



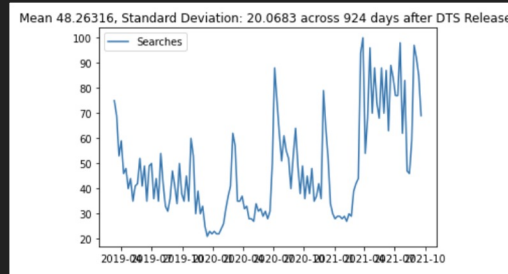
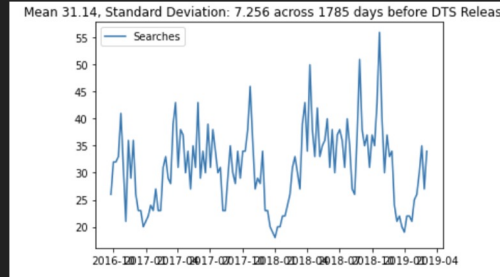
# How to Win an F1 Race: Driver, Constructor or Strategy?

Ranbir Mahtani and Manoj Simha

# Mercedes spent \$459M to Win the F1 Championship in 2020<sup>1</sup>

## Key Questions

1. What's more important to final position - driver, constructor, pit strategy, age?
2. Can we predict the outcome of a race given these variables?
3. What pit strategies are optimal for each circuit? Can they overcome starting position?



\$50mm went to their star driver Lewis Hamilton

20 Drivers

Formula 1 teams have massive budgets and a massive fanbase

10 Teams/Constructors

It is vital to spend resources wisely and exploit every edge

Qualifying, Race →  
WDC, WCC

<sup>1</sup><https://www.thedrive.com/accelerator/40525/it-cost-mercedes-459m-to-win-the-f1-championship-in-2020>

# Driver vs Constructor: Initial Approach

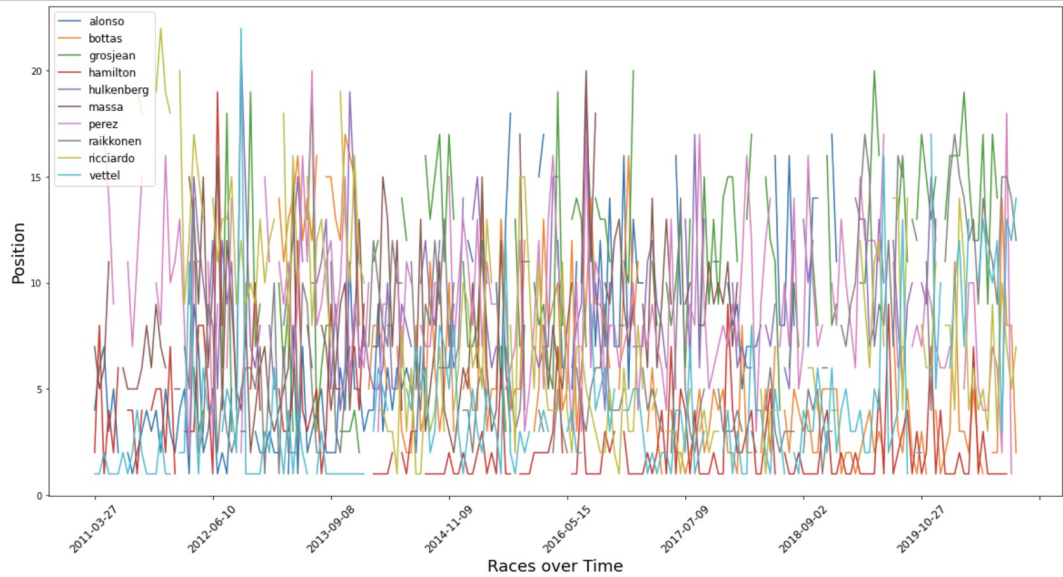
## Approach 1 (Driver vs Constructor):

- Mean Difference Approach
- Hold constructors constant
- Get the average of the difference in position amongst teammates ~ 3 positions → 3/20 → 15%



WILLIAMS ESPORTS   
@WilliamsEsports

This moment when your teammate becomes your biggest rival on track... 😊 🙄



# Multiple Regression Outputs and Analysis

Driver	Coefficien t	SE
Webber	-4.3281	1.206
Raikkonen	-3.9415	0.744
Vettel	-3.8794	0.511
Hamilton	-2.9624	0.870
Verstappen	-2.5917	0.619

