



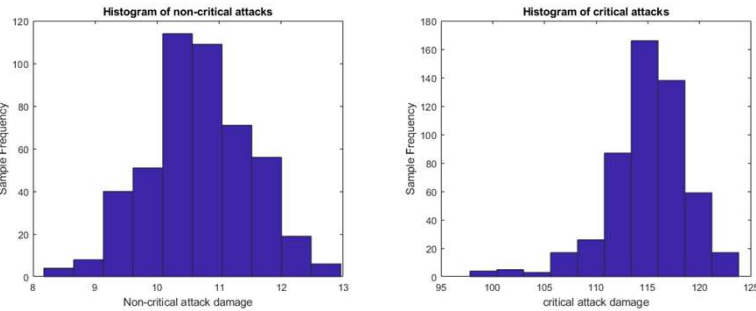
How to Increase Your Critical Hit Rate

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General Rationale

Critical hits are binary outcomes that seem to occur at random during battle. While successes on this variable are known to dramatically increase mean attack damage (see figure below), it is not currently understood what players can do to improve their chances of success. In this study, we investigate the relationship between all seven player variables and the frequency of critical hits on population of Ogres located at Castle Yates.



Histograms of attack damage grouped by the binary event. Based on the mean difference between these histograms, critical hits increase expected damage more than ten-fold.

Model

To predict the success rate of critical hits, p , we used a logistic regression model with the following predictors:

1. MND
2. WIS
3. DEX
4. STR
5. AGI
6. VIT
7. FOC

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7$$

Method

All data (N=1000) was collected from battles with Ogre type monsters located on the final floor of castle Yates (see figure below).

Our single dependent variable is the 'critical' variable (column 8 from data exporter). Our seven independent variables are the 'MND', 'WIS', 'DEX', 'STR', 'AGI', 'VIT', 'FOC' variables (column 12 to 18 from data exporter)

We used a Legendary ingot to introduce variability between battles (Thornton, 2018), and meals with an added bonus to all 7 independent variables to introduce variability within battles (Pitt, 2019).



Map of the world indicating the location where data collection occurred.

Results

Variable	estimate	95% CI	p-value
MND	0.069	[-0.060 , 0.197]	.2928
WIS	0.062	[-0.067 , 0.190]	.3475
DEX	0.242	[0.112 , 0.372]	<.001
STR	-0.018	[-0.147 , 0.112]	.7916
AGI	0.036	[-0.094 , 0.165]	.5875
VIT	-0.041	[-0.170 , 0.089]	.5400
FOC	0.048	[-0.081 , 0.178]	.4648

Tabulated results from logistic regression analysis performed on the data.

logistic regression was performed on the standardized design matrix, so the magnitudes of each estimate are comparable across predictors.

Of the seven independent variables investigated, only DEX is significant at the .05 level.

According to the estimated slope, increasing DEX by 1 increases the chances of a critical hit by a factor of 1.274.

Conclusions

- We find DEX is the only significant predictor of critical hit outcomes. Therefore, players wishing to increase chances of critical hits should increase the player variable DEX.
- The conclusions of our study may be limited to the Ogre monster population at Castle Yates, since we did not include data from any other kind of battle.

References

- (1) Thornton, Robert (2018) What are all these ingots for? A breakdown of effects by ingot type. *Royal Library Submissions* vol. 2
- (2) Pitt, Bradley (2019) How to pick ingredients for a desired meal effect. *Royal Library Submissions* vol. 5