Dungeons & Dragons

Death Saving Rolls Simulation Study

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ST 541
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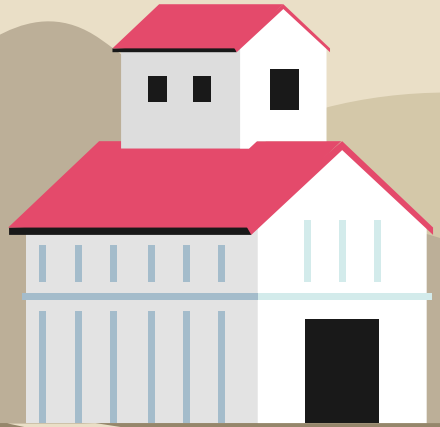
Background



What is D&D?

Dungeons and Dragons (D&D) is a popular roleplaying game where players utilize dice to help make decisions in battles and completing skill checks. This is where the randomness comes into play. Decisions are usually made with a 20-sided die.

What are Death Saves?

When characters reaches 0 health points (HP), they are near death. They then must make rolls with a 20-sided die to determine if your character will die.

Original Death Save Rules

Dice Roll	Result
1	2 x Fail
2 - 9	Fail
10 - 19	Success
20	*Stabilized

*Consider “Stabilized” as 3 x Success

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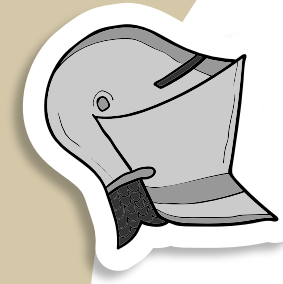
Research Question



Research Questions

Advantage?

Roll 2x and choose the higher of the rolls.

Disadvantage

Roll 2x and choose the lesser of the rolls.

Rerolls?

What if you reroll more than once?

Saves Required?

What if you change the threshold for survival?

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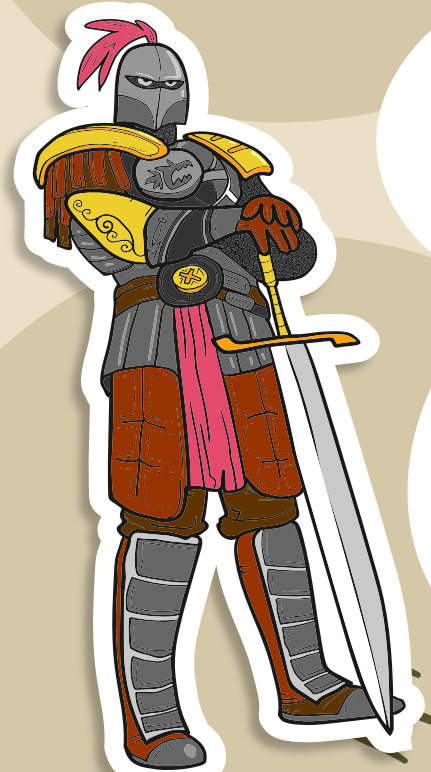
Methods

Important Functions



mod_roll()

modify the roll based on the chosen rule

roll()

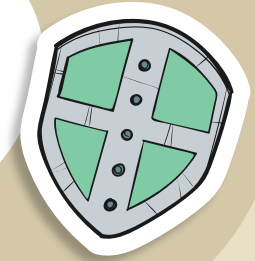
simulate the roll based on several inputs

result()

