

# 3 ROUND VS 1 ROUND

## 1. ENGAGEMENT

A good engagement should describe the "how much" and "how often" the game is played by users.  
`total\_round\_played` is used to measure "how much" since it is the smallest common unit for game play time-amount.  
`active\_Ndays\_user` is used to mesure "how "often". It is 1 if user active N or more days within 8 days test period, otherwise 0.

### 1.1 TOTAL ROUND PLAYED COMPARISON

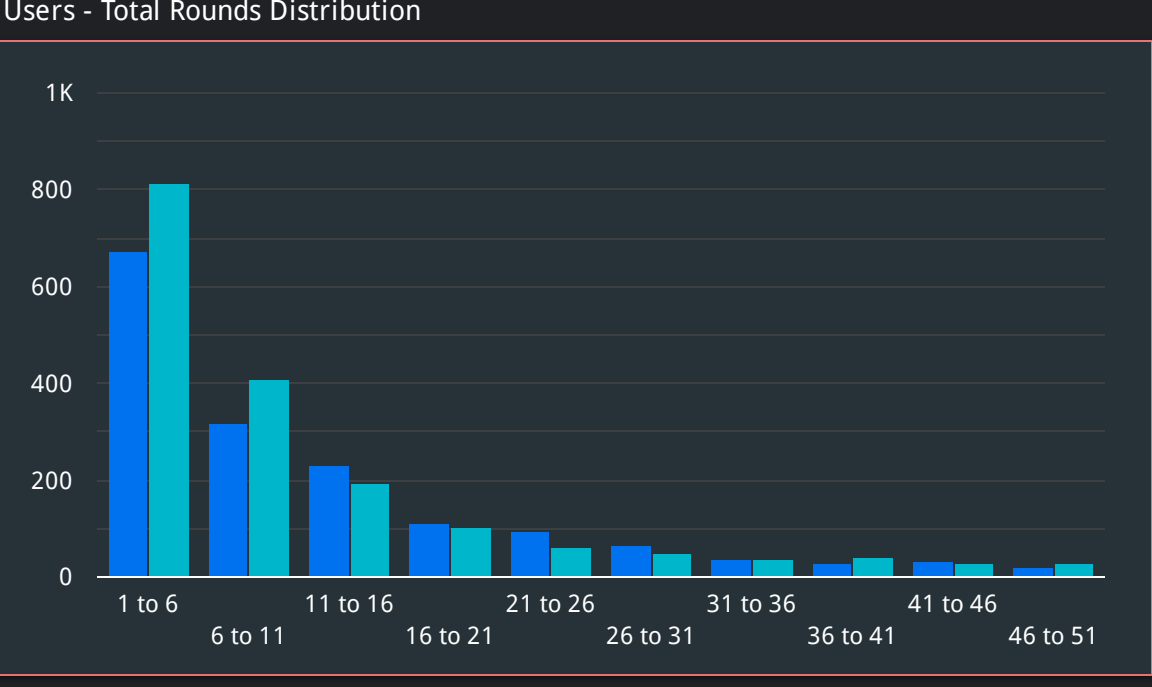
test_...	sam...	avg_tot...	mdn_to...	std_tot...	sum_ranks...
g1	1867	33.05	9	84.59	50344
g0	1993	24.26	8	56.64	43331

- Data is heavily left scewed, in such cases U-Test are preferred.
- U-Test emphasizes the rank differences between samples.
- Without any testing we can see that average %35 and median %12 increased in group 1.

According the Mann-Whitney U-Test for given parameters;  
- Z score:-109.94  
- P value: 0.0 (extremly close to zero)

RESULT :3 ROUNDS LEAD MORE ENGAGEMENT.

[Click to see more about Mann-Whitney U-Test.](#)



### 1.2 USER ACTIVITY COMPARISON

test_group ▾	sample_size	active_2days_users	active_3days_users	active_4days_users	active_5days_users
g1	1867	551	267	155	98
g0	1993	718	334	187	96

- active\_Ndays\_user: \*\*Number of users who are active N or more days in the test period.
  - Since activity of a user in a day is a categorical variable (active or not), Chi-squared test is preferred.
- According to Chi-Square test for number of users who are active 2 days or more and 3 days or more ;  
- Z scores: 4.27, 2.06  
- P value: 0.00, 0.039

RESULT: USERS LIKELY TO PLAY THE GAME OFTEN IN 1 ROUND. HOWEVER NO EFFECTS ON MOST ACTIVE USERS.

[Clickt to see more about Chi-squared test.](#)

## 2. COMPETITIVENESS

Competition is a key factor in every game  
In a perfect competition environment it is exptected to have 0.5 winning ratio for each user.  
Since number of played games are very diverse, parameters weighted by played games for groups.

