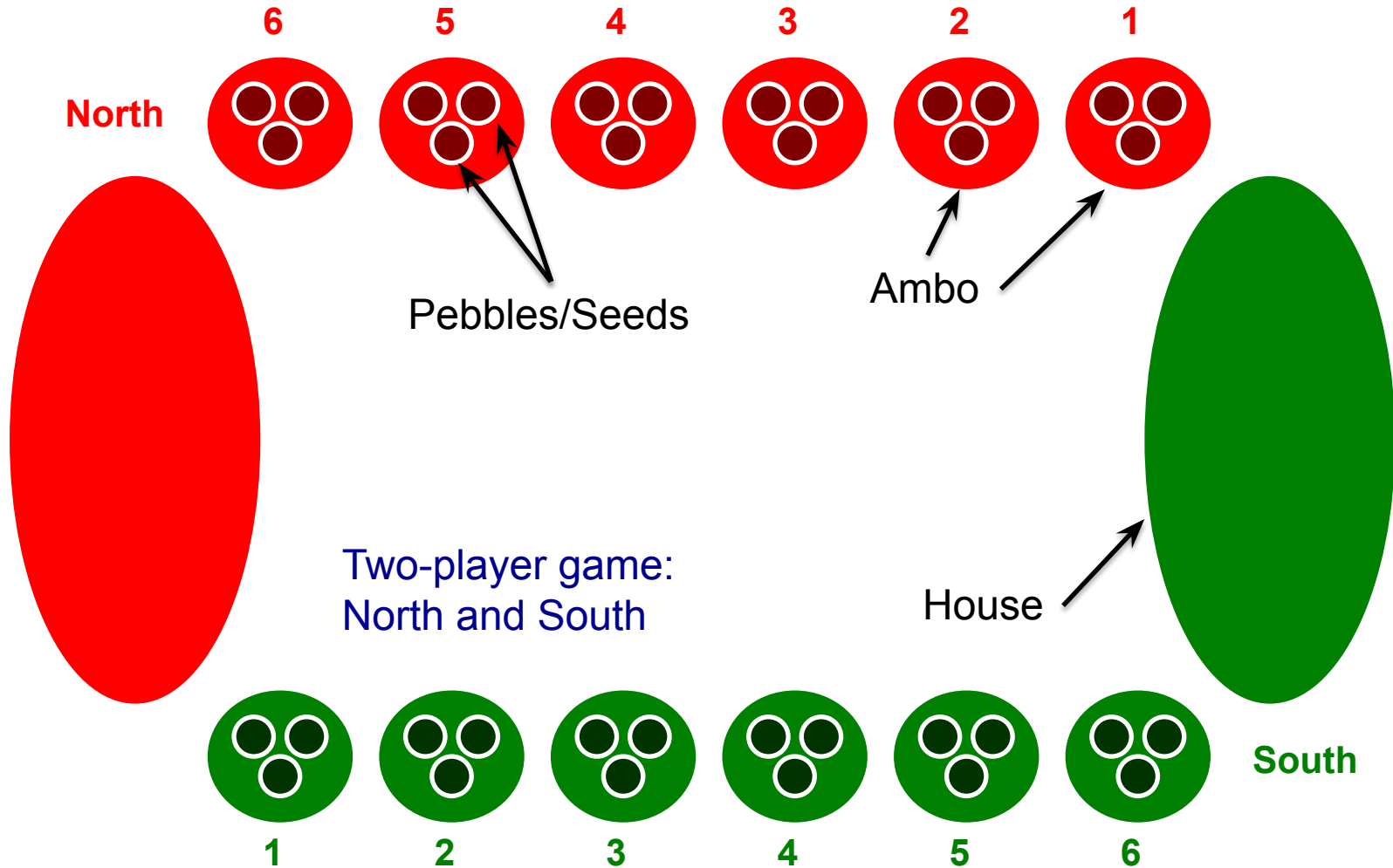
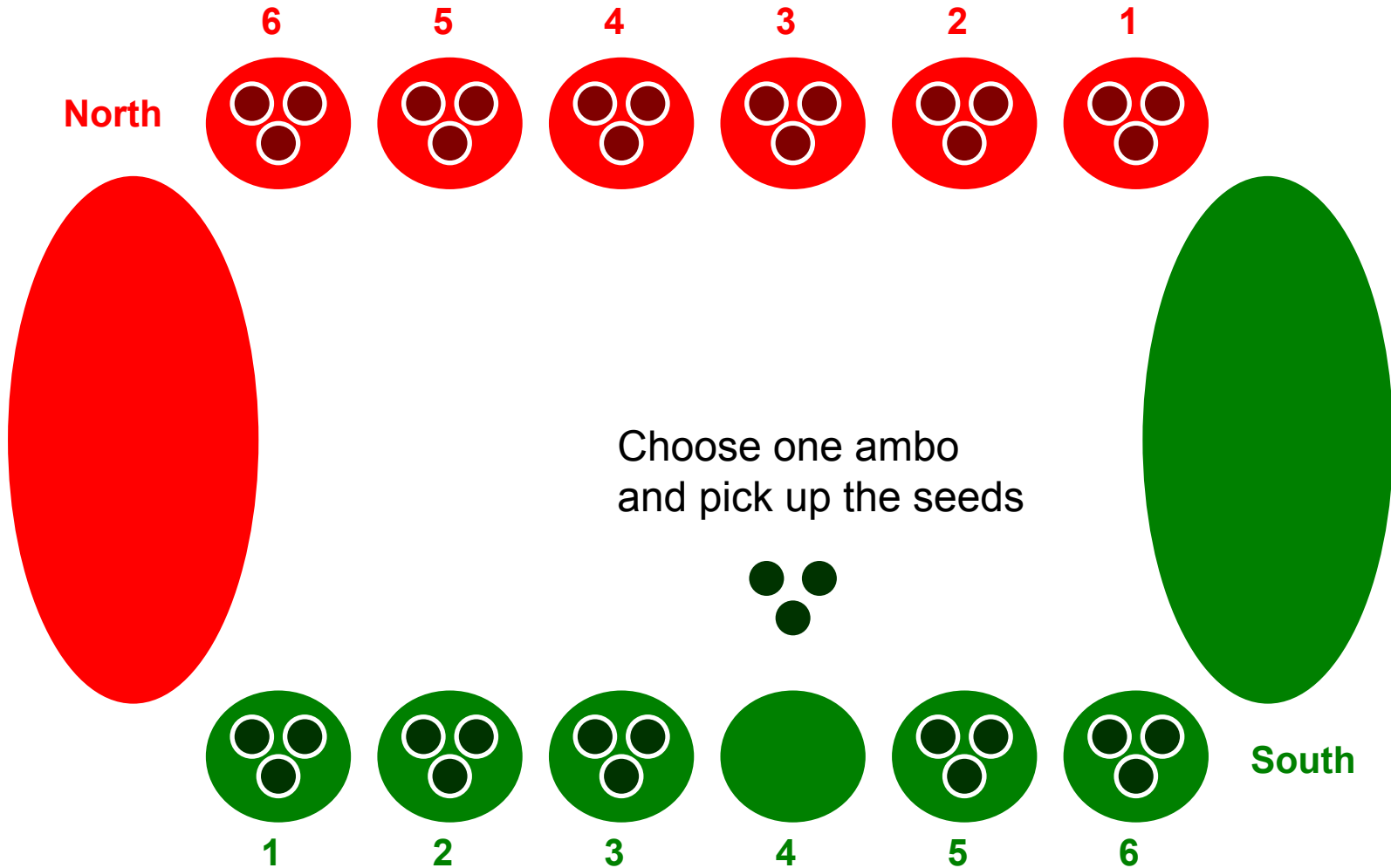


