BOARD GAME COMPLEXITY ANALYSIS

Andy Brandt

GOAL OF ANALYSIS

- Use a t-test to determine if on average games receive a rating of 6.5 or higher out of 10

- Do newer games take longer to play?

- Are newer games more complex than older games?

- Is there a correlation between a game's complexity and how long it takes to play?

- Is there a correlation between a game's average rating and its complexity?

DATASET

Taken from Board Game Geek:

- 19,000+ board games

- Average rating from game owners (out of 10)

- Board game complexity (out of 5)

- Average play time

- Year published

DATA SUMMARY

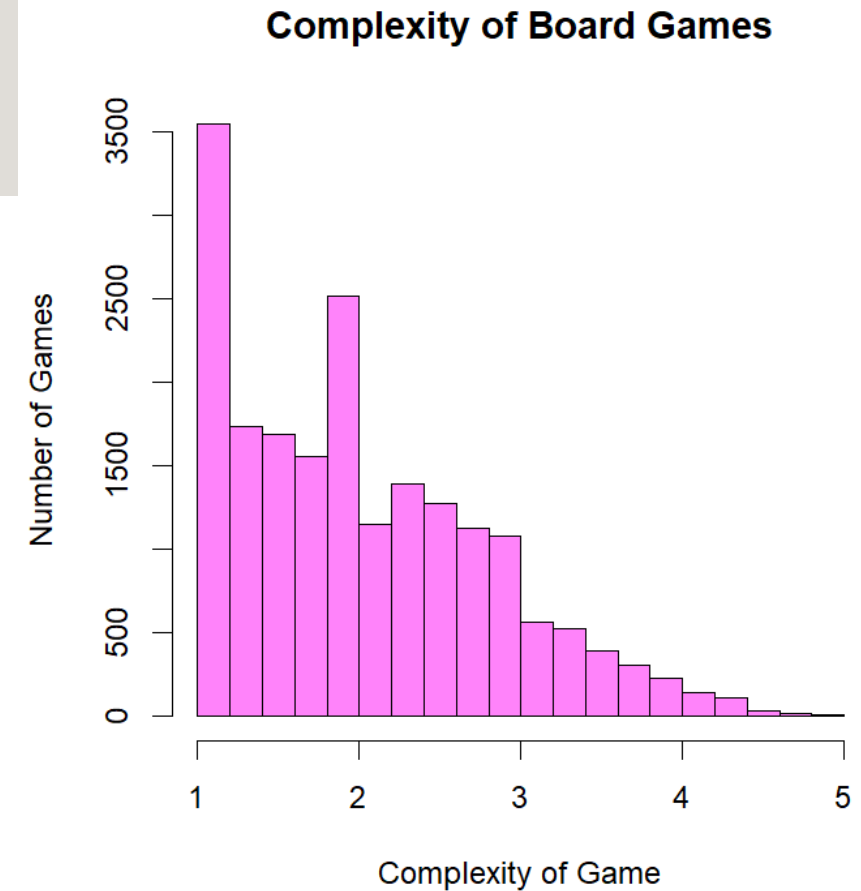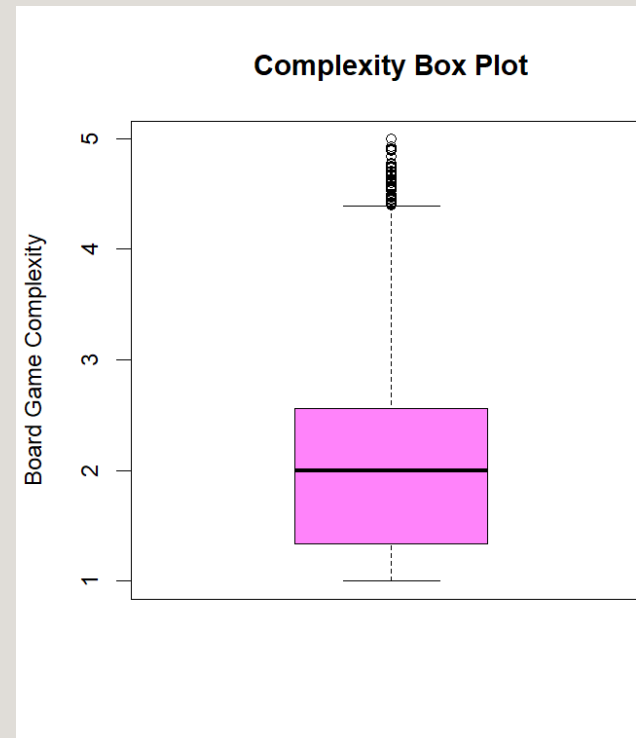| Category	Minimum	Q1	Median	Q3	Maximum	Mean	Standard Deviation
Average Rating (/10)	1.050 Oneupmanship: Mine's Bigger	5.840	6.440	7.030	9.540 DEFCON 1	6.416	0.9177
Complexity (/5)	1.000 War	1.350	2.000	2.560	5.000 Empire (Third Edition)	2.037	0.8021
Play Time (Minutes)	1 Tic-Tac-Toe	30	45	90	60000 The Campaign for North Africa: The Desert War 1940-43	94.99	559.2
Year Published	-3500 Senet	2001	2011	2016	2022 The 7th Citadel	2002	100.9

