# STA210 SP'24 Final Project

## Exploring 2023 Stop and Frisk Data in NYC

amaris

```
library(tidyverse)
library(tidymodels)
library(dplyr)
library(readxl)
stop_and_frisk <- read_excel("2023_nypd_stop_and_frisk_data.xlsx")
```

### Introduction:

#### Background:

The stop-and-frisk program in New York City, administered by the NYPD, allows officers to detain, question, and potentially search individuals suspected of carrying weapons or contraband. This initiative has sparked significant controversy due to concerns of racial profiling. In 2017, 90% of those stopped were African-American or Latino, primarily aged between 14 and 24. Despite efforts to address racial disparities, such as policy reforms, the disproportionate impact of the stop-and-frisk program persists, highlighting potential underlying factors like implicit bias.

Implicit bias, also known as implicit prejudice or implicit attitude, is a negative attitude, of which one is not consciously aware, against a specific social group. It is thought to be shaped by experience and based on learned associations between particular qualities and social categories, including race and/gender/age etc. Individuals' perceptions and behaviors can be influenced by the implicit biases they hold, even if they are unaware they hold such biases.

#### Dataset:

Each stop made by the NYPD requires officers to complete a detailed form, documenting various aspects of the encounter. Since 2017, these forms have been electronically recorded and stored in an NYPD database. The dataset contains information such as the stop's location,

officer details, characteristics of the stopped individual (including age, race, gender, etc.), frisk/search details, and the officer's description of the individual's demeanor during the stop.

Our analysis will utilize the most recently released NYPD annual report from the source: https://www.nyc.gov/site/nypd/stats/reports-analysis/stopfrisk.page, containing 82 variables and 16,871 observations.

## Project Motivation & Research Question:

Among the 82 variables, a variable of particular interest is "demeanor of person stopped" - where the police utilize 1 - 2 adjectives to describe stop subject "demeanor". Common adjectives include "calm", "nervous", "agitated", "aggressive", etc. It should be noted that these descriptions are self-generated instead of the police choosing from a pre-defined set of adjectives. We propose that these "demeanor" adjectives are indicative of the police officers' perception of the stopped subject.

This project aims to investigate the relationship between physical/demographical characteristics of stopped individuals and the demeanor adjectives assigned by police officers. Specifically, we will explore:

- How do officer-assigned demeanor adjectives vary across different demographic groups (age, race, gender)?
- Are there correlations between certain physical characteristics and the types of demeanor descriptions used by officers during stops?
- Additionally, we will briefly examine whether demeanor descriptions influence subsequent police behaviors, such as frisking, searching, or requesting consent.

By analyzing these relationships, we seek to shed light on potential implicit biases affecting police interactions during stop-and-frisk encounters. Understanding these dynamics is crucial for addressing systemic biases and ensuring fair and equitable policing practices.

## Variables Introduction:

### Predictor variables of interest:

SUSPECT_REPORTED_AGE (chr and transformed to num): the age of suspect

SUSPECT_SEX (chr): female or male

SUSPECT_RACE_DESCRIPTION (chr): includes 7 categories: American Indian/Alaskan Native, Asian/Pacific Islander, Black, Black Hispanic, Middle Eastern/Southwest Asian, White, White Hispanic

SUSPECT_HEIGHT (chr and transformed to num): the height of suspect by feet

SUSPECT_WEIGHT (chr and transformed to num): the weight of suspect by pounds

SUSPECT_BODY_BUILD_TYPE (chr): includes categories: HEA(Heavy), MED(Medium), THN(Thin), U(Unknown), XXX(body type not applicable/placeholder value indicating missing data)

SUSPECT_EYE_COLOR (chr): includes categories: BLK(Black), BLU(Blue), BRO(Brown), GRN(Green), GRY(Grey), HAZ(Hazel), MUL(Multicolored), OTH(Other), PNK(Pink)

SUSPECT_HAIR_COLOR (chr): includes categories: BLD (Bald), BLK (Black), BLN (Blonde), BRO (Brown), GRN(Green), GRY (Gray), ORG (Orange), PLE (Purple), PNK(Pink), RED(Red), SDY(Sandy), WHI (White), XXX (Unknown/Unspecified - often used when the suspect's hair color is not recorded or unclear), ZZZ (could be an unusual or placeholder value indicating an error or missing data).