ASSIGNMENT 1 - KALAH

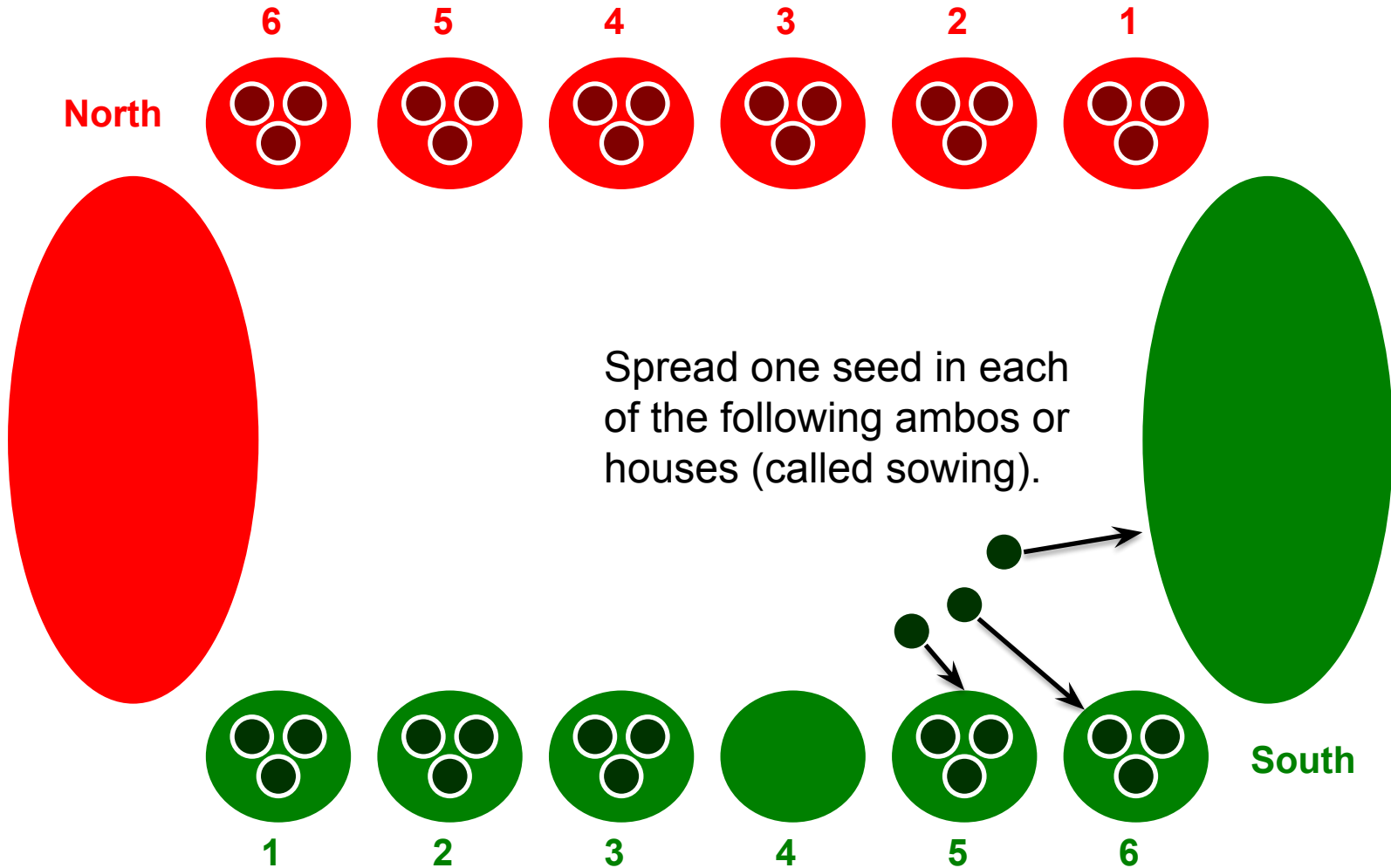
Kalah



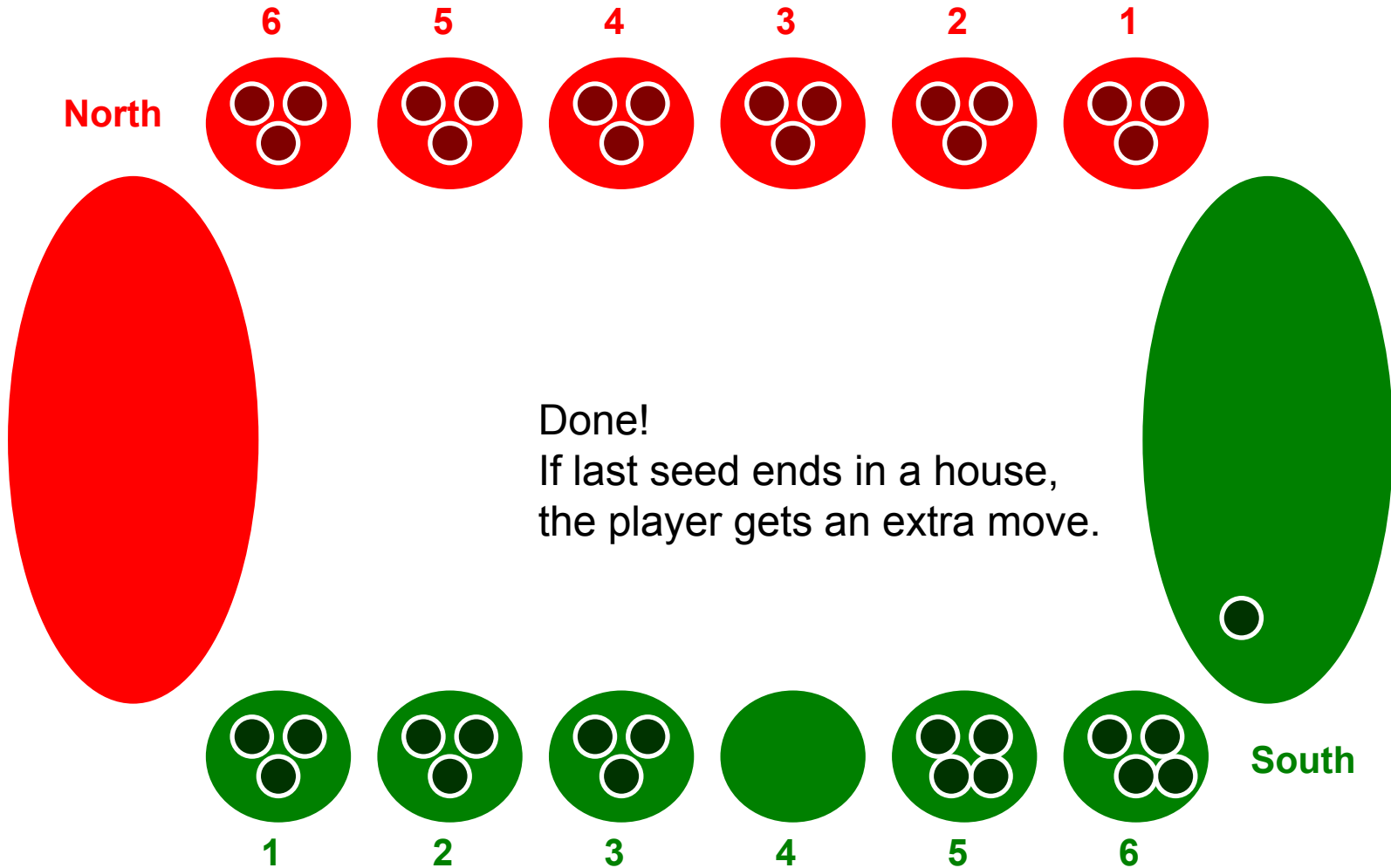
South's move



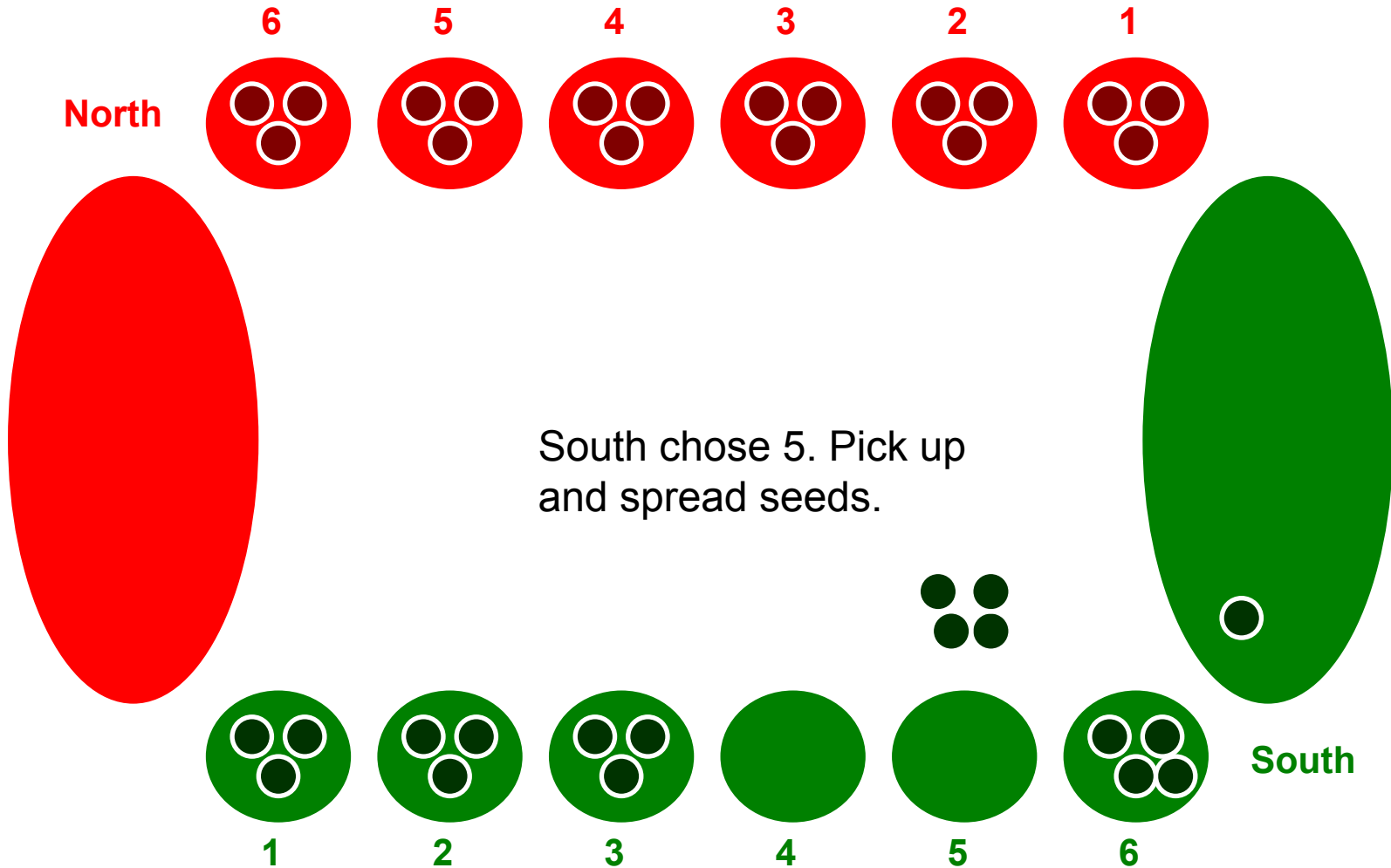
South's move



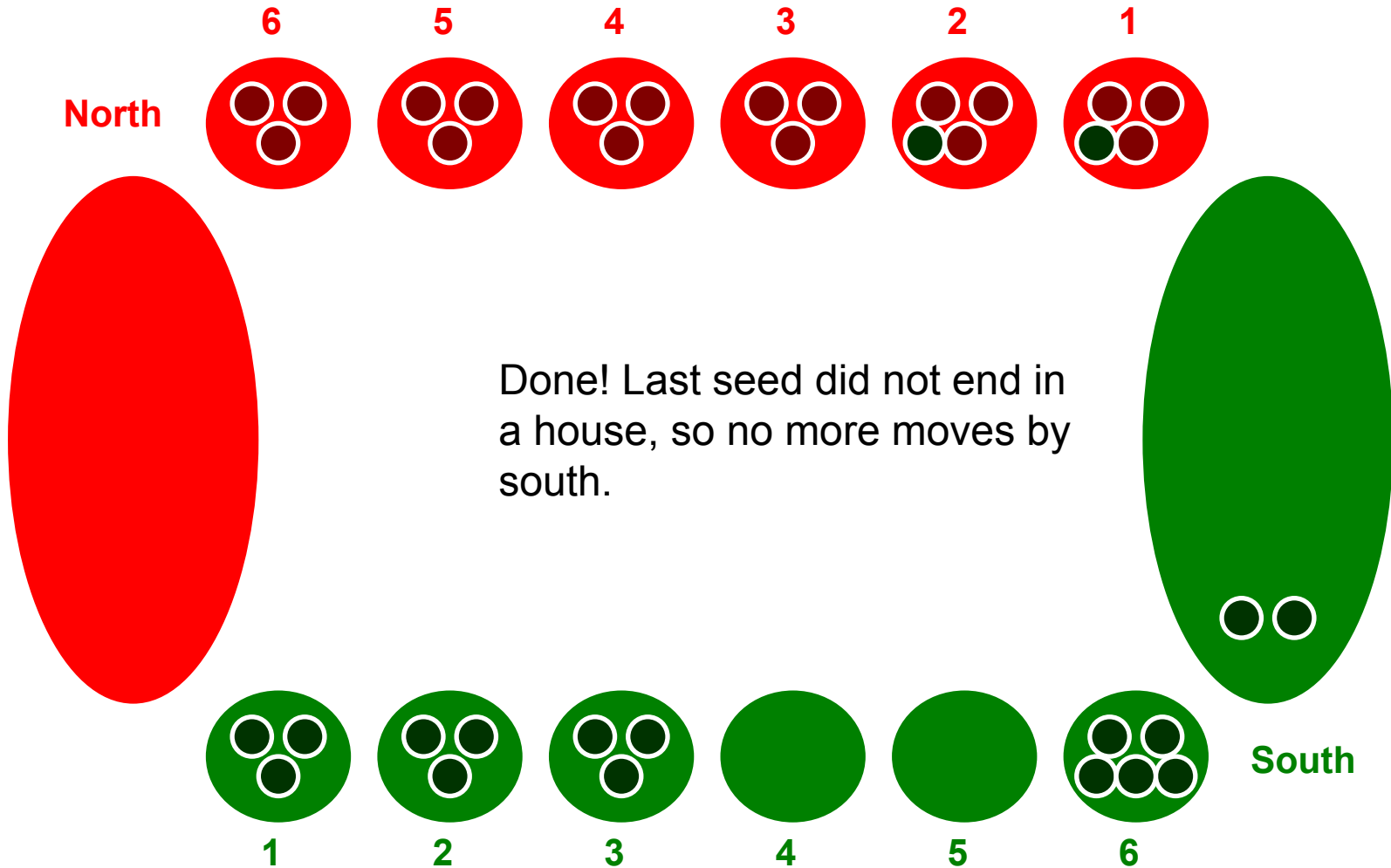
South's move



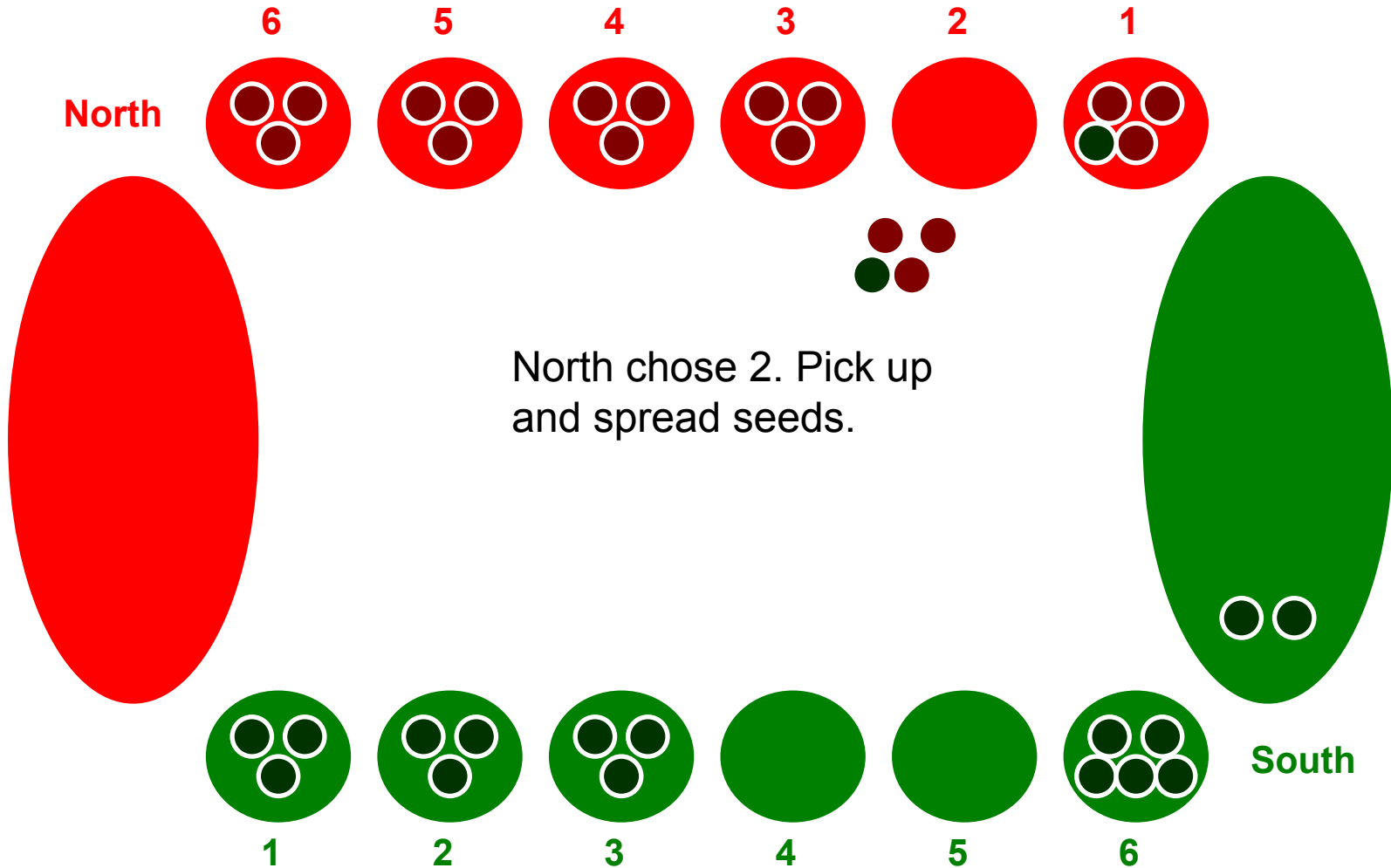
South's move



