

Project Task 10: Test Heuristics vs Random Player and Establish Rules for Human vs Heuristic Machines By Carrie Corcoran

This is the 10th task in my semester long project of building heuristic mancala machines. In this task, I adapted existing code from human vs random player so that a human player can also play against heuristic machines. I also had the random and heuristic machines play one another, and recorded the results. Observations from the various tasks are recorded below.

Observations playing against machines:

- Max score player had really interesting run of repeat turns- suggests that sometimes move with best score increase is also move that leads to additional turn
- Longer turns seem to result in higher score increases- could make for additional heuristic if time allows
- Even when the machines don't win, game playing requires more thought on human player's part- found myself playing more defensively

Machine vs machine observations:

- First player advantage is even greater than originally expected, and more pronounced in heuristic than random games. This makes sense for move again heuristic, as it's easier to find moves that lead to an additional move at the start of the game.
- Move again heuristic substantially stronger than max score heuristic, matching initial observations in coding. Move again heuristic beat max score heuristic in most games even without first player advantage.

Code:

```
;Modified code for human to play machines
(defun human-vs-machine-game (machine)
  (reset-board)
  (alternate-moves machine)
  (remaining-pieces 'a)
  (remaining-pieces 'b)
  (format t "Final Score: ~%")
  (format t "Human Player: ~A ~%" (AH))
  (format t "Machine Player: ~A ~%" (BH))
  (cond
    (> (AH) (BH))
```

```

        (format t "Human Player wins! ~%")
    )
    ((< (AH) (BH))
     (format t "Machine Player wins! ~%")
    )
    (t
     (format t "The game is a tie! ~%")
    )
)
)

;Methods for machines to play one another
(defun machine-game (verbose machine1 machine2)
  (reset-board)
  (cond
    (verbose
     (draw-board)
    )
  )
  (machine-game-turns 'a verbose machine1 machine2)
  (remaining-pieces 'a)
  (remaining-pieces 'b)
  (cond
    (verbose
     (format t "Final Score: ~%")
     (format t "Player A: ~A ~%" (AH))
     (format t "Player B: ~A ~%" (BH))
    )
  )
  (cond
    ((> (AH) (BH))
     (cond
       (verbose
        (format t "Player A wins! ~%")
       )
     )
    0
  )
  ((< (AH) (BH))
   (cond
     (verbose
      (format t "Player B wins! ~%")
     )
   )
  )
  1
)
(t

```

```

        (cond
          (verbose
            (format t "The game is a tie! ~%" )
          )
        )
      2
    )
  )
)

(defun machine-game-turns (player verbose machine1 machine2)
  (cond
    (verbose
      (format t "Player ~A's turn ~%" player)
    )
  )
  (cond
    ((eql player 'a)
      (setf machine machine1)
    )
    (t
      (setf machine machine2)
    )
  )
  (cond
    ((= machine 1)
      (random-move player verbose)
    )
    (( = machine 2)
      (heuristic-again-move player verbose)
    )
    (t
      (heuristic-max-score-move player verbose)
    )
  )
  (cond
    ((or (empty-side 'a) (empty-side 'b))
      t
    )
    ((eql player 'a)
      (machine-game-turns 'b verbose machine1 machine2)
    )
    (t
      (machine-game-turns 'a verbose machine1 machine2)
    )
  )
)
)