Team	Coefficien t	SE
Mercedes	-5.9702	0.857
Red Bull	-3.0299	0.482
Ferrari	-2.8166	0.349
Lotus	-2.1760	0.593
McLaren	0.2824	0.425

Pit Stops	Coefficien t	SE
1	0.4628	0.200
2	1.1034	0.197
3	1.8463	0.224
4	1.7041	0.321
6	4.0104	0.876

	Coefficien t	SE
Age	0.6781	0.271

# Driver-Controlled Coefficient for Constructors

	Ferrari	Red Bull	Mercedes	Lotus	Force India	McLaren	Racing Point	Sauber	Williams	Afla Romeo
Alonso	2.9932					8.2032				
Bottas			2.5804						6.6337	
Hamilton			1.9001			2.8951				
Massa	5.5864								6.1596	
Perez					6.4473	4.1737	4.831	6.1866		
Raikkonen	3.6735			2.8938						7.852
Rosberg			4.3553							
Vettel	3.9652	2.6639								
Webber		3.2745								
Average	4.054575	2.9692	2.945267	2.8938	6.4473	5.09067	4.831	6.1866	6.39665	7.852

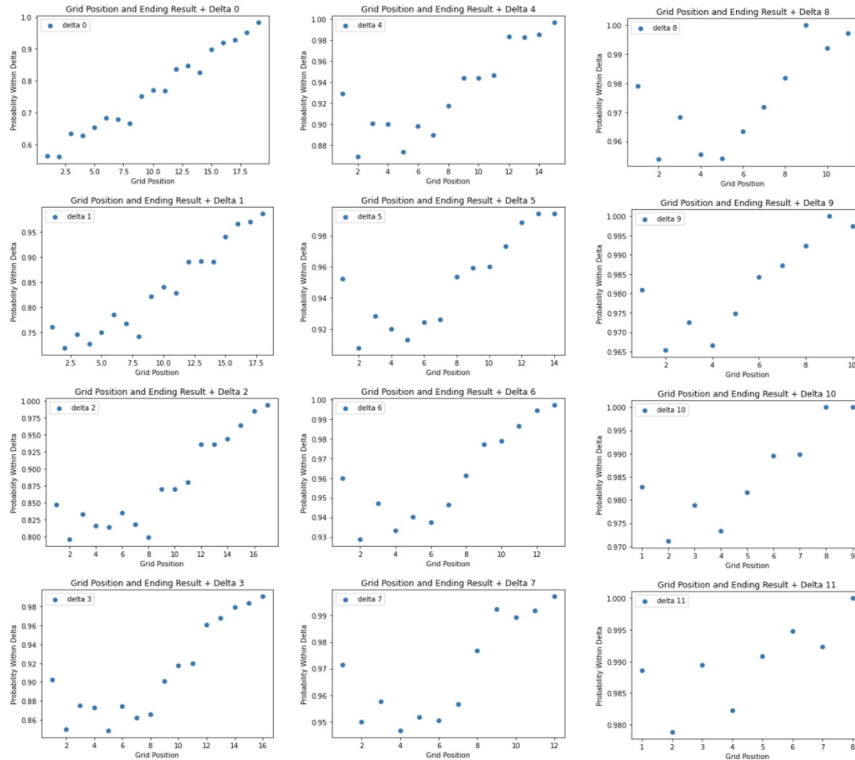
Constructor	Highest Driver Contribution
Ferrari	0.2617721956
Red Bull	0.102822309
Mercedes	0.3548631703
McLaren	0.4312925616
Williams	0.03705846029

## Key Takeaway:

**At their best (Hamilton with Mercedes), drivers can account for approx. 35% of race results while constructors account for 65%**

# Importance of Race Day

Fig 6: Grid Position + Delta Graphs



# Pitstop Strategy

	positionOrder	name_x	stop	
	0	8.750000	70th Anniversary Grand Prix	2.0
	1	8.750000	Brazilian Grand Prix	3.0
	2	8.790698	Abu Dhabi Grand Prix	1.0
	3	7.333333	Australian Grand Prix	1.0
	4	7.333333	Italian Grand Prix	1.0
	5	8.400000	Austrian Grand Prix	2.0

- Brazilian Grand Prix
  - Min Average Position 8.75
  - Corresponding strategy: 2 stops