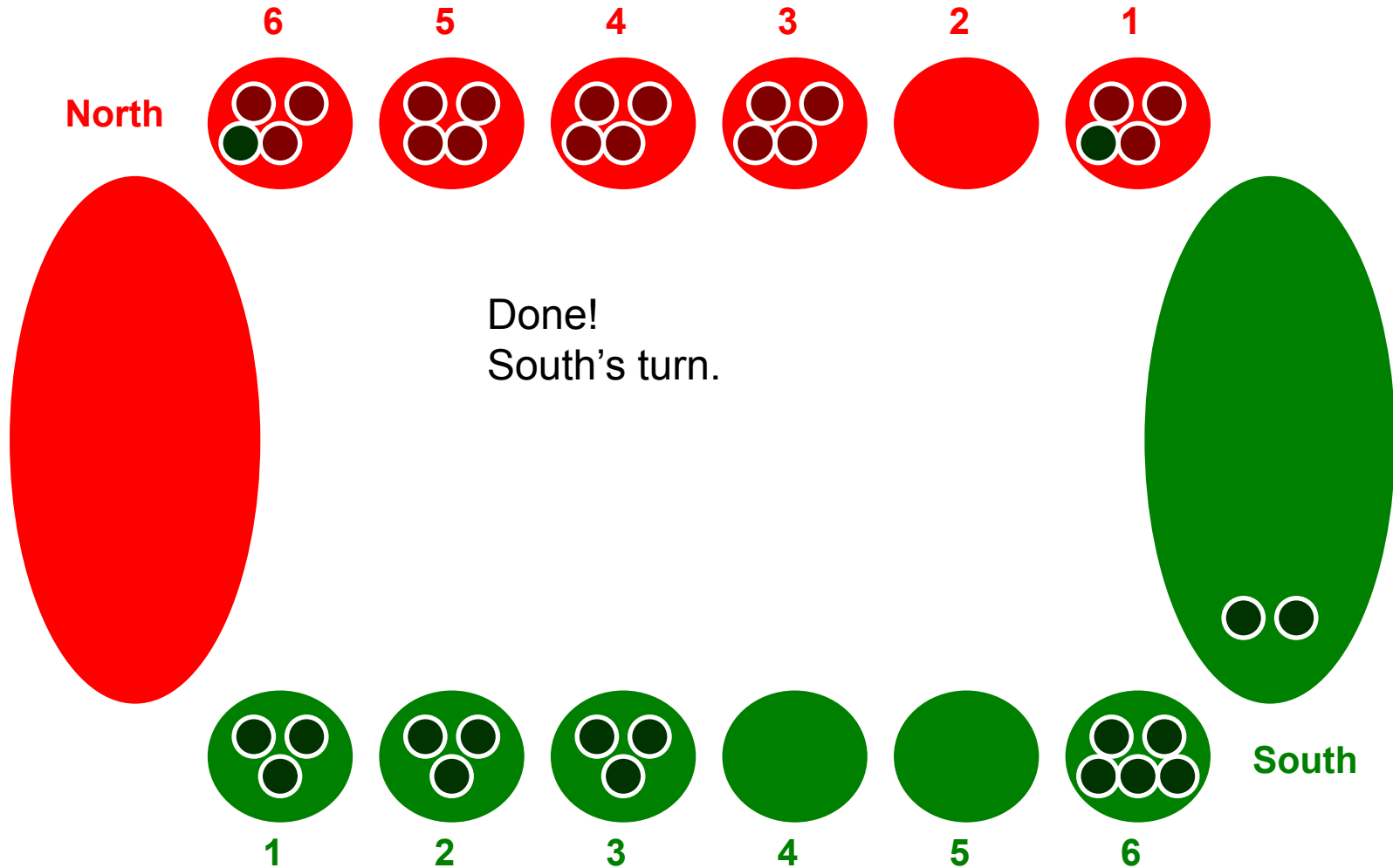
South's move



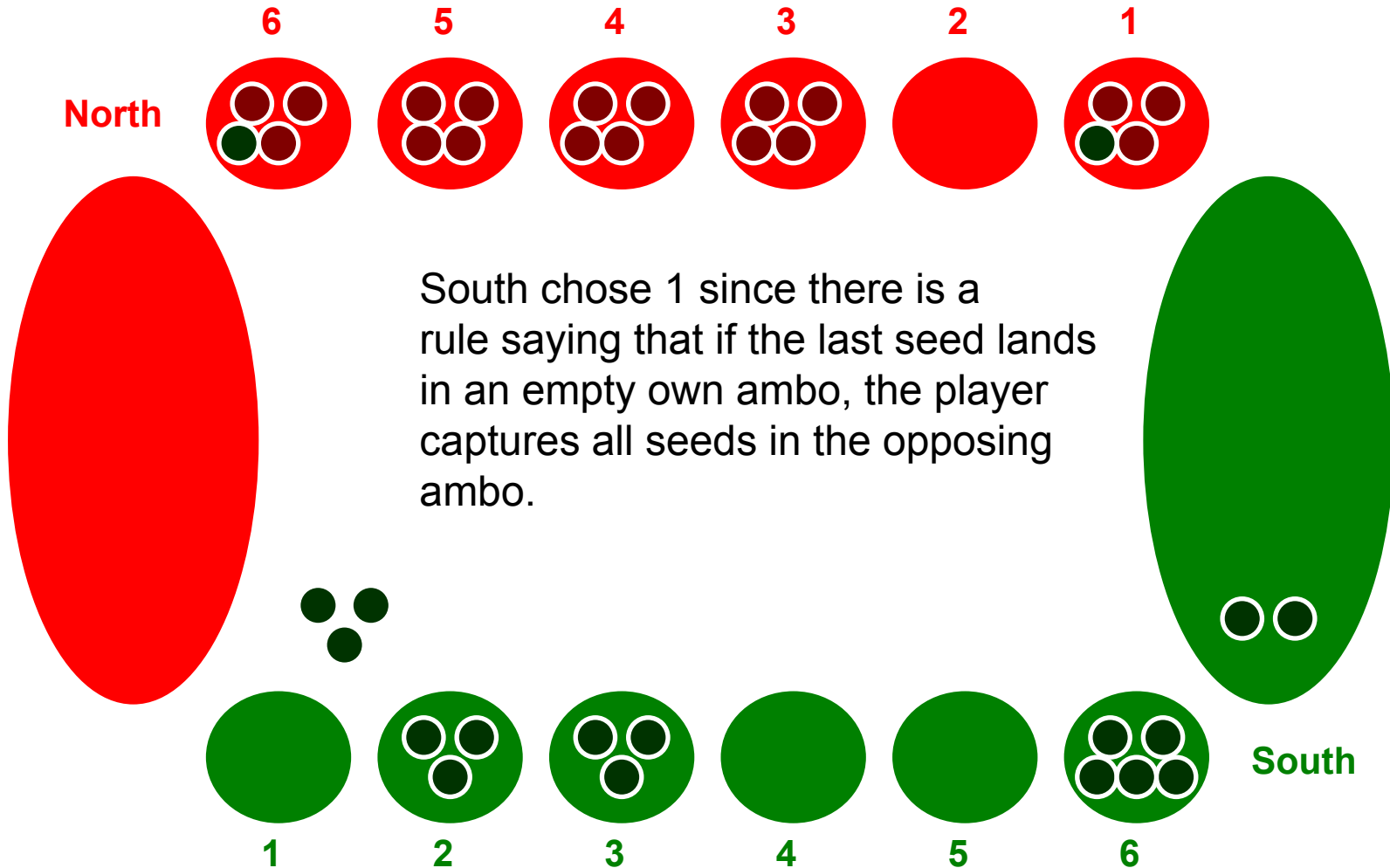
North's move



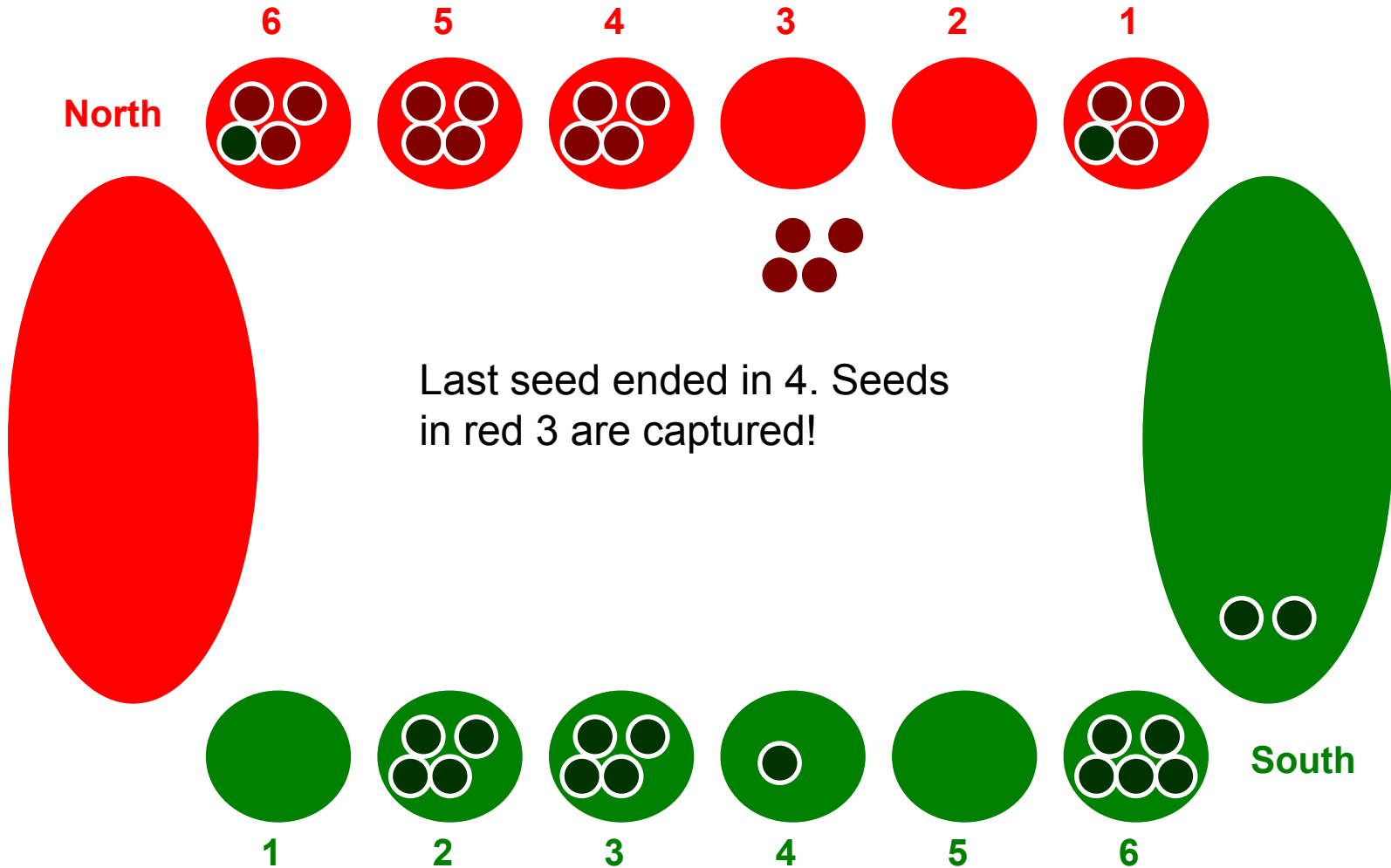
North's move



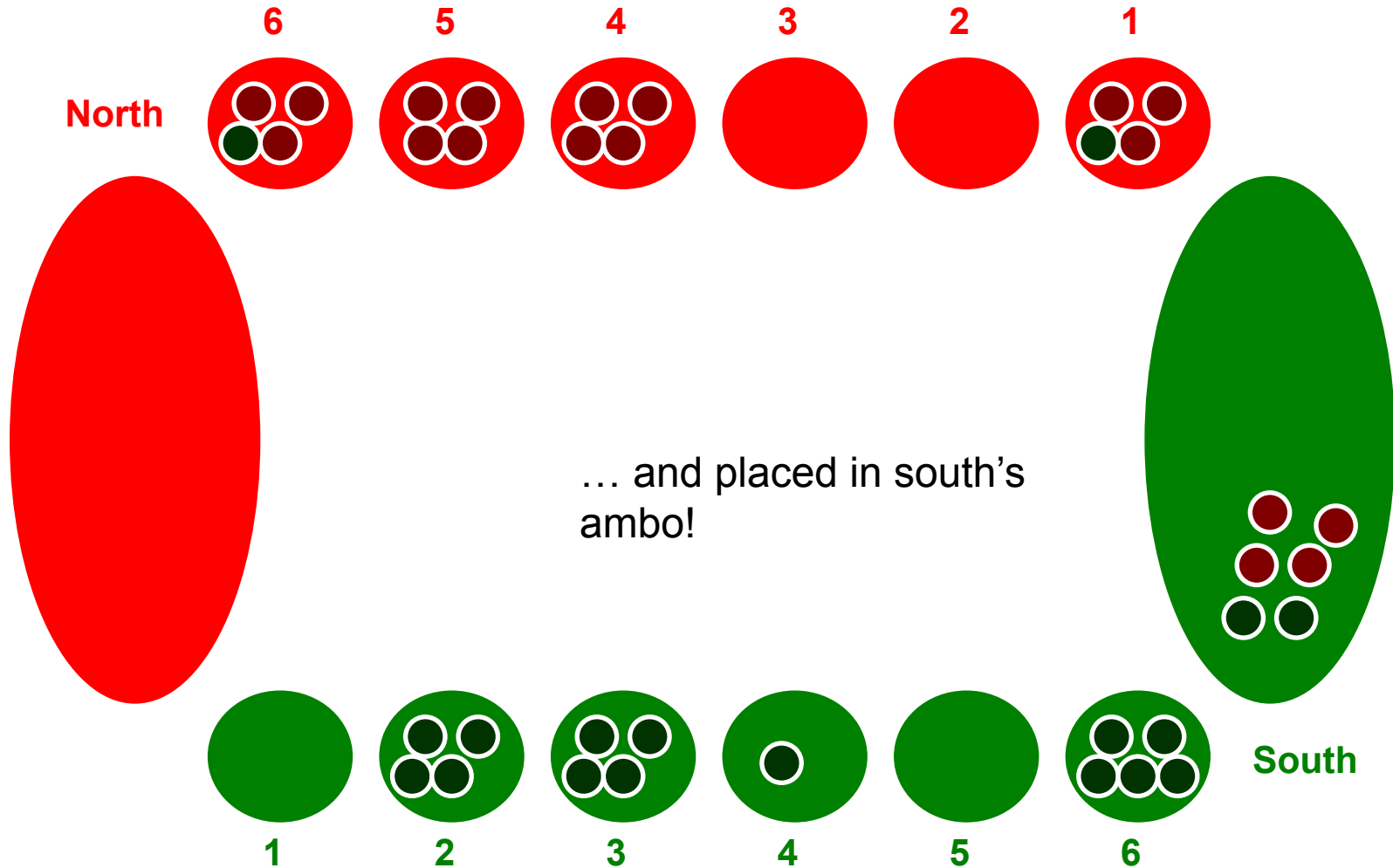
South's move



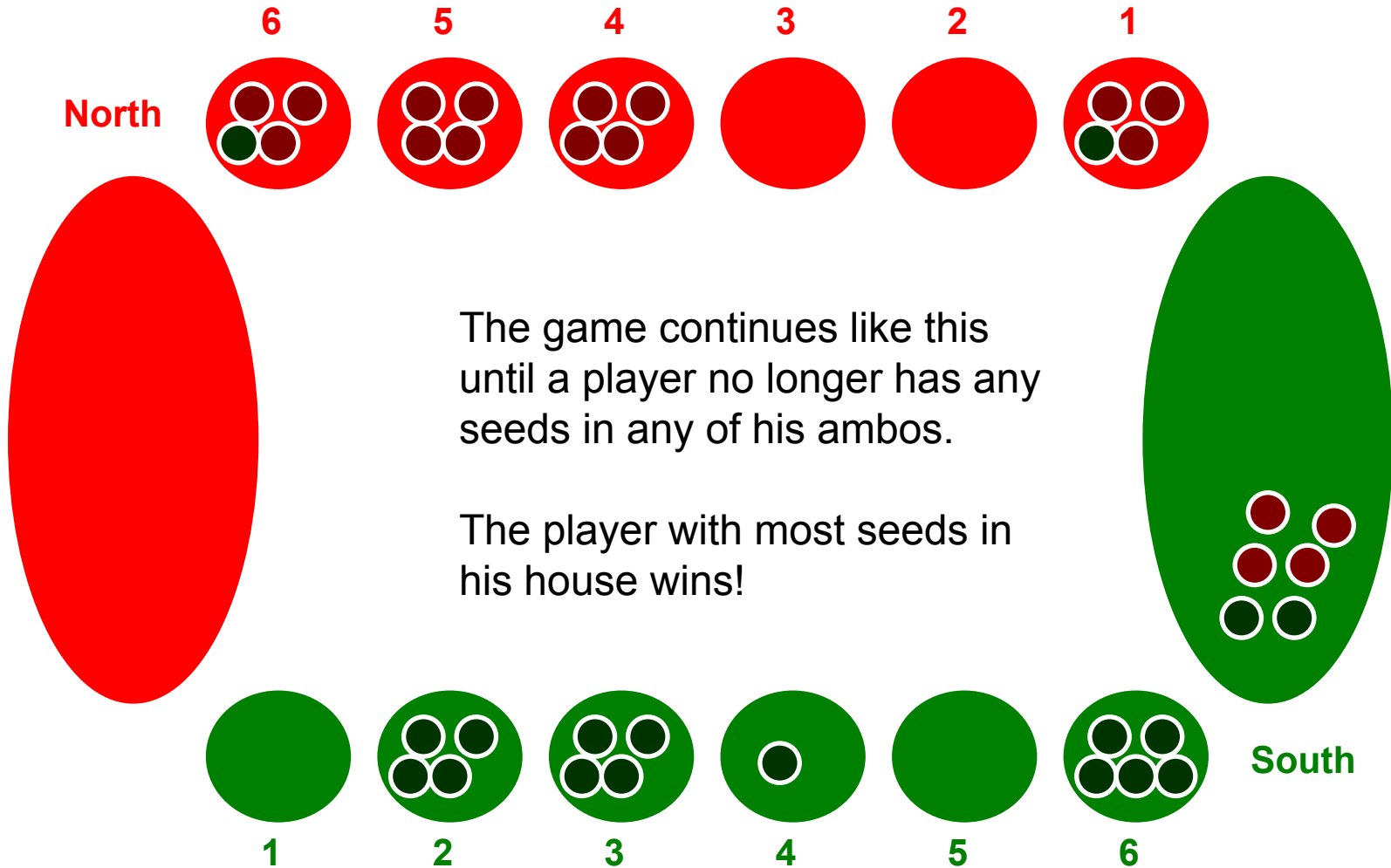
South's move