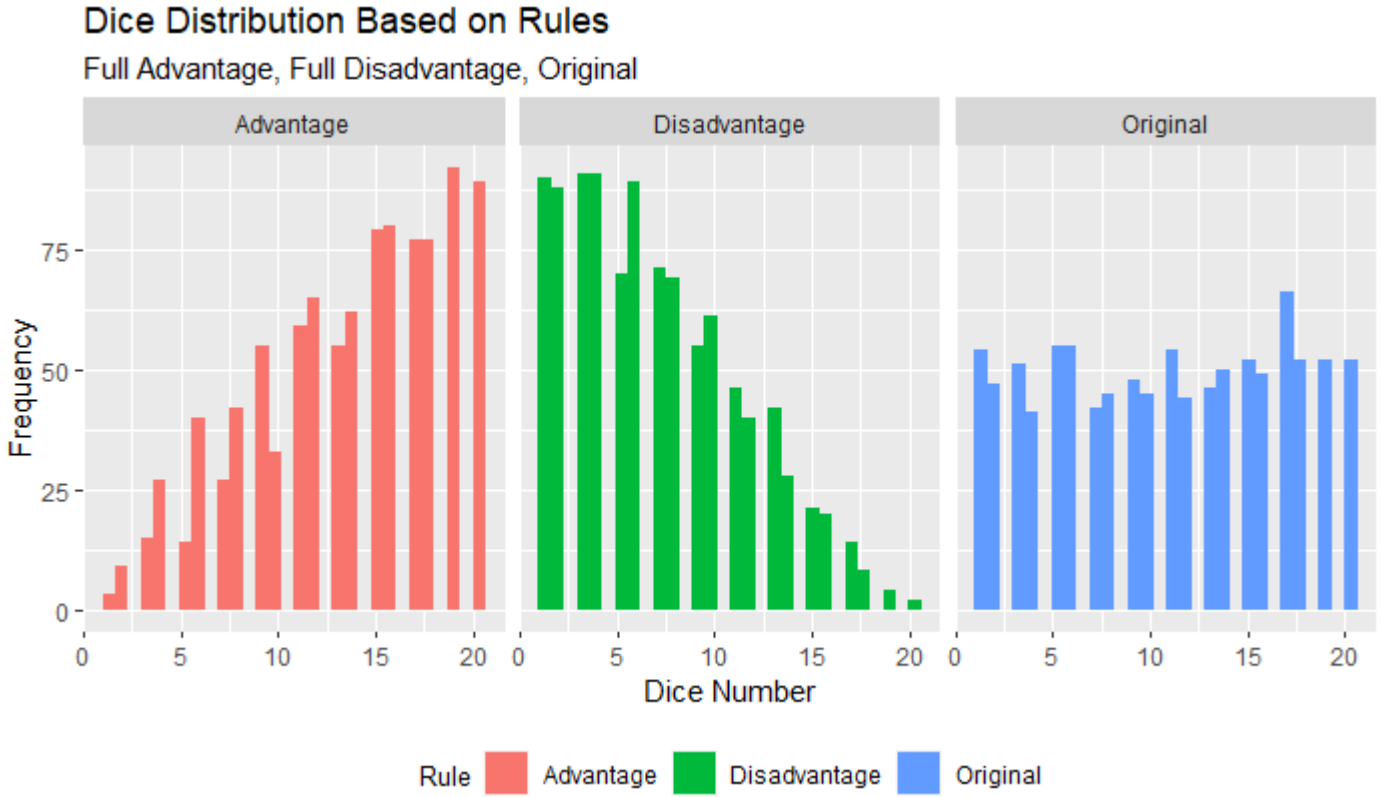
assess whether the current roll is a success or fail

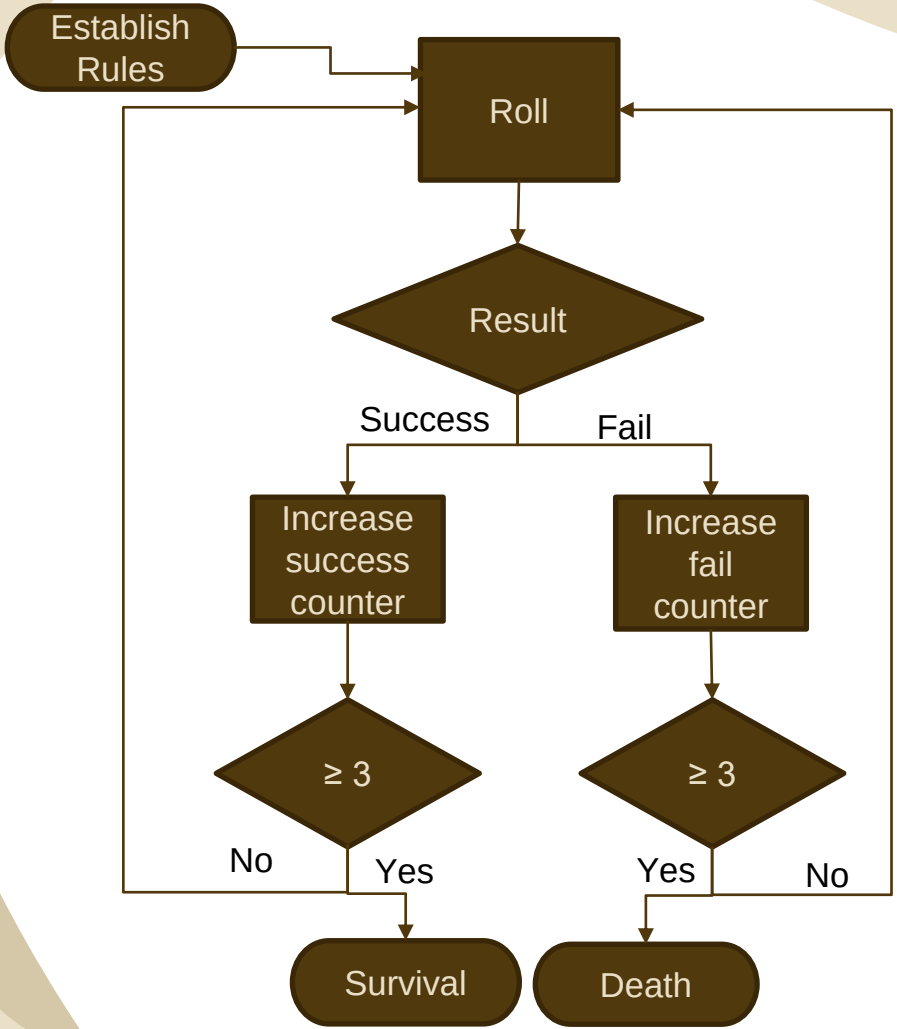
survival_prob()

simulate B number of rolls and return the mean survival probability and standard error



