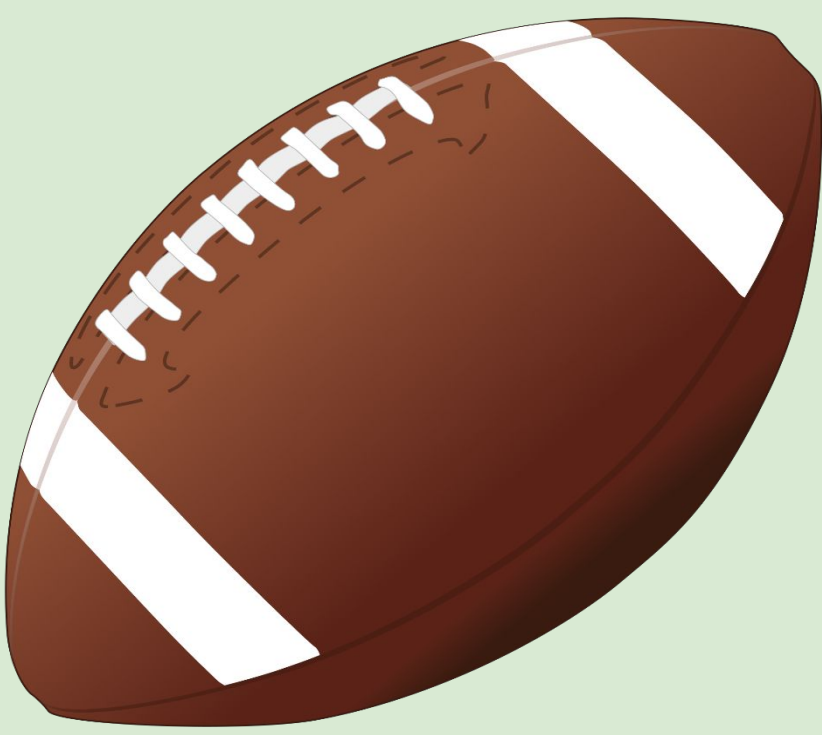# Expected Generated Force at the Moment of Tackle in the NFL (First 9 weeks of 2022 season)

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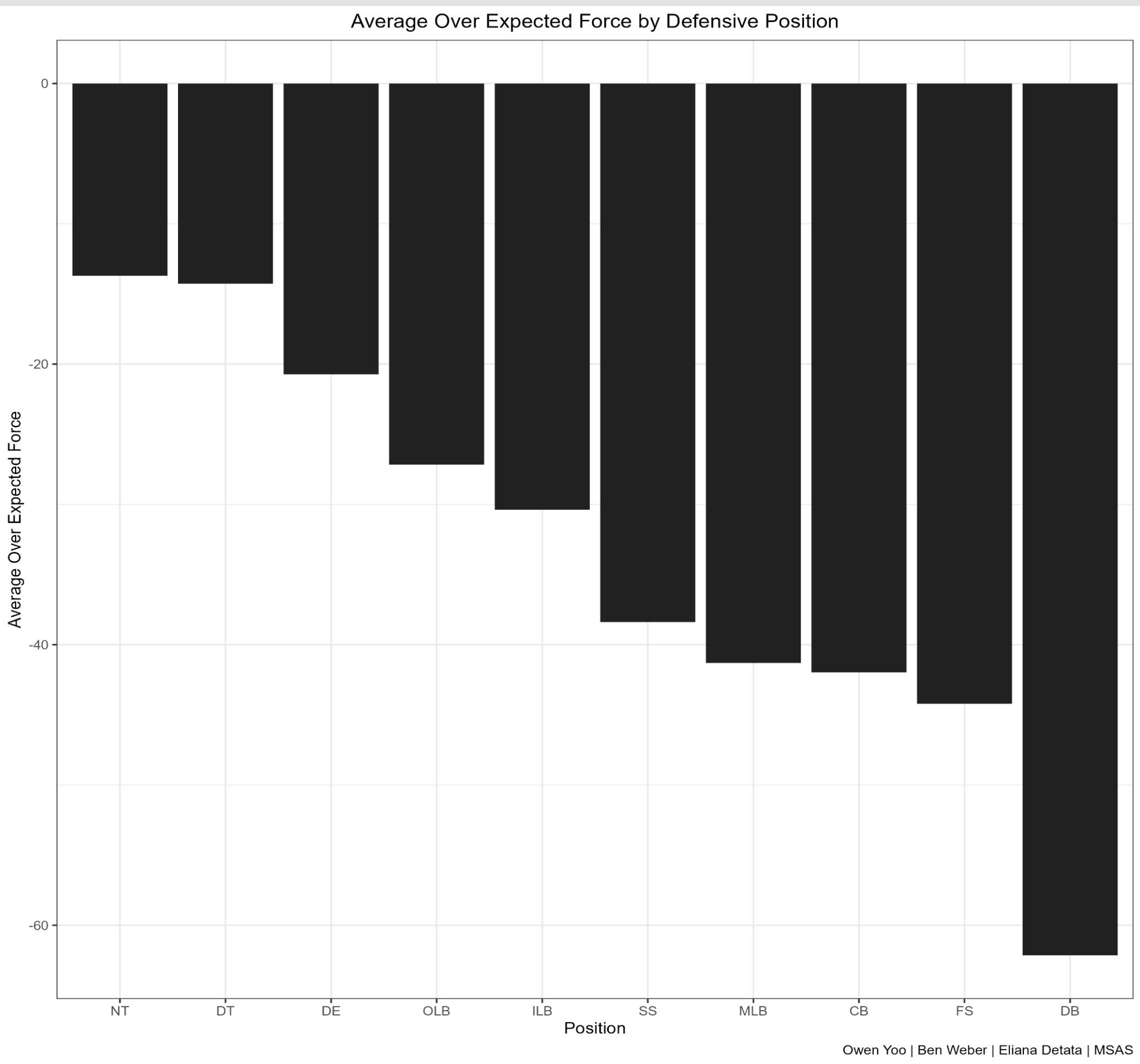University of Michigan | MSAS