AVERAGE RATING

- The simplest of the created graphs

- Mean: 6.416

- Left Skew

- Most games land at about the 6.5/10 rating

Average Community Rating of Board Games
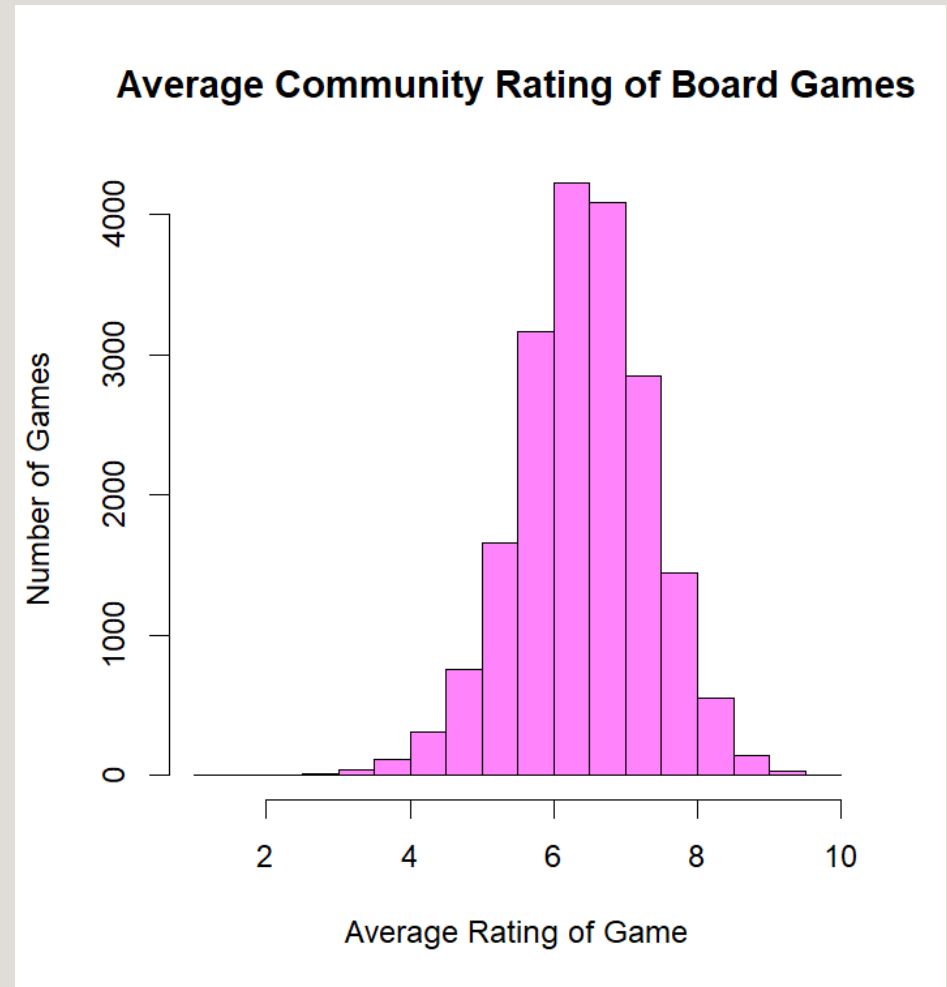
AVERAGE COMPLEXITY

