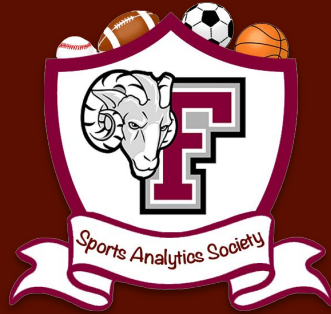


Defending The Kansas City Chiefs:

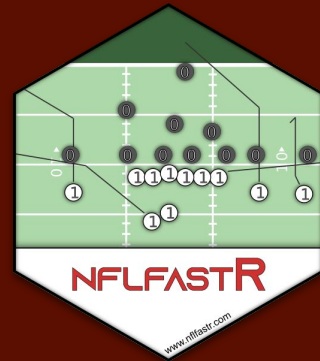
In some cases, less is more.



Presented By: Max Janniello, Peter Majors, and Chris Orlando

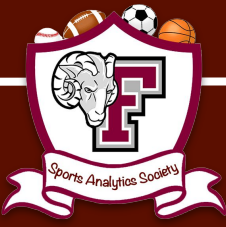
Data Preparation:

- Analysis Performed In Python, Visualizations in Python, R and Excel
- Inner Joined “scheme_data.csv” with nflfastR’s 2021 Play-By-Play Data
- Expanded Fields From 47 to 422, Few Overlaps
- Reduced Rows Where KC Ran or Passed From 1343 to 976 (73% Retention)
 - Data Cleaning Was Necessary, Imperfect Merge



Part 1: Chiefs' Tendencies





Chiefs' Tendencies: Downs

1st Down

DIST (Y/1D)	RUN %	PASS %
10	42	58

2nd Down

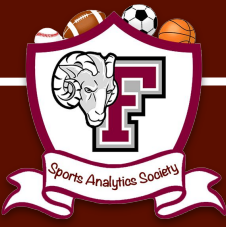
DIST (Y/1D)	RUN %	PASS %
1 to 3	51	49
4 to 7	23	77
7+	23	77

3rd Down

DIST (Y/1D)	RUN %	PASS %
1 to 3	36	64
4 to 7	4	96
7+	3	97

4th Down

DIST (Y/1D)	RUN %	PASS %
0-1	50	50
2+	14	86



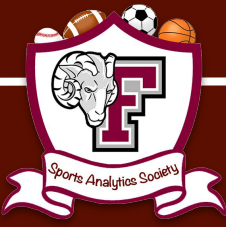
Chiefs' Tendencies: Formations

I Form

DIST (Y/1D)	RUN %	PASS %
1 TO 3	72	28
4 TO 7	75	25
8+	72	28
TOTAL	74	26

Singleback

DIST (Y/1D)	RUN %	PASS %
1 TO 3	63	37
4 TO 7	66	34
8+	58	42
TOTAL	60	40



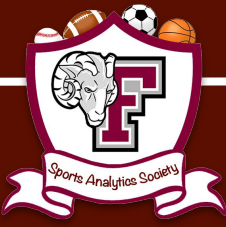
Chiefs' Tendencies: Formations (cont.)

