

Here are the results of my tournament run for all 3 student heuristics:

| | ID_Improved | Student_Custom1 | Student_Custom2 | Student_Custom3 |
|-------------|-------------|-----------------|-----------------|-----------------|
| Random | 16 to 4 | 18 to 2 | 18 to 2 | 19 to 1 |
| MM_Null | 14 to 6 | 19 to 1 | 16 to 4 | 15 to 5 |
| MM_Open | 11 to 9 | 12 to 8 | 15 to 5 | 15 to 5 |
| MM_Improved | 9 to 11 | 12 to 8 | 12 to 8 | 14 to 6 |
| AB_Null | 12 to 8 | 17 to 3 | 18 to 2 | 16 to 4 |
| AB_Open | 14 to 6 | 14 to 6 | 14 to 6 | 12 to 8 |
| AB_Improved | 13 to 7 | 7 to 13 | 14 to 6 | 15 to 5 |
| | | | | |
| Results | 63.57% | 70.71% | 76.43% | 75.71% |

The cells on the board can be classified based on the number of moves that would be possible from that cell (assuming the board is blank).

For instance, from each of the 4 corners of the board, only 2 moves are possible.

From the top-left corner cell, the player can only go to position A or B.

This makes it a two-move cell.

From the center cell of the board, 8 moves are possible, since the player could move to any cell A-H.

This makes it an eight-move cell.

Similarly, the number of legal moves can be calculated for each cell.

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | | | | | | 2 |
| | | B | | C | | |
| | A | | | | D | |
| | | | 8 | | | |
| | G | | | | E | |
| | | H | | F | | |
| 2 | | | | | | 2 |

Filling out the board based on the above gives us:

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 3 | 4 | 4 | 4 | 3 | 2 |
| 3 | 4 | 6 | 6 | 6 | 4 | 3 |
| 4 | 6 | 8 | 8 | 8 | 6 | 4 |
| 4 | 6 | 8 | 8 | 8 | 6 | 4 |
| 4 | 6 | 8 | 8 | 8 | 6 | 4 |
| 3 | 4 | 6 | 6 | 6 | 4 | 3 |
| 2 | 3 | 4 | 4 | 4 | 3 | 2 |

Student_Custom1 calculates the weighted sum of all the cells to which the player can move and subtracts from it the weighted sum of all the cells to which the opponent can move.

Student_Custom2 is a variation of Student_Custom1 in which the player's weighted sum is doubled before the weighted sum of the opponent is subtracted.

Student_Custom3 is the opposite of Student_Custom2 in which the opponent's weighted sum is doubled before being subtracted from the player's weighted sum.

I picked these heuristics because they assign the highest value to the 8s (and then the 6s) which would influence the player to:

1. constantly gravitate to the center of the board
2. stay away from the edges as much as possible
3. avoid the corners at all costs

This approach would present the player with more move options for subsequent moves.

All 3 heuristics performed better than ID_Improved because they took into consideration that some positions on the board are better than others.

Between the 3 heuristics, Student_Custom2 (more weight given to player position) and Student_Custom3 (more weight given to opponent position) did better than Student_Custom1 (equal weight to both players) with Student_Custom2 having a slight edge over Student_Custom3. However, I think this could vary from run to run.

Given that the opponent can “jump over” filled/occupied positions, I think it would be hard to trap the opponent with a partition. As such giving more focus to the player’s own moves would be a better strategy. I would go with Student_Custom2 as my top choice.