How Increasing Changeup Usage Made Shane McClanahan one of the Most Dominant Pitchers of 2022

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Tampa Bay Rays SP Shane McClanahan had a breakout sophomore year in 2022 receiving his first CY Young votes. In 2021, McClanahan posted an xERA(expected earned run average over nine innings based on expected weighted on-base average) of 4.60 which is not a great figure compared to league average. In 2022, McClanahan posted an elite 2.79 xERA dropping his xERA by a staggering 1.81 expected runs per nine innings. How did McClanahan find such success in 2022 compared to 2021? Are there other metrics that vastly improved as well over this span that correlate with this big drop in xERA? As an organization known for pitching development, I wanted to find if there are any metrics that it seems the Rays prioritize.

```
head(chadwick_player_lu()) #For player database, no need to be displayed
```

```
## -- Player Lookup from the Chadwick Bureau's public register of baseball players
```

```
## i Data updated: 2022-12-13 14:39:22 PST
```

```
## # A tibble: 6 x 40
##   key_person key_uuid    key_m~1 key_r~2 key_b~3 key_b~4 key_f~5 key_npb key_s~6
##   <chr>      <chr>         <int> <chr>   <chr>   <chr>     <int>   <int> <chr>
## 1 663ecca1   663ecca1-6~  439524 ""      ""      thoen-~      NA      NA ""
## 2 b9b35787   b9b35787-c~      NA ""      ""      pssque~      NA      NA ""
## 3 3e8b4a3e   3e8b4a3e-0~      NA ""      ""      ahara-~      NA      NA ""
## 4 8e7b24b0   8e7b24b0-6~      NA ""      ""      ahease~      NA      NA ""
## 5 aaf20538   aaf20538-b~      NA ""      ""      aaberg~      NA      NA ""
## 6 34c63185   34c63185-8~      NA ""      ""      aadlan~      NA      NA ""
## # ... with 31 more variables: key_sr_nba <chr>, key_sr_nhl <chr>,
## #   key_findagrave <int>, name_last <chr>, name_first <chr>, name_given <chr>,
## #   name_suffix <chr>, name_matrilineal <chr>, name_nick <chr>,
## #   birth_year <int>, birth_month <int>, birth_day <int>, death_year <int>,
## #   death_month <int>, death_day <int>, pro_played_first <int>,
## #   pro_played_last <int>, mlb_played_first <int>, mlb_played_last <int>,
## #   col_played_first <int>, col_played_last <int>, pro_managed_first <int>, ...
```

```
playerid_lookup(last_name = "McClanahan", first_name = "Shane") #Found player ID is 663556
```

```
## -- Player ID Lookup from the Chadwick Bureau's public register of baseball playe
```

```
## i Data updated: 2022-12-13 14:39:27 PST
```

```
## # A tibble: 1 x 11
##   first_name last_name  given_~1 name_~2 nick_~3 birth~4 mlb_p~5 mlbam~6 retro~7
##   <chr>      <chr>      <chr>    <chr>   <chr>     <int>   <int>   <int> <chr>
## 1 Shane      McClanahan Shane    ""      ""         1997    2021  663556 mccls0~
## # ... with 2 more variables: bbref_id <chr>, fangraphs_id <int>, and
## #   abbreviated variable names 1: given_name, 2: name_suffix, 3: nick_name,
## #   4: birth_year, 5: mlb_played_first, 6: mlbam_id, 7: retrosheet_id
```

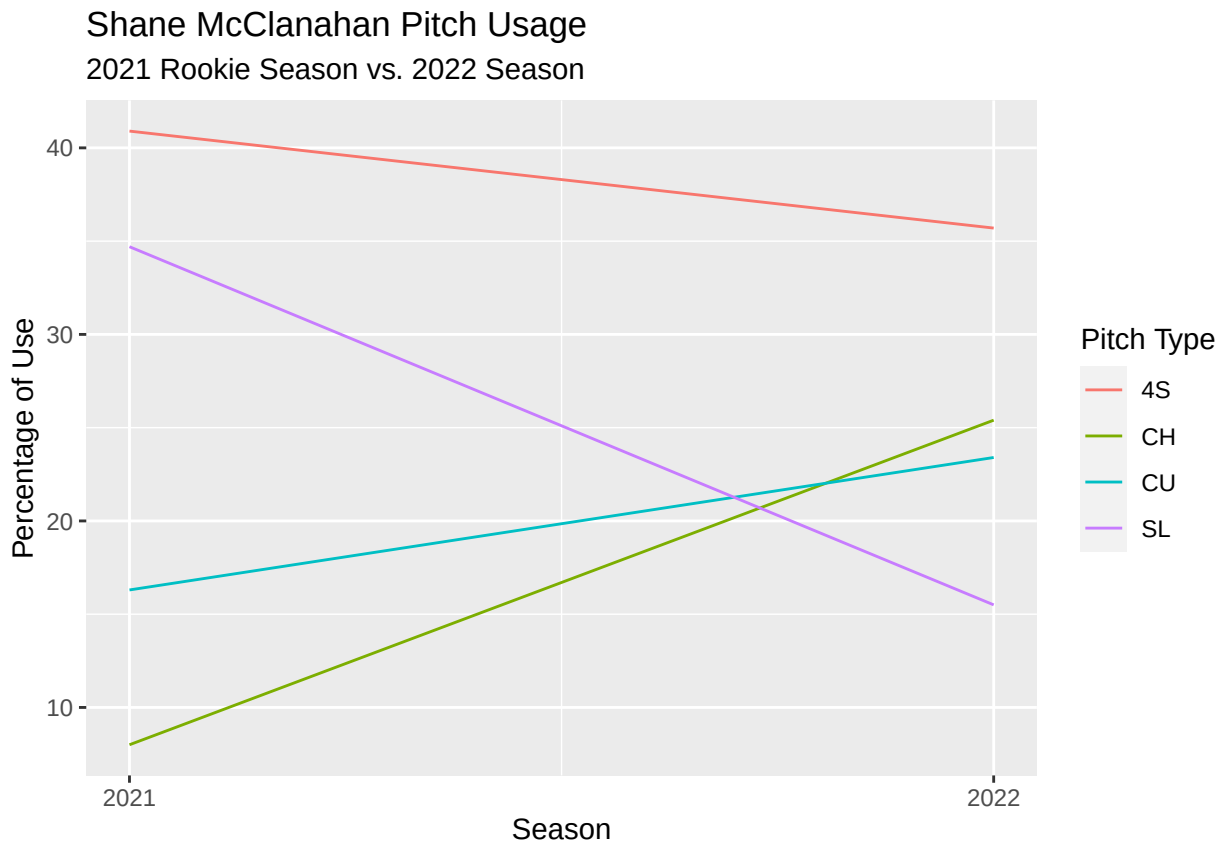
```
shane21temp <- statcast_search_pitchers(start_date = "2021-04-01", end_date = "2021-10-02",
                                        pitcherid = 663556) #Finds Shane McClanahan's 2021 pitches
shane22temp <- statcast_search_pitchers(start_date = "2022-04-01", end_date = "2022-10-02",
                                        pitcherid = 663556)#Finds Shane McClanahan's 2022 pitches
```

```
Season <- c(2021, 2022, "Career", "MLB Average")
Age <- c(24, 25, 0, 0)
Pitches <- c(1954, 2463, 4417, 0)
Batted_Balls <- c(337, 405, 742, 0)
Barrels <- c(36, 26, 62, 0)
Barrel_Percentage <- c(10.7, 6.4, 8.4, 6.7)
Barrel_PA <- c(7.0, 4.1, 5.4, 4.6)
Exit_Velocity <- c(91.7, 87.6, 89.5, 88.4)
Max_EV <- c(117.3, 116.2, 117.3, 122.4)
Launch_Angle <- c(8.5, 8.3, 8.4, 12.1)
Sweet_Spot_Percentage <- c(36.8, 31.6, 34.0, 33.0)
#I had to combine multiple data sets that I found and input them manually as
#there was no option to export and I had to log everything manually.
xBA <- c(.263, .207, .232, .245)
xSLG <- c(.436, .332, .379, .405)
WOBA <- c(.304, .248, .273, .316)
xWOBA <- c(.328, .261, .291, .315)
Hard_Hit_Percentage <- c(45.7, 32.6, 38.5, 35.8)
#In the future I think I am going to build a program that scrapes data automatically if it
#is not found in baseballr as season overall stats for players are not included.
K_Percentage <- c(27.3, 30.3, 29.0, 22.1)
BB_Percentage <- c(7.2, 5.8, 6.4, 8.4)
ERA <- c(3.43, 2.54, 0, 0)
xERA <- c(4.60, 2.79, 0, 0)
FIP <- c(3.31, 3.00, 3.13, 0)
WHIP <- c(1.273, 0.926, 0, 0)

seasons <- data.frame(Season, Age, Pitches, Batted_Balls, Barrels, Barrel_Percentage, Barrel_PA,
                      Exit_Velocity, Max_EV, Launch_Angle, Sweet_Spot_Percentage,
                      xBA, xSLG, WOBA, xWOBA, Hard_Hit_Percentage, K_Percentage, BB_Percentage,
                      ERA, xERA, FIP, WHIP) #Create dataset "seasons"
```

