

	AB_Improved			AB_Custom			AB_Custom_2			AB_Custom_3		
	Won	Lost	Win Rate	Won	Lost	Win Rate	Won	Lost	Win Rate	Won	Lost	Win Rate
Random	9	1	90%	10	0	100%	7	3	70%	10	0	100%
MM_Open	9	1	90%	9	1	90%	9	1	90%	10	0	100%
MM_Center	9	1	90%	8	2	80%	8	2	80%	10	0	100%
MM_Improved	9	1	90%	9	1	90%	10	0	100%	10	0	100%
AB_Open	5	5	50%	2	8	20%	2	8	20%	4	6	40%
AB_Center	8	2	80%	7	3	70%	3	7	30%	8	2	80%
AB_Improved	5	5	50%	3	7	30%	2	8	20%	6	4	60%
Win Rate	77.1%			68.6%			58.6%			82.9%		

Chart 1 - Game-Agent Results

Analyzing the results from Chart 1, I found that my custom heuristic scoring functions did well against a Random opponent, as well as against all of the Minimax opponents with a win rate of at least 80%. However when put against any of the Alpha-Beta opponents, the results varied, ultimately winning on average 41% (average of all win rates for custom scoring functions vs all Alpha-Beta opponents). Overall my custom functions seemed to do well against an AB_Center opponent, followed by an AB_Improved opponent, and performing the worst against an AB_Open opponent.

For my first custom scoring function I decided to determine whether or not the move made mirrored the opponent's last move. And if not, then calculating the distance away from the mirrored tile in hopes for our player to move towards it. I chose this heuristic because of what Malcolm Haines mentioned in Lesson 8 about mirroring the opponent. Though not an exact heuristic to what he mentioned I tried to capture a piece of it to see how it would perform.

My second heuristic incentivizes our player to keep close to its opponent, calculating the tile distance away from the opponent. The closer our player is the higher the score it will return. Finally my third heuristic incentivizes our player to divide the board in half along the y-axis. My hope was for our player to quickly divide and contain our opponent.

Given the three custom scoring functions I would suggest my third custom function of attempting to divide the board up in half (AB_Custom_3). This heuristic seemed to do just as well as our AB_Improved against all AB opponents, but performed better when it came down to playing against Minimax opponents. More importantly it outperformed the AB_Improved heuristic against an AB_Improved opponent. This opponent serves to target our player specifically based on the number of moves left. Finally because it attempts to divide the board, it attempts to create a barrier between both players forcing each piece to fight on the outer edges of the board end game, this can potentially help us draw out the game to use more precise heuristics towards the end against the more generalized heuristic opponents.