Heuristics Analysis

I've used 3 different types of heuristics functions.

1. Center Score: Outputs a score equal to square of distance from the center of the board to the position of the player
2. Improved Score: Outputs a score equal to the difference in the number of moves available to the two players
3. Open Move Score: Outputs a score equal to the number of moves open for your computer player on the board
4. Weighted Improved Score: improved score with a w1 multiplied to own_moves. W1 equals the move count of the game.

So for my custom score function I thought it would be neat if I could mix and match some of these heuristics by multiplying them with each other.

1. AB_Custom multiplied the output of the center score and the open move heuristics
2. AB_Custom2 uses the weighted improved score
3. AB_Custom3 multiplied the output of the open mve and improved score

These evaluation functions are pretty straightforward and simple. Benchmarking it against a computer player, here are the results:

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom2		AB_Custom3	
		won	lost	won	lost	won	lost	won	lost
1	Random	9	1	10	0	9	1	8	2
2	MM_Open	7	3	7	3	8	2	7	3
3	MM_Center	6	4	9	1	6	4	9	1
4	MM_Improved	5	5	7	3	6	4	3	7
5	AB_Open	5	5	6	4	6	4	3	7
6	AB_Center	5	5	4	6	4	6	4	6
7	AB_Improved	5	5	2	8	4	6	5	5
	Win Rate	60.0%		64.3%		61.4%		55.7%	

As you can see the evaluation functions that performed the best are the AB_Custom and the AB_Custom2. AB_Custom is my recommendation for heuristics as it scored the highest.

Another reason it uses the center score, which gives a better heuristics if it stays near the center. Another reason is using the center score is a decent heuristics but multiplying it by open moves would create a higher score if the player waits till a later game state.