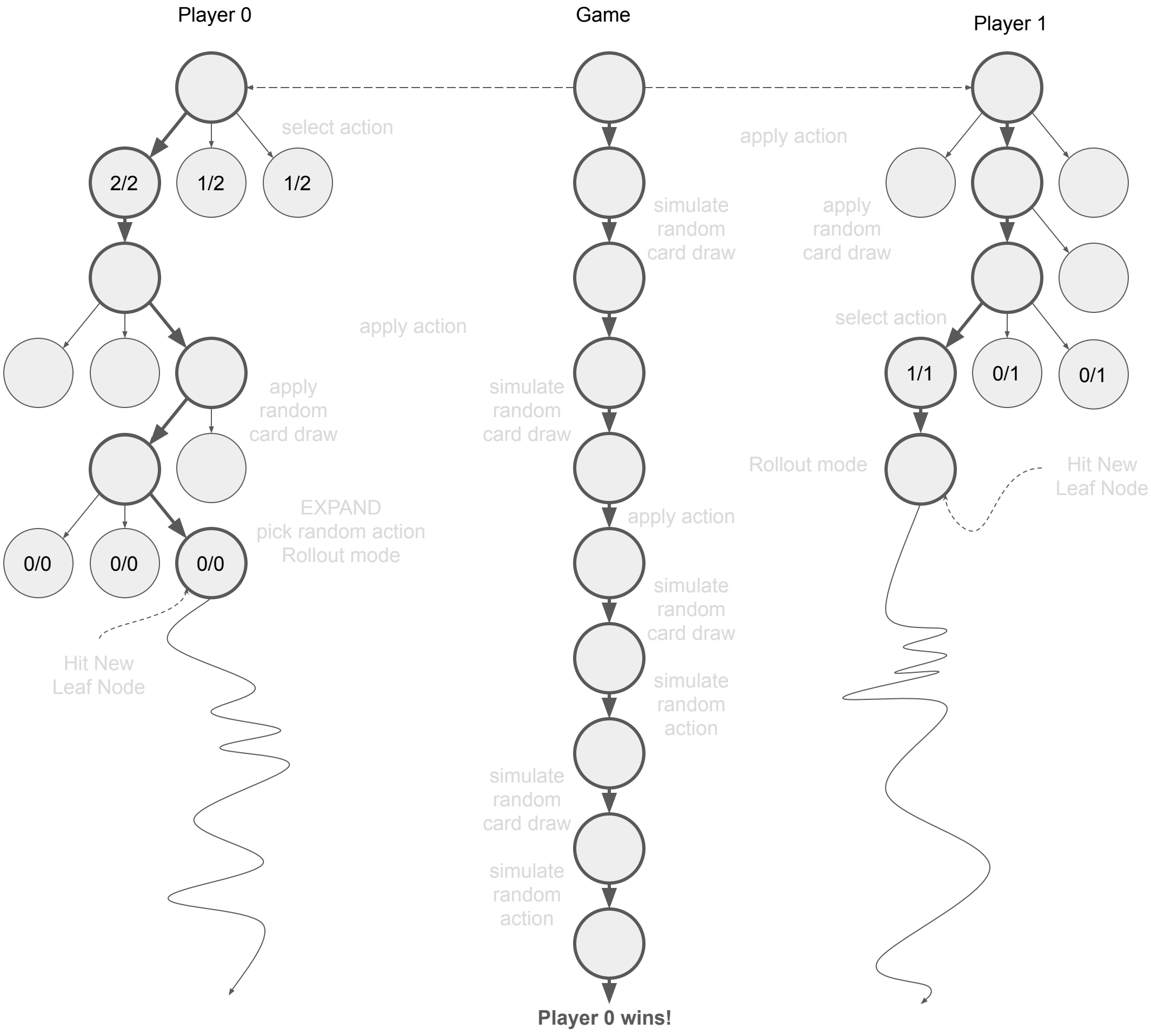
Simulate a random game



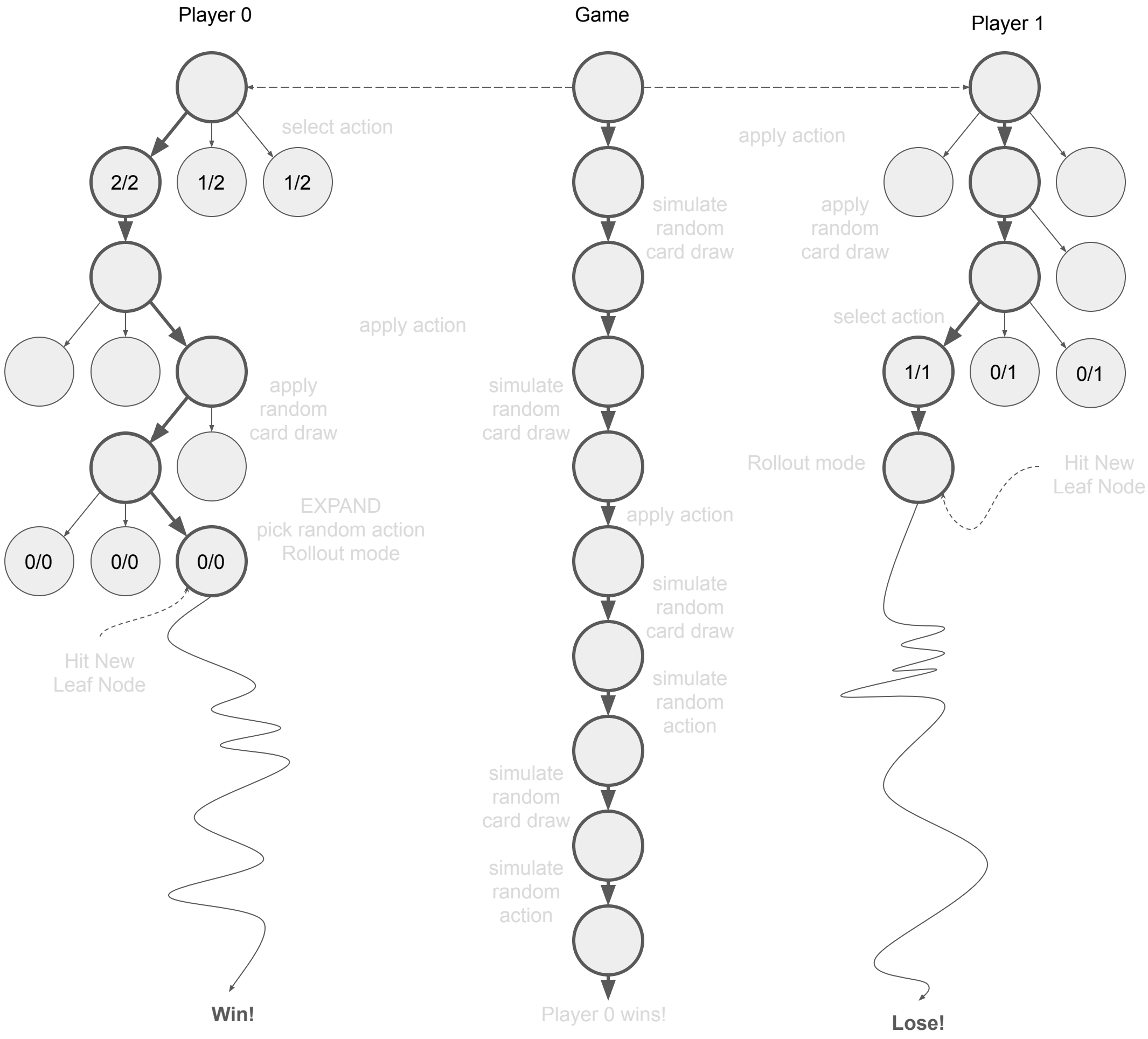