South's move



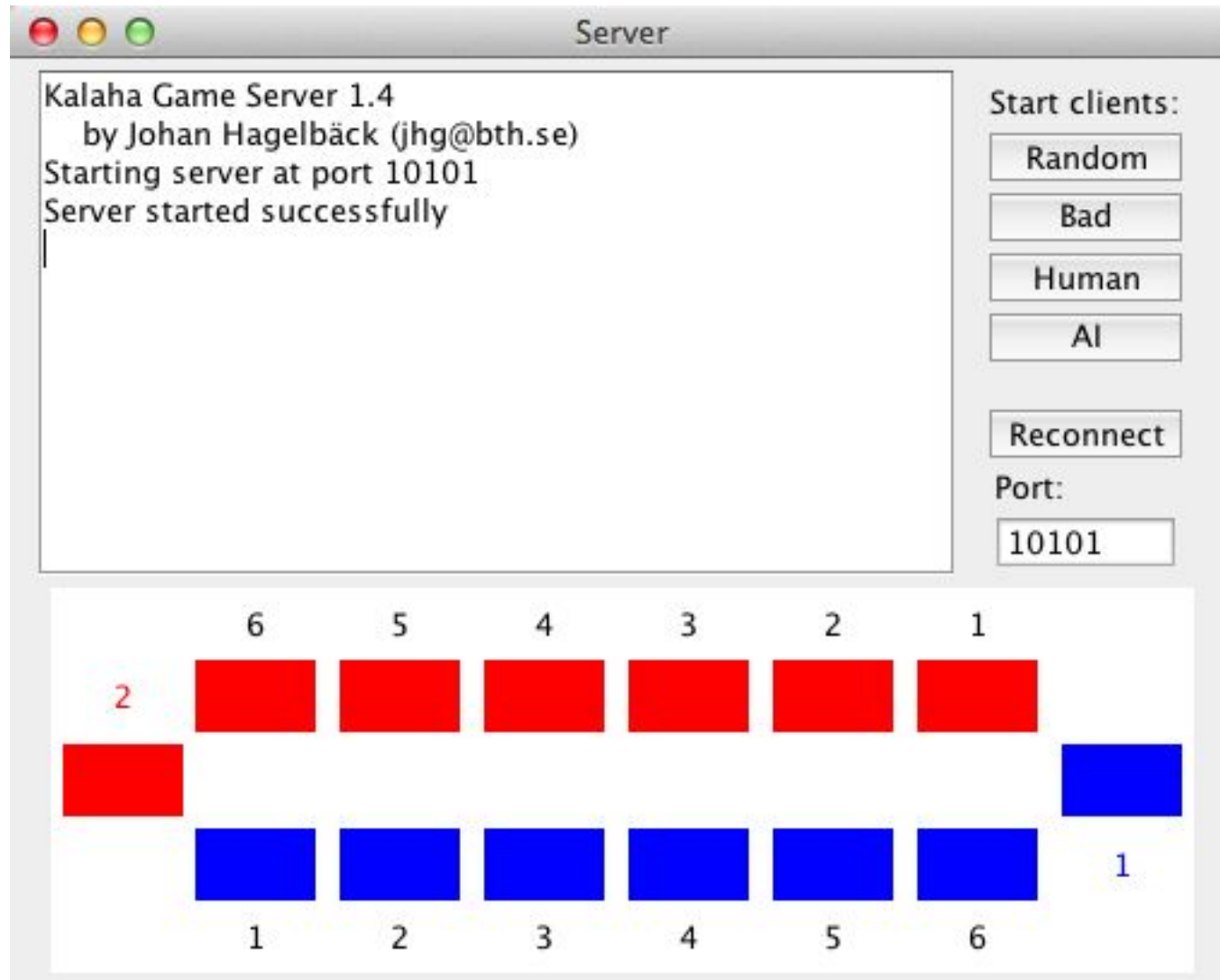
Game ends



Complete rules

1. At the beginning of the game, three pebbles are placed in each ambo. Typically, the winner of the previous game starts the next game.
2. Each player controls the six ambos and their pebbles on his side of the board. His score is the number of pebbles in the kalah to his right.
3. Players take turns sowing their pebbles. On a turn, the player removes all pebbles from one of the ambos under his control. Moving counter-clockwise, the player drops one pebble in each ambo in turn, including the player's own kalah but not his opponent's.
4. If the last sown pebble lands in the player's kalah, the player gets an additional move. There is no limit on the number of moves a player can make in his turn.
5. If the last sown kalah lands in an empty ambo owned by the player, and the opposite ambo contains pebbles, both the last pebble and the opposite pebbles are captured and placed into the player's kalah.
6. When one player no longer has any pebbles in any of his ambos, the game ends. The other player moves all remaining pebbles to his kalah, and the player with the most pebbles in his kalah wins.