- Mean: 2.034

- Right Skew

- Majority of games have very low complexity

Complexity Box Plot

Complexity of Board Games

PLAY TIME

| SDs Away from Mean	Entries outside SD	SDs Away from Mean	Entries Outside SD
1	174	5	41
2	77	6	30
3	60	7	25
4	50	8	20

- Mean: 94.57
  - Max: 60000
- Median: 45.00
- Wildy Skewed Right
- Near unusable due to "campaign" games

- 4.2% games > 4 hours
- 0.7% games > 12 hours

Board Game Play Time

Board Game Play Time
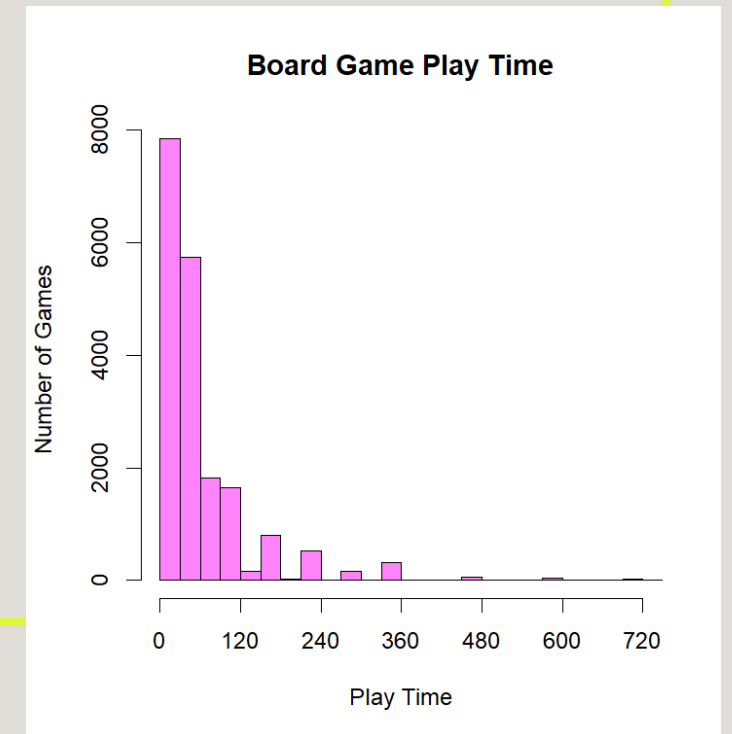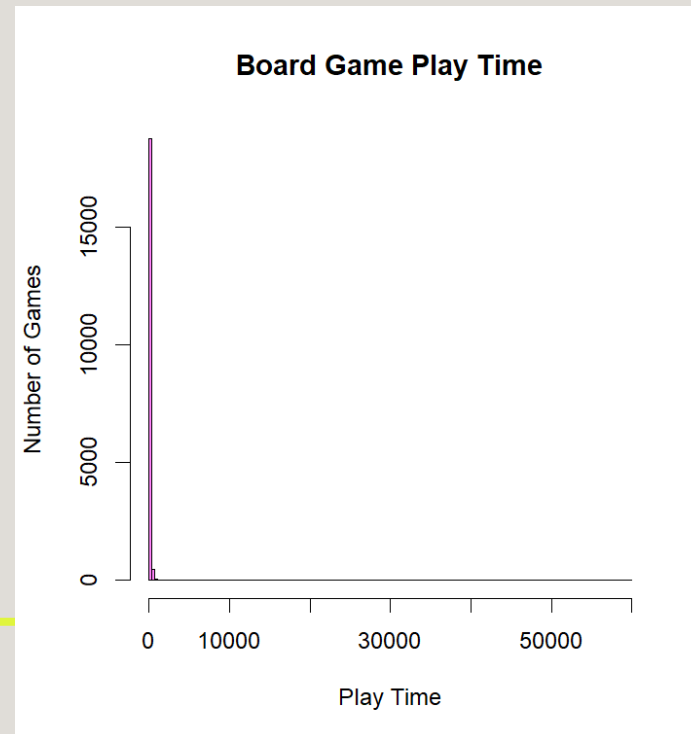
YEAR PUBLISHED