Simulate a random game



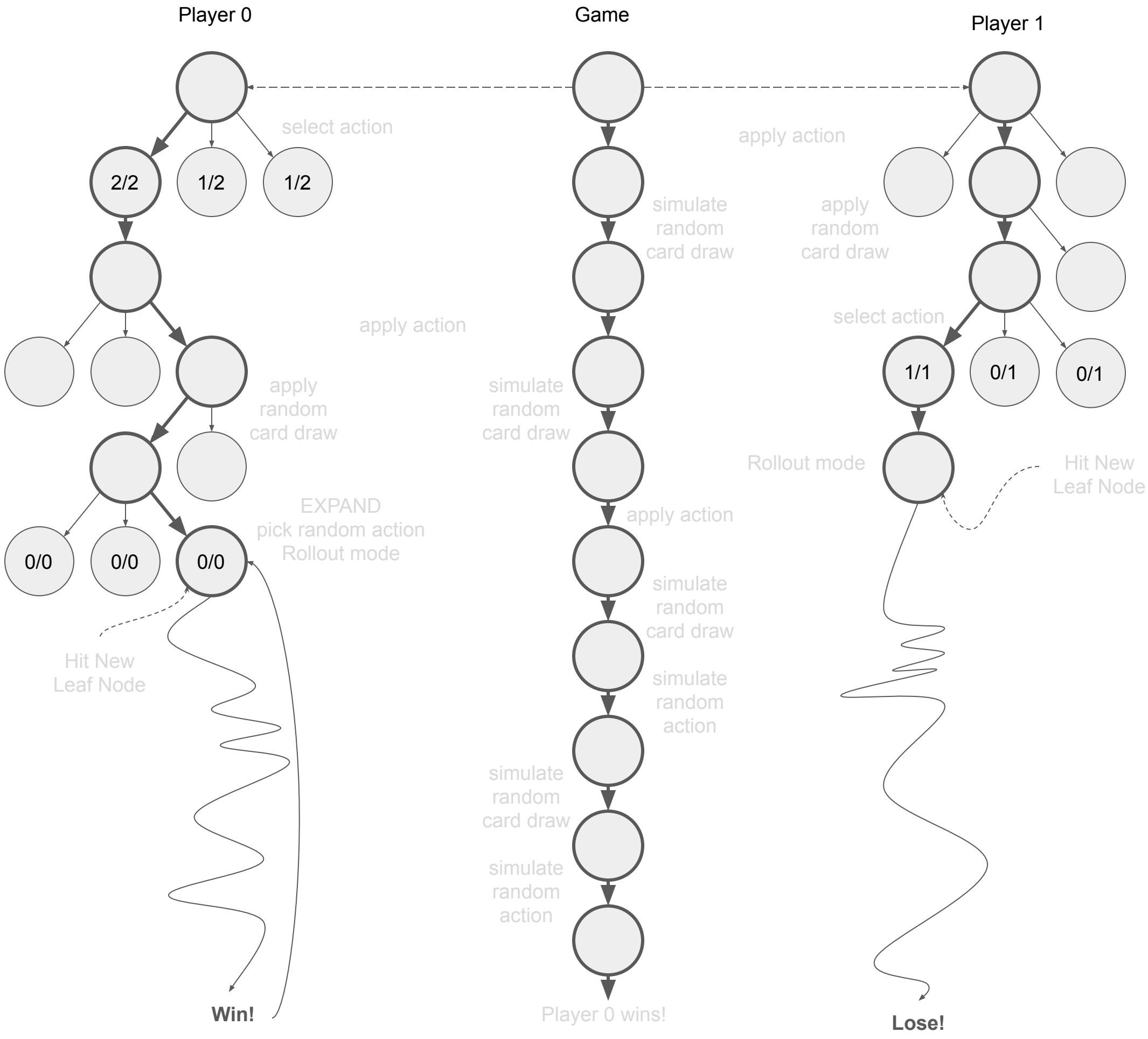
Simulate a random game



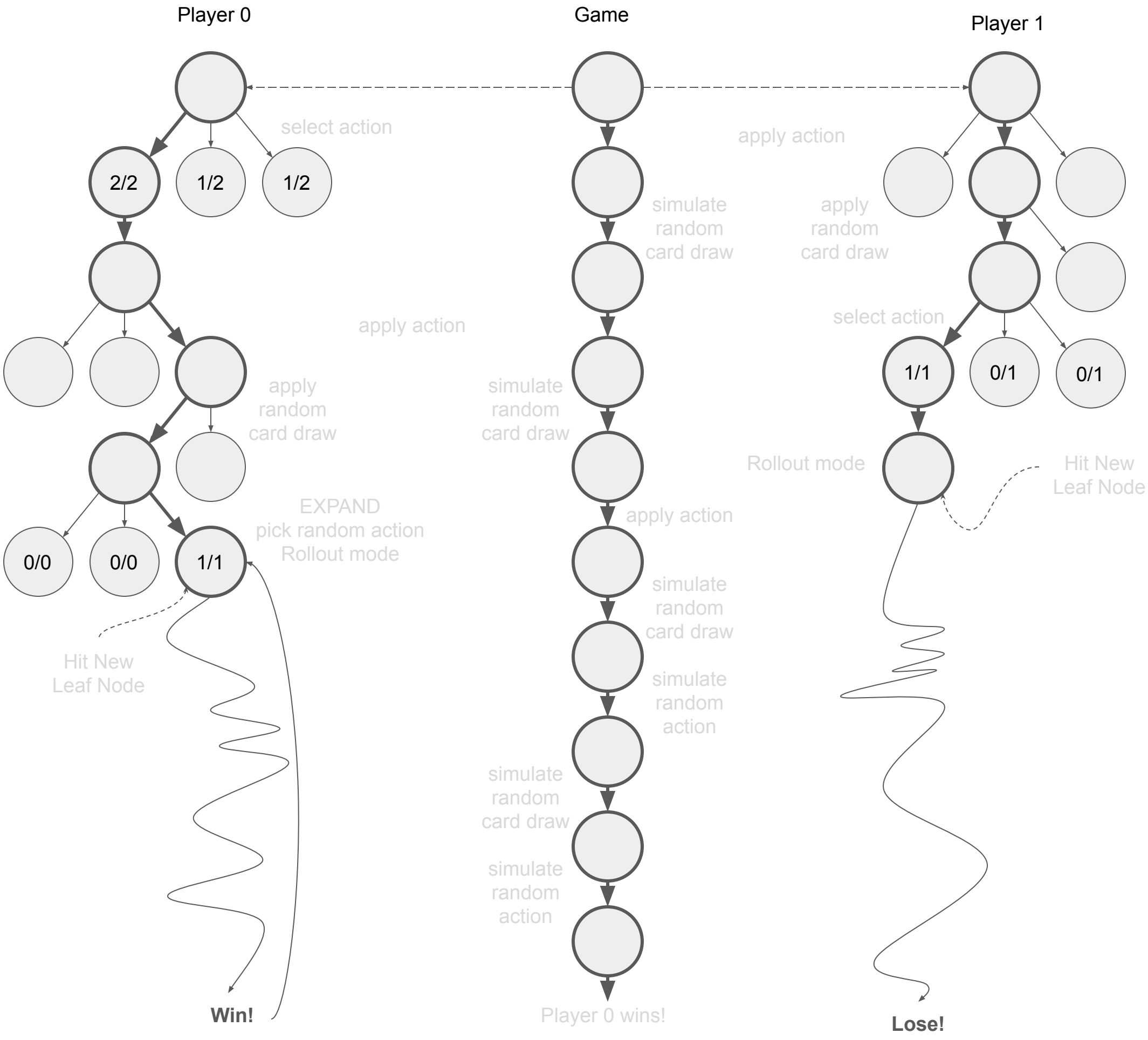