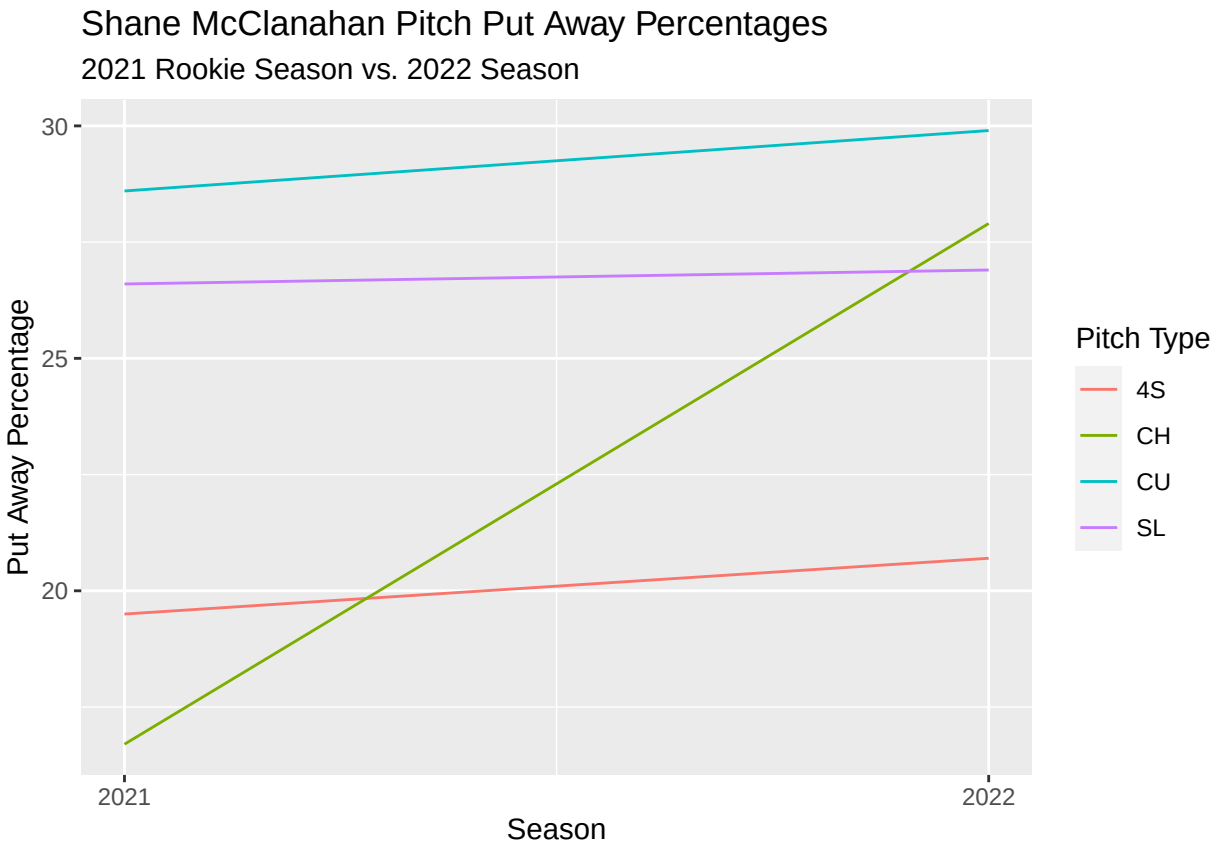
```
Year <- c(2022, 2021, 2022, 2021, 2022, 2021, 2022, 2021)
Pitch_Type <- c("4S", "4S", "CH", "CH", "CU", "CU", "SL", "SL")
Use_Percentage <- c(35.7, 40.9, 25.4, 8.0, 23.4, 16.3, 15.5, 34.7)
AVG_MPH <- c(96.7, 96.4, 87.7, 89.2, 82.0, 82.5, 89.3, 89.1)
#Pitch data from baseball savant
AVG_Spin <- c(2233, 2256, 1732, 1725, 2628, 2653, 2350, 2400)
PutAWay_Percentage <- c(20.7, 19.5, 27.9, 16.7, 29.9, 28.6, 26.9, 26.6)
```

```
pitches <- data.frame(Year, Pitch_Type, Use_Percentage, AVG_MPH, AVG_Spin, PutAWay_Percentage)
#Create df based on pitch data
```

```
ggplot(data = pitches) +
  geom_line(mapping = aes(x = Year, y = Use_Percentage, color = Pitch_Type)) +
  scale_x_continuous("Season", c(2021, 2022)) +
  scale_y_continuous("Percentage of Use") +
  ggtitle("Shane McClanahan Pitch Usage", "2021 Rookie Season vs. 2022 Season") +
  guides(color = guide_legend(title = "Pitch Type"))
```