Introduction

- What factors go into the force executed in tackles? We analyzed based on position, different factors of the play, as well as location on the field.
- This data was acquired from the Big Data Bowl 2023 prompt regarding analyzing tackling.
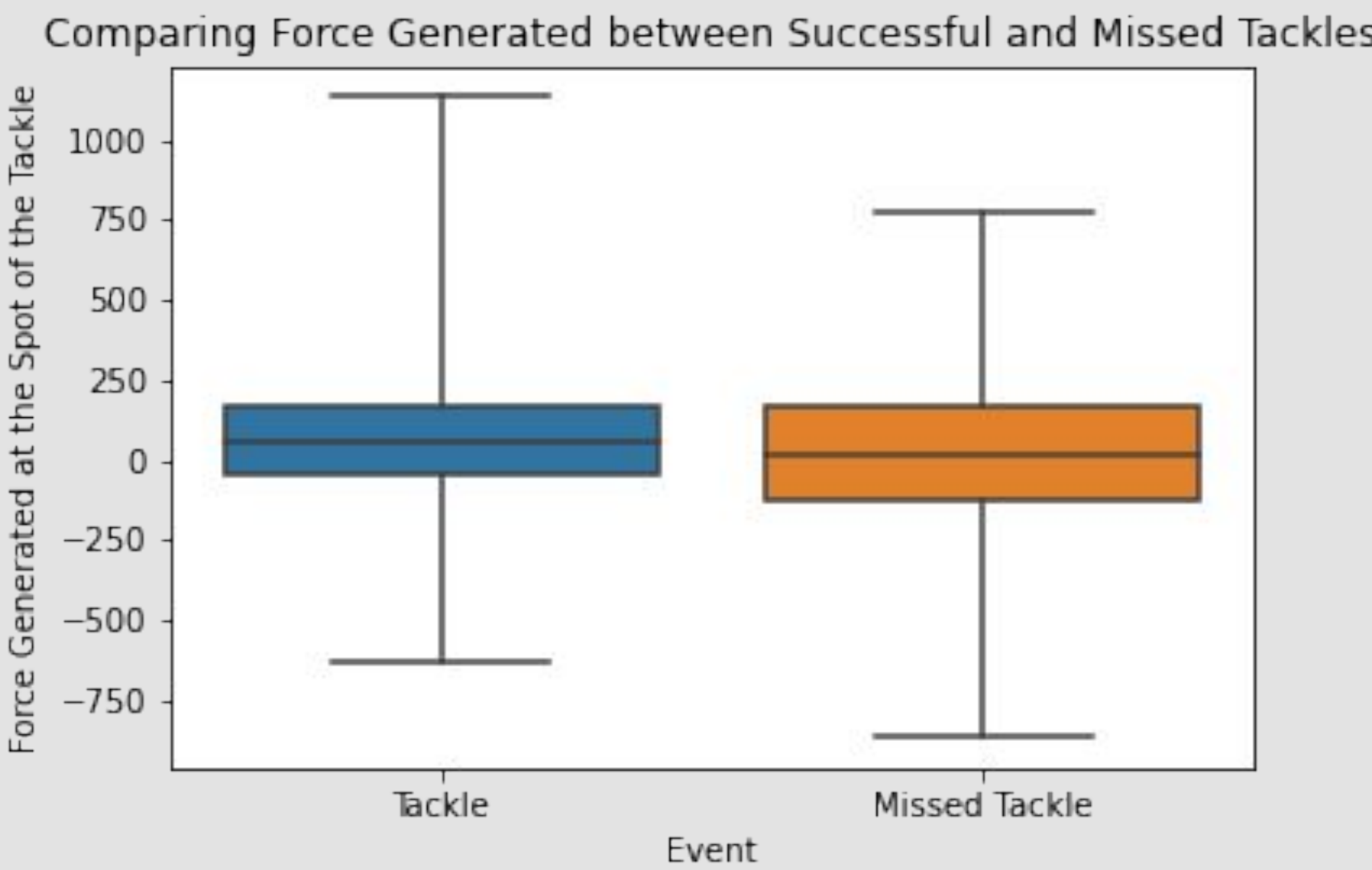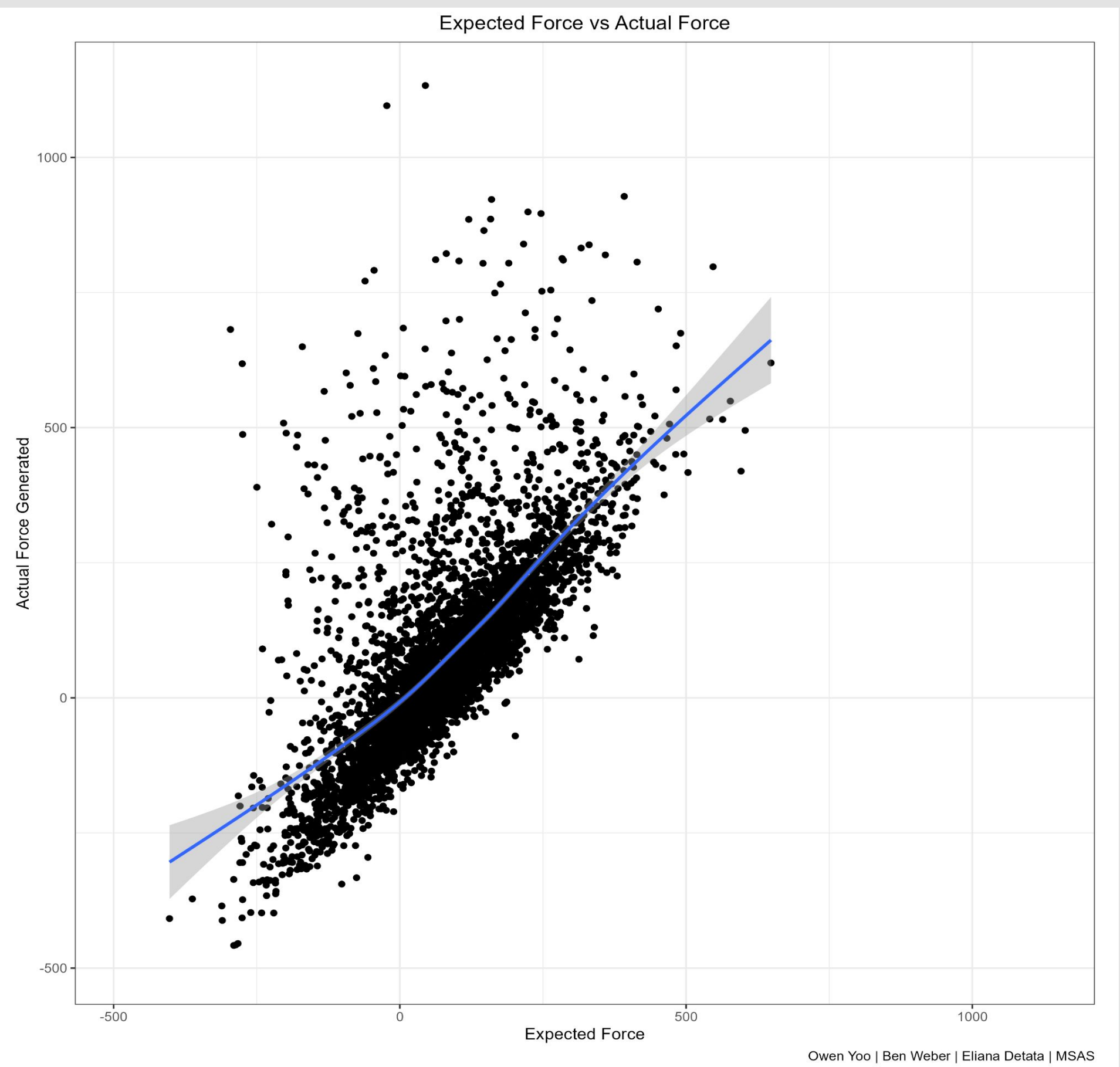