Heuristic Analysis

```
**************************
    Playing Matches
**************************
```

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom_2		AB_Custom_3	
		Won	Lost	Won	Lost	Won	Lost	Won	Lost
1	Random	10	0	10	0	10	0	10	0
2	MM_Open	8	2	7	3	9	1	9	1
3	MM_Center	10	0	10	0	10	0	10	0
4	MM_Improved	6	4	9	1	7	3	8	2
5	AB_Open	4	6	5	5	5	5	4	6
6	AB_Center	8	2	6	4	6	4	6	4
7	AB_Improved	5	5	5	5	7	3	4	6
	Win Rate:	72.9%		74.3%		77.1%		72.9%	

I attempted several heuristic, however the three that I settled on all made use of the number of movies available for each player when determining the next move. AB_Custom, weighted the number of available moves for the current player much more heavily than the number of moves for the opposing player. 3 to 1. AB_Custom 2 also weighted the available moves for the existing player higher but at a rate of 2 to 1. Finally, AB_Custom 3, equally weighted the number of moves for both players but also considered the distance between the players in determining the correct move.

Out of these three, two beat the AB_Improved agent and one tied its win rate. With the highest win rate, AB_Custom 2 was the best meaning weighting number of available moves for the current player is more beneficial, but you cannot weight it too heavily.

I then reran the test with multipliers of 2x, 1.75x, and 1.5x to see where the sweet spot was:

```
**************************
    Playing Matches
**************************
```

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom_2		AB_Custom_3	
		Won	Lost	Won	Lost	Won	Lost	Won	Lost
1	Random	10	0	10	0	10	0	10	0
2	MM_Open	9	1	9	1	9	1	9	1
3	MM_Center	10	0	9	1	10	0	10	0
4	MM_Improved	6	4	8	2	8	2	9	1
5	AB_Open	5	5	7	3	7	3	7	3
6	AB_Center	5	5	6	4	6	4	6	4
7	AB_Improved	6	4	4	6	4	6	6	4
	Win Rate:	72.9%		75.7%		77.1%		81.4%	

Decreasing the multiplier seemed to improve the results of the heuristic. I then tested multipliers of 1.5x, 1.25x, and 1.125x. The 1.5x performed the best with the 1.25x slightly worse, and the 1.125x even worse. Looks like there is a maxima around 1.5x so I would recommend using my AB_Custom as the appropriate heuristic.