```

```

;Test machines against one another and record results
(defun machine-vs-machine-stats (machine1 machine2 wins1 wins2
ties games)
  (setf game (machine-game nil machine1 machine2))
  (cond
    ((= game 0)
      (setf wins1 (+ wins1 1))
    )
    ((= game 1)
      (setf wins2 (+ wins2 1))
    )
    (t
      (setf ties (+ ties 1))
    )
  )
  (cond
    ((< games 100)
      (machine-vs-machine-stats machine1 machine2 wins1 wins2
ties (+ games 1))
    )
    (t
      (list wins1 wins2 ties)
    )
  )
)
)
(defun machine-vs-machine-game-test ()
  (format t "Testing machine players against one another~%")
  (format t "Test 1: 2 Random Players for 100 games: ~%")
  (setf lst (machine-vs-machine-stats 1 1 0 0 0 1))
  (format t "Player 1 wins: ~A ~%" (nth 0 lst))
  (format t "Player 2 wins: ~A ~%" (nth 1 lst))
  (format t "Ties: ~A ~%" (nth 2 lst))
  (format t "Test 2: 2 Move Again Heuristic Players for 100
games: ~%")
  (setf lst (machine-vs-machine-stats 2 2 0 0 0 1))
  (format t "Player 1 wins: ~A ~%" (nth 0 lst))
  (format t "Player 2 wins: ~A ~%" (nth 1 lst))
  (format t "Ties: ~A ~%" (nth 2 lst))
  (format t "Test 3: 2 Max Score Heuristic Players for 100
games: ~%")
  (setf lst (machine-vs-machine-stats 3 3 0 0 0 1))
  (format t "Player 1 wins: ~A ~%" (nth 0 lst))
  (format t "Player 2 wins: ~A ~%" (nth 1 lst))
  (format t "Ties: ~A ~%" (nth 2 lst))
  (format t "Test 4: Player 1 Random, Player 2 Move Again
Heuristic for 100 games: ~%")
  (setf lst (machine-vs-machine-stats 1 2 0 0 0 1))

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(format t "Player 1 wins: ~A ~%" (nth 0 lst))
(format t "Player 2 wins: ~A ~%" (nth 1 lst))
(format t "Ties: ~A ~%" (nth 2 lst))
(format t "Test 5: Player 1 Move Again Heuristic, Player 2
Random for 100 games: ~%")
(setf lst (machine-vs-machine-stats 2 1 0 0 0 1))
(format t "Player 1 wins: ~A ~%" (nth 0 lst))
(format t "Player 2 wins: ~A ~%" (nth 1 lst))
(format t "Ties: ~A ~%" (nth 2 lst))
(format t "Test 6: Player 1 Random, Player 2 Max Score
Heuristic for 100 games: ~%")
(setf lst (machine-vs-machine-stats 1 3 0 0 0 1))
(format t "Player 1 wins: ~A ~%" (nth 0 lst))
(format t "Player 2 wins: ~A ~%" (nth 1 lst))
(format t "Ties: ~A ~%" (nth 2 lst))
(format t "Test 7: Player 1 Max Score Heuristic, Player 2
Random for 100 games: ~%")
(setf lst (machine-vs-machine-stats 3 1 0 0 0 1))
(format t "Player 1 wins: ~A ~%" (nth 0 lst))
(format t "Player 2 wins: ~A ~%" (nth 1 lst))
(format t "Ties: ~A ~%" (nth 2 lst))
(format t "Test 8: Player 1 Move Again Heuristic, Player 2 Max
Score Heuristic for 100 games: ~%")
(setf lst (machine-vs-machine-stats 2 3 0 0 0 1))
(format t "Player 1 wins: ~A ~%" (nth 0 lst))
(format t "Player 2 wins: ~A ~%" (nth 1 lst))
(format t "Ties: ~A ~%" (nth 2 lst))
(format t "Test 9: Player 1 Max Score Heuristic, Player 2 Move
Again Heuristic for 100 games: ~%")
(setf lst (machine-vs-machine-stats 3 2 0 0 0 1))
(format t "Player 1 wins: ~A ~%" (nth 0 lst))
(format t "Player 2 wins: ~A ~%" (nth 1 lst))
(format t "Ties: ~A ~%" (nth 2 lst))
)

```

Human vs Move Again Heuristic Player Demo:

```
[> (human-vs-machine-game 2)
```

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	4	4	4	4	4	4	—
0	—	—	—	—	—	—	
	4	4	4	4	4	4	0
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a3