[Click to see more about T test.](#)

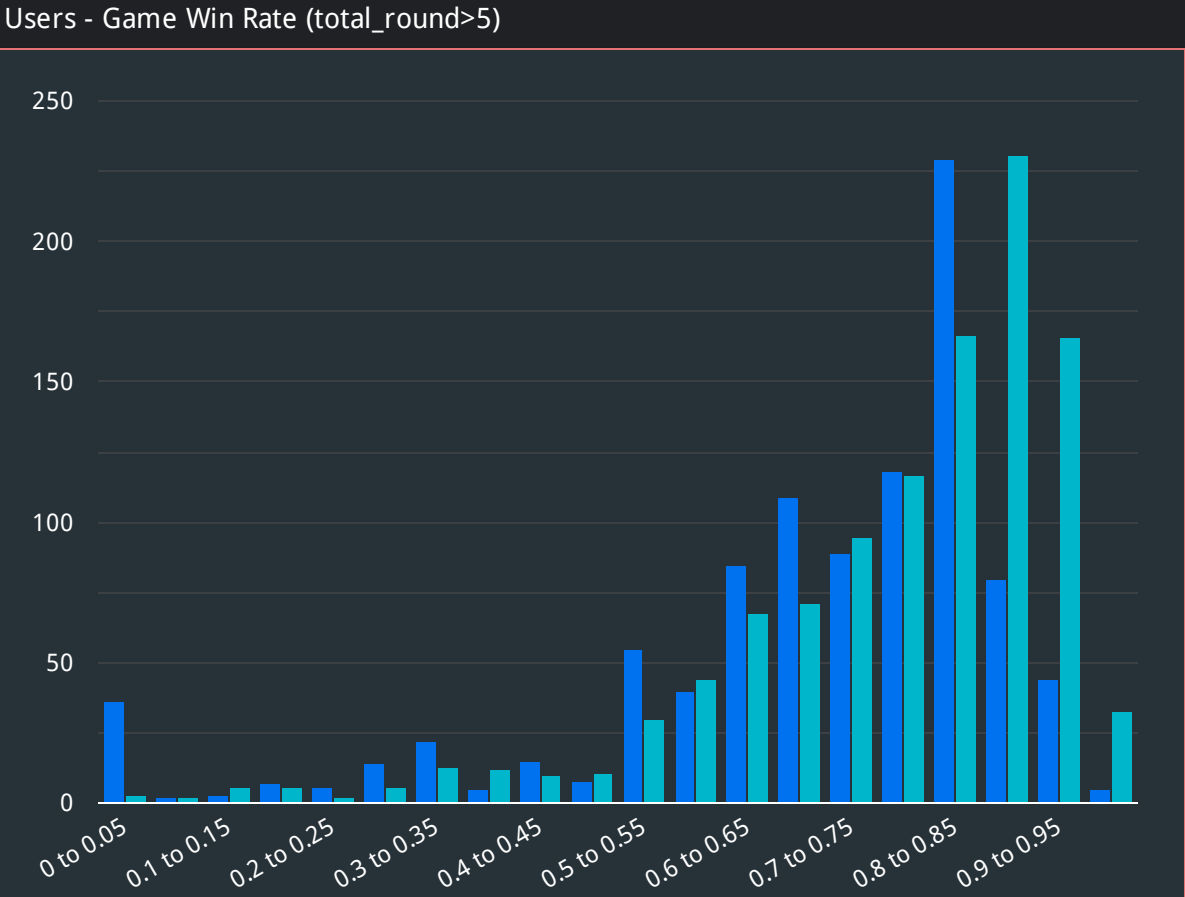
test_gro...	sample_...	avg_weighted_win...	std_weighted_win_rate
g1	1867	0.77	0.17
g0	1993	0.83	0.15

- When we look at chart, we can see there is huge difference on number of users who have 0.85 or higher winning rate between groups.
- Users centered more around 0.5-0.8 winning rate in group 1.
- Group 1 have less winning rate and higher std which means less likely to estimate winner and it is more competitive.

- Parameters are weighted to emphasize number of played games.
- T-test is preferred since parameters are weighted and samples are large enough.

According to T-test;  
- t-statistic: 11.64  
- p-value: 0.0 (very close to zero)

RESULT: 3 ROUNDS LEAD MORE COMPETITION.



ad\_impression > 0

abtest_group ▾	sample_size	avg_revenue	std_revenue
g1	429	0.04508861...	0.129725...
g0	705	0.02831704...	0.087451...

- When we look at first table, we can see there is almost no difference between two groups aaverages.

- When we filter the data by users who have at least one impression, we can see 2 different behaviours in groups.

- While %22 of users watch ad in group1, g2 ad watchers are %35.
- However total revenues of groups are almost equal, g1 average %60 higher than g2.
- Which means 3 rounds lead 2 different patern in group1; the users watch more ads and the users avoid to watch ads.