Simulate a random game



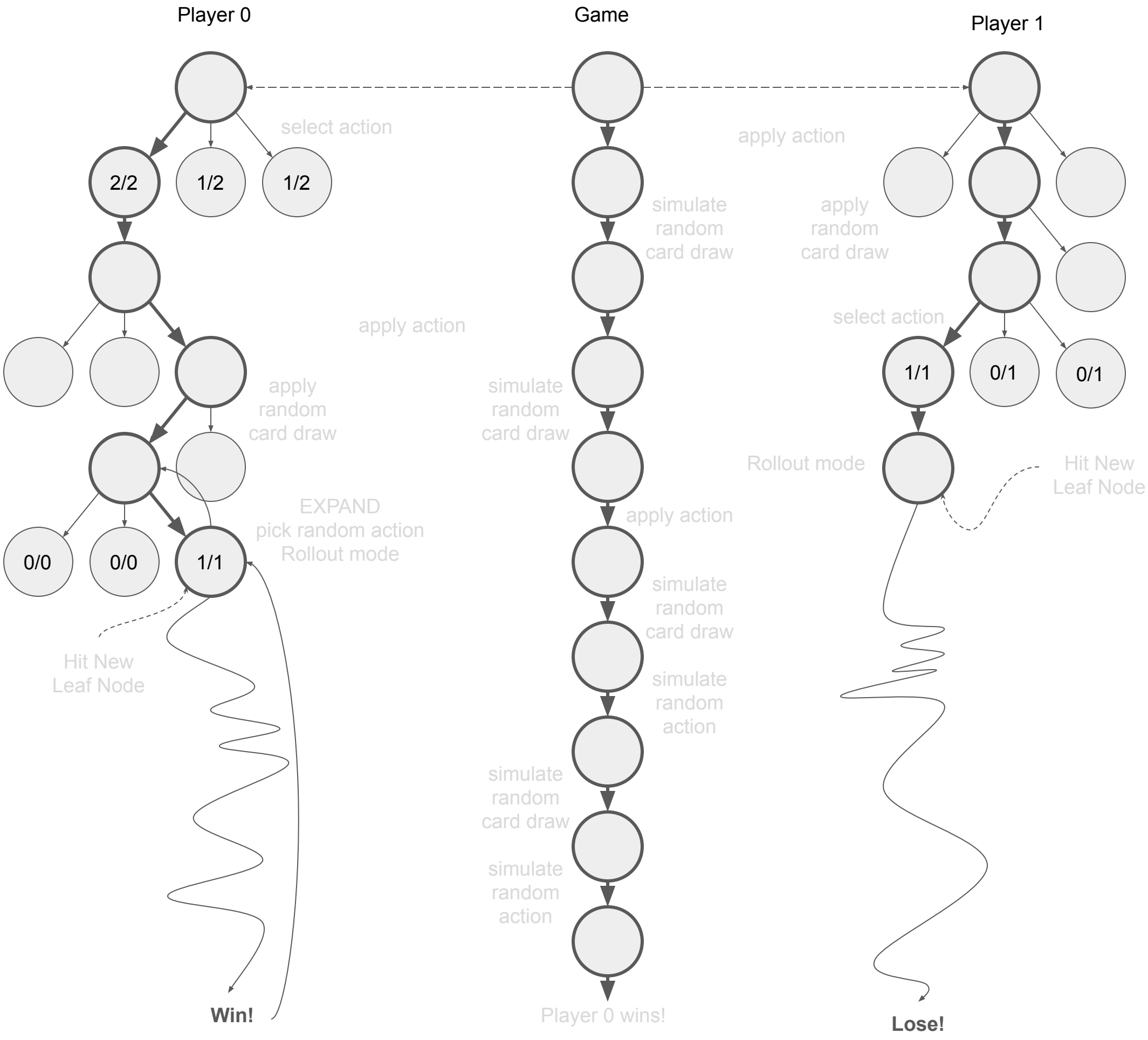
Backpropagate the win to the tree of player 0