Human player picks up stones in A3

HB	B6	B5	B4	B3	B2	B1	
—	4	4	4	4	4	4	—
0	—	—	—	—	—	—	
	4	4	0	5	5	5	1
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	4	4	4	4	4	4	—
0	—	—	—	—	—	—	
	4	4	0	5	5	5	1
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a6

Human player picks up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	4	4	5	5	5	5	—
0	—	—	—	—	—	—	
	4	4	0	5	5	0	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B4

HB	B6	B5	B4	B3	B2	B1	
—	5	5	0	5	5	5	—
0	—	—	—	—	—	—	—
—	5	5	1	5	5	0	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	5	5	0	5	5	5	—
0	—	—	—	—	—	—	—
—	5	5	1	5	5	0	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

Move Again Heuristic player picks up stones in B2

HB	B6	B5	B4	B3	B2	B1	
—	6	6	1	6	0	5	—
1	—	—	—	—	—	—	—
—	5	5	1	5	5	0	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Move Again Heuristic player moves again!

No moves found leading to additional move- picking move randomly.

Random player picks up stones in B5

HB	B6	B5	B4	B3	B2	B1	
—	7	0	1	6	0	5	—
2	—	—	—	—	—	—	
	6	6	2	6	5	0	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A4

HB	B6	B5	B4	B3	B2	B1	
—	7	0	2	7	1	6	—
2	—	—	—	—	—	—	
	6	6	2	0	6	1	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B4

HB	B6	B5	B4	B3	B2	B1	
—	8	1	0	7	1	6	—
2	—	—	—	—	—	—	
	6	6	2	0	6	1	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	7	1	7	—
3	—	—	—	—	—	—	
	7	7	3	1	7	2	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B1

HB	B6	B5	B4	B3	B2	B1	
—	1	2	1	8	2	0	—
4	—	—	—	—	—	—	—
—	—	—	—	—	—	—	2
—	8	7	3	1	7	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	1	2	1	9	3	1	—
4	—	—	—	—	—	—	—
—	—	—	—	—	—	—	2
—	0	8	4	2	8	3	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	2	3	2	0	3	1	—
5	—	—	—	—	—	—	—
—	—	—	—	—	—	—	2
—	1	9	5	3	9	3	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A5

HB	B6	B5	B4	B3	B2	B1	
—	3	4	3	1	4	2	—
6	—	—	—	—	—	—	—
—	—	—	—	—	—	—	2
—	2	9	5	3	0	4	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	3	4	3	1	4	2	—
6	—	—	—	—	—	—	—
—	—	—	—	—	—	—	2
—	0	10	6	3	0	4	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A3

HB	B6	B5	B4	B3	B2	B1	
—	3	4	3	2	5	3	—
6	—	—	—	—	—	—	—
—	—	—	—	—	—	—	2
—	0	10	0	4	1	5	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	3	5	4	0	5	3	—
6	—	—	—	—	—	—	—
—	—	—	—	—	—	—	2
—	0	10	0	4	1	5	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B5

HB	B6	B5	B4	B3	B2	B1	
—	4	0	4	0	5	3	—
7	—	—	—	—	—	—	—
—	—	—	—	—	—	—	2
—	1	11	1	4	1	5	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	4	0	4	0	5	3	—
7	—	—	—	—	—	—	
							2
	1	11	1	4	1	5	
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a1
Human player picks up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	4	0	4	0	5	3	—
7	—	—	—	—	—	—	
							2
	0	12	1	4	1	5	
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A2

HB	B6	B5	B4	B3	B2	B1	
—	5	1	5	1	6	4	—
7	—	—	—	—	—	—	
							3
	1	0	2	5	2	6	
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	0	1	5	1	6	4	—
7	—	—	—	—	—	—	
							8
	1	0	2	5	2	6	
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

Move Again Heuristic player picks up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	0	1	6	0	6	4	—
7	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	1	0	2	5	2	6	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B4

HB	B6	B5	B4	B3	B2	B1	
—	1	2	0	0	6	4	—
8	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	2	1	3	5	2	6	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A3

HB	B6	B5	B4	B3	B2	B1	
—	1	2	0	0	6	4	—
8	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	2	1	0	6	3	7	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	2	3	1	1	7	5	—
9	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	2	1	0	6	3	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala
Move Again Heuristic player moves again!