RESULT: IN OVERALL, THERE IS NO DIFFERECE BETWEEN GROUPS IN TERMS OF AD MONETIZATON.

abtest_group	user_id	revenue ▾
0	1902bef8-bd01-479f-9e6f-abdbca96afed	599
1	28773f75-646f-47b8-a2c8-a5629a0d4ab6	338
0	a3b9b778-ee43-4882-8e51-9f53d93fb254	184
0	ead4ef06-ca90-48b0-93db-3cd5197edd93	133
1	3ae5aadb-c355-4601-b6d3-d0aac4994eb3	118
0	09917113-2edf-463f-9fa6-b0a4051b9011	93
0	7981dfe4-da9e-4417-a652-2a99bf1e8f70	38
1	ec8b26a0-81f0-4cfb-9878-f0d293df1f85	34
0	6e98431a-dd18-48b8-a84b-4ec4eb8001ce	33
0	d2bb8945-f296-447d-b9cb-2b9d21e18923	20

## 4. USER PROGRESS

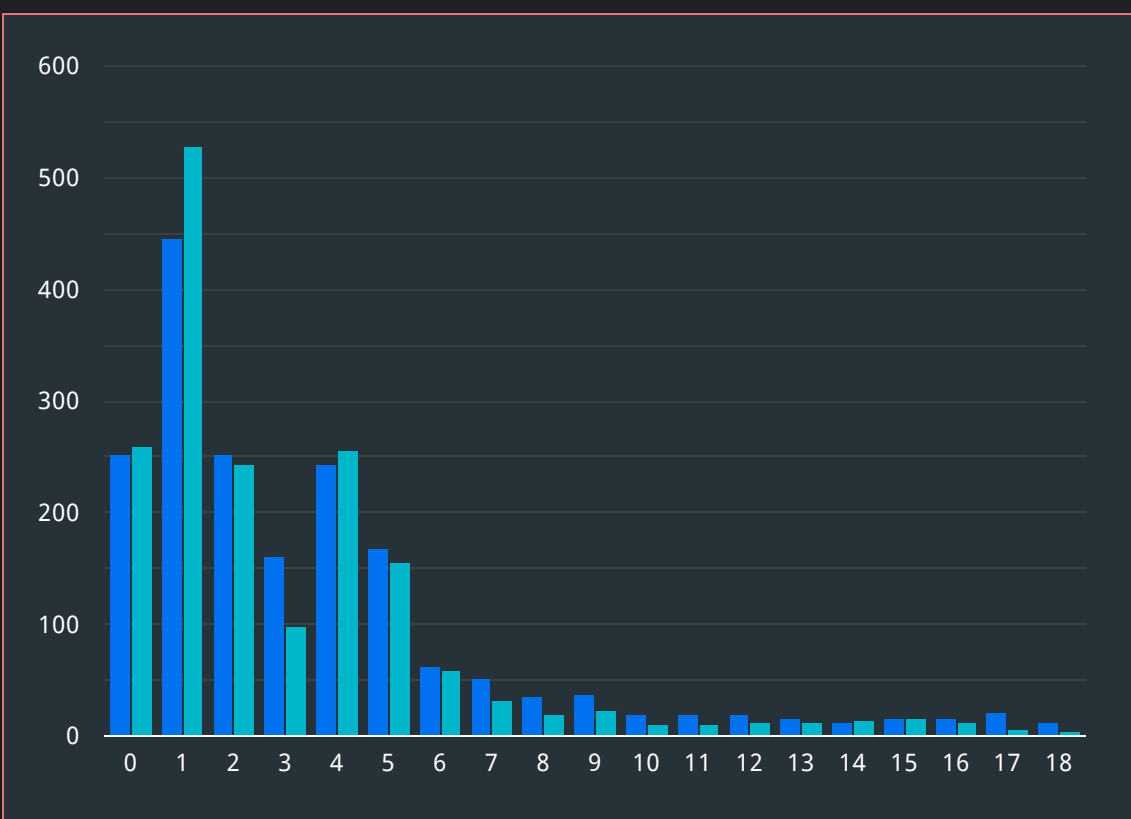
To get consistent insights user's progress should be covered as well.  
car\_level\_up event is used to measure user's progress.

abtest_group ▾	sample_size	avg_car_level_up	std_car_level_up
g1	1879	4.49015433...	7.31249706...
g0	1986	5.12134944...	7.76194147...

- We can see that average car level up is %14 higher in 1 round.
- We knew that is round 3 was more competitive, so this result align with previous findings.

According to T-test;  
- t-statistic: 2.59  
- p-value: 0.0095

RESULT: 1 ROUND LEADS HIGHER (EASIER) CAR LEVEL UPS.



## SUMMARY

CHOICE: 3 ROUND

	Engagement - Rounds	Engagement - Frequency	Competition	Ad Monetization	User Progress
1 Round	Lower	Higher, Same (Most Active Users)	Lower	Same	Higher
3 Round	Higher	Lower, Same (Most Active Users)	Higher	Same	Lower
Test	Mann-Whitney	Chi-squared	T test	-	T test

- To put into words, I think more competitive game is always better as long as it doesn't lead frustration and churn like it didn't in this case.
- In more competitive environment users are more likely to use out of game progress options (rewarded adds, in-app purchases).
- We saw that 429 people brought same ad revenue with 705 people.
- Obtaining same or higher engagement with more competitive game can be good signal for better monetization in future.