- Mean: 2002

- Strong Left Skew

- 53 games created before 1750

- 77 before 1850

- 200 before 1950

Board Game Release Dates

Board Game Release Dates
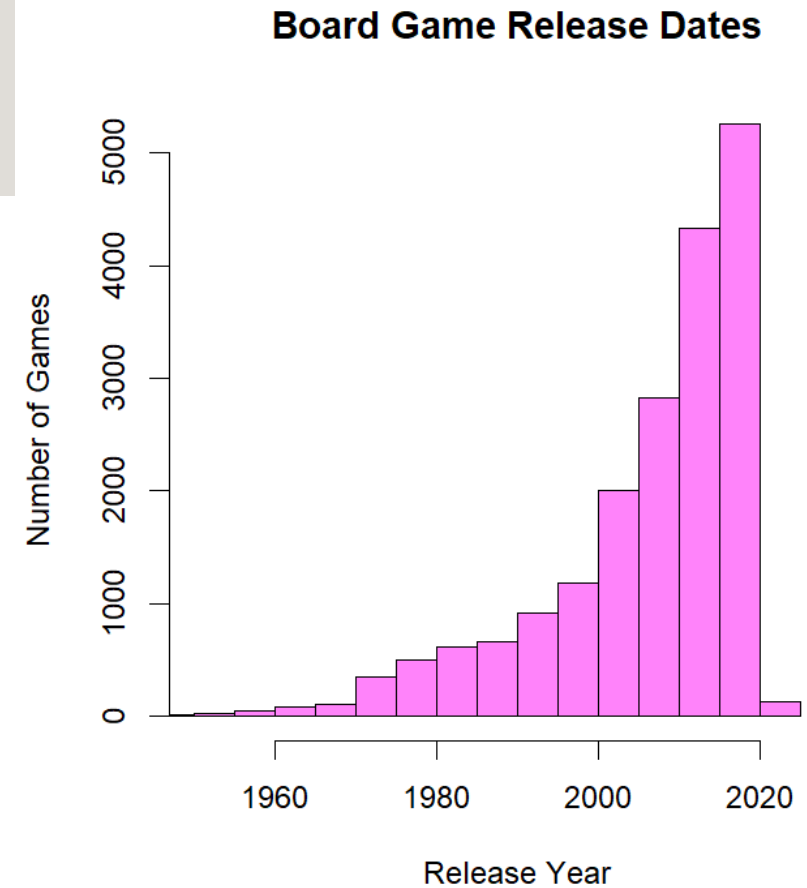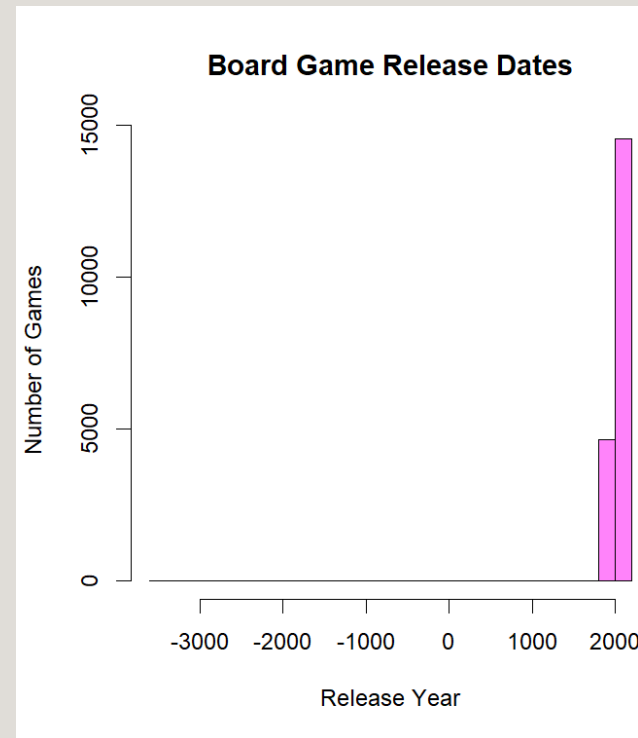
T-TEST ON RATING

- I would like to believe that most board games are good

- This can be shown if, on average, a board game is ranked at least 6.5 out of 10. I will also test this at a 5% significance level

- 25 randomly chosen games are shown on the right, I will use these to conduct the t-test.