Dice Distributions Based on Rules





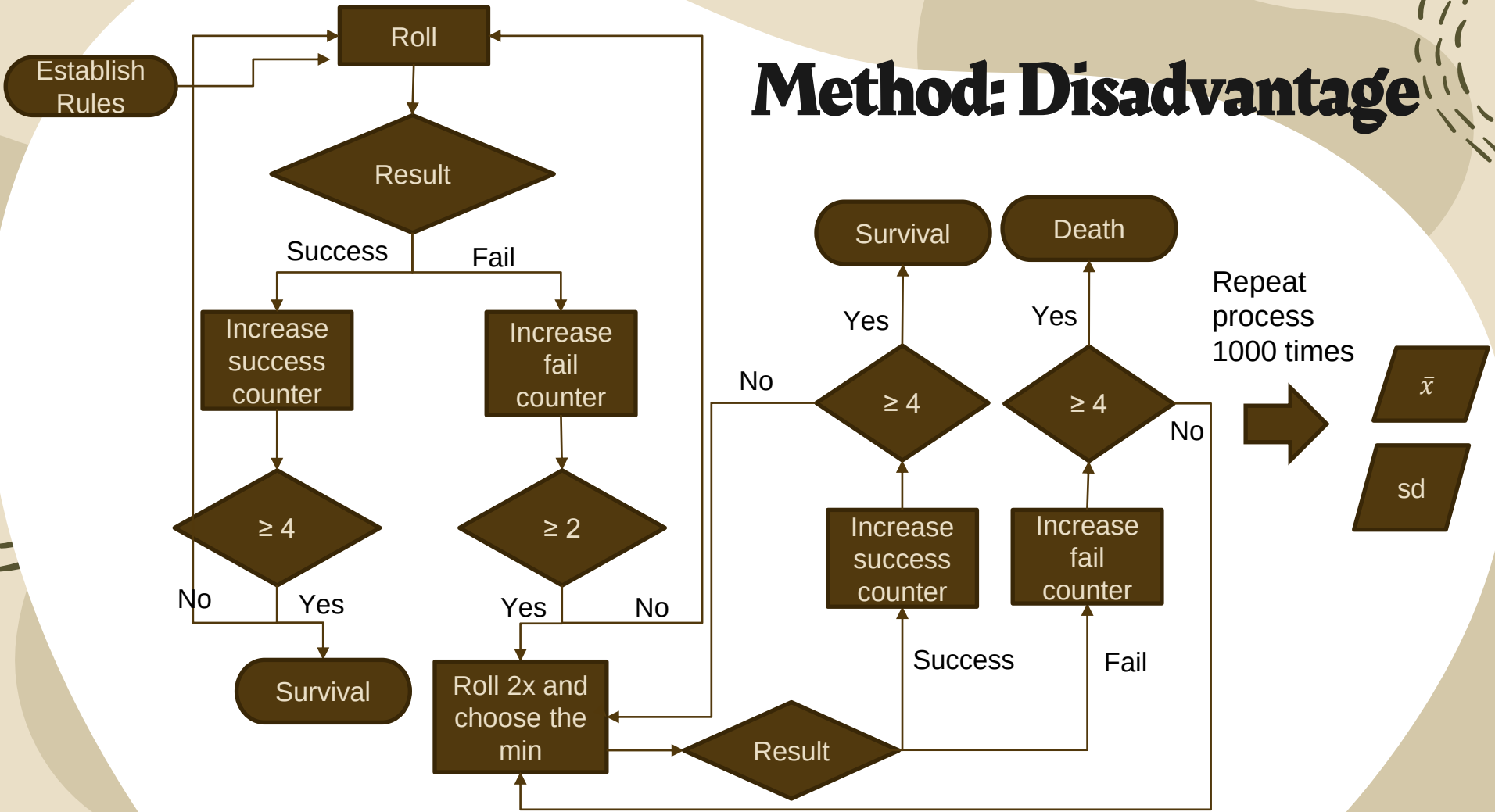
Method: No Mods

Repeat process 1000 times

Sample Mean

Standard deviation

Method: Disadvantage