Note: The interpretation of categorical variables is based on conventions and assumptions due to the absence of a specific codebook for the dataset. Numeric variables (age, height, weight) are obtained through suspect report, while other categorical variables may reflect subjective perceptions of police or suspect report.

**Variables of interest for exploratory analysis:**

FRISKED_FLAG (chr): indicates whether or not the suspect was frisked (N = No, Y = Yes)

SEARCH_FLAG (chr): indicates whether or not the suspect was searched (N = No, Y = Yes)

ASK_FOR_CONSENT_FLG (chr): indicates whether the police asked for subject consent for the frisk/search behaviors after stop (N = No, Y = Yes)

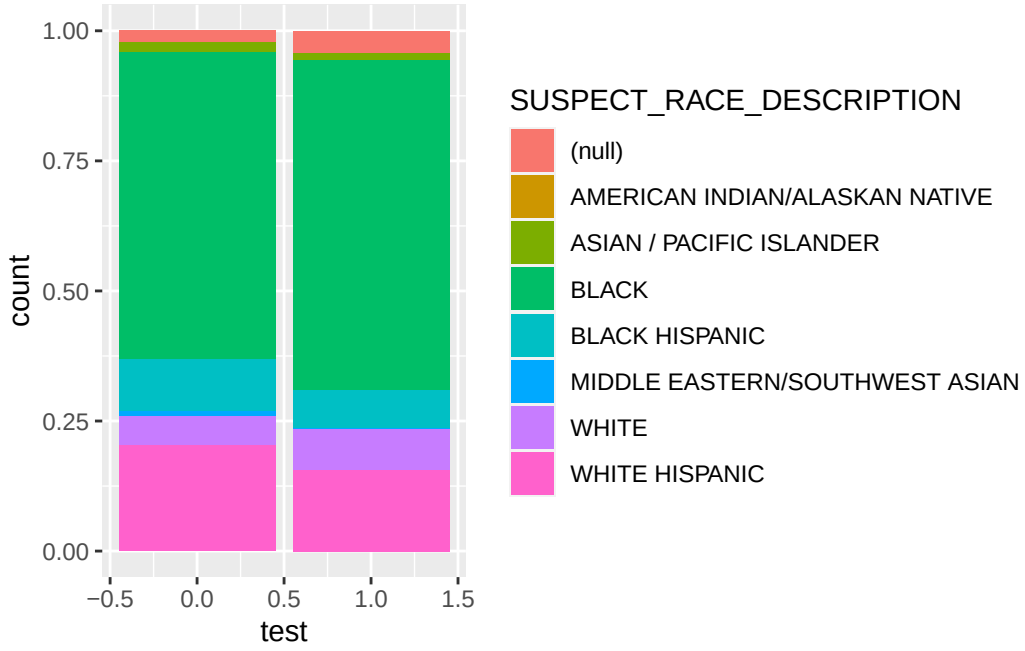
### Data Cleaning & New Variable Creation

### Exploratory Data Analysis

```
demeanor_types <- stop_and_frisk |>
  count(DEMEANOR_OF_PERSON_STOPPED)
```

```
stop_and_frisk |>
  mutate(test = if_else(DEMEANOR_OF_PERSON_STOPPED == "AGITATED", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_RACE_DESCRIPTION)) +
           geom_bar(position = "fill")
```

```
Warning: Removed 2548 rows containing non-finite values (`stat_count()`).
```




Let's categorize the 69 demeanor descriptions into 5 broad categories based on their similarity in meaning or behavior.

We'll group them as follows:

**1. Calm/Neutral Demeanor:**

- This category includes descriptions indicating a relaxed, cooperative, or normal state of mind.

- CALM - NORMAL - APPARENTLY NORMAL - RELAXED - QUIET - UNDERSTANDING - CALM AND COOPERATIVE - CALM AND COMPLIANT - CALM AND UNDERSTANDING - CALM COOPERATIVE - CALMED - NEUTRAL - CALM COMPLIANT - CALM UNDERSTANDING - APP NORMAL - COMPLIANT - APPARENT NORMAL

**2. Nervous/Anxious Demeanor:**

- Descriptions reflecting anxiety, nervousness, or apprehension.

