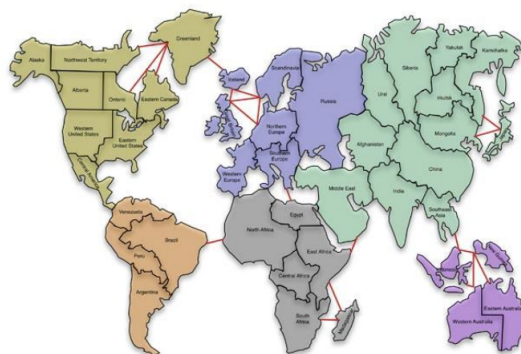# Risk Board Game Strategy Assessments

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1   Background

"The individualist without strategy who takes opponents lightly will inevitably become a captive."[1]

1.1   History

Risk was originally produced by parker brothers, now a division of hasbro. It was invented by the French film director Albert Lamorisse in 1957 and it was originally called "The Conquest of the World."[2]

The creator of the game anticipated that it should take 90 minutes to complete, but many players end up with the board occupying their tables for days at a time.[3] With varying strategies and fragile alliances, Risk can be a drawn-out, yet intellectually fulfilling game.

1.2   Rules

Risk is a turn-based for two to six players. In the standard Risk Game, Earth has six continents and 42 regions.

[4]

At the start of the game, players choose countries into which they place one army. This is the claiming phase. Only one army may be placed in any region during the claiming phase. At the beginning of each player's turn (after the claiming phase) they will receive bonus troops for continents that they own completely.

After claiming, players will then place armies into regions that they own. This happens, again, one at a time until everyone has placed all their starting armies.

Then players may choose to attack other regions. They may only attack bordering regions. Attackers can use up to three dice, if they have at least three troops. Otherwise, they may only use one die for each troop. Defenders roll up to two dice. The attacker and the defender then sort their dice and compare them. (Attacker's highest vs defender's highest AND attacker's second highest vs defender's second highest) For each die that is greater in this comparison, that player kills one opposing army in the battle. Defenders win ties.

2 Intricacies

2.1 In theory

The start of the game can set you up for success or failure. The player must not underestimate the importance of their choices while claiming territories.

Strategies are numerous. Watching your opponents' moves and attempting to understand what their intent is can be the key to victory. The AI that we implemented in our assessment of strategies was not advanced enough to emulate this kind of behavior. Given more time, this may have been possible through exhaustive searching. However, human intuition is more powerful than machinery when it comes to identifying deceit.

2.2 In practice

Representing the board internally was not too difficult. It ends up being an undirected graph.

◼	Asia (7)
◼	Europe (5)
◼	North America (5)
◼	Africa (3)
◼	South America (2)
◼	Australia (2)

[4]
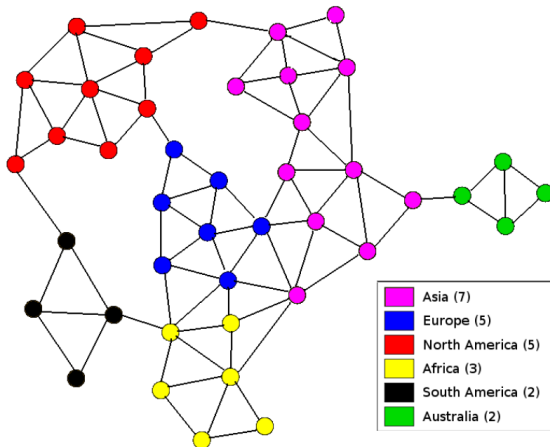
3 Type of Strategies

3.1 Smallest Continent first

Popular strategy where the player looks to claim either Australia or South America as it is easier to defend due to the limited number of paths into and from the continent. Easy to build up forces as there are only four territories to maintain and the troop bonus is advantageous. Places troops on edges of its continents or near continents desired for conquering

3.2 Continents First

Player strategically seeks to claim each continent and doesn't branch out unless a continent can be claimed Defensive playstyle

3.3 Territory First

Player aims to prevent others from claiming continents by securing territories Aggressive playstyle

3.4 Prey on the weak

Always targets the weakest bordering country When placing, always prefers the least-claimed continent Prey on the strong Always attack the owner of a continent, if possible, so that no extra points are gained. Choose the strongest territory owned by the strongest opponent to attack, so long as two dice can still be used.

4 Probability of outcomes

Your understanding of probabilities can greatly help your chances of not dying early on.

Best probability is having the attacker attack a defender with only one dice.

This would be a great place to add Joseph's calculations.

5 Strategy Assessment

5.1 Generation

This is how we generated our strategies

5.2 Simulation

This is how we ran our simulations

5.3 Statistics

These are our results

References

[1] The Art of War by Sun Tzu

[2] http://en.wikipedia.org/wiki/Risk_(game)

[3] http://io9.com/5897532/the-origins-and-evolution-of-the-strategy-board-game-risk

[4] http://web.mit.edu/sp.268/www/risk.pdf