Shotgun

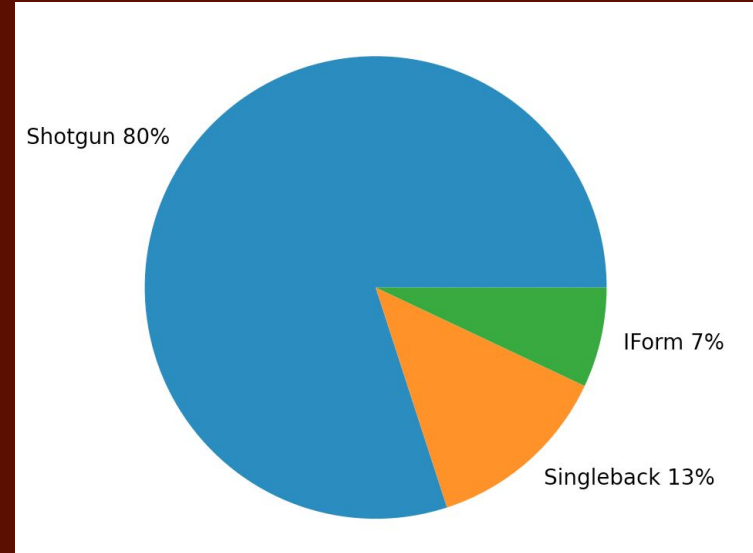
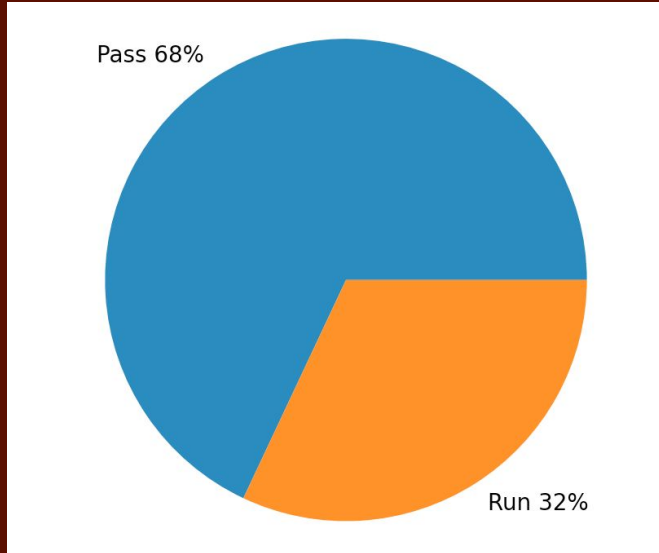
DIST (Y/1D)	RUN %	PASS %
1 TO 3	35	65
4 TO 7	14	86
8+	24	76
TOTAL	23	77

Play Action

FORMATION	PA %	NO PA %
I FORM	86	14
SINGLEBACK	85	15



Chiefs' Tendencies: Shotgun & Pass Heavy



League Average (2021): 57.6% Pass & 42.4% Run



Chiefs' Tendencies: Drop Back Depth

1st Down

DIST (Y/1D)	DROP	DIFF
10	3.9	0.9

2nd Down

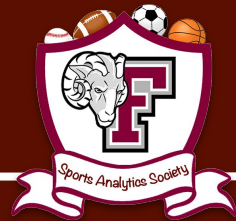
DIST (Y/1D)	DROP	DIFF
1 to 3	2.8	2
4 to 7	5.4	-0.6
7+	5.8	-1

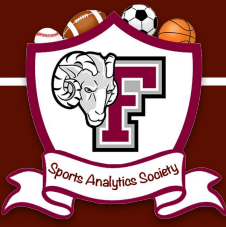
3rd Down

DIST (Y/1D)	DROP	DIFF
1 to 3	3.8	1
4 to 7	8.1	-3.3
7+	9.2	-4.4

League Average (2021): 4.8 Yards

Part 2: Defensive Gameplans





Defensive Gameplans: The Blitz

BLITZ (Y/N) ?	PLAYS	TIME TO PRESSURE	TIME TO THROW
BLITZ	99	.81 seconds	2.31 seconds
NO BLITZ	877	.66 seconds	1.87 seconds

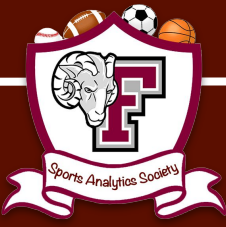
Pressure can still be created effectively without blitzing.



Defensive Gameplans: The Stunt

STUNT (Y/N) ?	PLAYS	TIME TO THROW	EPA
STUNT	134	3.21 seconds	.39
NO STUNT	842	1.71 seconds	.08

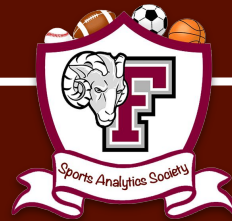
No Stunts lead to quicker time to throw and decrease Chiefs EPA per play.