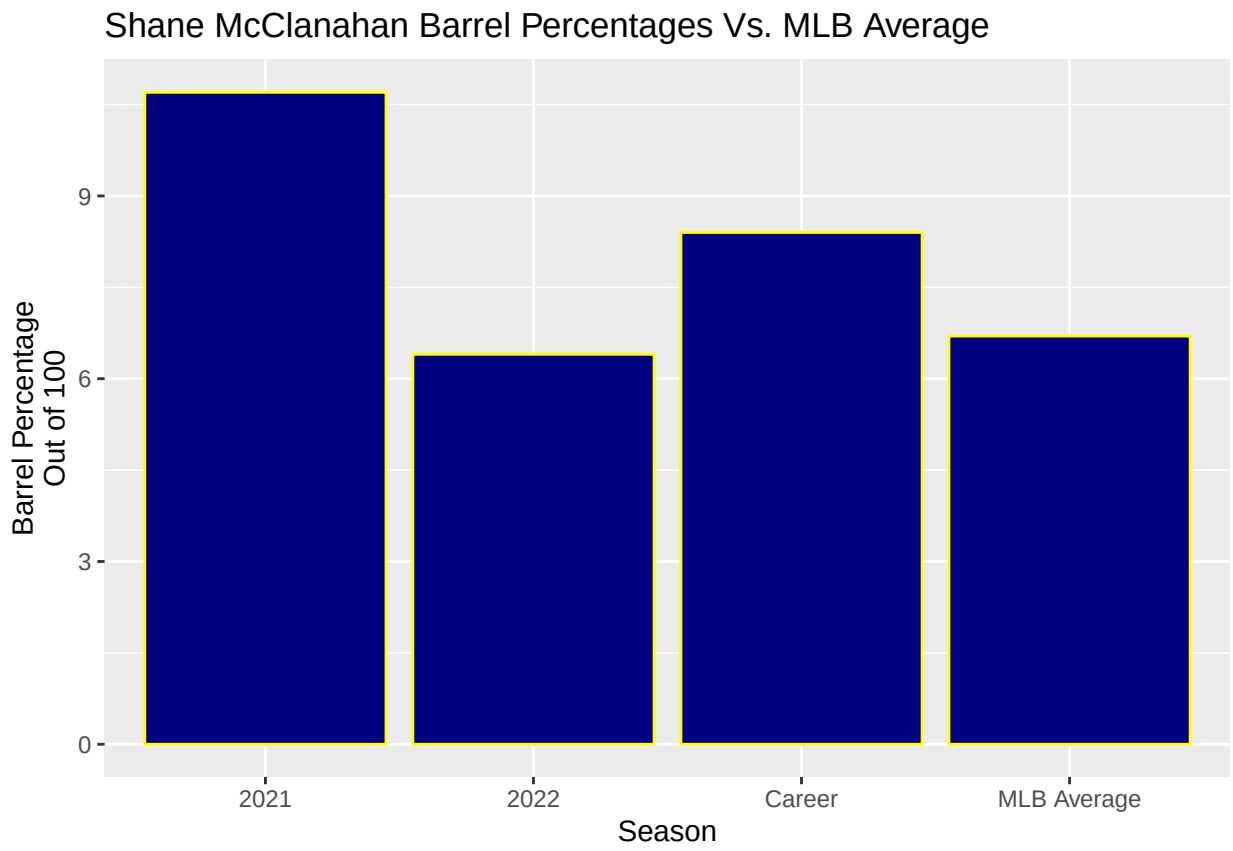



```
ggplot(data = pitches) +
  geom_line(mapping = aes(x = Year, y = PutAWay_Percentage, color = Pitch_Type)) +
  scale_x_continuous("Season", c(2021, 2022)) +
  scale_y_continuous("Put Away Percentage") +
  ggtitle("Shane McClanahan Pitch Put Away Percentages", "2021 Rookie Season vs. 2022 Season") +
  guides(color = guide_legend(title = "Pitch Type"))
```