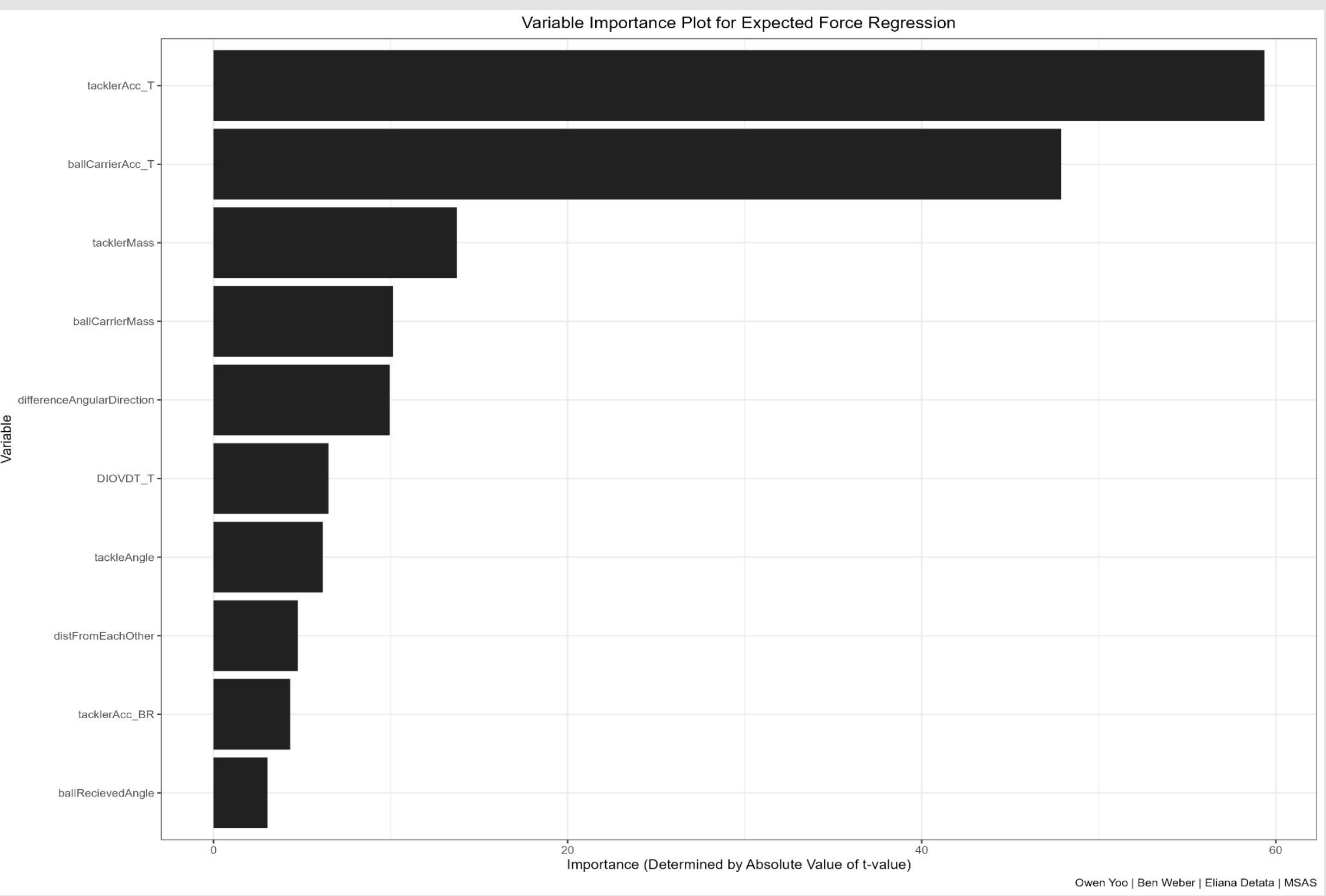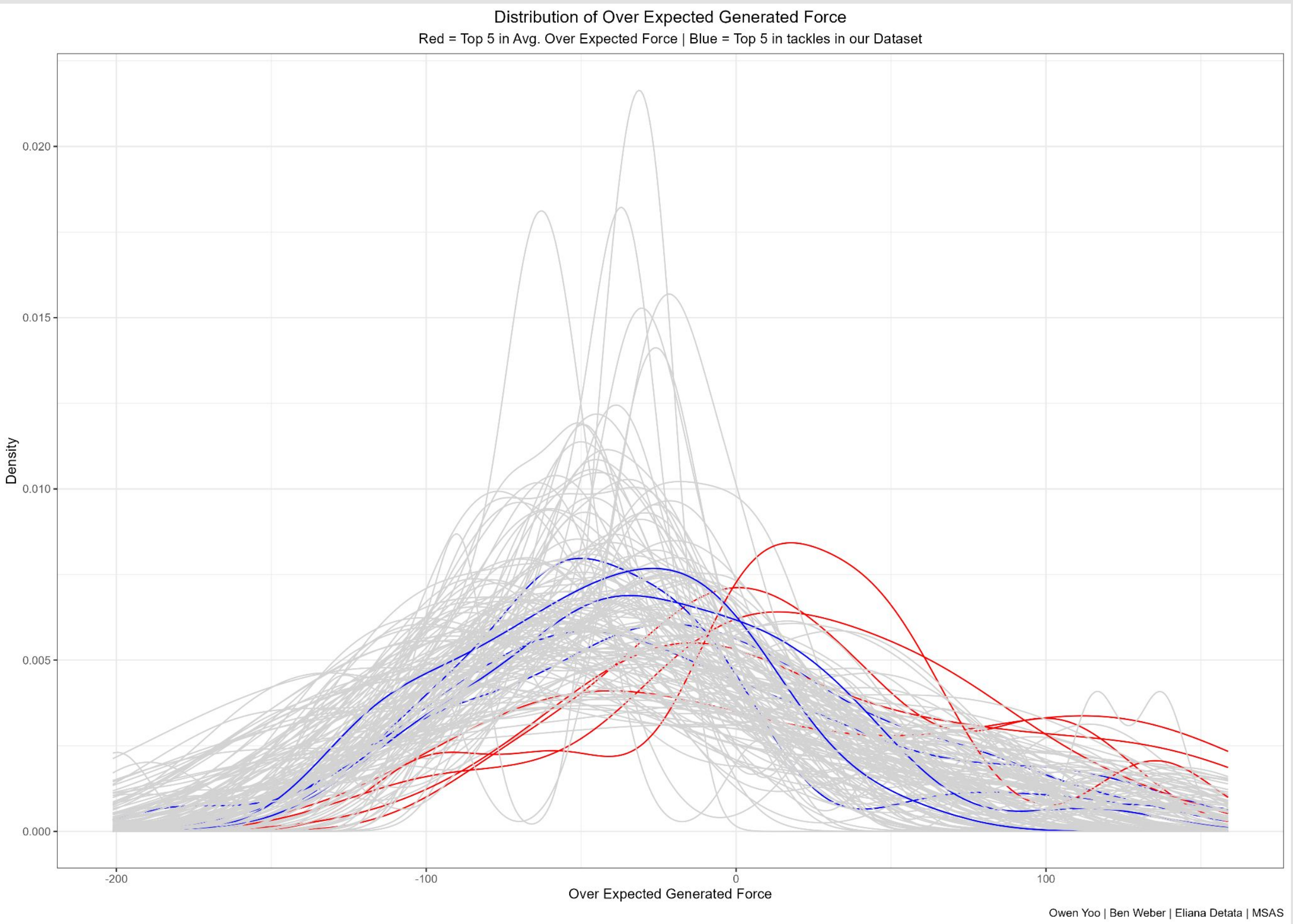
Important Terms