Defensive Gameplans: Box Defense Inside 10 Yards

STACK THE BOX (Y/N) ?	PLAYS	TIME TO THROW	TIME TO PRESSURE	TD %
OVER 7 IN THE BOX	38	.96 seconds	.36 seconds	37
7 OR LESS IN THE BOX	44	2.52 seconds	.91 seconds	32

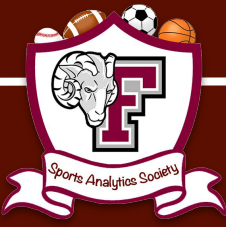
Even though “stacking the box” gives Mahomes less time to throw, it has no impact on whether they score.



Defensive Gameplans: Red Zone Targets

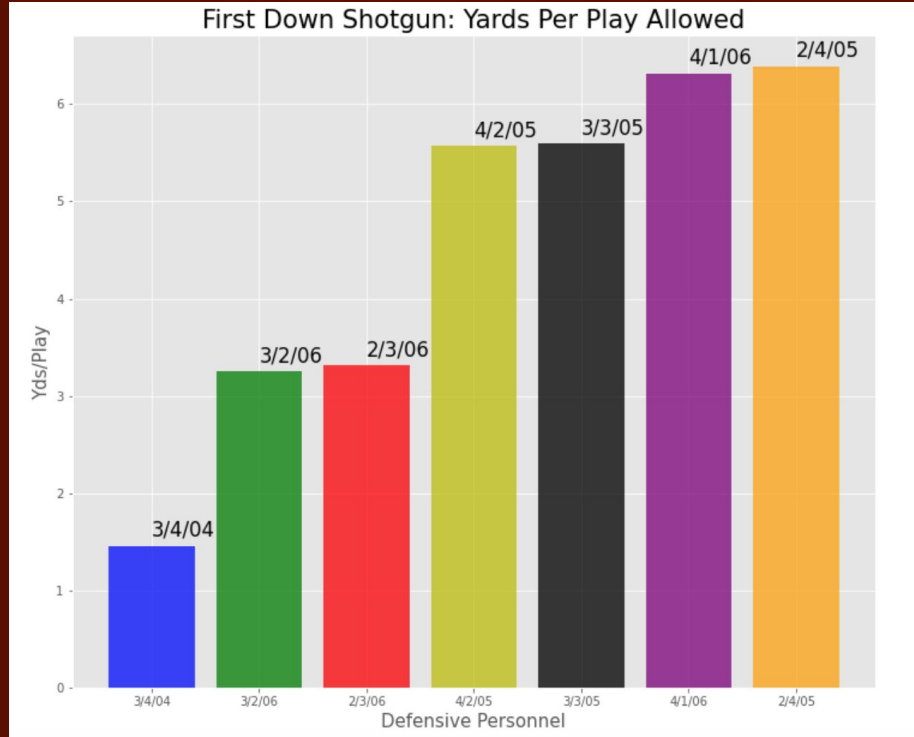
PLAYER	CATCHES	TARGETS	TARGET SHARE	TDS	TDS/CATCHES	TDS/TARGET
HILL	18	25	31.3%	7	38.9 %	28 %
HARDMAN	8	14	17.5%	2	25 %	14.3 %
KELCE	11	13	16.3%	5	45.5 %	38.5 %

Tyreek Hill is more often targeted, but Travis Kelce is their Red Zone “X-Factor”.