Move Again Heuristic player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	3	1	1	7	5	—
10	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	3	1	0	6	3	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	0	3	1	1	7	5	—
10	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	0	2	1	7	3	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A4

HB	B6	B5	B4	B3	B2	B1	
—	0	4	2	2	8	6	—
10	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	0	2	1	0	4	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B5

HB	B6	B5	B4	B3	B2	B1	
—	1	0	2	2	8	6	—
11	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	1	3	1	0	4	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A2

HB	B6	B5	B4	B3	B2	B1	
—	1	0	2	2	8	6	—
11	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	1	0	2	1	5	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A5

HB	B6	B5	B4	B3	B2	B1	
—	1	0	3	3	9	7	—
11	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	1	0	2	1	0	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B4

HB	B6	B5	B4	B3	B2	B1	
—	2	1	0	3	9	7	—
12	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	1	0	2	1	0	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Move Again Heuristic player moves again!

Move Again Heuristic player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	3	9	7	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	2	0	2	1	0	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	3	9	7	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	0	1	3	1	0	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A3

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	3	9	7	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	0	1	0	2	1	3	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	4	10	8	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	0	1	0	2	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	1	2	1	0	10	8	—
14	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	0	1	0	2	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Move Again Heuristic player moves again!

Move Again Heuristic player picks up stones in B5

	HB	B6	B5	B4	B3	B2	B1	
	—	—	—	—	—	—	—	
	2	0	1	0	10	8		
15	—	—	—	—	—	—		
							8	
	0	1	0	2	1	0		
	—	—	—	—	—	—		
	A1	A2	A3	A4	A5	A6	HA	

Last stone placed in player's mancala

Move Again Heuristic player moves again!

No moves found leading to additional move- picking move randomly.

Random player picks up stones in B1

	HB	B6	B5	B4	B3	B2	B1	
	—	—	—	—	—	—	—	
	3	1	2	1	11	0		
16	—	—	—	—	—	—		
							8	
	1	2	0	2	1	0		
	—	—	—	—	—	—		
	A1	A2	A3	A4	A5	A6	HA	

Picking up stones in A2

	HB	B6	B5	B4	B3	B2	B1	
	—	—	—	—	—	—	—	
	3	1	2	1	11	0		
16	—	—	—	—	—	—		
							8	
	1	0	1	3	1	0		
	—	—	—	—	—	—		
	A1	A2	A3	A4	A5	A6	HA	

Picking up stones in A4

	HB	B6	B5	B4	B3	B2	B1	
	—	—	—	—	—	—	—	
	3	1	2	1	11	1		
16	—	—	—	—	—	—		
							8	
	1	0	1	0	2	1		
	—	—	—	—	—	—		
	A1	A2	A3	A4	A5	A6	HA	

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	3	1	2	1	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	1	0	1	0	2	0	—
—	—	—	—	—	—	—	—
A1	A2	A3	A4	A5	A6	HA	

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	3	1	2	1	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	8
—	1	0	1	0	2	0	—
—	—	—	—	—	—	—	—
A1	A2	A3	A4	A5	A6	HA	

Select your move: a5

Human player picks up stones in A5

HB	B6	B5	B4	B3	B2	B1	
—	3	1	2	1	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	9
—	1	0	1	0	0	1	—
—	—	—	—	—	—	—	—
A1	A2	A3	A4	A5	A6	HA	