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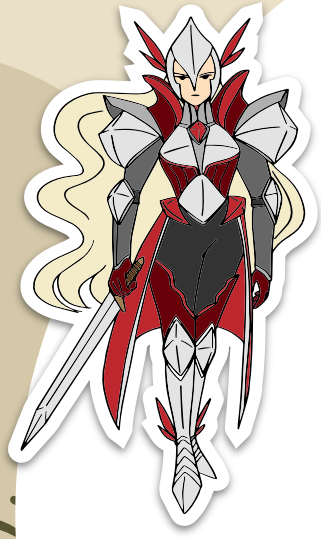
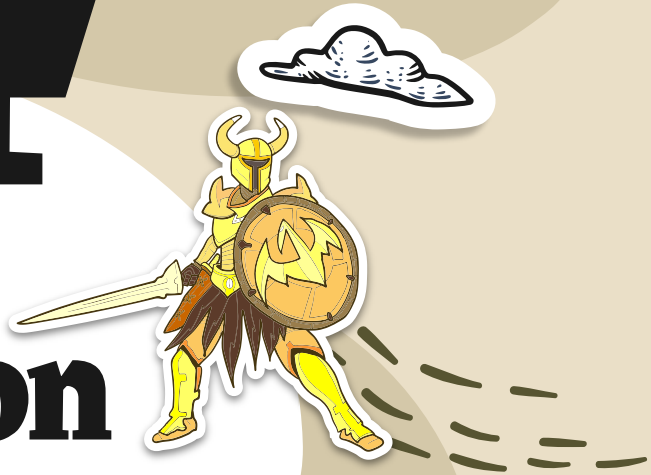
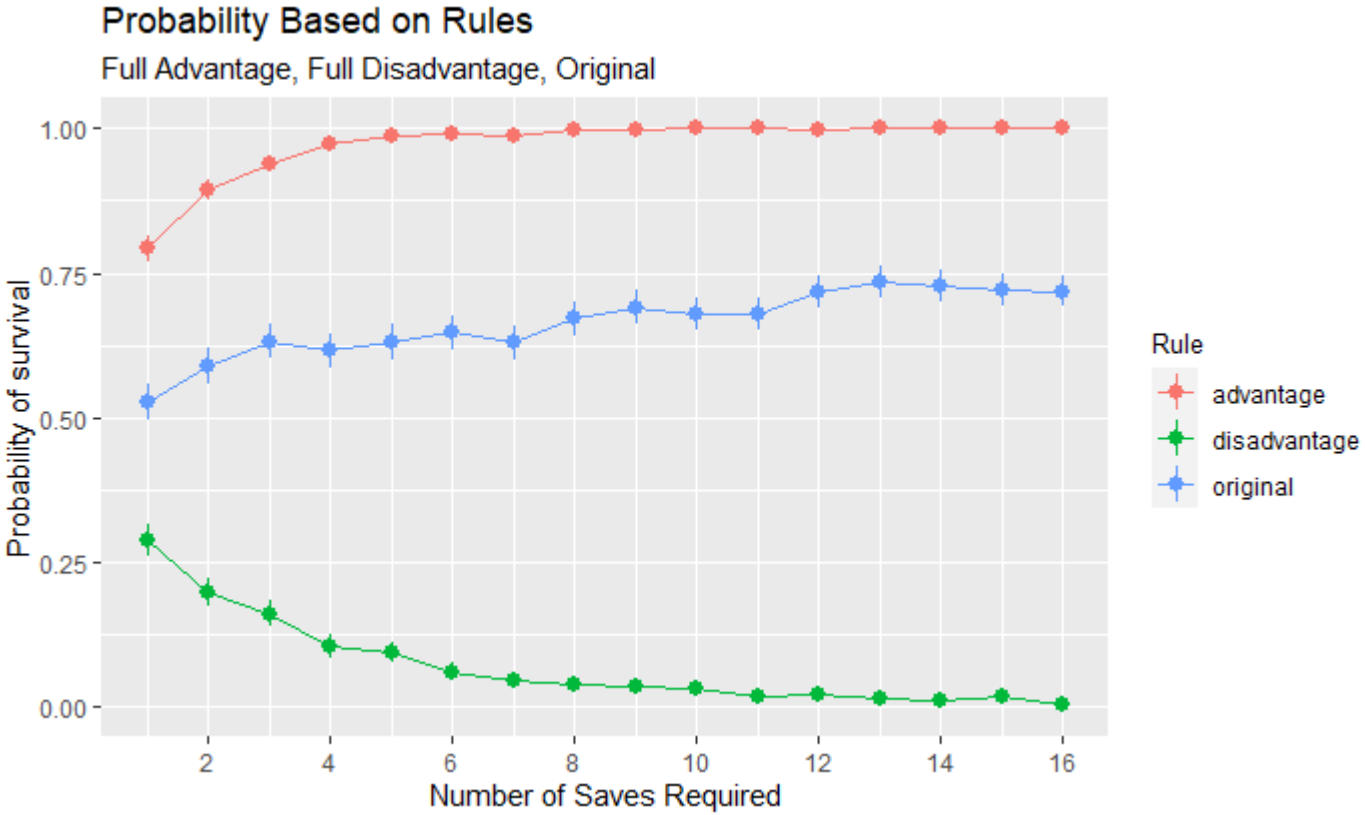
Simulation Results