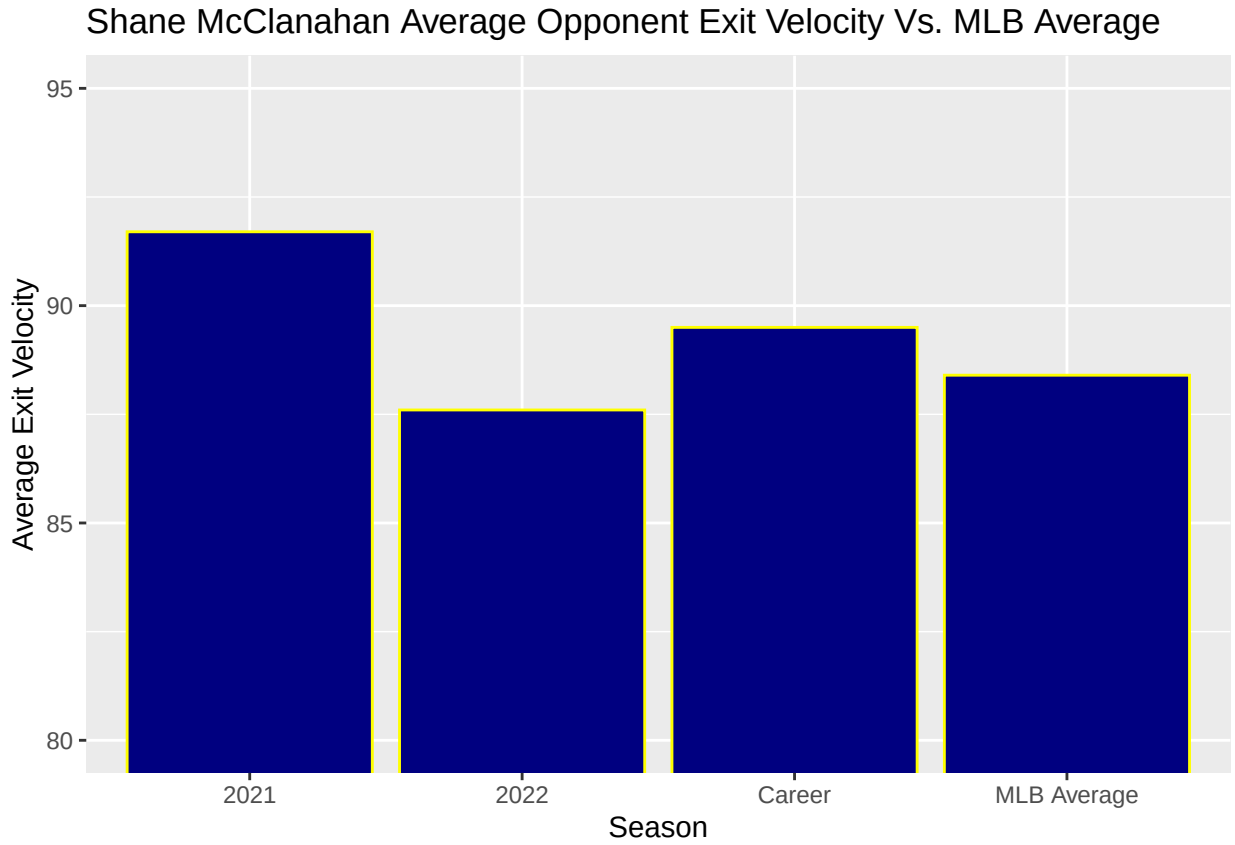


These are Shane McClanahan's pitch usage percentages and put away percentages for 2021 and 2022 according to baseball savant. His pitch usage changed quite a bit from his rookie season in 2021 to 2022. McClanahan found much more success in 2022 by altering not necessarily his arsenal, but how he used it. In 2022, McClanahan threw his 4-Seam Fastball about 5% less, Slider about 19% less, Changeup about 17% more, and Curveball about 7% more. When you look at the put-away percentages, you find that McClanahan's Changeup went from a 17% put-away rate in 2021 to a 28% put-away rate 2022. By increasing his usage on his Changeup and limiting the use of his slider, McClanahan's Changeup became his second best put-away pitch and his xERA went from a poor 4.6 in 2021 to an elite 2.79.

```
barrels <- ggplot(data = seasons, mapping = aes(x = Season, y = Barrel_Percentage)) +
  geom_col(color = "Yellow", fill = "Navy") +
  ggtitle("Shane McClanahan Barrel Percentages Vs. MLB Average") +
  scale_y_continuous("Barrel Percentage\nOut of 100")

exitvelo <- ggplot(data = seasons, mapping = aes(x = Season, y = Exit_Velocity)) +
  geom_col(color = "Yellow", fill = "Navy") +
  ggtitle("Shane McClanahan Average Opponent Exit Velocity Vs. MLB Average") +
  scale_y_continuous("Average Exit Velocity") +
  coord_cartesian(ylim = c(80, 95))

barrels
```

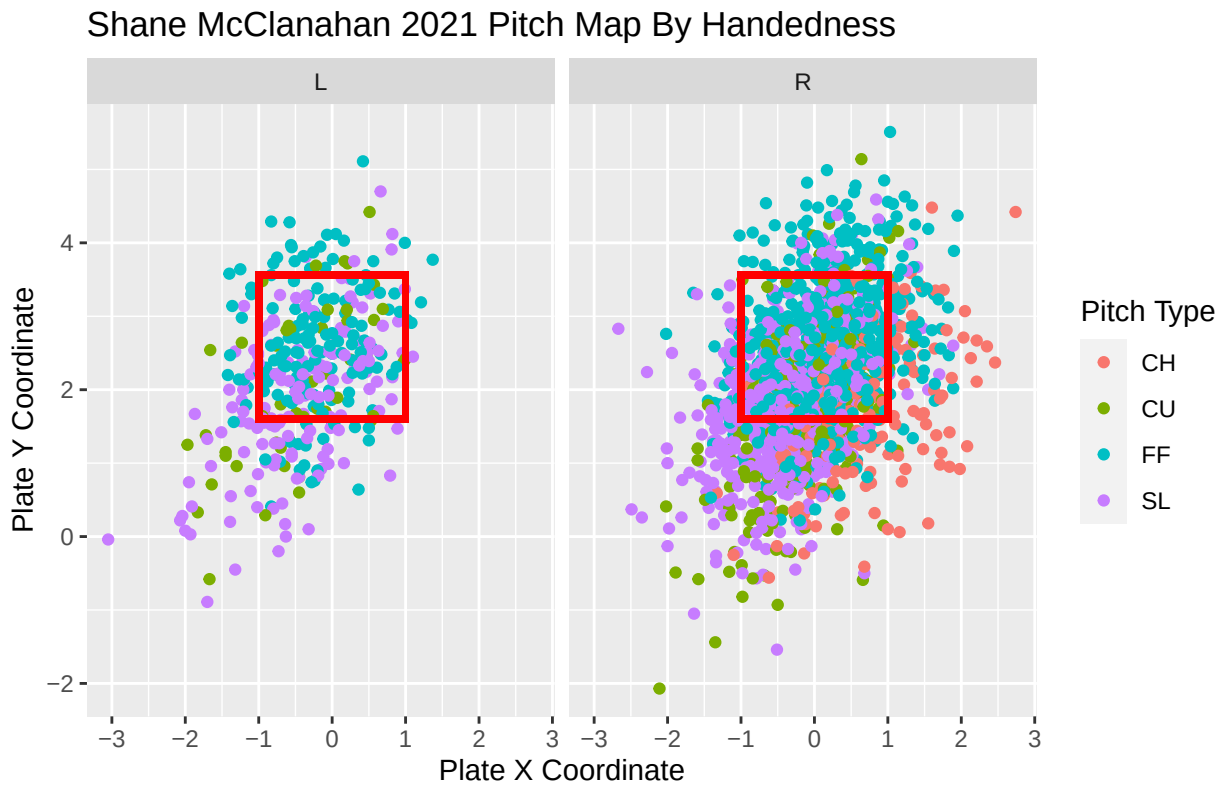

Shane McClanahan Barrel Percentages Vs. MLB Average
Barrel Percentage
Out of 100
9
6
3
0
2021
2022
Career
MLB Average
Season

```
exitvelo
```