- NERVOUS - ANXIOUS - VERY NERVOUS - EXTREMELY NERVOUS - PHYSICALLY NERVOUS - NERVOUS SCARED - NERVOUS OUT OF BREATH - AGGITATED - SCARED - SUSPICIOUS - APPREHENSIVE - WORRIED - NERVOUSE

**3. Angry/Confrontational Demeanor:**

- This category comprises descriptions indicating anger, aggression, or hostility.

- UPSET - ANNOYED - ANGRY - AGITATED - AGGRESSIVE - COMBATIVE - IRATE - IRRITATED - AGGRAVATED - HOSTILE - MAD - AGGRESSIVE/NERVOUS - UNCOOPERATIVE - IRRATE - AGGRESIVE - ARGUMENTATIVE - DEFENSIVE - NON COMPLIANT

**4. Confused/Disoriented Demeanor:**

- Descriptions suggesting confusion, surprise, or disorientation.

- CONFUSED - SURPRISED - SHOCKED - INTOXICATED - INTOX - ERRATIC - OUT OF BREATH

**5. Indifferent Demeanor:**

- Descriptions suggesting withdrawal

- INDIFFERENT - EVASIVE - TIRED

**Other/Outliers (Removed):**

- Some descriptions are less common or do not fit well into the above categories.

Removed Descriptions: Defensive (21), Laughing (16), Crying (14), Excited (14), Talkative (22), NA, N/A

These categorizations aim to group similar demeanor descriptions together based on their emotional or behavioral context, allowing for a more concise representation suitable for further analysis using multinomial regression models.

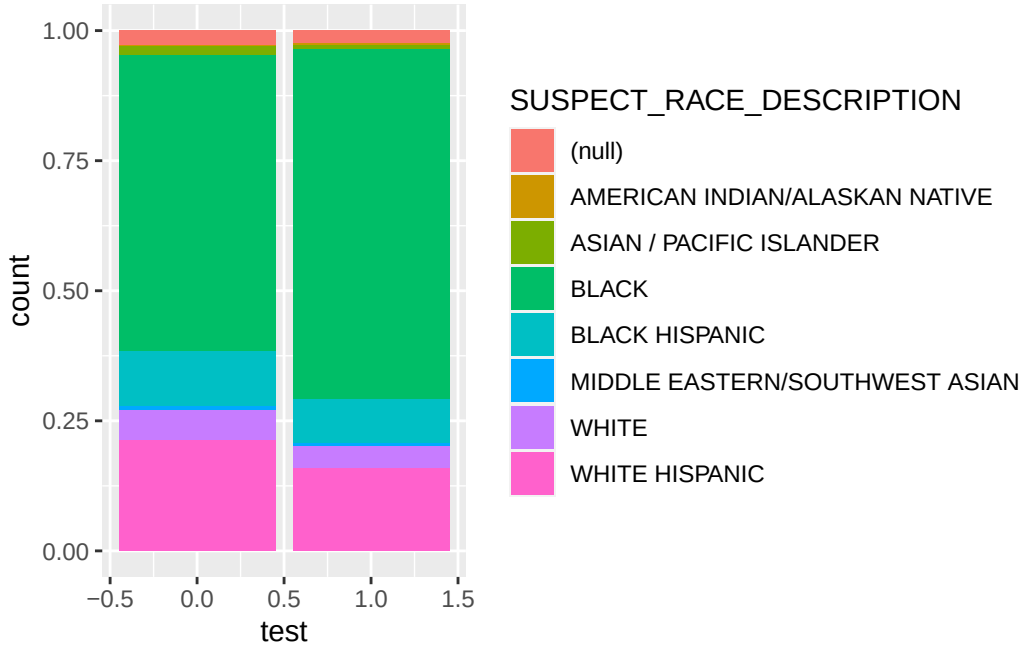
```
stop_and_frisk <- stop_and_frisk|>
   mutate(category = case_when(
    DEMEANOR_OF_PERSON_STOPPED %in% c(
      "CALM", "NORMAL", "APPARENTLY NORMAL", "RELAXED", "QUIET","UNDERSTANDING",
      "CALM AND COOPERATIVE", "CALM AND COMPLIANT", "CALM AND UNDERSTANDING",
      "CALM COOPERATIVE", "CALMED", "NEUTRAL", "CALM COMPLIANT", "CALM UNDERSTANDING",
      "APP NORMAL", "COMPLIANT", "APPARENT NORMAL"
      ) ~ "Calm/Neutral Demeanor",
    DEMEANOR_OF_PERSON_STOPPED %in% c(
      "NERVOUS", "ANXIOUS", "VERY NERVOUS", "EXTREMELY NERVOUS","PHYSICALLY NERVOUS",
      "NERVOUS SCARED", "NERVOUS OUT OF BREATH", "AGGITATED", "SCARED", "SUSPICIOUS",
      "APPREHENSIVE", "WORRIED", "NERVOUSE"
      ) ~ "Nervous/Anxious Demeanor",
    DEMEANOR_OF_PERSON_STOPPED %in% c(
      "UPSET", "ANNOYED", "ANGRY", "AGITATED", "AGGRESSIVE", "COMBATIVE", "IRATE",
      "IRRITATED", "AGGRAVATED", "HOSTILE", "MAD", "AGGRESSIVE/NERVOUS", "UNCOOPERATIVE",
```

```
      "IRRATE", "AGGRESSIVE", "ARGUMENTATIVE", "DEFENSIVE", "NON COMPLIANT"
      ) ~ "Angry/Confrontational Demeanor",
    DEMEANOR_OF_PERSON_STOPPED %in% c(
      "CONFUSED", "SURPRISED", "SHOCKED", "INTOXICATED", "INTOX", "ERRATIC", "OUT OF BREAT
      ) ~ "Confused/Disoriented Demeanor",
    DEMEANOR_OF_PERSON_STOPPED %in% c(
      "INDIFFERENT", "EVASIVE", "TIRED"
      ) ~ "Indifferent Demeanor",
    TRUE ~ "Other/Outliers"  # Default case for any other demeanor not matching the above
  ))
```