Last stone placed in player's mancala

Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	3	1	2	1	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	9
—	1	0	1	0	0	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Select your move: a6

Human player picks up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	3	1	2	1	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	10
—	1	0	1	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	3	1	2	1	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	10
—	1	0	1	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Select your move: a1

Human player picks up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	3	1	2	1	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	10
—	0	1	1	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	3	0	2	1	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	11
—	0	1	1	0	0	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

Move Again Heuristic player picks up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	3	0	3	0	11	1	—
17	—	—	—	—	—	—	—
—	—	—	—	—	—	—	11
—	0	1	1	0	0	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B4

HB	B6	B5	B4	B3	B2	B1	
—	4	1	0	0	11	1	—
18	—	—	—	—	—	—	—
—	—	—	—	—	—	—	11
—	0	1	1	0	0	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Move Again Heuristic player moves again!

No moves found leading to additional move- picking move randomly.

Random player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	11
—	1	2	2	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A3

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	11
—	1	2	0	1	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	11
—	1	2	0	1	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Select your move: a4

Human player picks up stones in A4

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	11
—	1	2	0	0	2	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A5

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	12
—	1	2	0	0	0	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala
Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	12
—	1	2	0	0	0	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Select your move: a6
Human player picks up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	13
—	1	2	0	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala
Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	13
—	1	2	0	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Select your move: a1

Human player picks up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	13
—	0	3	0	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A2

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	11	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	13
—	0	0	1	1	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	0	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	24
—	0	0	1	1	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

No moves found leading to additional move- picking move randomly.

Random player picks up stones in B1

	HB	B6	B5	B4	B3	B2	B1	
	—	0	1	0	0	1	0	—
19	—	—	—	—	—	—	—	
		0	0	1	1	1	0	24
	—	—	—	—	—	—	—	—
		A1	A2	A3	A4	A5	A6	HA

Player picks up stones in opposite space and places them in the player's mancala

	HB	B6	B5	B4	B3	B2	B1	
	—	0	1	0	0	1	0	—
20	—	—	—	—	—	—	—	
		0	0	1	1	0	0	24
	—	—	—	—	—	—	—	—
		A1	A2	A3	A4	A5	A6	HA

Human player's turn!

	HB	B6	B5	B4	B3	B2	B1	
	—	0	1	0	0	1	0	—
20	—	—	—	—	—	—	—	
		0	0	1	1	0	0	24
	—	—	—	—	—	—	—	—
		A1	A2	A3	A4	A5	A6	HA

Select your move: a4

Human player picks up stones in A4

	HB	B6	B5	B4	B3	B2	B1	
	—	0	1	0	0	1	0	—
20	—	—	—	—	—	—	—	
		0	0	1	0	1	0	24
	—	—	—	—	—	—	—	—
		A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	0	1	0	0	0	0	—
20	—	—	—	—	—	—	
	—	—	—	—	—	—	25
	0	0	1	0	1	0	
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

No moves found leading to additional move- picking move randomly.

Random player picks up stones in B5

HB	B6	B5	B4	B3	B2	B1	
—	1	0	0	0	0	0	—
20	—	—	—	—	—	—	
	—	—	—	—	—	—	25
	0	0	1	0	1	0	
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	1	0	0	0	0	0	—
20	—	—	—	—	—	—	
	—	—	—	—	—	—	25
	0	0	1	0	1	0	
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	1	0	0	0	0	0	—
20	—	—	—	—	—	—	
	0	0	1	0	1	0	25
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a6

Sorry, that's not a valid move. Please choose a bowl with stones in it.

HB	B6	B5	B4	B3	B2	B1	
—	1	0	0	0	0	0	—
20	—	—	—	—	—	—	
	0	0	1	0	1	0	25
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a5

Human player picks up stones in A5

HB	B6	B5	B4	B3	B2	B1	
—	1	0	0	0	0	0	—
20	—	—	—	—	—	—	
	0	0	1	0	0	1	25
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Player picks up stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	1	0	0	0	0	0	—
20	—	—	—	—	—	—	
	0	0	1	0	0	1	25
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

No moves found leading to additional move- picking move randomly.