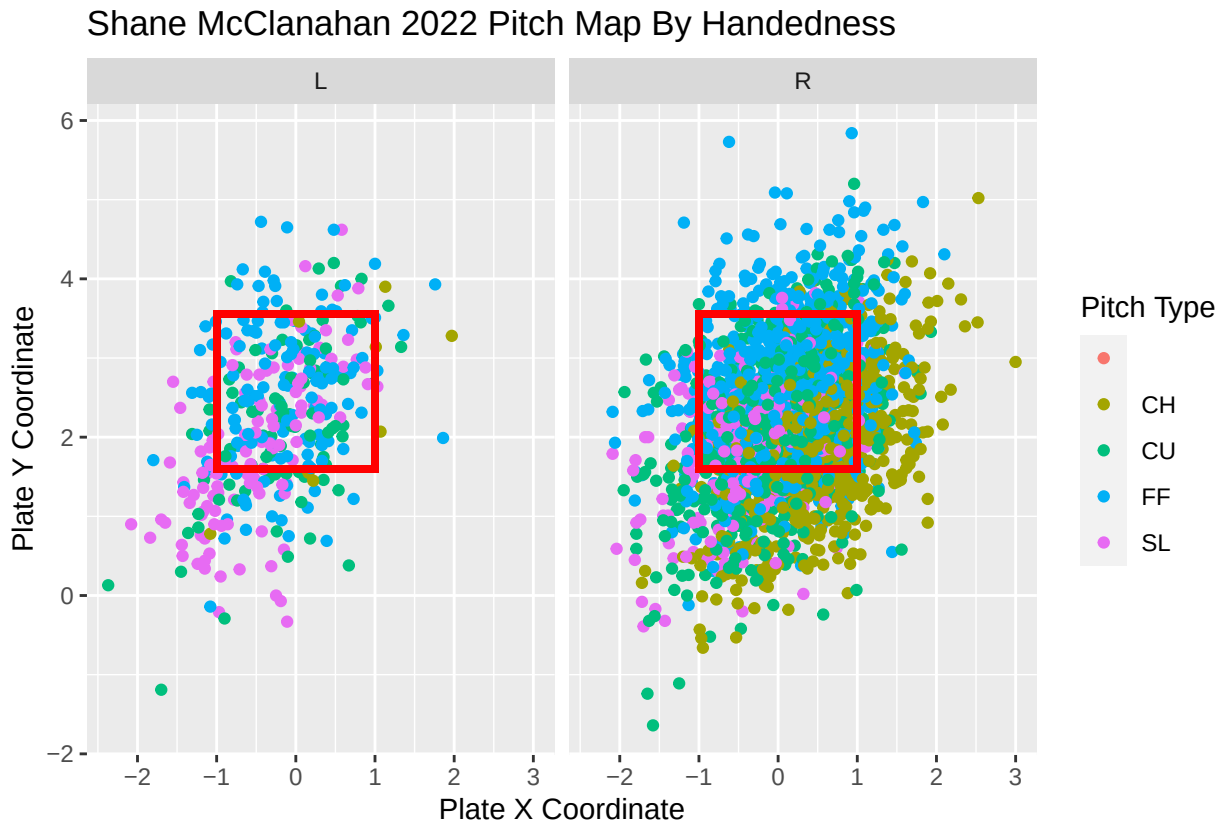
McClanahan posted elite AVG exit velocity and barrel percentages in 2022 bringing his overall career statistics down tremendously from 2021. McClanahan received 10 total points in AL Cy Young Award voting making him one of the most exciting up and coming pitchers in baseball and one of the most respected. McClanahan was well above MLB Average in many categories and had one of the biggest breakout seasons of all pitchers this year.

```
ggplot(data = shane21temp) +
  geom_point(mapping = aes(x = plate_x, y = plate_z, colour = pitch_type)) +
  facet_grid(~stand)+
  coord_equal() +
   geom_rect(mapping = aes(ymax = 3.56, ymin = 1.6, xmax = -1, xmin = 1),
             alpha = 0, size=1.2, colour = "red") +
  ggtitle("Shane McClanahan 2021 Pitch Map By Handedness") +
  scale_y_continuous("Plate Y Coordinate") +
  scale_x_continuous("Plate X Coordinate") +
  guides(color = guide_legend(title = "Pitch Type"))
```




```
ggplot(data = shane22temp) +
  geom_point(mapping = aes(x = plate_x, y = plate_z, color = pitch_type)) +
  facet_grid(~stand)+
  coord_equal() +
   geom_rect(mapping = aes(ymax = 3.56, ymin = 1.6, xmax = -1, xmin = 1),
             alpha = 0, size=1.2, colour = "red") +
  ggtitle("Shane McClanahan 2022 Pitch Map By Handedness") +
  scale_y_continuous("Plate Y Coordinate") +
  scale_x_continuous("Plate X Coordinate") +
  guides(color = guide_legend(title = "Pitch Type"))
```

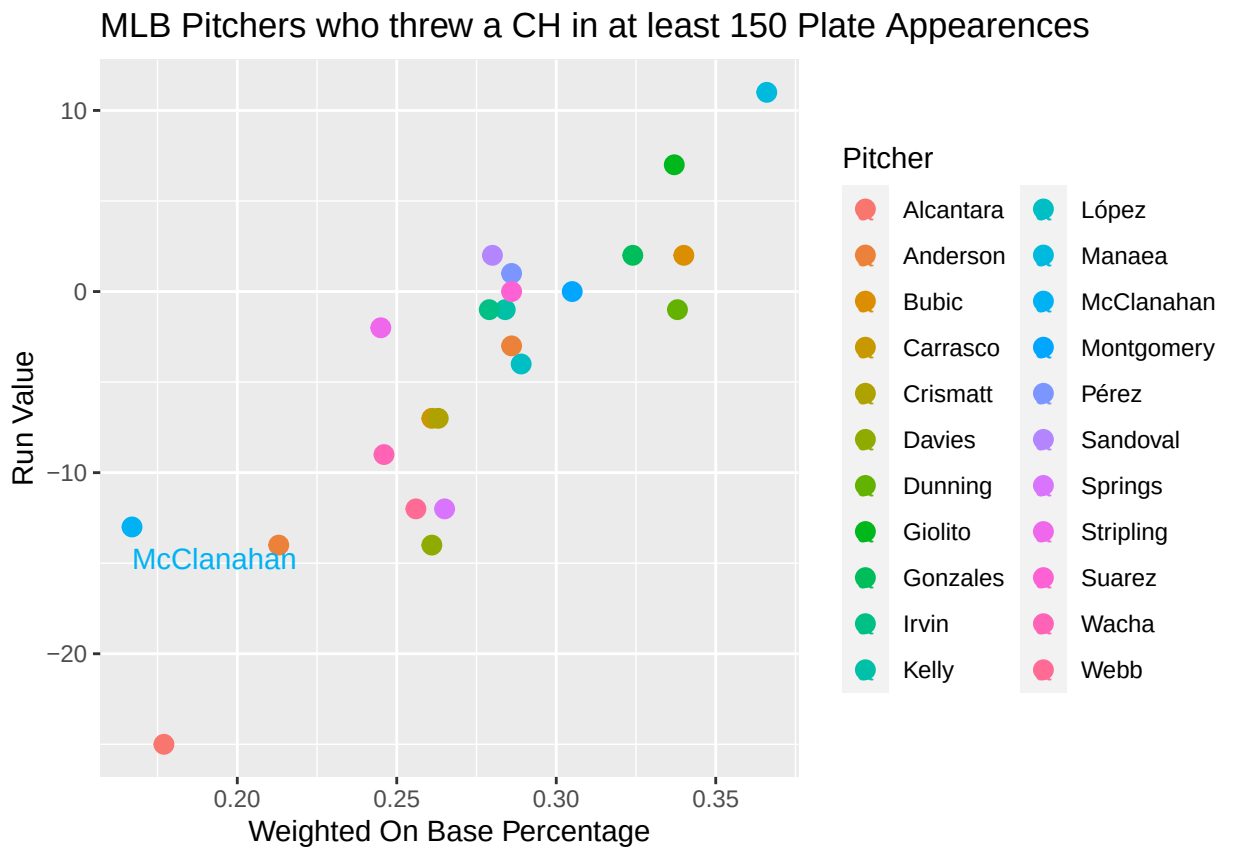
```
## Warning: Removed 31 rows containing missing values (geom_point).
```