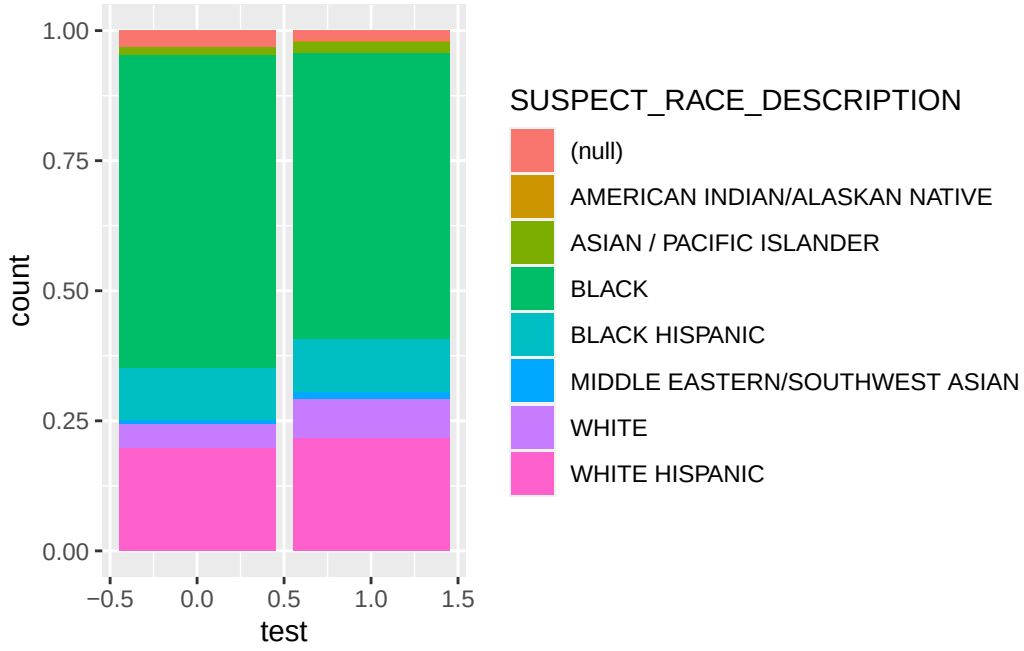
```
stop_and_frisk |>
  count(category)
```

```
# A tibble: 6 x 2
  category                          n
  <chr>                         <int>
1 Angry/Confrontational Demeanor  2665
2 Calm/Neutral Demeanor           5188
3 Confused/Disoriented Demeanor    440
4 Indifferent Demeanor              64
5 Nervous/Anxious Demeanor        3060
6 Other/Outliers                  5554
```