Comparing the Rules



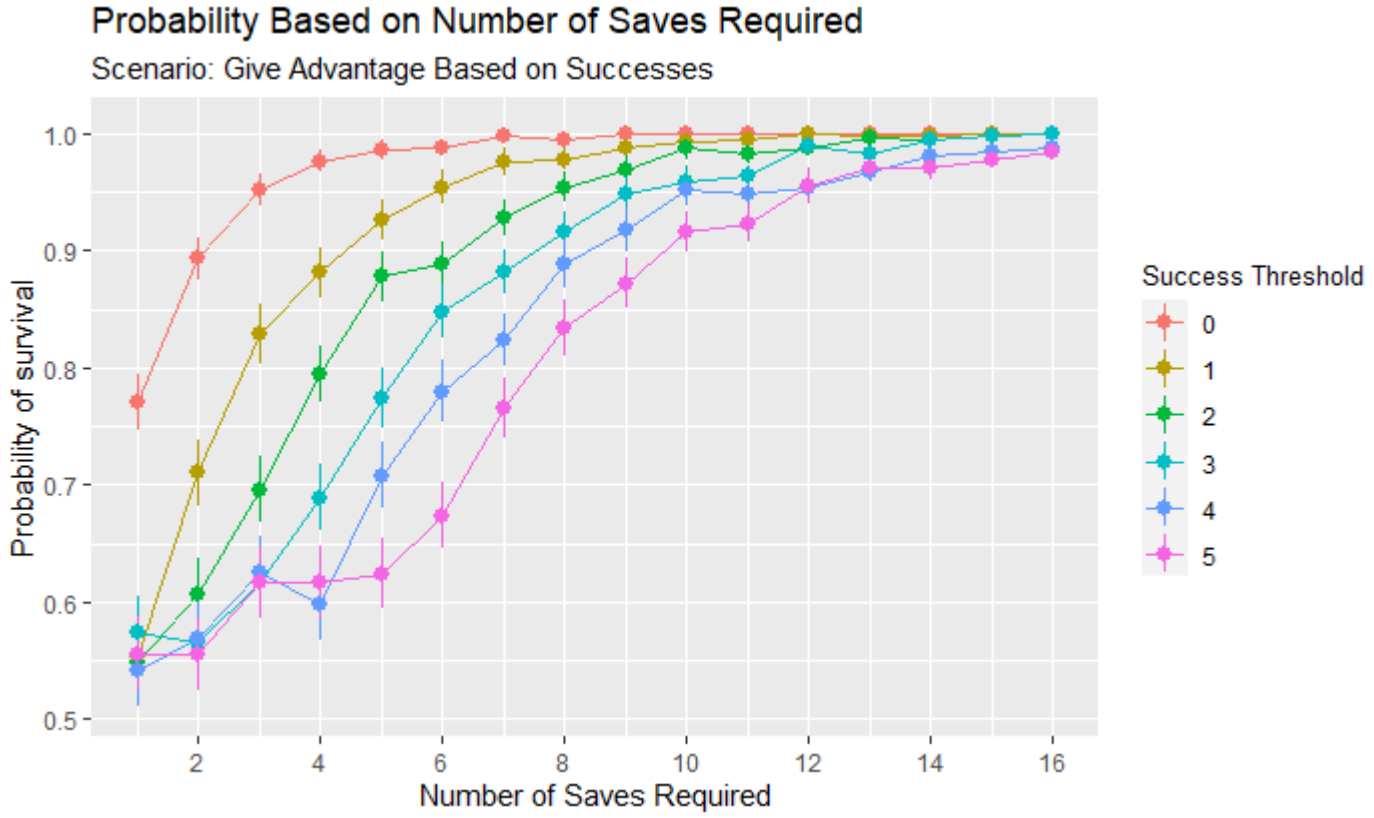
Verdict?