| Name	Rating
Snarf Quest	5.24
Malifaux (Second Edition)	8.12
Bakari	5.28
UNO H2O Splash	6.00
Tetris (1989)	5.59
Enchanters: Overlords	7.55
Agricola: All Creatures Big and Small	7.38
Tranquility Base	7.05
Nichtlustig	5.20
Blood Rage	8.00
Hedbanz for Adults!	5.39
Ticket to Ride: London	7.24
Star Maps	6.51
Terraforming Mars: Ares Expedition	6.13
What's He Building in There?	6.65
The Estates	7.49
Orange Quest	5.65
Barbeque Party	5.07
1000 Bornes Express	5.80
Espresso	6.17
Warhammer Underworlds: Dreadfane	8.05
Castle Dice	6.67
On the Hunt for Dinos	5.84
Monopoly: The Legend of Zelda	5.56
The Whatnot Cabinet	7.52

T-TEST ON RATING

- Sample mean: 6.446

- Sample standard deviation: 0.9979

- $H_o = 6.5$

- $H_a > 6.5$

- $t_o = \dfrac{\bar{x} - \mu 0}{\frac{s}{\sqrt{n}}} = \dfrac{6.5 - 6.446}{\frac{0.9979}{\sqrt{25}}} \approx 0.2706$

- P-score $\approx 5.750052e\text{-}07$

- Since the p-value < 0.05, we reject H_o at a 5% significance level. The data provides sufficient evidence to conclude that the average game's community ranking is greater than 6.5/10.

| Name	Rating
Snarf Quest	5.24
Malifaux (Second Edition)	8.12
Bakari	5.28
UNO H2O Splash	6.00
Tetris (1989)	5.59
Enchanters: Overlords	7.55
Agricola: All Creatures Big and Small	7.38
Tranquility Base	7.05
Nichtlustig	5.20
Blood Rage	8.00
Hedbanz for Adults!	5.39
Ticket to Ride: London	7.24
Star Maps	6.51
Terraforming Mars: Ares Expedition	6.13
What's He Building in There?	6.65
The Estates	7.49
Orange Quest	5.65
Barbeque Party	5.07
1000 Bornes Express	5.80
Espresso	6.17
Warhammer Underworlds: Dreadfane	8.05
Castle Dice	6.67
On the Hunt for Dinos	5.84
Monopoly: The Legend of Zelda	5.56
The Whatnot Cabinet	7.52