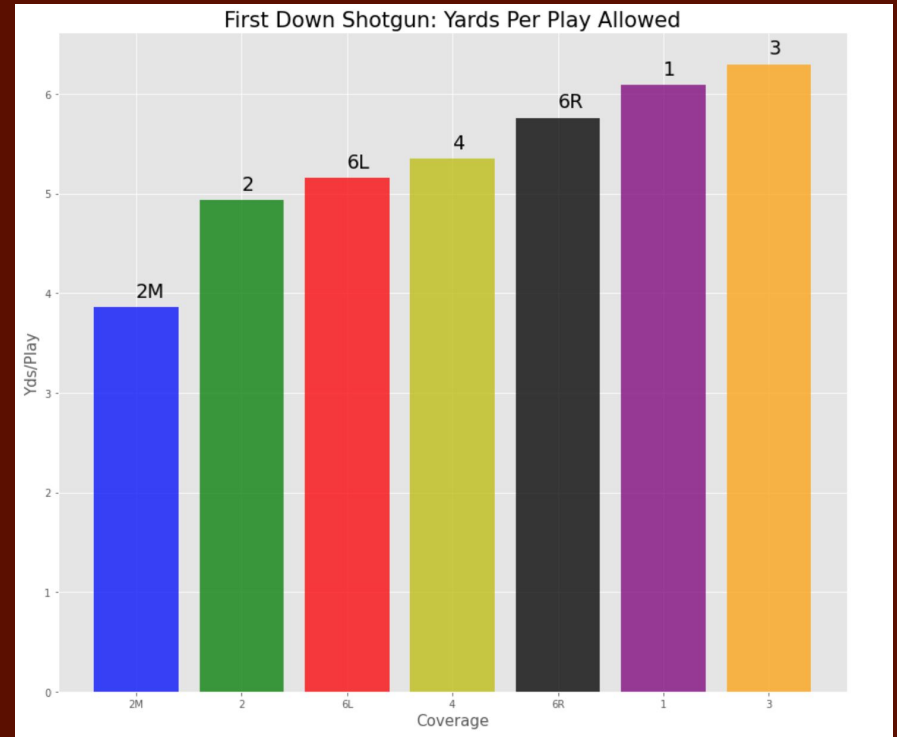


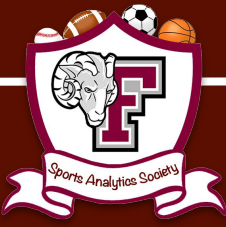
Influence on Optimal Decisions

Defensive Personnel:



Coverage Scheme:





Optimal Play Call On 1st Down Per Formation

1st Down

DIST (Y/1D)	FORM	COVERAGE	PERSONNEL	BOX	RUSHERS
10	Shotgun	Cover 2 Man	3 4 04	6	4
10	Singleback	Cover 4	2 4 05	9	5
10	I Form	Cover 6 R	3 4 04	8	4

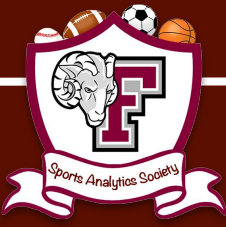


Optimal Play Call On 2nd Down Per Distance

2nd Down

DIST (Y/1D)	FORM	COVERAGE	PERSONNEL	BOX	RUSHERS
0 to 3	Shotgun	Cover 2	4 1 06	8	4
4 to 6	Shotgun	Cover 4	4 2 05	7	4
7+	Shotgun	Cover 3s	3 2 06	4	3

* Insufficient Sample For Singleback and I Form
Forms On 2nd and 3rd Downs

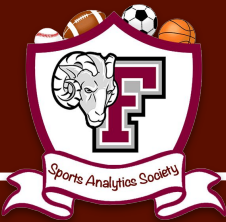


Defensive Gameplans: Downs (cont.)