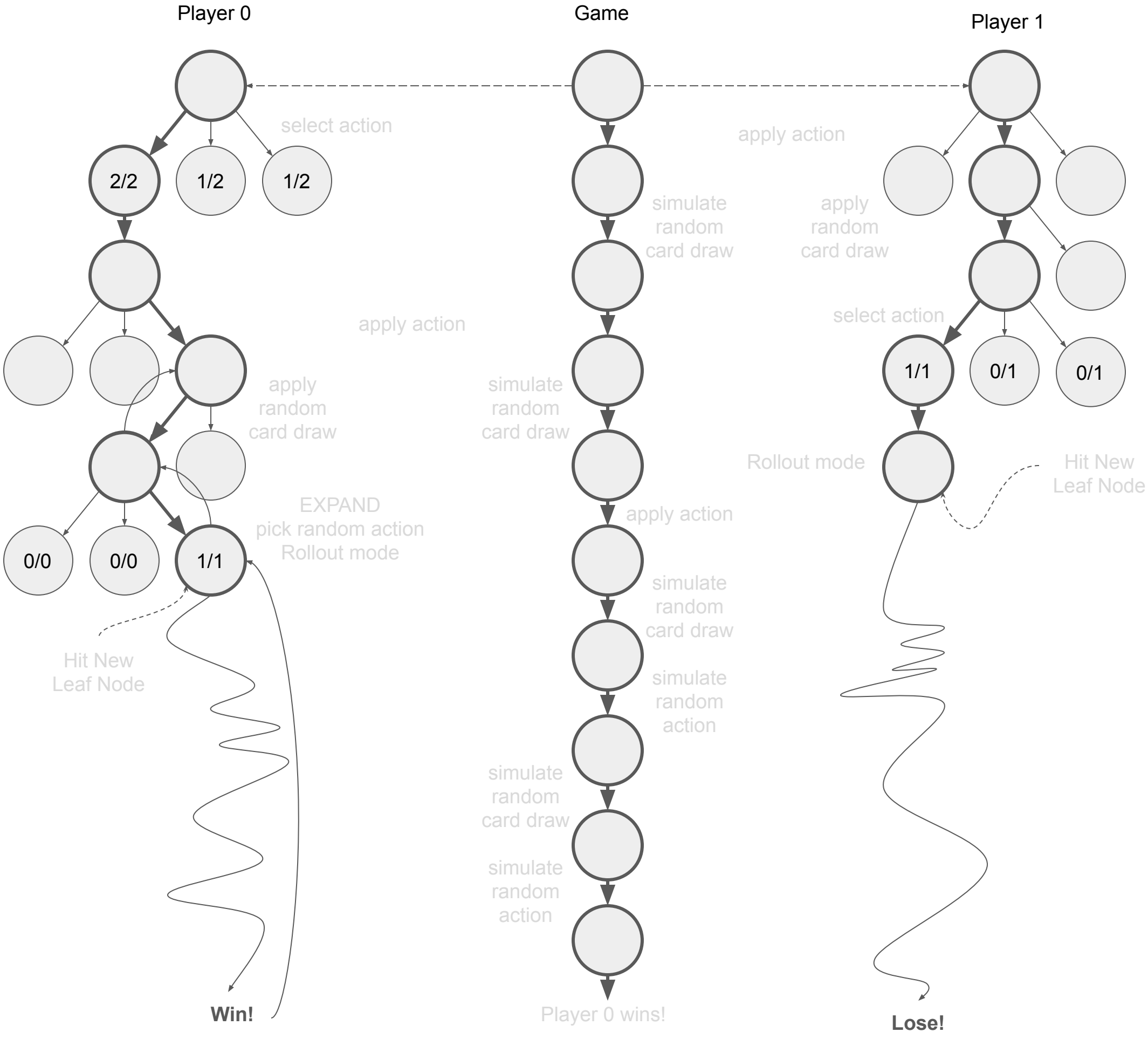
Backpropagate the win to the tree of player 0



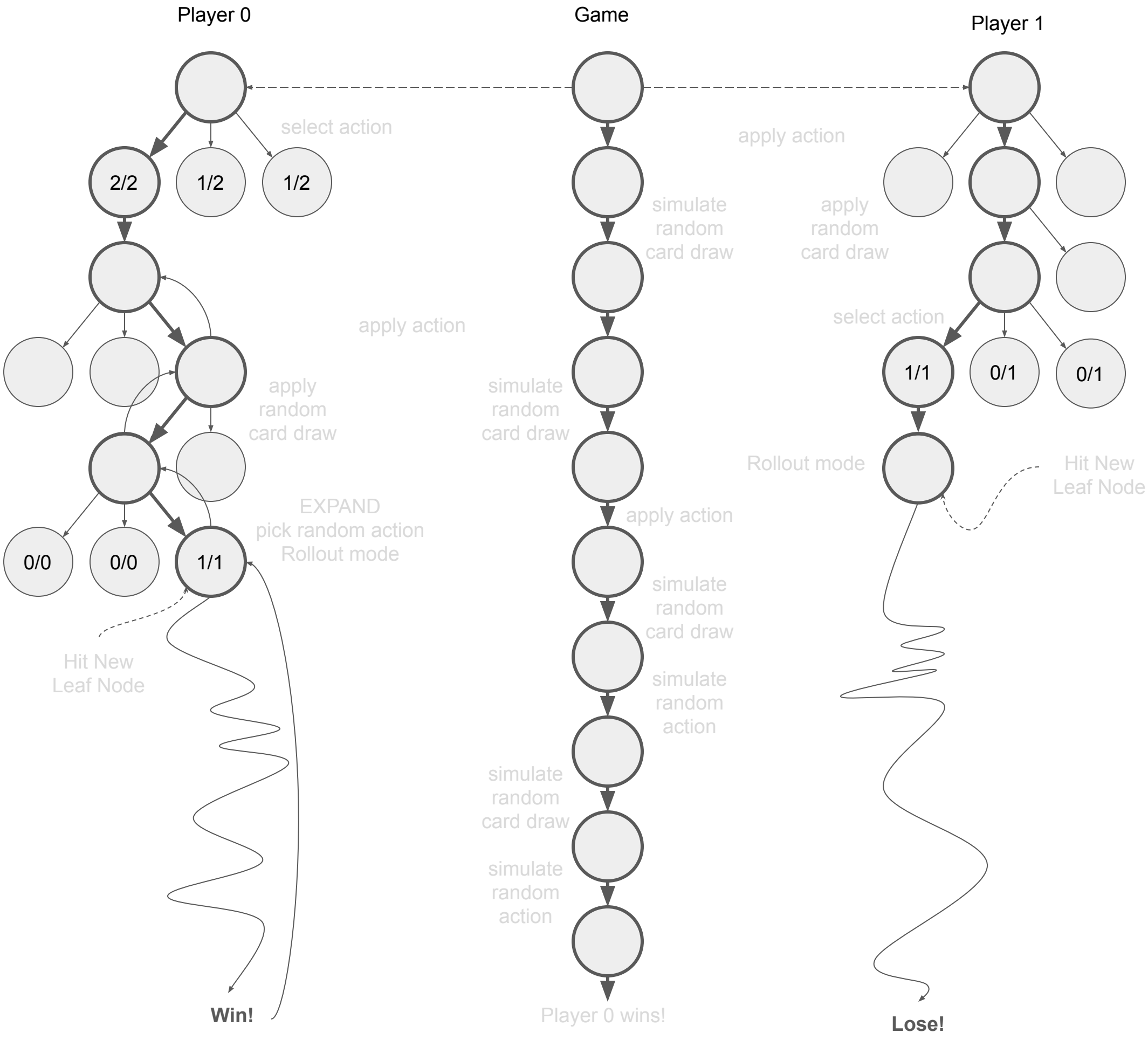
Backpropagate the win to the tree of player 0



