

Heuristic 1

Description: This heuristic takes the ratio of the player's available moves to the opponent's available moves. A score of more than 1 means the player has more moves than the opponent and vice versa. In addition, The ratio is further adjusted by penalising for moves that go to the periphery of the board as there would be less moves compared to staying in the center of the board.

Heuristic 2

Description: This heuristic takes the difference between the player's available moves and twice of the opponent's available moves. The aim is to keep the opponent's available moves to a minimum as compared to a simple difference of both players' available moves.

Heuristic 3

Description: This heuristic takes the number of moves available to the player.

Comparison

Round 1

Number of matches against each opponent = 5

Total number of matches per set per heuristic = 70

Set	AB_Improved	Heuristic 1	Heuristic 2	Heuristic 3
1	54.3	51.4	61.4	47.1
2	55.7	60.0	51.4	60.0
3	65.7	61.4	55.7	50.0
4	50.0	54.3	58.6	55.7
5	52.9	58.6	58.6	64.3
6	58.6	64.3	48.6	52.9
7	64.3	58.6	51.4	54.3
8	55.7	64.3	52.9	52.9
9	58.6	60.0	58.6	45.7
10	58.6	60.0	52.9	60.0
Average	57.44	59.29	55.01	54.29

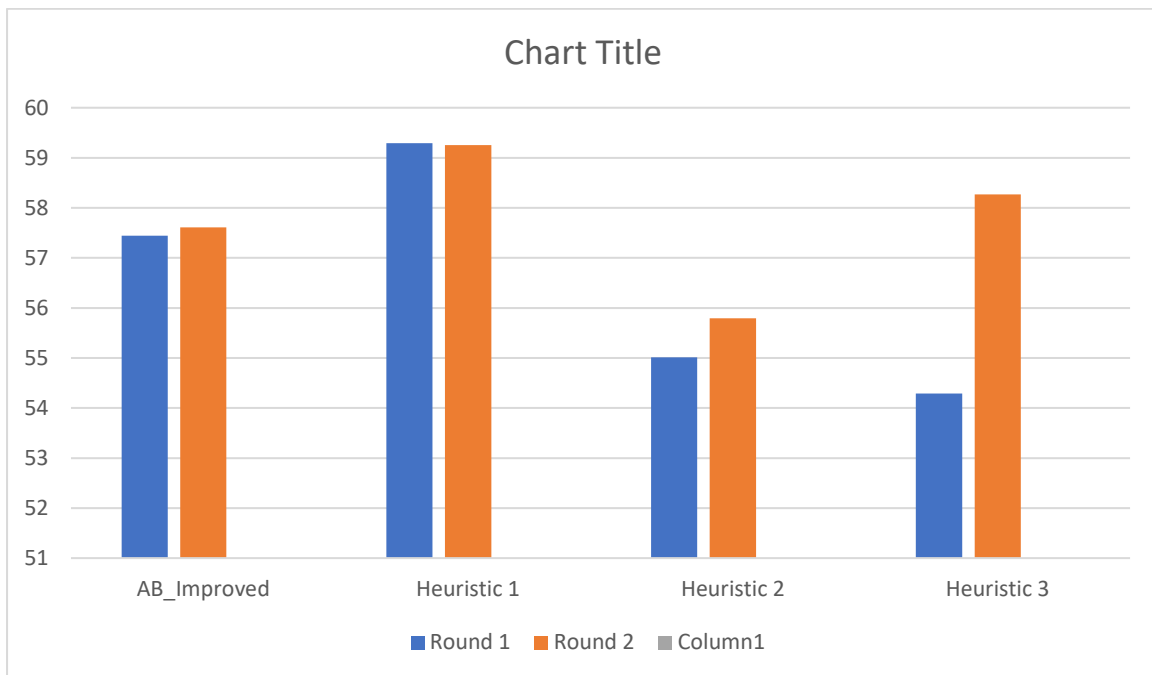
Round 2

Number of matches against each opponent = 20

Total number of matches per set per heuristic = 280

Set	AB_Improved	Heuristic 1	Heuristic 2	Heuristic 3
1	58.6	63.2	55.0	53.9
2	57.9	60.7	53.6	56.8
3	60.7	61.8	56.4	59.3

4	56.1	60.4	57.1	58.9
5	61.4	59.6	58.6	56.1
6	53.2	58.6	53.9	57.5
7	54.6	56.4	53.6	62.1
8	56.8	59.3	61.8	59.6
9	59.3	57.5	52.9	60.4
10	57.5	55.0	55.0	56.1
Average	57.61	59.25	55.79	58.07



Conclusion

Heuristic 1 was chosen because it gave the highest win rate of 59.29% over a sample of 10 rounds.

In addition, by using a ratio of the player's moves to the opponent's moves, Heuristic 1 prioritises moves that limit the opponent's moves, and thus should lead to a quicker resolution of the game. For example, if there are two available moves in the following ratio of player to opponent, (4:3) and (3:2), Heuristic 1 will prefer the second move with a ratio of 1.5 as compared to 1.33 whereas Heuristic 3 will score both moves equally.

Lastly, Heuristic 3 also encourages the player to stay in the center of the board as opposed to the corners and sides because more moves are prima facie available in the center. For example, a centre position of an empty board will have 8 available moves while a corner position will only have 2 available moves.