- Original rules are very fair and the increase in survival is gradual

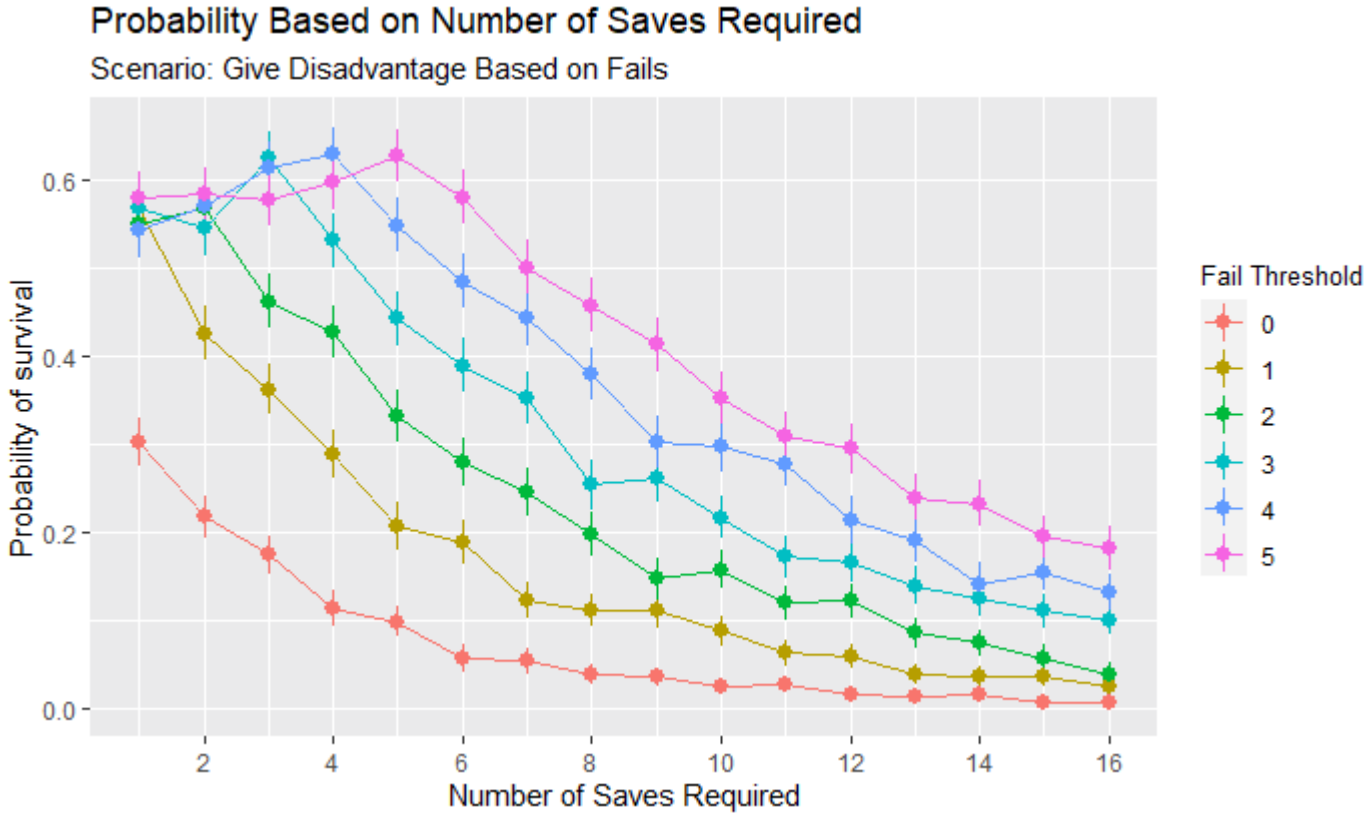
What if the rules are conditional on success or failure?