Random player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
0	0	0	0	0	0	0	
21							
							25
	0	0	1	0	0	1	
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Final Score:

Human Player: 27

Machine Player: 21

Human Player wins!

NIL

Human vs Max Score Heuristic Player Demo:

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[ ]> (human-vs-machine-game 3)
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Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
4	4	4	4	4	4	4	
0							
							0
	4	4	4	4	4	4	
	A1	A2	A3	A4	A5	A6	HA

Select your move: a3

Human player picks up stones in A3

HB	B6	B5	B4	B3	B2	B1	
—	4	4	4	4	4	4	—
0	—	—	—	—	—	—	
	4	4	0	5	5	5	1
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala
Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	4	4	4	4	4	4	—
0	—	—	—	—	—	—	
	4	4	0	5	5	5	1
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a4
Human player picks up stones in A4

HB	B6	B5	B4	B3	B2	B1	
—	4	4	4	4	5	5	—
0	—	—	—	—	—	—	
	4	4	0	0	6	6	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B2

HB	B6	B5	B4	B3	B2	B1	
—	5	5	5	5	0	5	—
0	—	—	—	—	—	—	
	5	4	0	0	6	6	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	5	5	5	5	0	5	—
0	—	—	—	—	—	—	
	0	5	1	1	7	7	2
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	6	6	6	6	1	6	—
0	—	—	—	—	—	—	
	0	5	1	1	7	0	3
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	6	6	6	1	6	—
0	—	—	—	—	—	—	
	1	6	2	2	8	1	3
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	0	6	6	6	1	0	—
0	—	—	—	—	—	—	
	1	6	2	2	8	1	9
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

Maximum Score Heuristic player picks up stones in B2

HB	B6	B5	B4	B3	B2	B1	
—	0	6	6	7	0	0	—
0	—	—	—	—	—	—	—
—	—	—	—	—	—	—	9
—	1	6	2	2	8	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	1	7	7	0	0	0	—
1	—	—	—	—	—	—	—
—	—	—	—	—	—	—	9
—	2	7	3	2	8	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A3

HB	B6	B5	B4	B3	B2	B1	
—	1	7	7	0	0	0	—
1	—	—	—	—	—	—	—
—	—	—	—	—	—	—	9
—	2	7	0	3	9	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	1	7	7	0	1	1	—
1	—	—	—	—	—	—	—
—	—	—	—	—	—	—	9
—	2	7	0	3	9	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Player picks up stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	1	7	7	0	1	1	—
10	—	—	—	—	—	—	
	2	7	0	3	0	0	9
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	1	7	7	0	1	1	—
10	—	—	—	—	—	—	
	2	7	0	3	0	0	9
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a4

Human player picks up stones in A4

HB	B6	B5	B4	B3	B2	B1	
—	1	7	7	0	1	1	—
10	—	—	—	—	—	—	
	2	7	0	0	1	1	10
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	1	7	7	0	1	1	—
10	—	—	—	—	—	—	
	2	7	0	0	1	1	10
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a6

Human player picks up stones in A6

	HB	B6	B5	B4	B3	B2	B1	
	—	—	—	—	—	—	—	
	10	1	7	7	0	1	1	
							11	
		2	7	0	0	1	0	
		A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Human player moves again!