Force Over Expected: (Expected force given - Actual Force Given)
A measure of a tackler's performance by their produced force above expectation.

TacklerAcc_T: This variable represents the acceleration of the tackler at the moment of the tackle

BallCarrierAcc_T: This variable represents the acceleration of the ball carrier at the moment of the tackle

tacklerMass: This variable represents the mass of the tackler

ballCarrierMass: This variable represents the mass of the ball carrier

differenceAngularDirection: This variable represents the difference in the angular direction of the ball carrier and tackler's acceleration at the moment of the tackle. Values close to 180 indicate that the players were moving towards each other, while values close to 0 indicate that the players were moving away from each other

DIOVDT_T: This variable represents the difference in a tackler's orientation compared to the direction of his movement at the moment of the tackle. It reveals how well the tackler squared up his momentum going into the tackle

tackleAngle: This variable represents the angle from which the ball carrier was tackled from. Values close to 180 indicate the ball carrier was tackle from the front, while values close to 0 indicate the ball carrier was tackled from behind

distFromEachOther: This variable represents the distance (yds) between the ball carrier and the tackler at the moment of the handoff/completion.

TacklerAcc_T: This variable represents the tackler's acceleration at the moment the ball was received. (handoff or completion) It allows us to consider the influence of the tackler acceleration at this critical moment of the play

ballReceivedAngle: This variable represents the difference in the angular direction of the ball carrier and tackler's acceleration at the moment of the handoff/completion. Values close to 180 indicate that the players were moving towards each other, while values close to zero indicate that the players were moving away from each other

Conclusion

- The general behavior found within field location was that tackles were more likely to underperform near the sidelines
- Based on position, DB's are likely to underperform in average over expected force
- The top 5 performers are listed to the right
- Based on linear regression, there are some outliers but most points are centered around the same trendline

Data Source

National Football League . (n.d.). *NFL Big Data Bowl 2023* . Kaggle. https://www.kaggle.com/competitions/nfl-big-data-bowl-2023/data

Force Generated Based on Successful Tackles

Comparing Force Generated between Successful and Missed Tackles

Force By Position

Average Over Expected Force by Defensive Position

Force Among All Defenders

Distribution of Over Expected Generated Force
Red = Top 5 in Avg. Over Expected Force | Blue = Top 5 in tackles in our Dataset

Top Avg. Over Expected Force
Minimum of 10 Tackles to be considered

tacklerName	count	force
Chauncey Gardner-Johnson	13	27.53527
Ernest Jones	16	27.35112
Grover Stewart	15	16.69987
Jonathan Allen	10	15.95222
Cameron Heyward	10	15.30390

Top Tacklers

tacklerName	count	force
Foyesade Oluokun	33	-37.88918
T.J. Edwards	27	-44.42046
C.J. Mosley	26	-13.89382
Rashaan Evans	26	-25.05644
Drue Tranquill	25	-16.50329

Linear Regression

Expected Force vs Actual Force

Variable Importance Plot for Expected Force Regression

Force Within Field

The Average Over Expected Force per Field Location