CORRELATION
YEAR VS. PLAY TIME

- No Correlation in the slightest

- -0.0008690 correlation

- Lines of dots come from common time rounding

  - 15 min, 30 mins, 60 mins, etc.
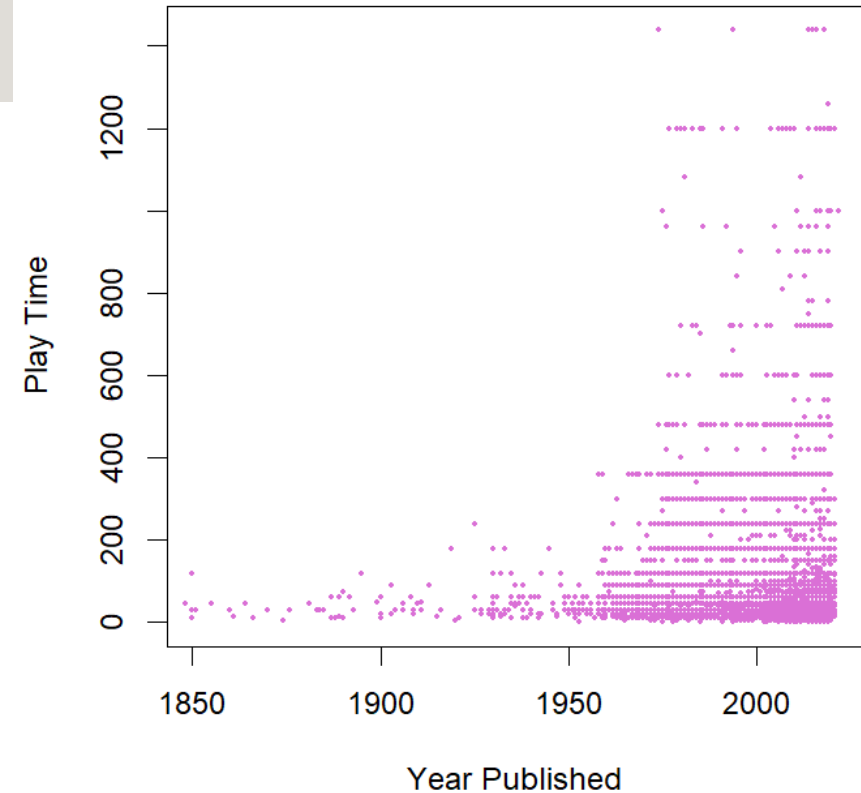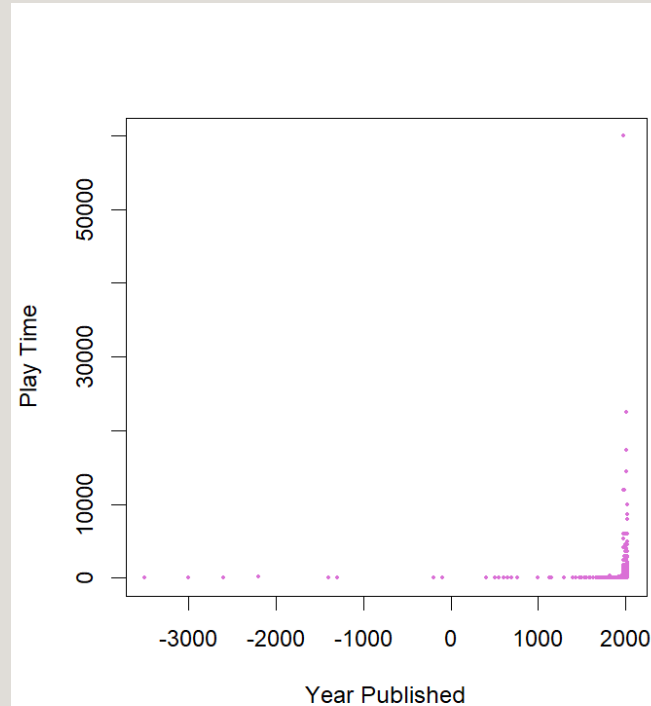
CORRELATION
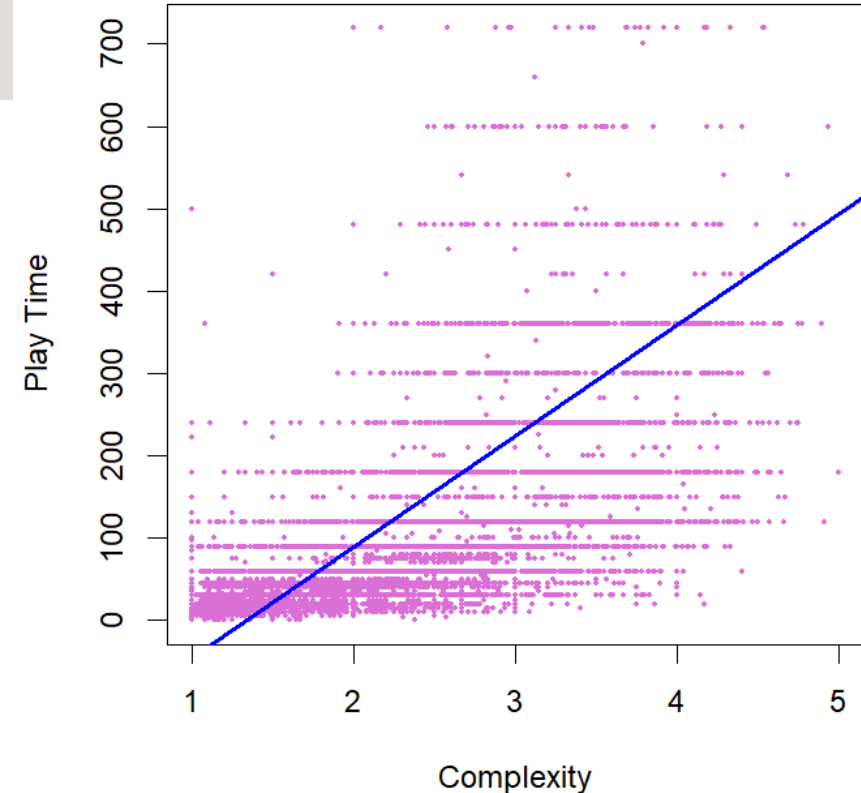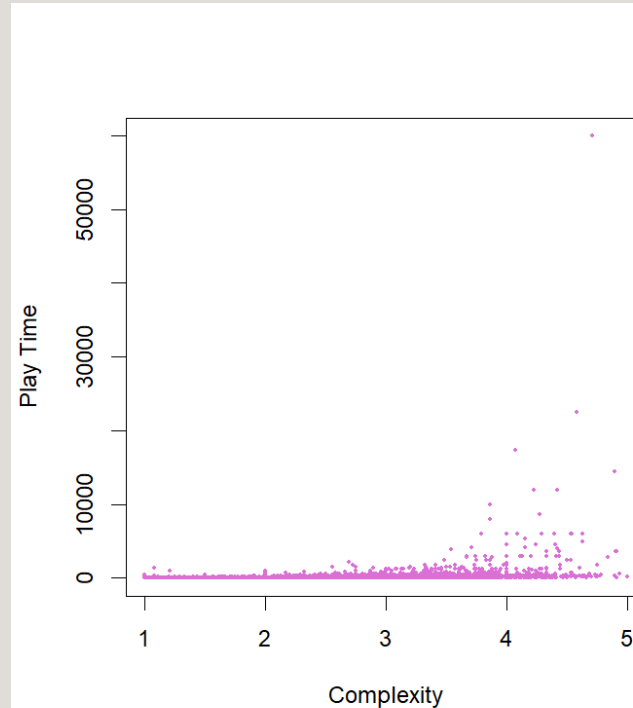# YEAR VS. COMPLEXITY