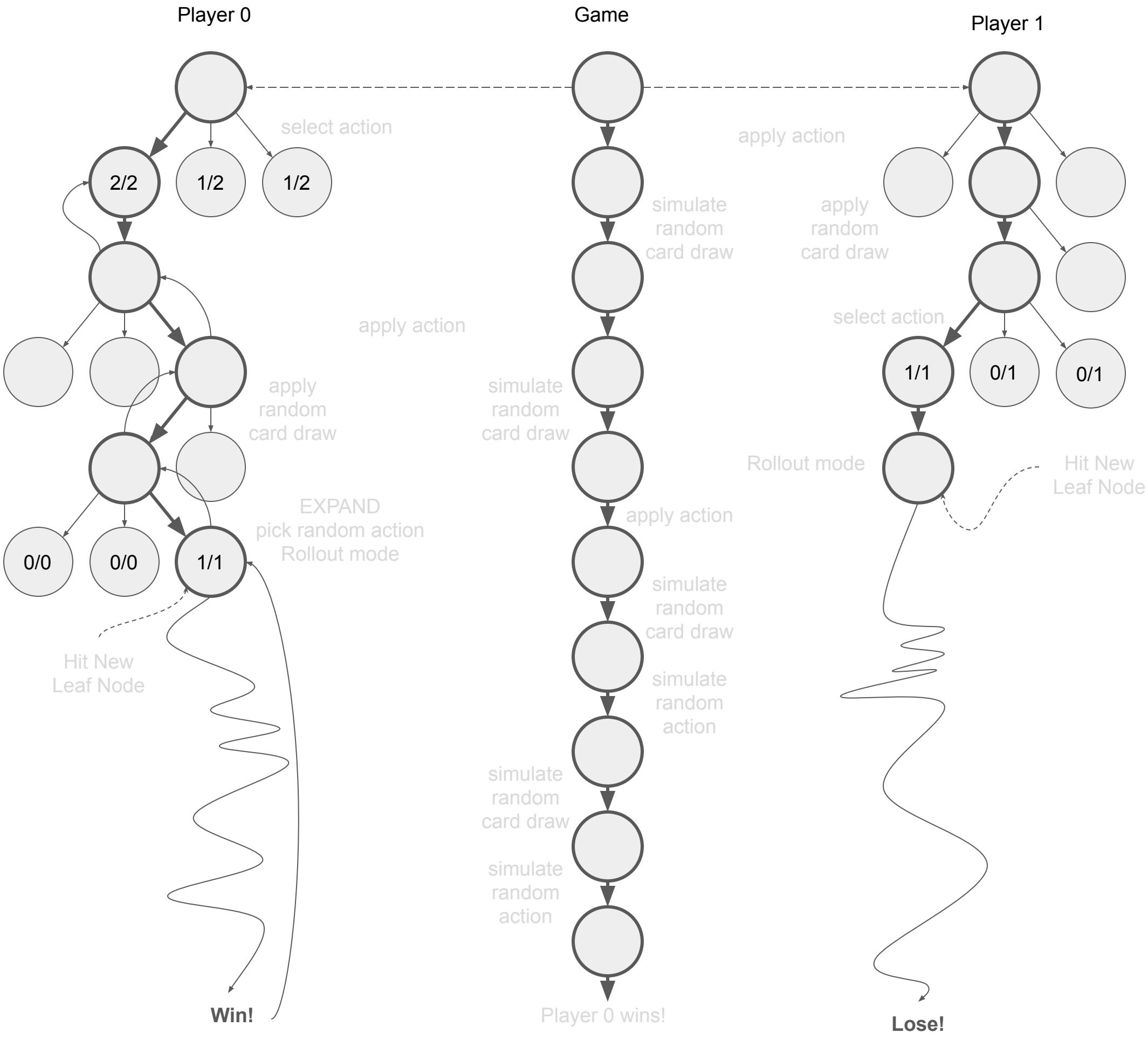
Backpropagate the win to the tree of player 0



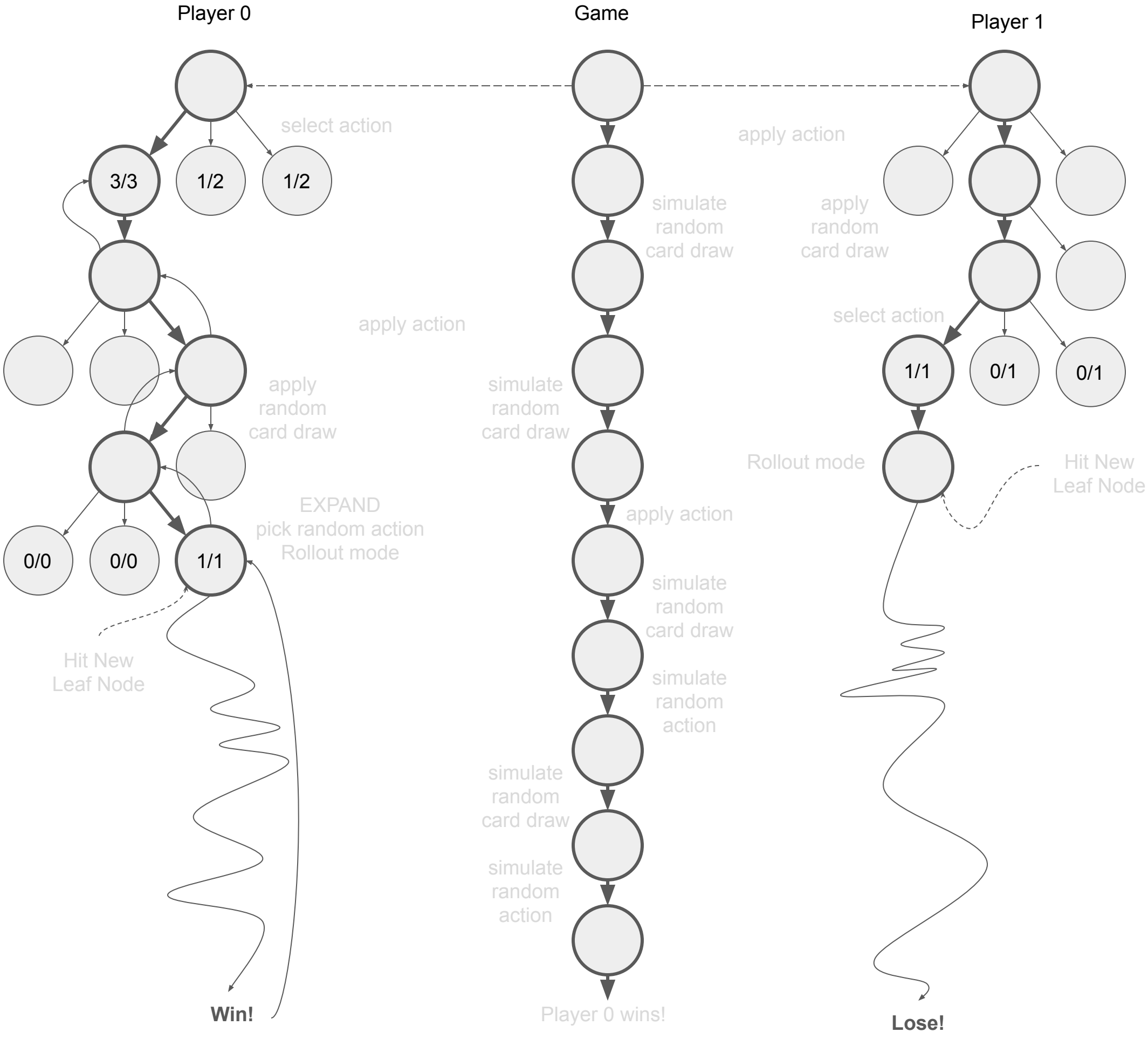
Backpropagate the win to the tree of player 0



