Adversarial Search Report – Opening Book Experiment

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1. Table documenting the experiment to evaluate the performance of their agent

	Without opening book[1]	With opening book[2]
Win rate (200 games)	55.5%	53%

1. Alpha-beta search agent, with search depth of 4, **first two moves randomly chosen**, against the default min-max agent.
2. Alpha-beta search agent, with search depth of 4, **first two moves from the opening book**, against the default min-max agent.
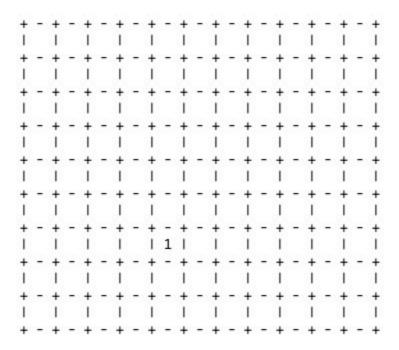
The win rate doesn't seem to improve by using the opening book.

2. Describe your process for collecting statistics to build your opening book. How did you choose states to sample? And how did you perform rollouts to determine a winner?

Build a tree of depth of 4, randomly choosing moves, until the game terminates. Add score of 1 if that state leads to a win for the active player, otherwise a score of -1. At last, pick the states that lead to the most wins for the active player.

3. What opening moves does your book suggest are most effective on an empty board for player 1 and what is player 2's best reply?

Opening move

```
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   | 1 |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
```

Counter move

```
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   | 2 |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   | 1 |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
|   |   |   |   |   |   |   |   |   |   |
+ - + - + - + - + - + - + - + - + - + - +
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