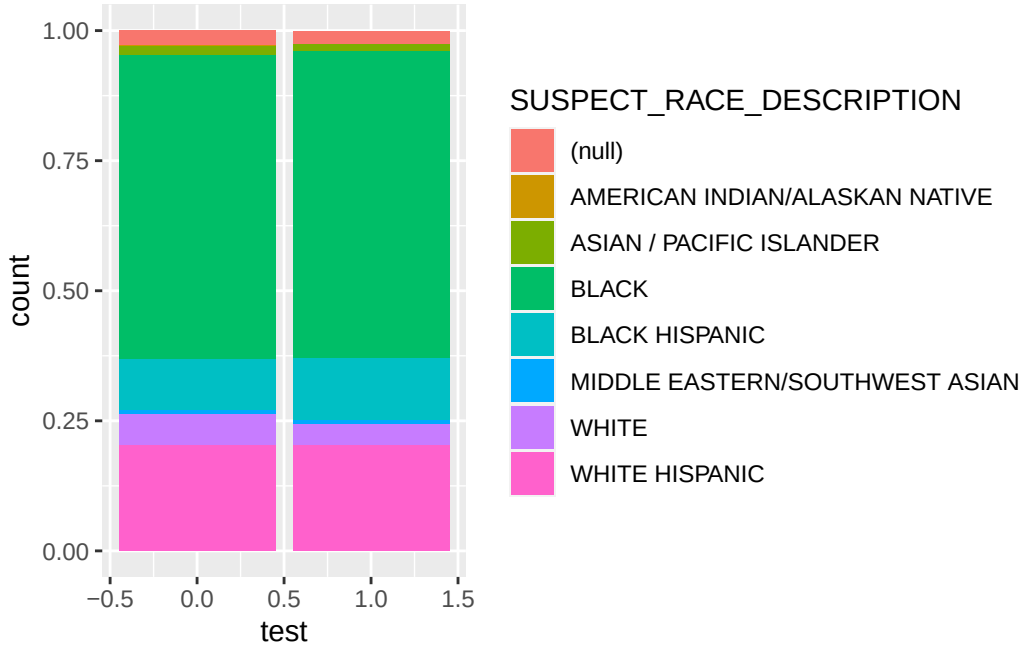
```
stop_and_frisk |>
  mutate(test = if_else(category == "Angry/Confrontational Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_RACE_DESCRIPTION)) +
           geom_bar(position = "fill")
```



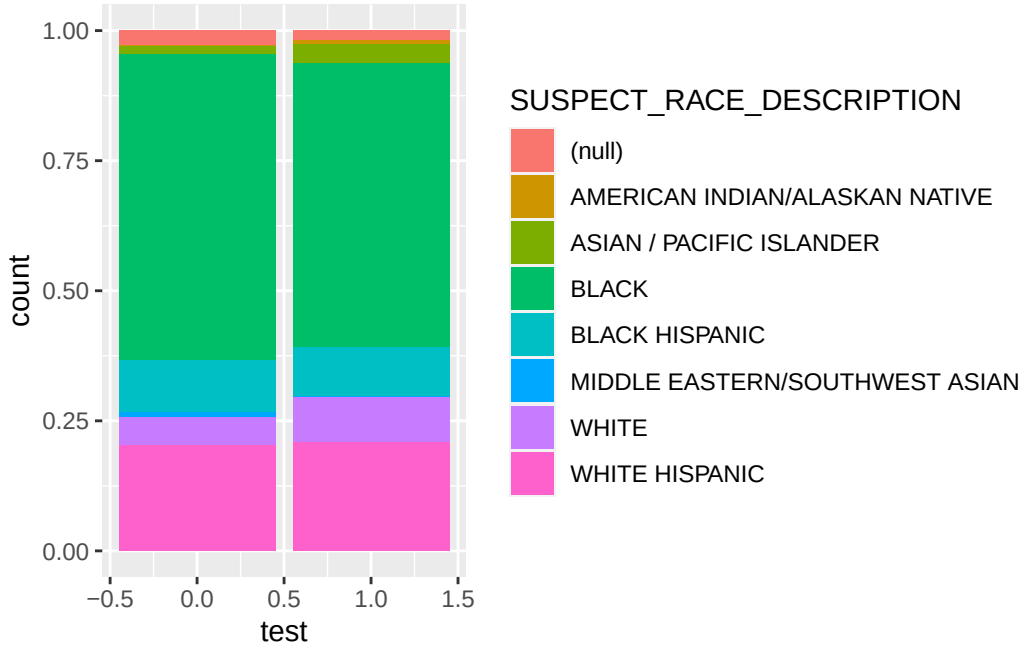

```
stop_and_frisk |>
  mutate(test = if_else(category == "Calm/Neutral Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_RACE_DESCRIPTION)) +
           geom_bar(position = "fill")
```