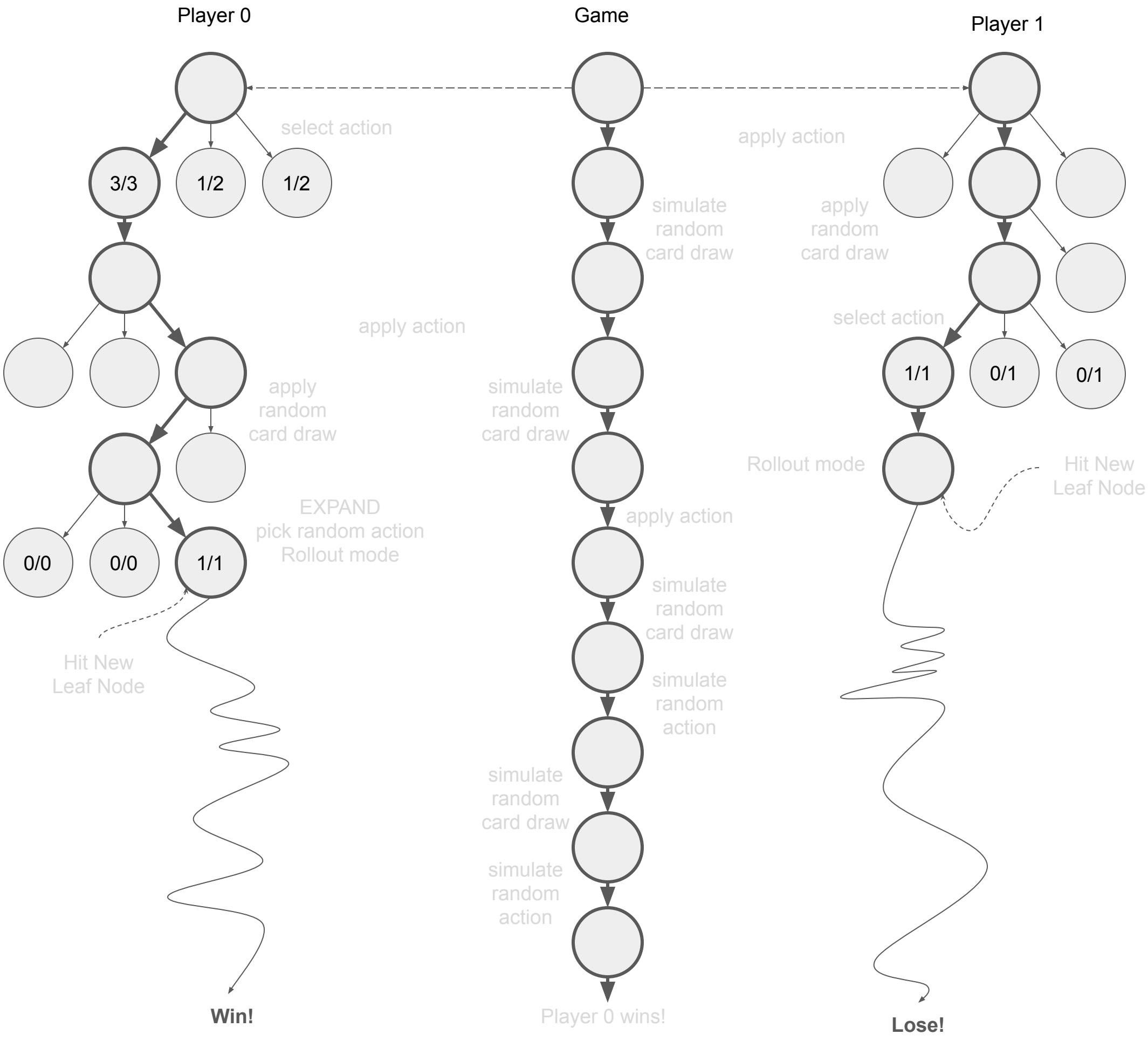
Backpropagate the win to the tree of player 0



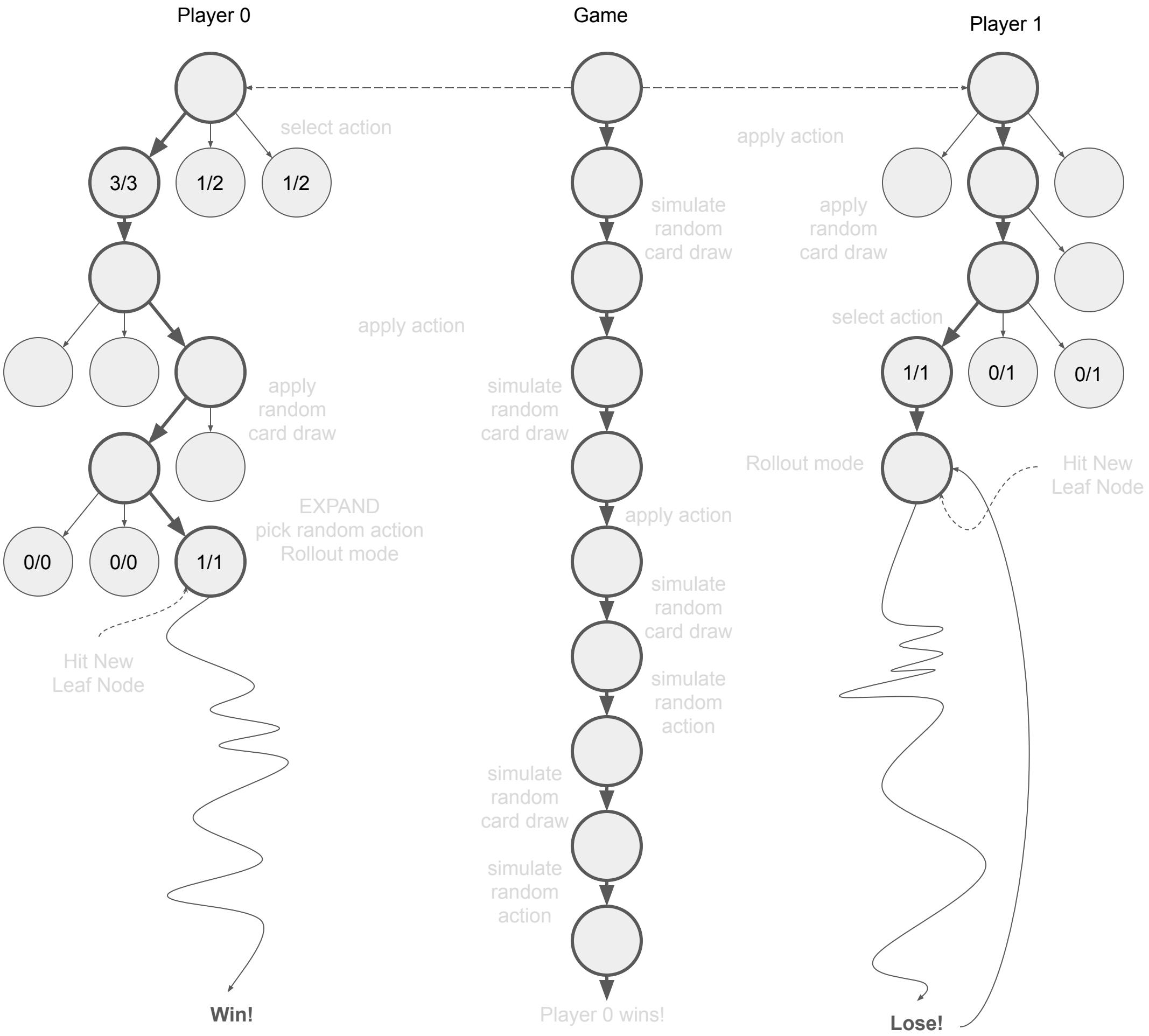
Backpropagate the win to the tree of player 0