- Still no correlation

- 0.006162 correlation

- There will always be a higher concentration of simple games regardless of decade
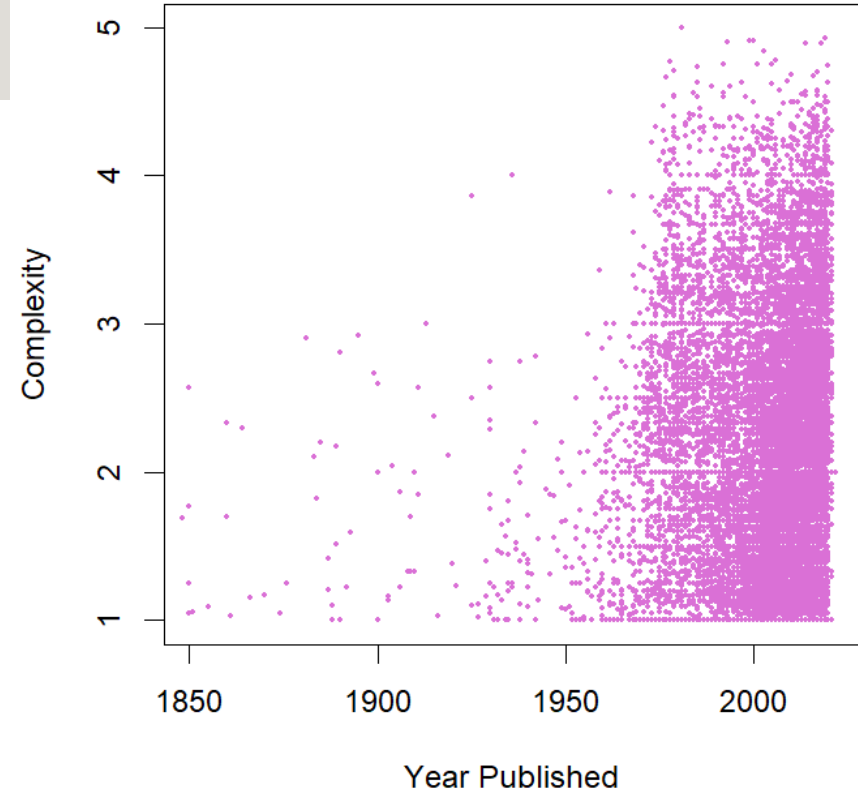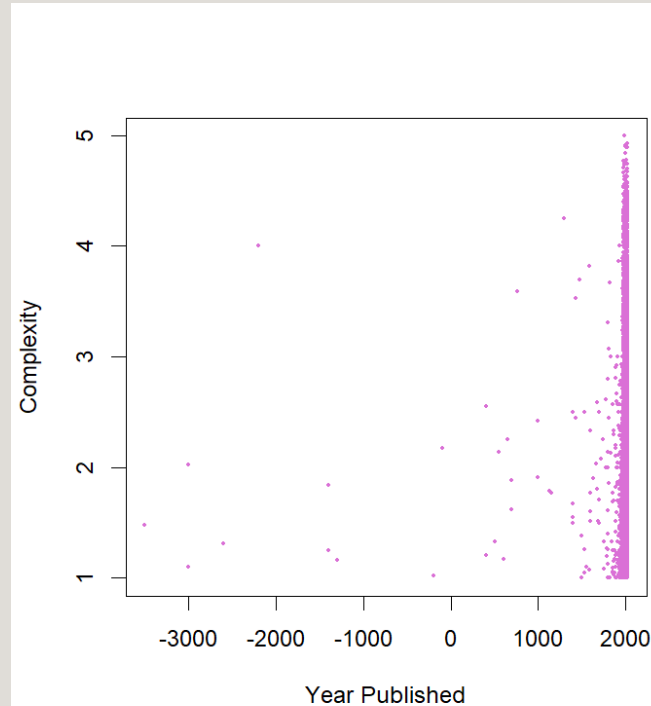
# LINEAR REGRESSION
PLAY TIME VS. COMPLEXITY