**Note that the first roll will always be a roll without advantage or disadvantage.

Being Advantage Focused – Success



Being Disadvantage Focused – Fail

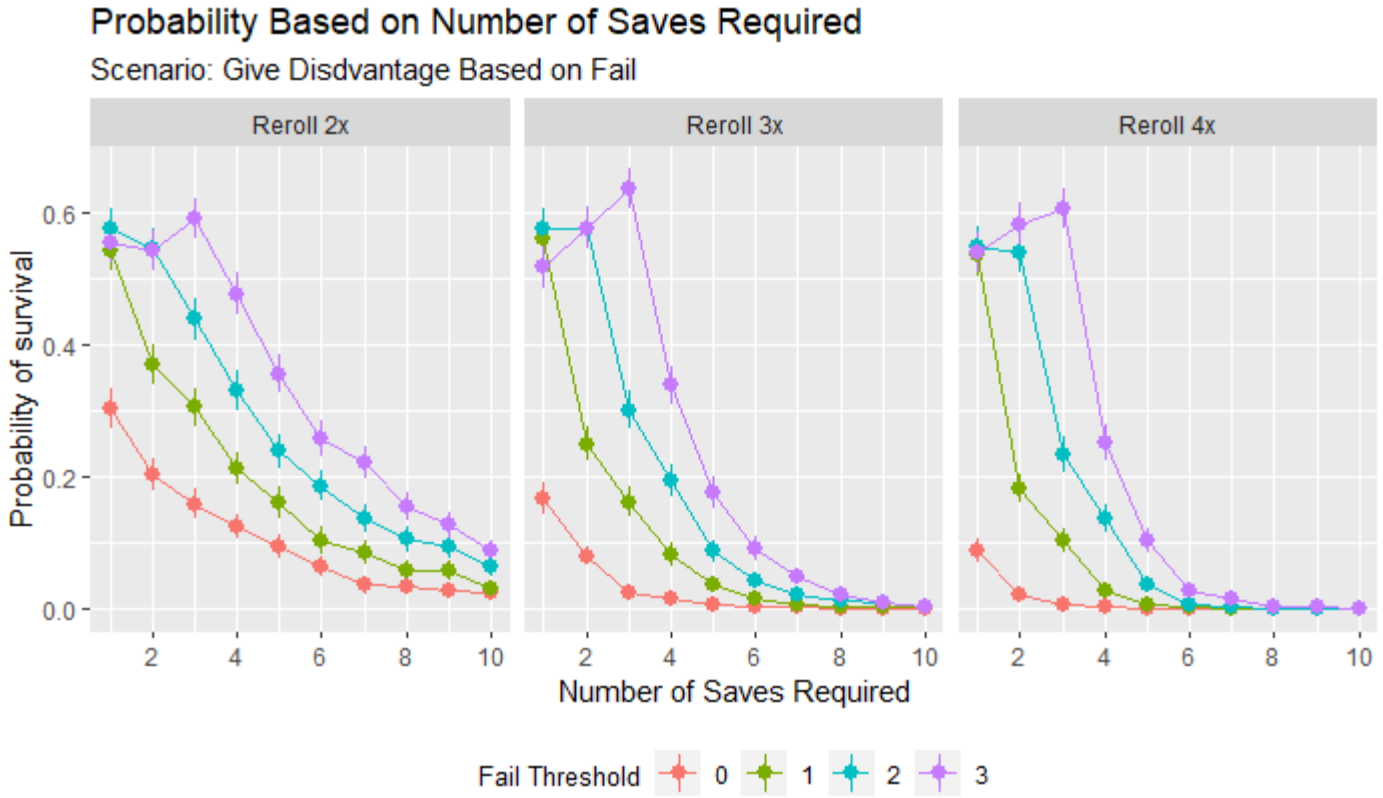


Verdict?

- The general trends are very similar to what we saw earlier
- As the success threshold increase, survival probability increases more gradually
- As the fail threshold increase, survival probability decrease more gradually
- SE bars are more noticeable as threshold values increase, but width decrease as the number of saves required increase

Being Advantage Focused –Rerolls –Success

Being Disadvantage Focused – Rerolls - Fail



Conclusion

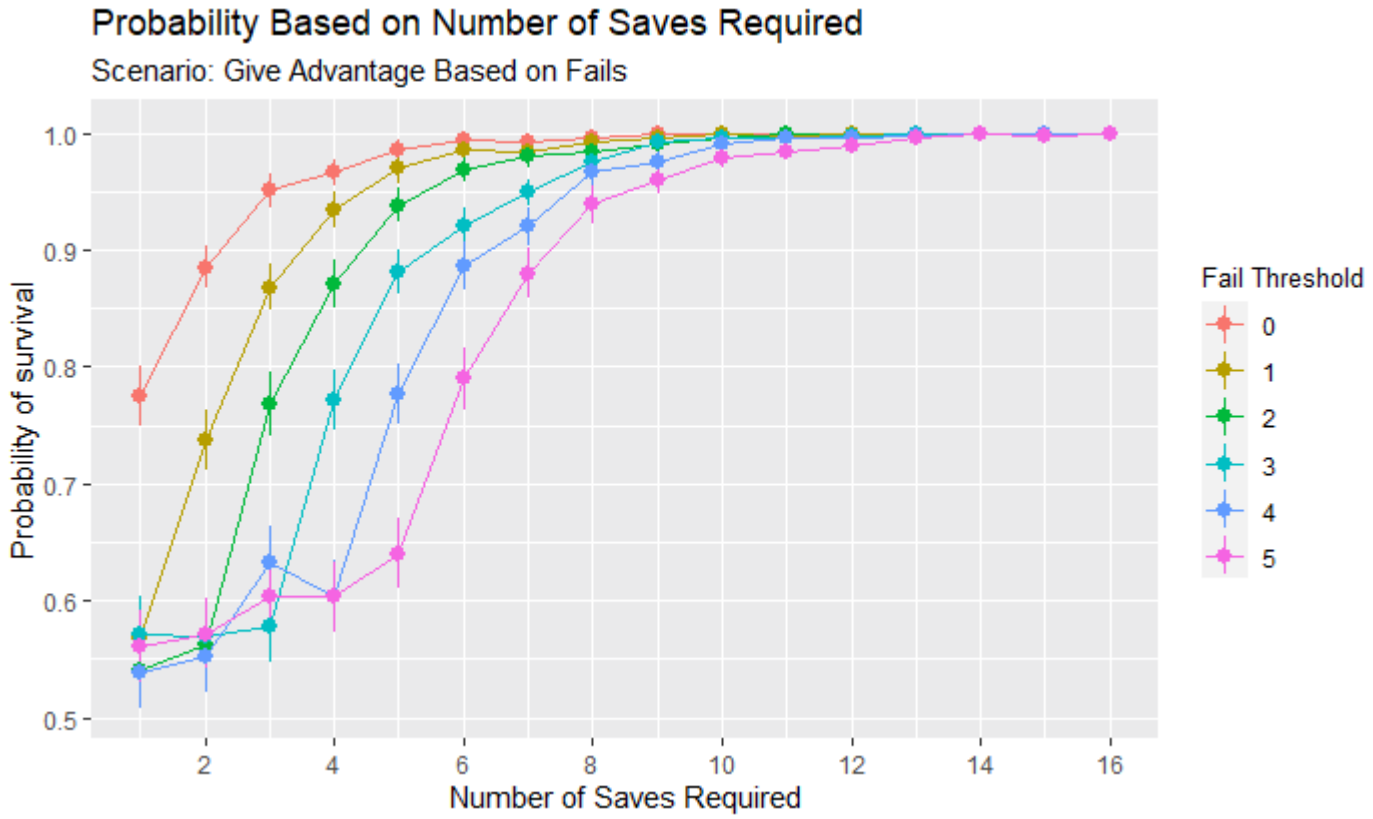
- To help players, it’s better to provide advantage.
- It seems fair to set the success threshold at 2.
- Allowing more than 2 rolls results in too much survivability, making death saves trivial.