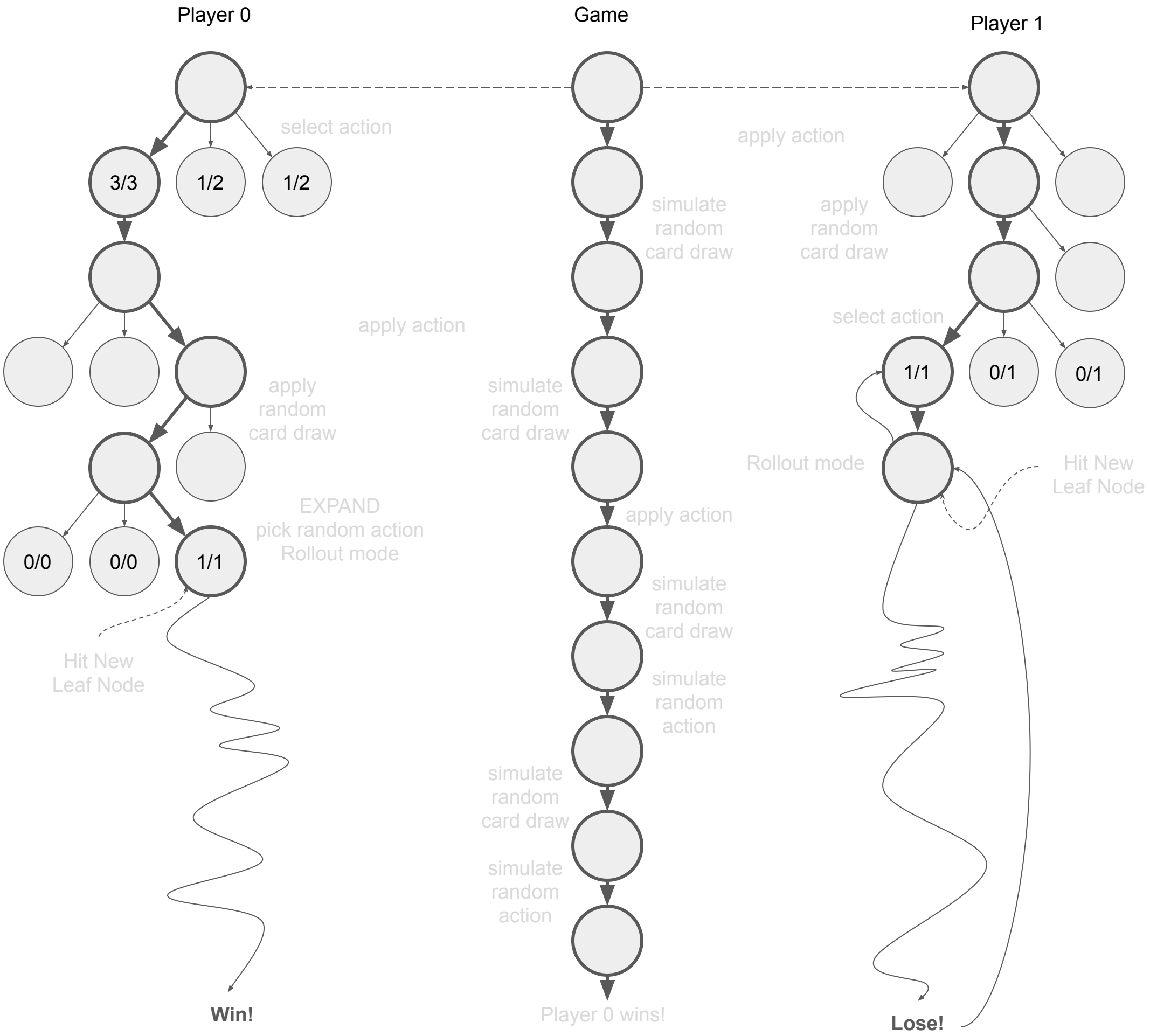
Backpropagate the win to the tree of player 0