	HB	B6	B5	B4	B3	B2	B1	
	—	—	—	—	—	—	—	
	10	1	7	7	0	1	1	
							11	
		2	7	0	0	1	0	
		A1	A2	A3	A4	A5	A6	HA

Select your move: a1

Human player picks up stones in A1

	HB	B6	B5	B4	B3	B2	B1	
	—	—	—	—	—	—	—	
	10	1	7	7	0	1	1	
							11	
		0	8	1	0	1	0	
		A1	A2	A3	A4	A5	A6	HA

Player picks up stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	1	7	0	0	1	1	—
10	—	—	—	—	—	—	—
—	—	—	—	—	—	—	18
—	0	8	1	0	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

Maximum Score Heuristic player picks up stones in B5

HB	B6	B5	B4	B3	B2	B1	
—	2	0	0	0	1	1	—
11	—	—	—	—	—	—	—
—	—	—	—	—	—	—	18
—	1	9	2	1	2	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A5

HB	B6	B5	B4	B3	B2	B1	
—	2	0	0	0	1	2	—
11	—	—	—	—	—	—	—
—	—	—	—	—	—	—	18
—	1	9	2	1	0	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B1

HB	B6	B5	B4	B3	B2	B1	
—	2	0	0	1	2	0	—
11	—	—	—	—	—	—	—
—	—	—	—	—	—	—	18
—	1	9	2	1	0	1	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	2	0	0	1	2	0	—
12	—	—	—	—	—	—	—
—	—	—	—	—	—	—	18
—	1	9	2	0	0	1	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	2	0	0	1	2	0	—
12	—	—	—	—	—	—	—
—	—	—	—	—	—	—	18
—	1	9	2	0	0	1	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a6

Human player picks up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	2	0	0	1	2	0	—
12	—	—	—	—	—	—	—
—	—	—	—	—	—	—	19
—	1	9	2	0	0	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	2	0	0	1	2	0	—
12	—	—	—	—	—	—	
	1	9	2	0	0	0	19
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a2

Human player picks up stones in A2

HB	B6	B5	B4	B3	B2	B1	
—	2	0	1	2	3	1	—
12	—	—	—	—	—	—	
	1	0	3	1	1	1	20
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

Maximum Score Heuristic player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	0	1	2	3	1	—
13	—	—	—	—	—	—	
	2	0	3	1	1	1	20
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A1

HB	B6	B5	B4	B3	B2	B1	
—	0	0	1	2	3	1	—
13	—	—	—	—	—	—	
	0	1	4	1	1	1	20
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A3

HB	B6	B5	B4	B3	B2	B1	
—	0	0	1	2	3	2	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	20
—	0	1	0	2	2	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B1

HB	B6	B5	B4	B3	B2	B1	
—	0	0	1	3	4	0	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	20
—	0	1	0	2	2	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	1	1	2	0	4	0	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	20
—	0	1	0	2	2	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Player picks up stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	1	1	2	0	4	0	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	20
—	0	1	0	2	2	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	1	1	2	0	4	0	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	20
—	0	1	0	2	2	2	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Select your move: a5

Human player picks up stones in A5

HB	B6	B5	B4	B3	B2	B1	
—	1	1	2	0	4	0	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	21
—	0	1	0	2	0	3	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Human player moves again!

HB	B6	B5	B4	B3	B2	B1	
—	1	1	2	0	4	0	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	21
—	0	1	0	2	0	3	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Select your move: a4

Human player picks up stones in A4

HB	B6	B5	B4	B3	B2	B1	
—	1	1	2	0	4	0	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	21
—	0	1	0	0	1	4	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Picking up stones in A6

HB	B6	B5	B4	B3	B2	B1	
—	1	1	2	1	5	1	—
13	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	1	0	0	1	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

Maximum Score Heuristic player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	1	2	1	5	1	—
14	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	1	0	0	1	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	0	1	3	0	5	1	—
14	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	1	0	0	1	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B4

HB	B6	B5	B4	B3	B2	B1	
15	1	2	0	0	5	1	
							22
	0	1	0	0	1	0	
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
16	0	2	0	0	5	1	
							22
	0	1	0	0	1	0	
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B5