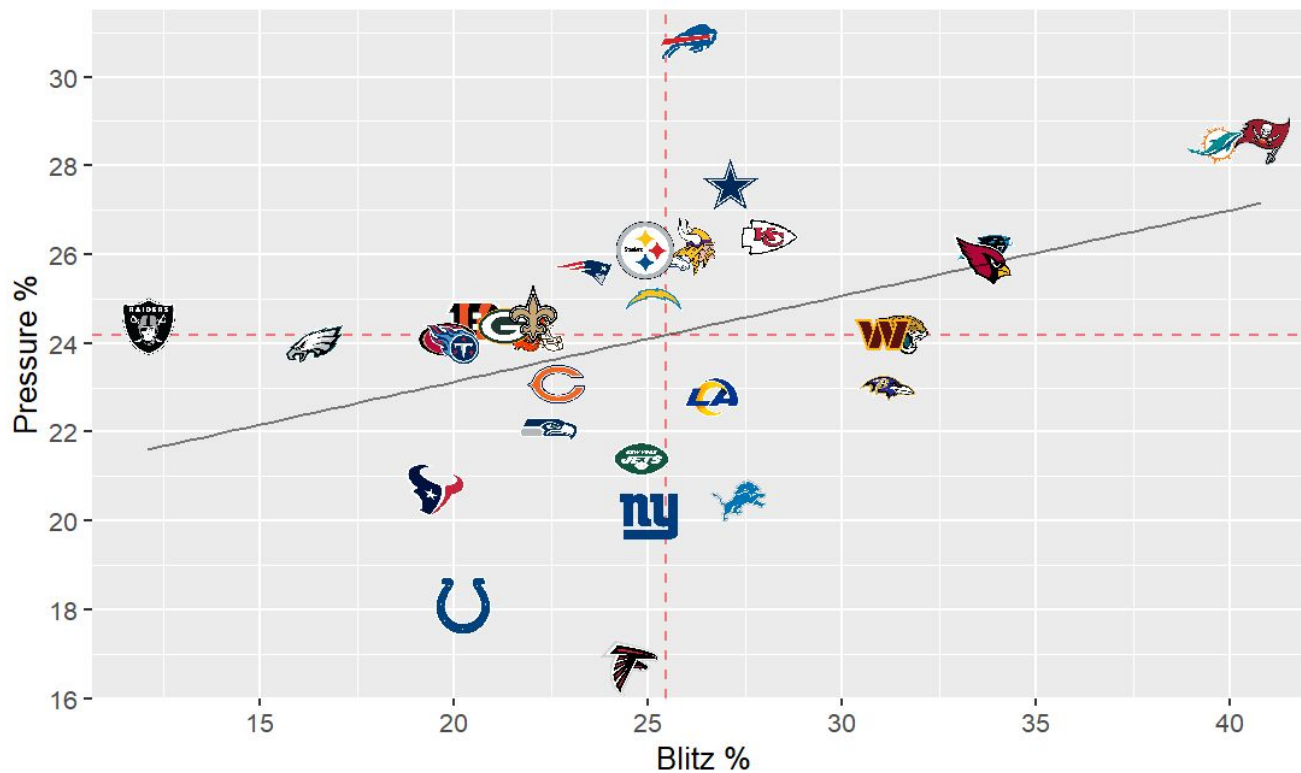
3rd Down

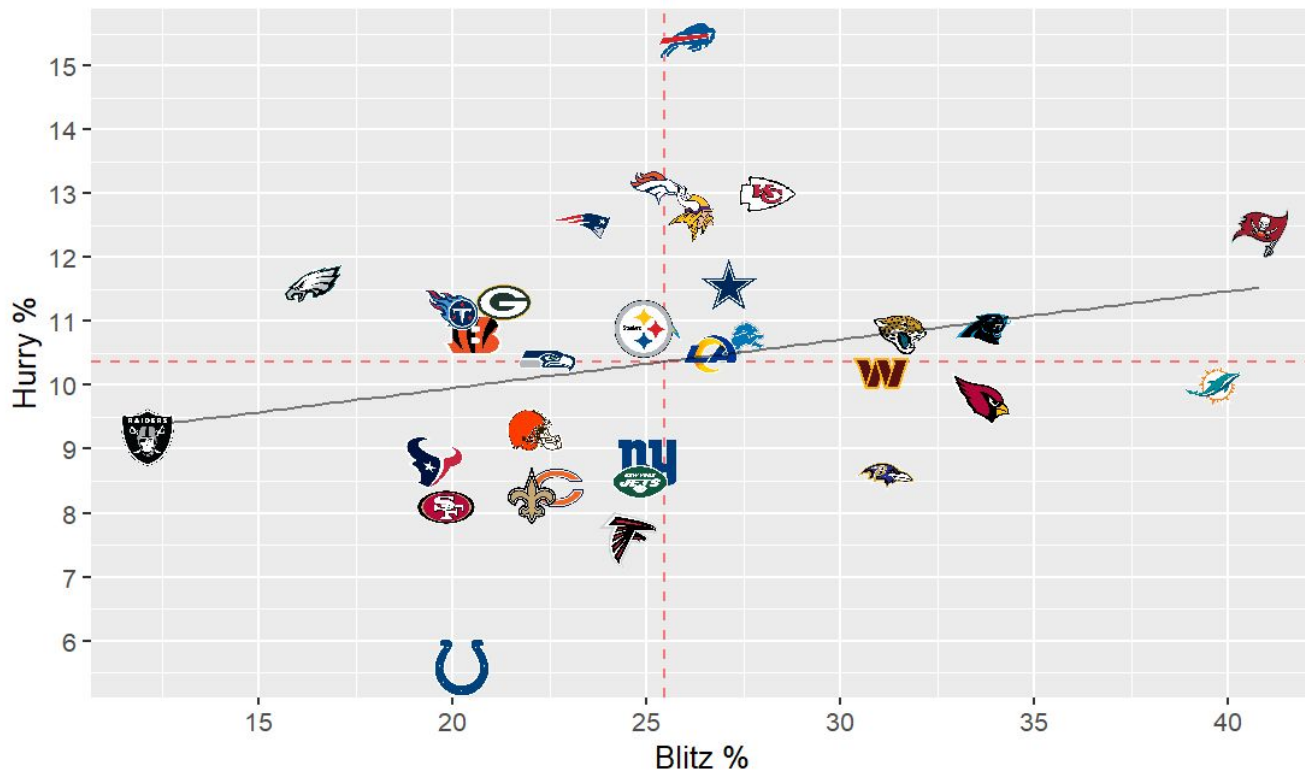
DIST (Y/1D)	FORM	COVERAGE	PERSONNEL	BOX	RUSHERS
0 to 3	Shotgun	Cover 6	3 3 05	7	5
4 to 6	Shotgun	Cover 3s	3 2 06	7	3
7+	Shotgun	Cover 6L	3 2 06	4	4

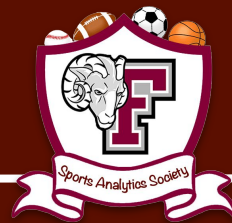
Part 3: Team Defenses

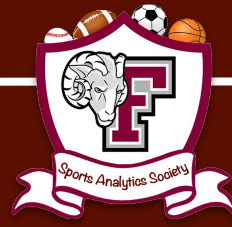


NFL Team Blitz and Pressure Rates, 2021 Season



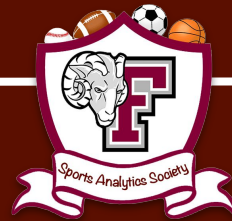






Saints Personnel - Coverage

- 5th in overall coverage grade (PFF), 2nd in overall defense (PFF)
- Marshon Lattimore:
 - 64.4 Man Coverage PFF Grade (15th amongst corners)
 - 12 pass breakups in man coverage (PBUs, 1st amongst corners)
 - 33% forced incompleteness percentage in man coverage (1st)
- Marcus Williams:
 - 77.2 PFF Coverage grade (7th amongst safeties)
 - 22 yards given up (13th overall) on 6 targets all season when in coverage



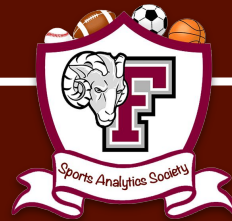
Saints Personnel - Coverage (cont.)