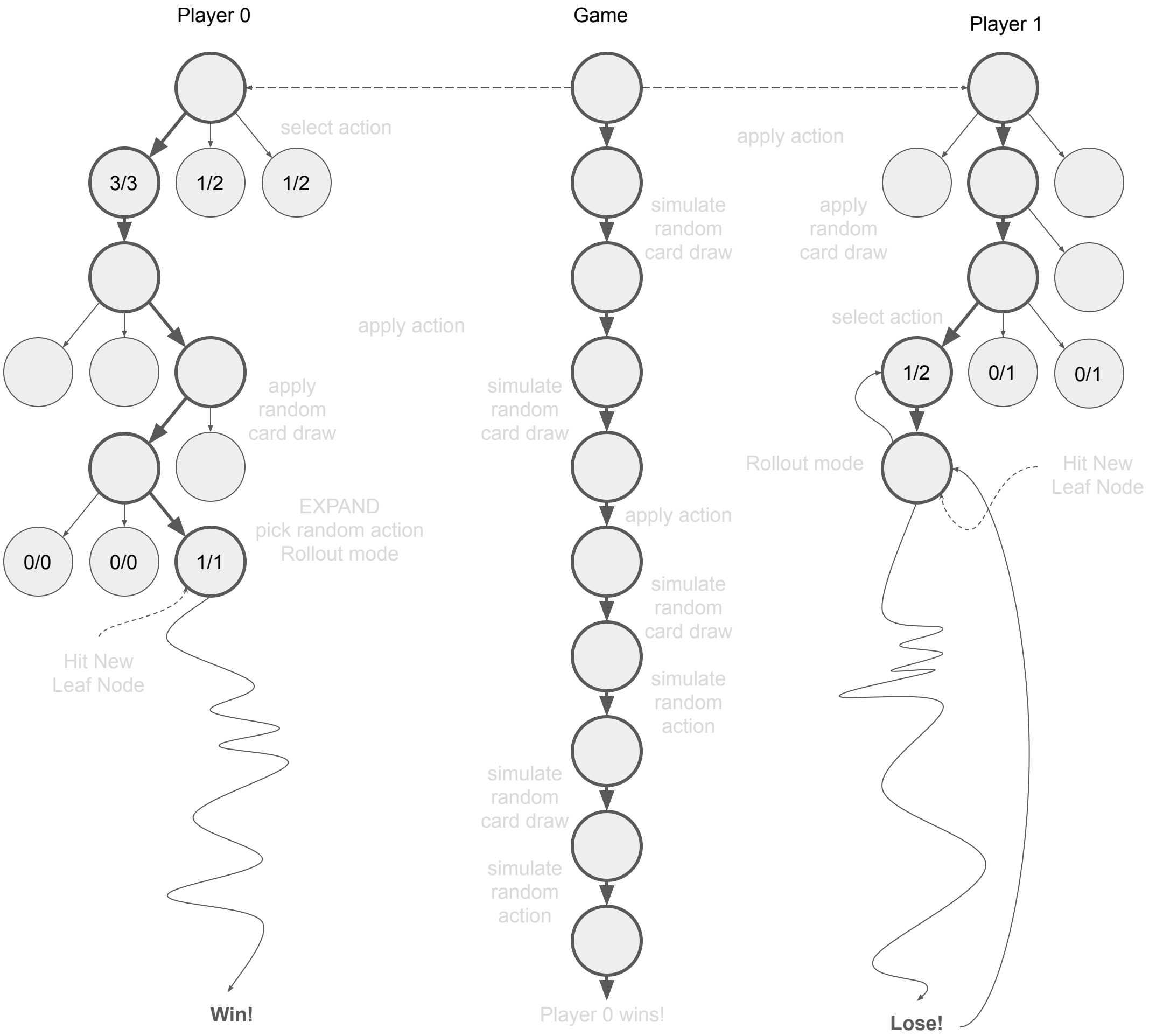
Backpropagate the loss to the tree of player 1



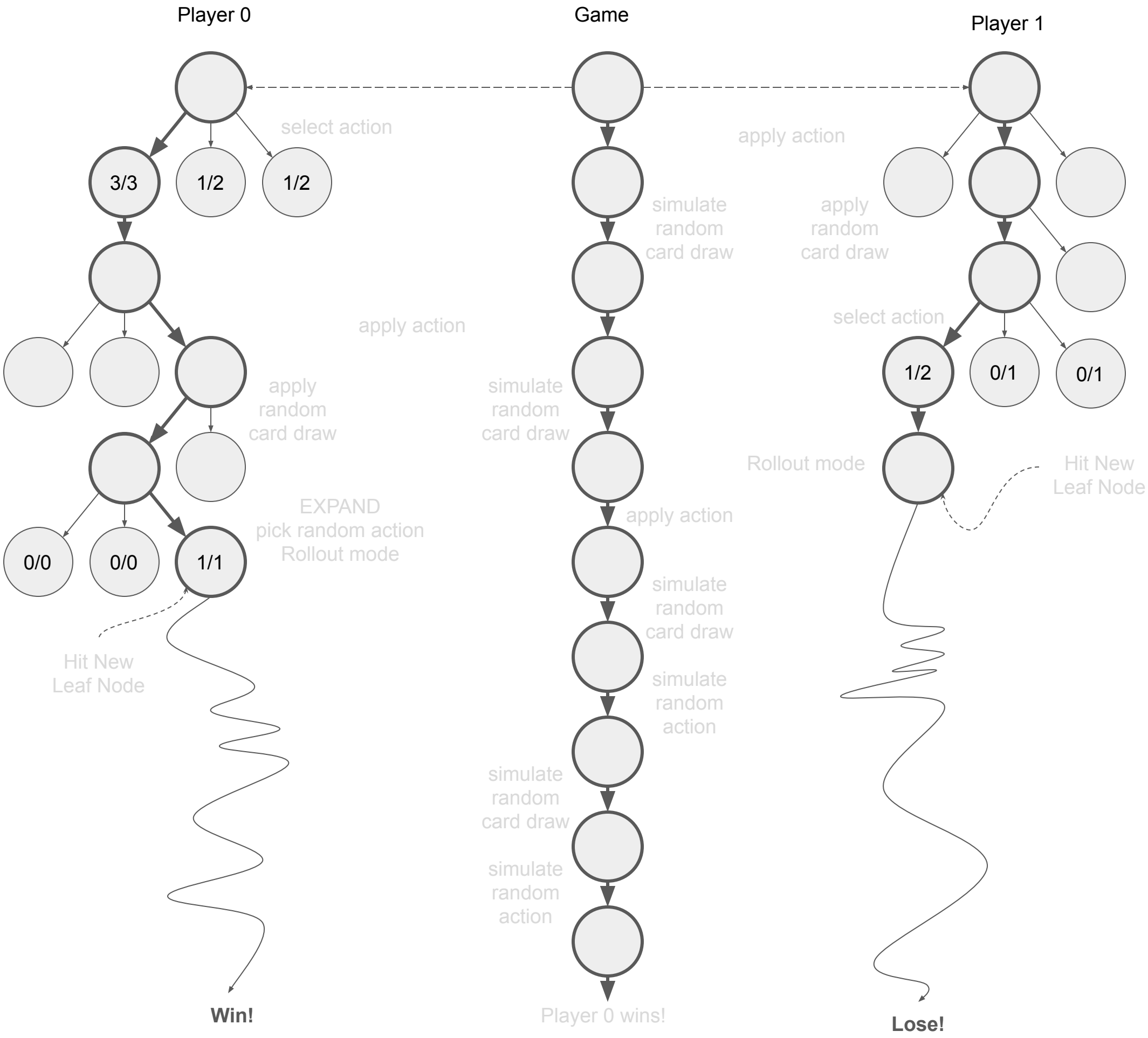
Backpropagate the loss to the tree of player 1



Backpropagate the loss to the tree of player 1



Backpropagate the loss to the tree of player 1


Player 0
Game
Player 1
select action
3/3
1/2
1/2
apply action
simulate
random
card draw
apply
random
card draw
apply
random
card draw
select action
1/2
0/1
0/1
apply
random
card draw
simulate
random
card draw
Rollout mode
Hit New
Leaf Node
EXPAND
pick random action
Rollout mode
apply action
0/0
0/0
1/1
simulate
random
card draw
Hit New
Leaf Node
simulate
random
action
simulate
random
card draw
simulate
random
action
Win!
Player 0 wins!
Lose!

Repeat!