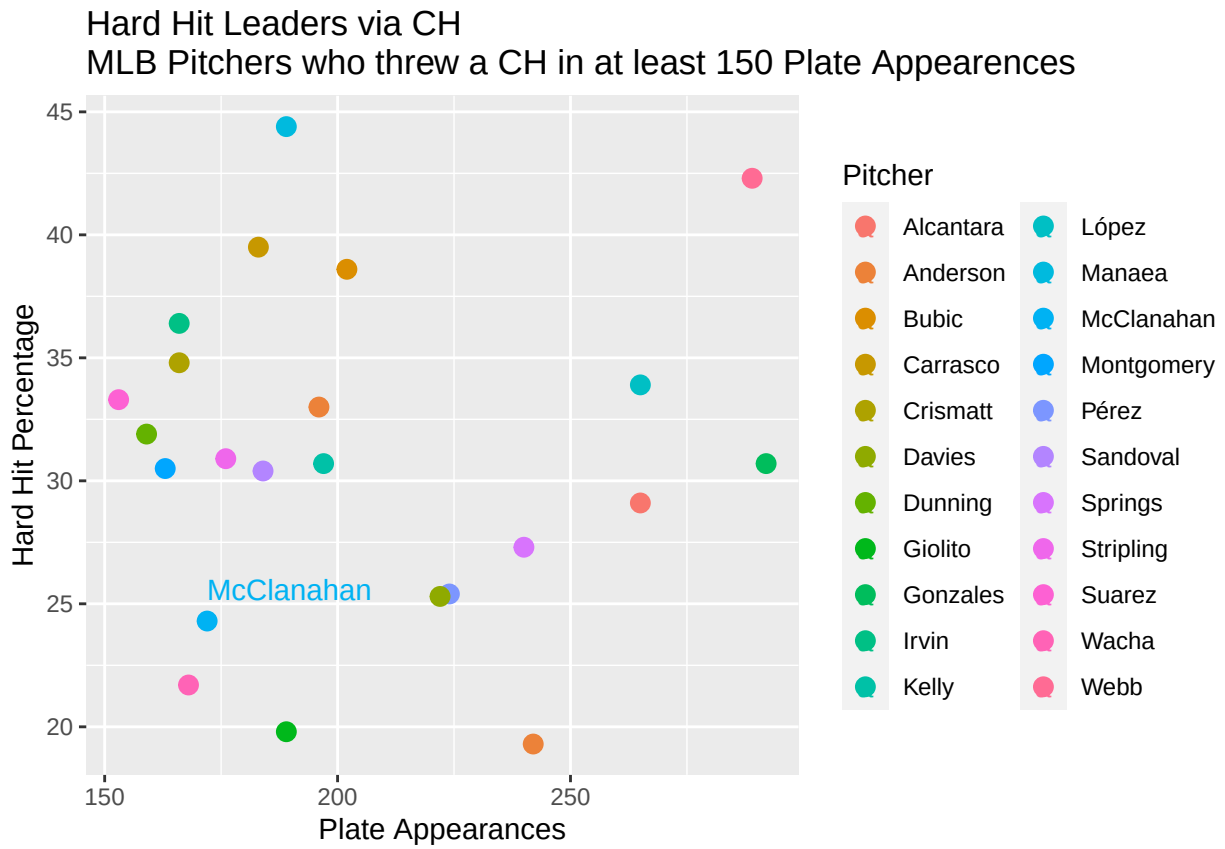

```
#Unsure why this gets another color for no data.
```

When looking at his 2021 pitch map vs 2022 pitch map, you can really see the difference in changeup usage. The big thing that stands out to me is also the difference between pitch mixes to right handed and left handed batters. His changeup usage skyrocketed against right handed batters while his slider was still being used as his primary put-away pitch against left handed batters. According to the maps, most of McClanahan's new found success came from tunneling low and in changeups off of elevated fastballs. The Rays pitcher's arsenal has been effective and he has had the ability to be more successful, he just wasn't utilizing his arsenal in the most effective way.