The Application





Server

Kalaha Game Server 1.4
by Johan Hagelbäck (jhg@bth.se)
Starting server at port 10101
Server started successfully
Client 1 connected
Client 2 connected
Move 6 by Player 1

Start clients:

Random

Bad

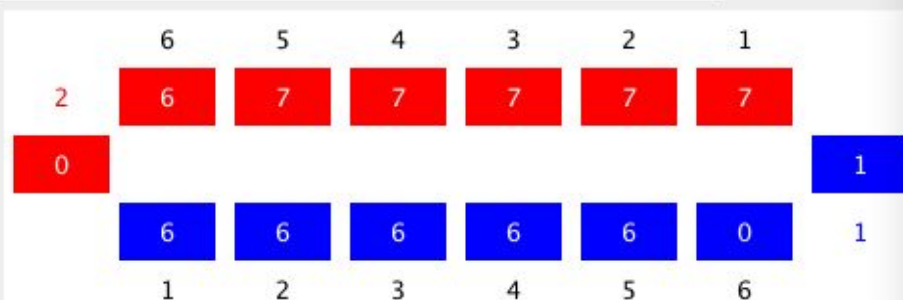
Human

AI

Reconnect

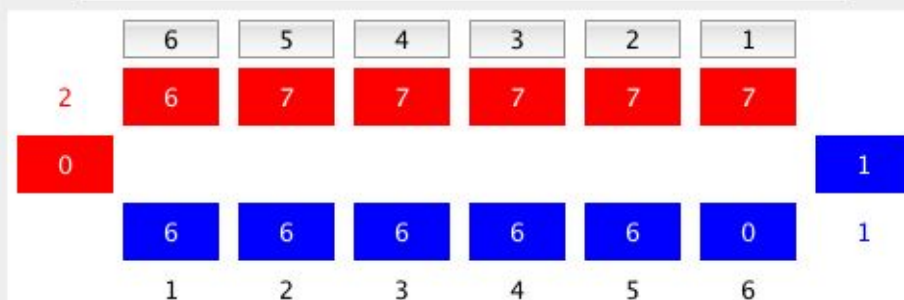
Port:

10101



Human Client

Connecting to localhost:10101
Done
I am player 2
Your move!



My AI Client

Connecting to localhost:10101
Done
I am player 1
Made move 6 in 0.0 secs



Server

Kalaha Game Server 1.4
by Johan Hagelbäck (jhg@bth.se)
Starting server at port 10101
Server started successfully
Client 1 connected
Client 2 connected
Move 6 by Player 1
Move 2 by Player 2
Move 5 by Player 1

Start clients:

Random

Bad

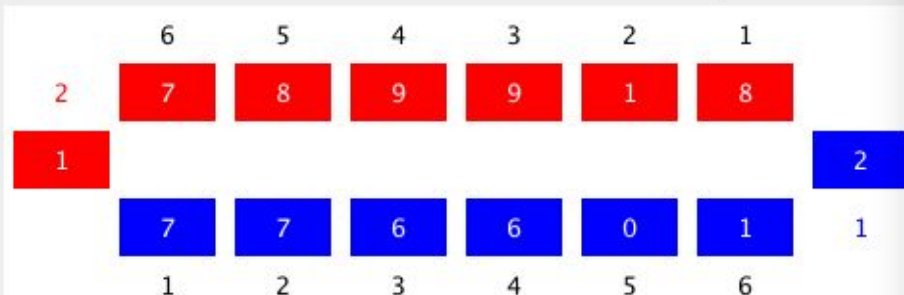
Human

AI

Reconnect

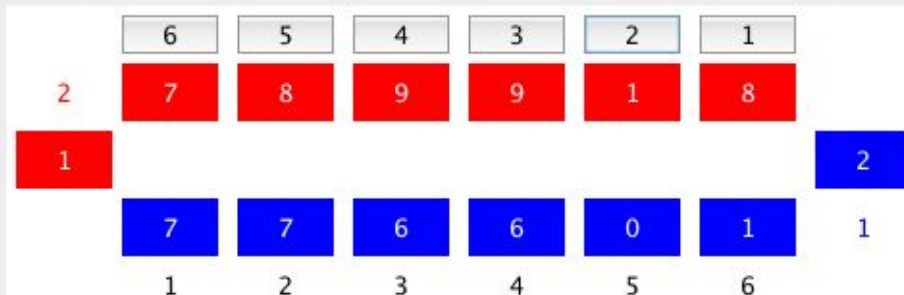
Port:

10101



Human Client

Connecting to localhost:10101
Done
I am player 2
Your move!
Your move!



My AI Client

Connecting to localhost:10101
Done
I am player 1
Made move 6 in 0.0 secs
Made move 5 in 0.0 secs

Application code

- The only class you need to make changes in is `AIClient.java`
- Changes are to be made in the method:
 - `int getMove(GameState currentBoard)`
- Here you shall make a Minimax search, and return the best move (1-6).
- The `GameState` class contains methods for making a move and update the board.
- Make sure to `clone()` the `GameState` each time you need a new board state.

Requirements

- Grade E:
 - Minimax with Depth-First search stopping at a pre-defined depth level (>4).
- Grade D:
 - Minimax with Iterative Deepening search stopping before a max time of 5 seconds.
- Grade C:
 - Minimax with Depth-First search and Alpha-Beta pruning stopping at a pre-defined depth level (>4).
- Grade B:
 - Minimax with Iterative Deepening search and Alpha-Beta pruning stopping before a max time of 5 seconds.
- Grade A:
 - As Grade B, but with an opening book that has stored >100 starting moves and if the AI won or not. This shall be used instead of Minimax for deciding the first move.

Grade A: Opening Handbook

- Opening Handbook is basically a predefined move-set at the beginning of the game.
 - Like in chess, where skilled players start by making specific moves according to selected strategy.
- These are for example created by generating different branches (possible moves) of the game to an arbitrary depth, and then checking which branch yields the highest win ratio.

Tips

- Minmax
 - It is not necessary to wait for the game to finish in order to score it

What to submit

- The complete source code for the Kalaha program containing your AI code.
- A note about which grade you are aiming for.
- Submit to Canvas no later than **the deadline on canvas.**