RISK - A Strategic Game



# BACKGROUND

RISK was invented by French film director Albert Lamorisse and originally released in 1957 as ***La Conquête du Monde*** (“The Conquest of the World”) in France. It was later bought by Parker Brothers and released in 1959 with some modifications to the rules as Risk: The Continental Game, then as Risk: The Game of Global Domination.

# OVERVIEW

RISK is a turn-based game for two to six players. The world map is divided into **42 territories**, which are grouped into **6 continents**. Six continents are Asia, North America, Europe, Africa, Australia, South America. The objective of the game is to occupy every territory on the board and in doing so, eliminate the other players. Players control armies with which they attempt to capture territories from other players, with results determined by rolling dice.

# DEVELOPMENT

Library: Gosu from <https://github.com/jlnr/gosu/>, version: 0.8.5

Ubuntu: 14.04

Ruby: 1.9.x

Duration: 3 months November, December (2014) and January (2015).

Thanks to Mike Moore - blowmage (<https://github.com/blowmage/writing_games_2014>) has inspired me with his presentation on Los Angeles Ruby Conference 2014: <https://www.youtube.com/watch?v=jJhbpY70miE>

# BASIC RULES

The game start with 2 players: Red and Blue. Each player has 40 armies which are distributed all over the world map.

Each turn consists of 3 phases: **Draft**, **Attack** and **Fortify**.

## 1. Draft Phase

At the **Draft** phase, an amount of armies will be given to the player. This amount varies based on 2 factors: number of territories owned and continent bonuses.

* Calculate the number of armies drafted for number of territories owned as following: divide total number of owned territories by 3 and round down to the nearest integer. If the result is less than 3, round up to three armies.
* Bonus armies for occupying a whole continent:

|  |  |
| --- | --- |
| **Continent** | **Bonus Armies** |
| Asia | 7 |
| North America | 5 |
| Europe | 5 |
| Africa | 3 |
| Australia | 2 |
| South America | 2 |

The player places these armies on any of his territories. Then end the **Draft** phase.

## 2. Attack Phase

At the **Attack** phase, the player is only allowed to attack territories that are adjacent to or connected by a sea-lane to a territory already held.

The battle outcome is decided by rolling dices. The attacking player attacks with an army, can roll up to 3 dice. At least one army is required for occupying the territory, therefore those territories with only 1 army is not allowed to engage in **Attack** phase.

Before the attack, the defender will resist the attack with either 1 or 2 armies by rolling 1 or 2 dice. Each player’s highest dice is compared and second highest dice too. In each comparison, the highest number wins. The defender wins when the result of comparison is tie. The loser removes 1 army from the game for each comparison. Any extra dice are disregarded and do not affect the results. See the illustration below:

Attacker Defender

[6] vs [6] -> Defender wins

[4] vs [3] -> Attacker wins

[1]

Each player loses 1 army.

If an attack eliminates the final defending army within a territory, the attacker then must occupy the newly conquered territory with at least the number of attacking armies used in the last round of attack. There is no limit to the total number of additional armies that may be sent in to occupy, providing at least one army remains behind in the original attacking territory. Players may attack any number of territories any number of times before yielding the turn to the next player. Attacking is optional; a player may decline to attack at all during the turn.

When the opponent has 0 territory at the **Attack** phase, the winner is the Attacker.

## 3. Fortify Phase

When finished attacking and before passing the turn over to the next player, a player has the option to manoeuvre any number of armies from a single territory occupied by the player into an adjacent territory occupied by the same player. This is sometimes referred to as a "free move". Under an alternate rule, the manoeuvring armies may travel through as many territories to their final destination as desired, providing that all involved pass-through territories are connected and occupied by that same player. As always, at least one army must be left in the originating territory. However, the player can only distribute between two territories. Play then proceeds to the next player.



## PROBABILITY

Defenders always win ties when dice are rolled. This gives the defending player the advantage in "one-on-one" fights, but the attacker's ability to use more dice offsets this advantage. The table below states the probabilities of all possible outcomes of one attacker dice roll and one defender dice roll.  Green indicates an advantage to the attacker and  Red  an advantage to the defender.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome probabilities of one die roll in *Risk* (various numbers of dice)** | | | | |
| **Defender** | | **Attacker** | | |
| **one die** | **two dice** | **three dice** |
| **one die** | **Defender loses one** | 41.67% | 57.87% | 65.97% |
| **Attacker loses one** | 58.33% | 42.13% | 34.03% |
| **two dice** | **Defender loses one** | 25.46% | N/A | N/A |
| **Attacker loses one** | 74.54% | N/A | N/A |
| **Defender loses two** | N/A | 22.76% | 37.17% |
| **Attacker loses two** | N/A | 44.83% | 29.26% |
| **Each loses one** | N/A | 32.41% | 33.58% |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Probabilities of attacker winning a whole battle in *Risk*** | | | | | | | | | | | |
|  | | **Number of attacking armies** | | | | | | | | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **Number of defending armies** | **1** | 42% | 75% | 92% | 97% | 99% | >99% | >99% | >99% | >99% | >99% |
| **2** | 11% | 36% | 66% | 79% | 89% | 93% | 97% | 98% | 99% | 99% |
| **3** | 3% | 21% | 47% | 64% | 77% | 86% | 91% | 95% | 97% | 98% |
| **4** | 1% | 9% | 31% | 48% | 64% | 74% | 83% | 89% | 93% | 95% |
| **5** | <1% | 5% | 21% | 36% | 51% | 64% | 74% | 82% | 87% | 92% |
| **6** | <1% | 2% | 13% | 25% | 40% | 52% | 64% | 73% | 81% | 86% |
| **7** | <1% | 1% | 8% | 18% | 30% | 42% | 54% | 64% | 73% | 80% |
| **8** | <1% | <1% | 5% | 12% | 22% | 33% | 45% | 55% | 65% | 72% |
| **9** | <1% | <1% | 3% | 9% | 16% | 26% | 36% | 46% | 56% | 65% |
| **10** | <1% | <1% | 2% | 6% | 12% | 19% | 29% | 38% | 48% | 57% |

The number of attacking armies does not include the minimum one army that must be left behind.

# WORLD MAP & REFERENCE FROM OTHER GAMES