Thanks!

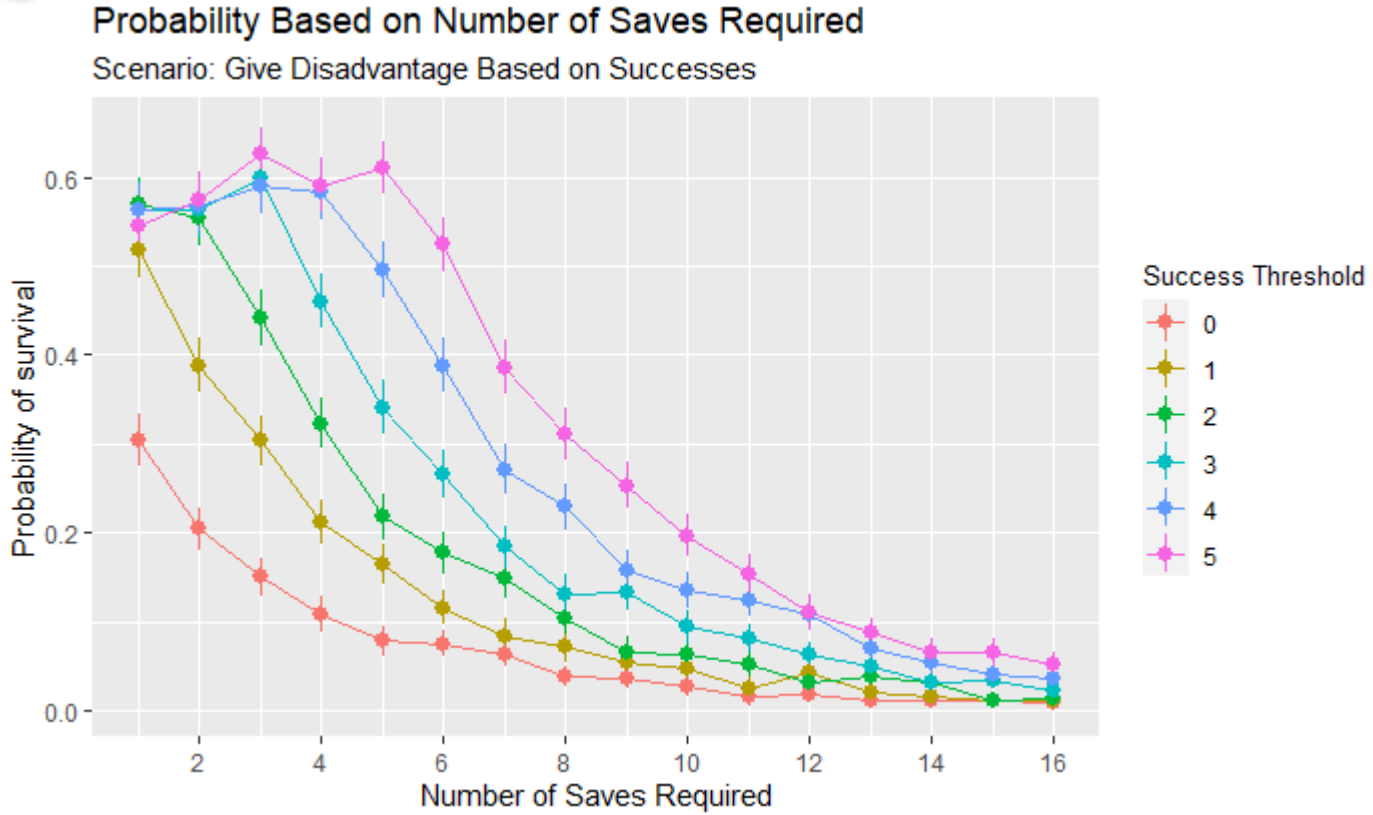
Any questions?

Extra Slides

Being Advantage Focused – Fail



Being Disadvantage Focused – Success



Being Advantage Focused –Rerolls -Fail

Being Disadvantage Focused –Rerolls - Success