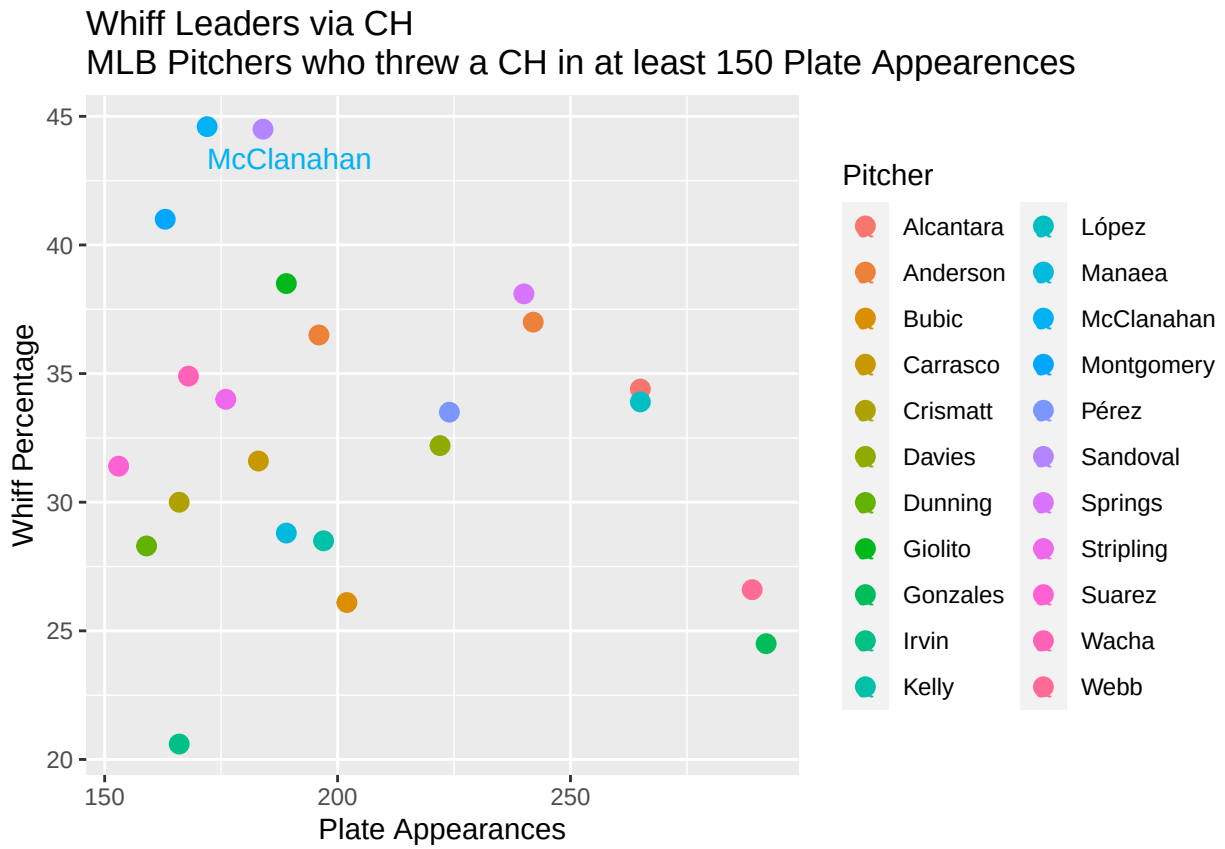
```
changeups <- read.csv("C:\\Users\\grayl\\OneDrive\\Desktop\\Baseball\\McClanahan Proj\\MostUsedCH.csv")


ggplot(data = changeups, mapping = aes(x = woba, y = run_value, color = last_name,
                                       label = ifelse(woba < .17, "McClanahan", " "),
                                       hjust = 0, vjust = 2)) +
  geom_point(size = 3) +
  geom_text() +
  ggtitle("MLB Pitchers who threw a CH in at least 150 Plate Appearences") +
  scale_y_continuous("Run Value") +
  scale_x_continuous("Weighted On Base Percentage") +
  guides(color = guide_legend(title = "Pitcher"))
```



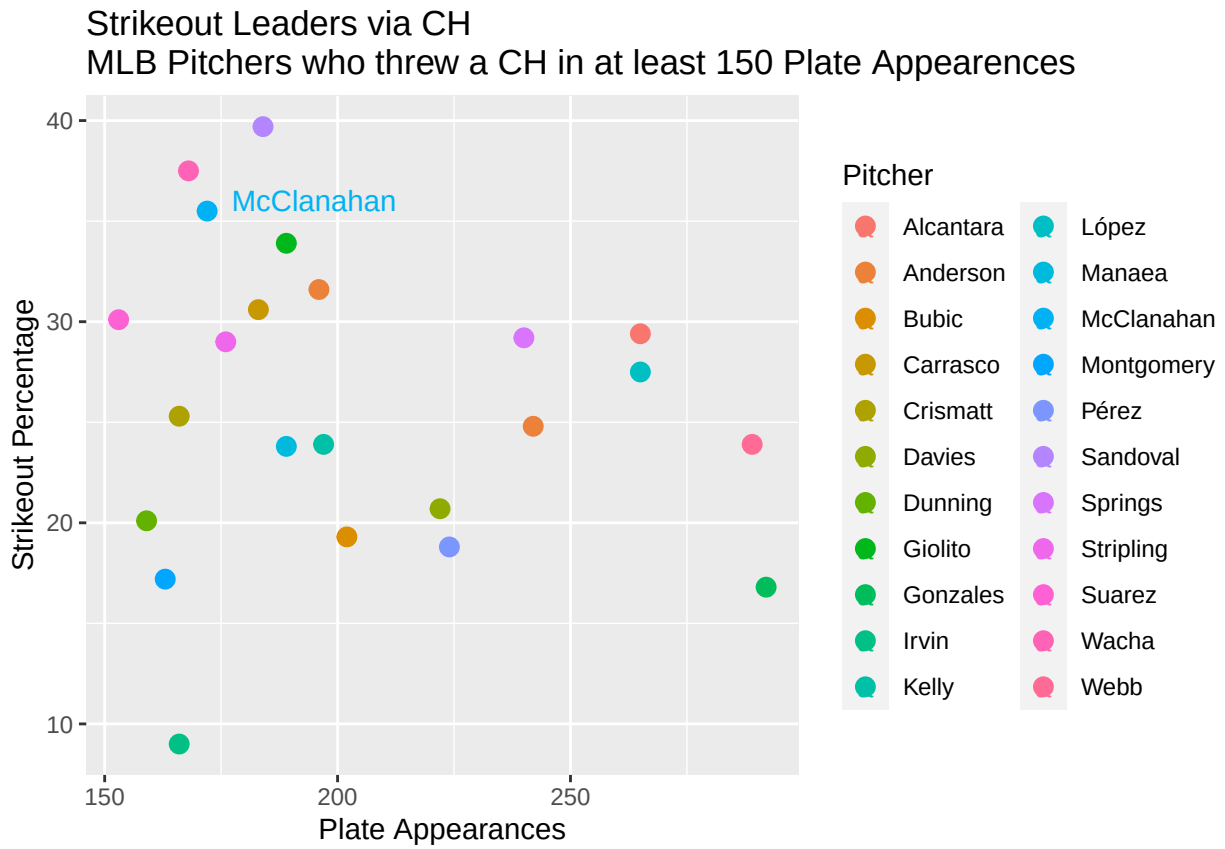

```
ggplot(data = changeups, mapping = aes(x = pa, y = hard_hit_percent, color = last_name,
                                       label = ifelse(pa == 172, "McClanahan", " "),
                                       hjust = 0, vjust = -1)) +
  geom_point(size = 3) +
  geom_text() +
  ggtitle("Hard Hit Leaders via CH\nMLB Pitchers who threw a CH in at least 150 Plate Appearences") +
  scale_y_continuous("Hard Hit Percentage") +
  scale_x_continuous("Plate Appearances") +
  guides(color = guide_legend(title = "Pitcher"))
```