- Demario Davis:
 - 73.6 PFF Coverage grade (13th amongst LBs)
 - 60.0 passer rating when targeted (5th amongst LBs)
- Malcolm Jenkins:
 - 51.9 passer rating in man coverage (13th amongst safeties)
 - 0 TDs allowed in coverage



Patriots Personnel - Coverage

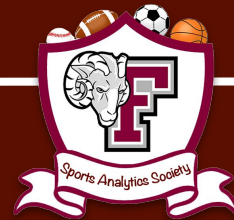
- JC Jackson:
 - 89.0 PFF Man Coverage Grade (1st amongst all players)
- Adrian Phillips:
 - 84.7 PFF Man Coverage Grade (2nd amongst safeties)
 - 27.6 passer rating allowed when targeted (5th amongst safeties)



Patriots Personnel - Coverage (cont.)

- Patriots run the most man coverage plays amongst all teams in NFL
- JC Jackson - 2nd highest % of man coverage plays ran amongst corners
- Devin McCourty - 2nd highest % of man coverage plays ran amongst safeties
- Kyle Dugger - 3rd highest % of man coverage plays ran amongst safeties
- Adrian Phillips - 5th highest % of man coverage plays ran amongst safeties
- Jalen Mills - 5th highest % of man coverage plays ran amongst corners

Patriots Personnel - Pash Rushers (min. 200 snaps)

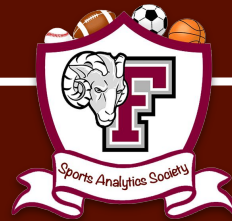


RANK	PLAYER	POSITION	PRESSURE RATE	DIFF BETWEEN LEAGUE AVG.
7	Matthew Judon	ED	14.88%	4.61%
21	Kyle Van Noy	LB	13.36%	3.09%
29	Christian Barmore	DI	12.38%	2.11%
100	Deatrich Wise Jr.	ED	8.92%	-1.35%



Saints Personnel - Pash Rushers (Min. 200 snaps)

RANK	PLAYER	POSITION	PRESSURE RATE	DIFF BETWEEN LEAGUE AVG.
14	Marcus Davenport	ED	14.14%	3.87%
47	David Onyemata	DI	11.31%	1.04%
61	Carl Granderson	ED	10.57%	.30%
88	Cameron Jordan	ED	9.36%	-0.91%



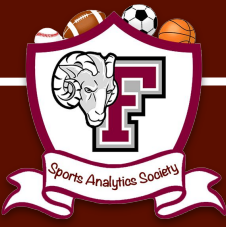
Our Approach To Predictions:

- Logistic Regression Predicts Likelihood of Pass vs. Run, Play-Action, and Motion
- Down, Distance, Time To Half, Quarter, Field Position, and Offensive Personnel
- Given Limited Data, A Binary Classification Model Should Be More Accurate

```
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split

#Perform Test Train Split (75% Train - 25% Test)
xtrain, xtest, ytrain, ytest = train_test_split(x, y, test_size = .25, random_state=14)

#Train The Logistic Regression Model And Apply To The Test Data
logReg = LogisticRegression()
logReg.fit(xtrain,ytrain)
```

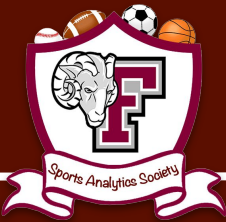


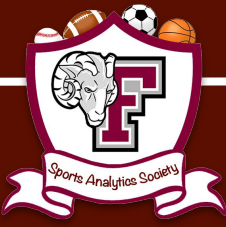
Logistic Regression Probabilities:

SITUATION	PROB OF PASSING PLAY	PROB OF PLAY ACTION	PROB OF MOTION
1	66.6%	33.5%	82.5%
2	90.5%	0.34%	52%
3	85.6%	12.7%	61%%
4	74.2%	7.9%	57.6%
5	99.7%	1.1%	39.9%

Situation 1:

Q1 15:00, 1st & 10, Own 25, 11 Personnel



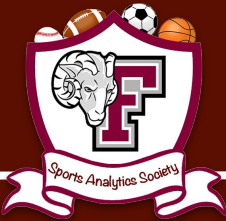


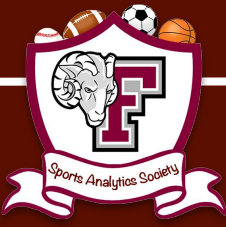
Situation 1

- Predicted: 66% chance it is a pass play, 33.5% play-action, 82.5% motion
- Chiefs in 11 personnel on 1st and 10 passes struggled most against:
 - Cover 2 man: 3.375 yards per play
- Personnel struggles
 - 3/4/04: 1.8 yards per play against
- No stunts on pass rush.
 - Pressure is quicker without stunts (.53sec) than with a stunt (1.2 sec)

Situation 2:

Q4 10:44, 4th & 2, 50 Yard Line, 12 Personnel



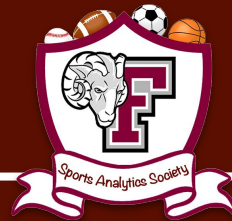


Situation 2

- PASS PASS PASS
 - 90% of the time in this situation, we predict KC will call for a pass
- Cover 1 is most effective in this scenario
 - In 12 personnel on passes thrown 0-5 yards, Chiefs average 1.87 yards per play against Cover 1
 - If this average, 1.87 yards, is what the defense allows, it would be a fourth down stop

Situation 3:

Q2 1:36, 2nd & 9, Own 40, 11 Personnel



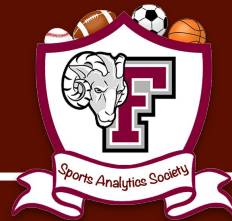


Situation 3

- Two minute drill From 11 personnel in 2nd and long, we found Cover 6 is most effective
 - 5.6 yards per play allowed
- 3/02/06 personnel found to work best allowing 1.8 yards per play
 - 6 DBs in coverage for obvious pass (85% predicted)
- Against cover 6 in two minute drill: AVG Target Depth is 2.5yds..
- Saints EPA when in Cover 6: -.177 & Pats: -.157

Situation 4:

Q3 8:12, 3rd & 2, Opp. 25, 13 Personnel

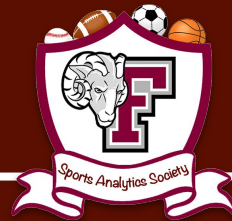


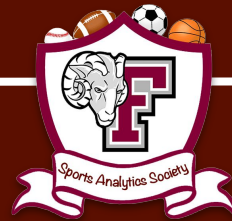


Situation 4

- 74% chance of pass, 16% chance of RPO
- The play: cover 1 and bracket Hill because of his 31.25% RZ target share
- With 13 personnel: more players in the box meant less success
 - 7 players in the box: 9.2 yards per play
 - 8 players: 4.5 yards per play
- On normal play, Mahomes has an average of 1.05 seconds until pressure
- Within 3 yards, this decreases to an average of 0.75 seconds

Situation 5:
Q4 0:54 1st & 10, Own 25,
No Timeouts, Tie Game, 01 Personnel





Situation 5

- With no timeouts and little time, KC will push down the field quickly
- In 2 minute drills, KC struggles most against man defenses
 - Under 2 mins, -0.07 EPA/Play vs Cover 2 man
- When middle of field coverage is shown as open:
 - Average yards/play is 0.4 yards less vs. when middle of field looks covered
 - This is relevant because KC is trying to stop the clock by going out of bounds

Conclusion

Thanks to PFF and Syracuse!