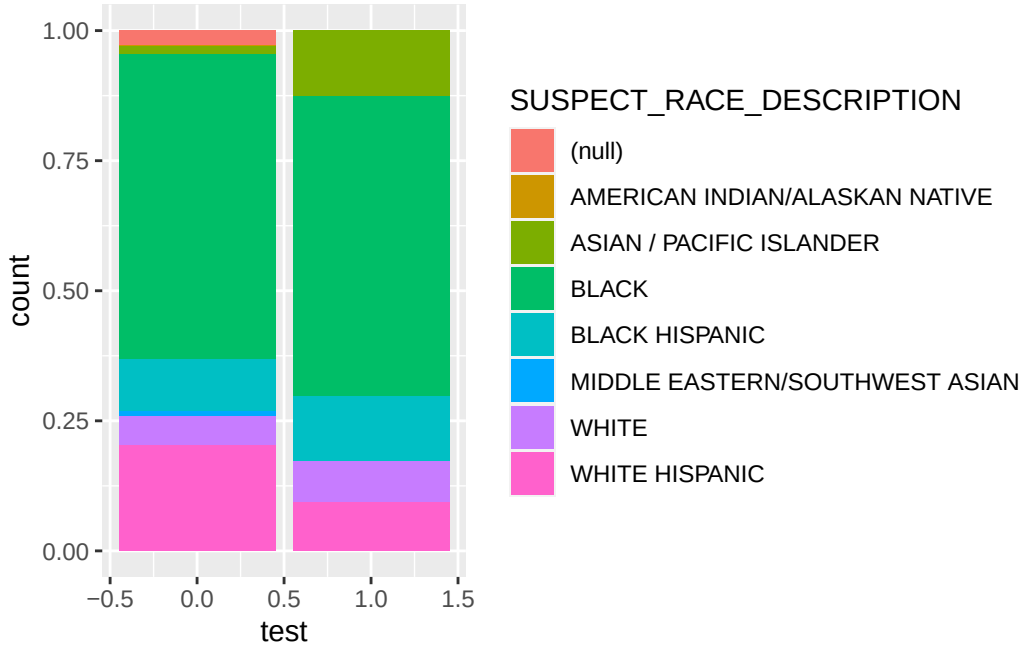

```
stop_and_frisk |>
  mutate(test = if_else(category == "Nervous/Anxious Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_RACE_DESCRIPTION)) +
           geom_bar(position = "fill")
```