HB	B6	B5	B4	B3	B2	B1	
17	1	0	0	0	5	1	
							22
	0	1	0	0	1	0	
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	0	0	0	5	1	—
18	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	1	0	0	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B2

HB	B6	B5	B4	B3	B2	B1	
—	1	1	1	1	0	1	—
19	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	1	0	0	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	1	1	1	0	1	—
20	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	1	0	0	1	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B4

HB	B6	B5	B4	B3	B2	B1	
—	0	2	0	1	0	1	—
20	—	—	—	—	—	—	
	0	1	0	0	1	0	22
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Picking up stones in B5

HB	B6	B5	B4	B3	B2	B1	
—	1	0	0	1	0	1	—
21	—	—	—	—	—	—	
	0	1	0	0	1	0	22
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B6

HB	B6	B5	B4	B3	B2	B1	
—	0	0	0	1	0	1	—
22	—	—	—	—	—	—	
	0	1	0	0	1	0	22
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Last stone placed in player's mancala

Maximum Score Heuristic player moves again!

Maximum Score Heuristic player picks up stones in B1

HB	B6	B5	B4	B3	B2	B1	
—	0	0	0	1	1	0	—
22	—	—	—	—	—	—	
	0	1	0	0	1	0	22
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	0	0	0	1	1	0	—
23	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	1	0	0	0	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Human player's turn!

HB	B6	B5	B4	B3	B2	B1	
—	0	0	0	1	1	0	—
23	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	1	0	0	0	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Select your move: a2

Human player picks up stones in A2

HB	B6	B5	B4	B3	B2	B1	
—	0	0	0	1	1	0	—
23	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	0	1	0	0	0	—
—	—	—	—	—	—	—	—
	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	0	0	0	1	1	0	—
23	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	0	1	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Machine player's turn!

Maximum Score Heuristic player picks up stones in B3

HB	B6	B5	B4	B3	B2	B1	
—	0	0	1	0	1	0	—
23	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	0	1	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Player picks up and stones in opposite space and places them in the player's mancala

HB	B6	B5	B4	B3	B2	B1	
—	0	0	1	0	1	0	—
24	—	—	—	—	—	—	—
—	—	—	—	—	—	—	22
—	0	0	0	0	0	0	—
—	—	—	—	—	—	—	—
—	A1	A2	A3	A4	A5	A6	HA

Final Score:

Human Player: 22

Machine Player: 26

Machine Player wins!

NIL

Machine vs Machine Test Demo:

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[ ]> (machine-vs-machine-game-test)
Testing machine players against one another
Test 1: 2 Random Players for 100 games:
Player 1 wins: 56
Player 2 wins: 39
Ties: 5
Test 2: 2 Move Again Heuristic Players for 100 games:
Player 1 wins: 81
Player 2 wins: 17
Ties: 2
Test 3: 2 Max Score Heuristic Players for 100 games:
Player 1 wins: 100
Player 2 wins: 0
Ties: 0
Test 4: Player 1 Random, Player 2 Move Again Heuristic for 100
games:
Player 1 wins: 15
Player 2 wins: 82
Ties: 3
Test 5: Player 1 Move Again Heuristic, Player 2 Random for 100
games:
Player 1 wins: 99
Player 2 wins: 1
Ties: 0
Test 6: Player 1 Random, Player 2 Max Score Heuristic for 100
games:
Player 1 wins: 27
Player 2 wins: 63
Ties: 10
Test 7: Player 1 Max Score Heuristic, Player 2 Random for 100
games:
Player 1 wins: 67
Player 2 wins: 27
Ties: 6
Test 8: Player 1 Move Again Heuristic, Player 2 Max Score
Heuristic for 100 games:
Player 1 wins: 82
Player 2 wins: 16
Ties: 2
Test 9: Player 1 Max Score Heuristic, Player 2 Move Again
Heuristic for 100 games:
Player 1 wins: 27
Player 2 wins: 66
Ties: 7
NIL
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