- First time we can see the correlation

- 0.1929 correlation

- Y-int: -178.8

- Scaler: 134.4

- $\hat{Y} = -178.8 + 139.4x$

- Generally speaking, the more complex a game is, the longer the game is

LINEAR REGRESSION RATING VS. COMPLEXITY

- Highest correlation we've seen!

- Correlation coefficient of 0.5116206

- Y-intercept: -0.8354

- Scaler: 0.4474

- $\hat{Y} = -0.8354 + 0.4474x$

- If a game's rating increase by one, on average, the games complexity will increase by about 0.45
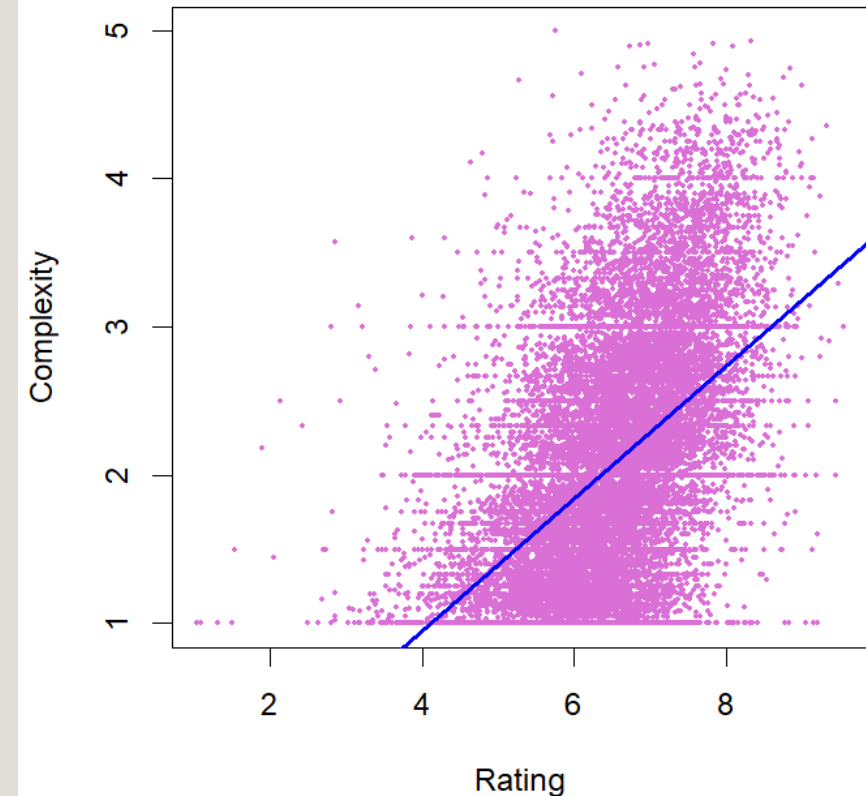
CONCLUSION

- It seems that the year a game was published has no influence on a game's complexity or how long it takes to complete the game.

- In fact, there isn't even a strong correlation between a game's complexity and its play time, only a loose connection.

- The only correlation we have is a games rating and how complex the game is. After all, people will get tired of simple game much quicker than they would a game with a lot of moving pieces or difficult mechanics.