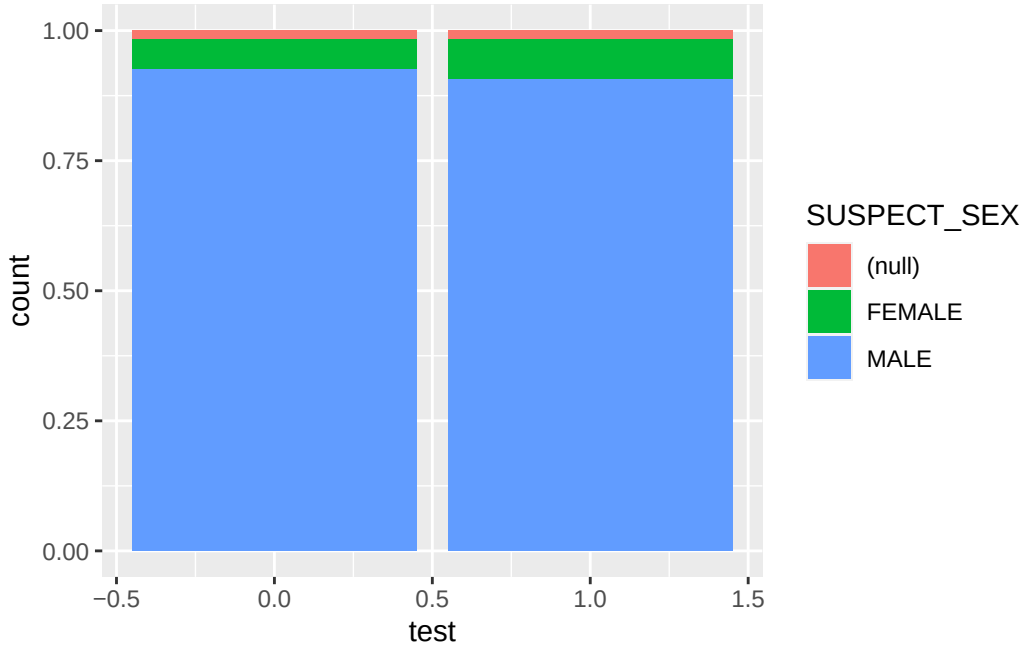

```
stop_and_frisk |>
  mutate(test = if_else(category == "Confused/Disoriented Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_RACE_DESCRIPTION)) +
           geom_bar(position = "fill")
```



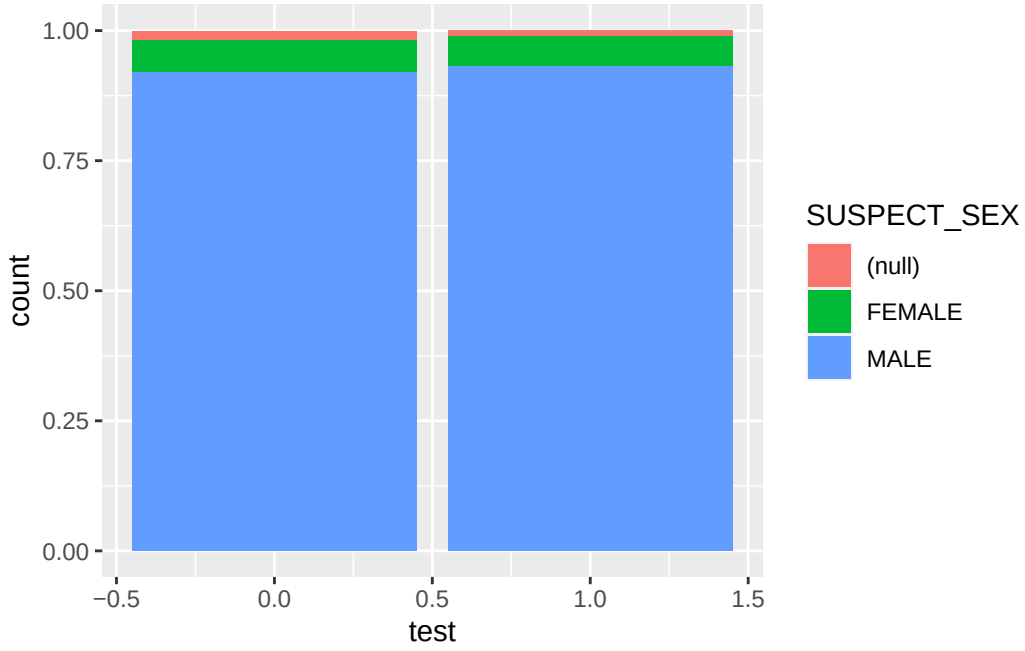

```
stop_and_frisk |>
  mutate(test = if_else(category == "Indifferent Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_RACE_DESCRIPTION)) +
           geom_bar(position = "fill")
```