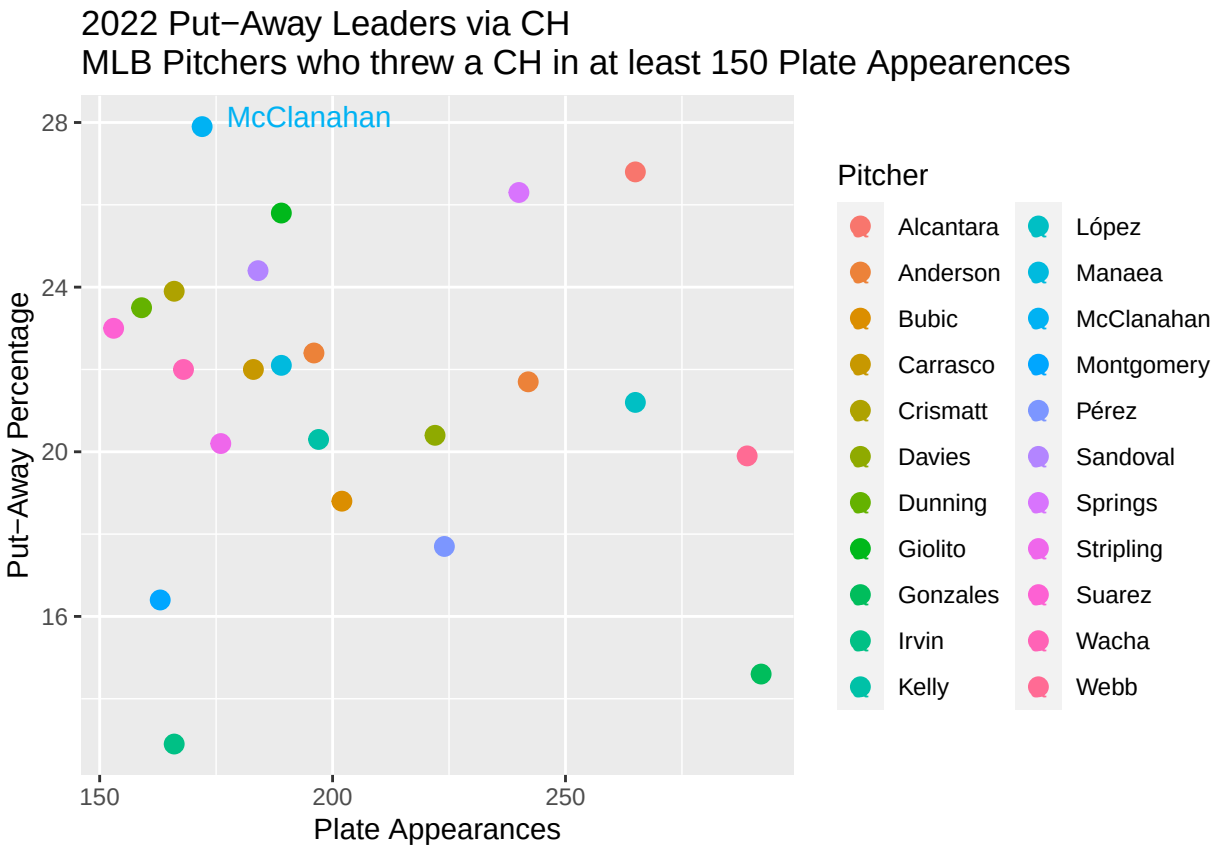

```
ggplot(data = changeups, mapping = aes(x = pa, y = whiff_percent, color = last_name,
                                       label = ifelse(pa == 172, "McClanahan", " "),
                                       hjust = 0, vjust = 2)) +
  geom_point(size = 3) +
  geom_text() +
  ggtitle("Whiff Leaders via CH\nMLB Pitchers who threw a CH in at least 150 Plate Appearences") +
  scale_y_continuous("Whiff Percentage") +
  scale_x_continuous("Plate Appearances") +
  guides(color = guide_legend(title = "Pitcher"))
```




```
ggplot(data = changeups, mapping = aes(x = pa, y = k_percent, color = last_name,
                                       label = ifelse(pa == 172, "McClanahan", " "),
                                       hjust = -.15, vjust = 0)) +
  geom_point(size = 3) +
  geom_text() +
  ggtitle("Strikeout Leaders via CH\nMLB Pitchers who threw a CH in at least 150 Plate Appearences") +
  scale_y_continuous("Strikeout Percentage") +
  scale_x_continuous("Plate Appearances") +
  guides(color = guide_legend(title = "Pitcher"))
```




```
ggplot(data = changeups, mapping = aes(x = pa, y = put_away, color = last_name,
                                       label = ifelse(pa == 172, "McClanahan", " "),
                                       hjust = -.15, vjust = 0)) +
  geom_point(size = 3) +
  geom_text() +
  ggtitle("2022 Put-Away Leaders via CH\nMLB Pitchers who threw a CH in at least 150 Plate Appearences") +
  scale_y_continuous("Put-Away Percentage") +
  scale_x_continuous("Plate Appearances") +
  guides(color = guide_legend(title = "Pitcher"))
```



When compared to the 23 pitchers who threw the most changeups this year, McClanahan is very obviously an outlier. The Tampa Bay pitcher allowed the lowest weighted on-base percentage, whiff percentage, put away percentage, and was also third in strikeout % and fourth in hard hit percentage among these pitchers. By run value, he was the 4th most effective pitcher when throwing changeups in all of baseball. There was only one pitcher ahead of him that also received Cy Young votes. That was 2022 NL Cy Young winner Sandy Alcantara who posted a career low 2.28 ERA through 228.2 IP. McClanahan was just behind this with a 2.58 ERA through 289.2 IP. Considering McClanahan threw 71 more innings than Alcantara and had better K%, Put Away%, hard hit%, whiff%, and wOBA it could be argued he had more success with his changeup than the NL Cy Young winner. In one season, McClanahan drastically increased his changeup usage, and became one of the best left handed arms in baseball at only 25 years old.