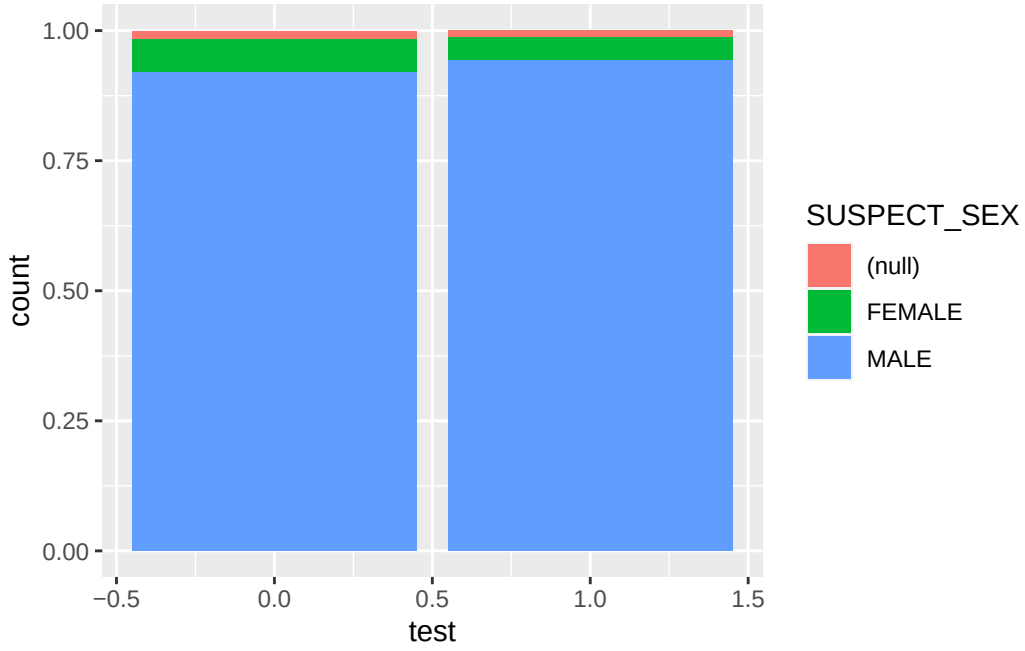

```
stop_and_frisk |>
  mutate(test = if_else(category == "Angry/Confrontational Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_SEX)) +
           geom_bar(position = "fill")
```



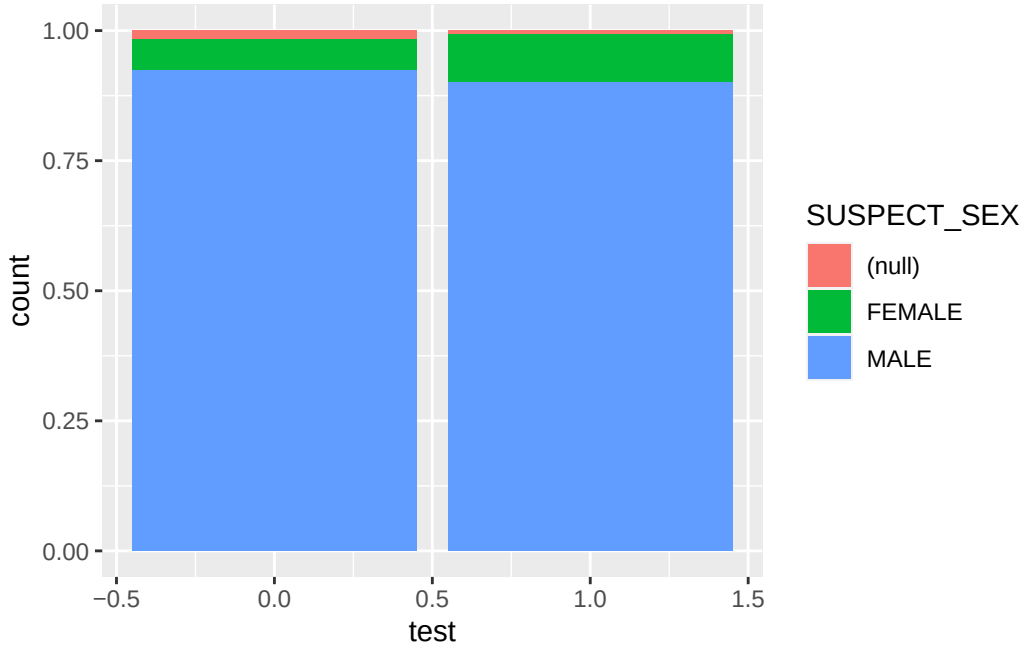

```
stop_and_frisk |>
  mutate(test = if_else(category == "Calm/Neutral Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_SEX)) +
           geom_bar(position = "fill")
```



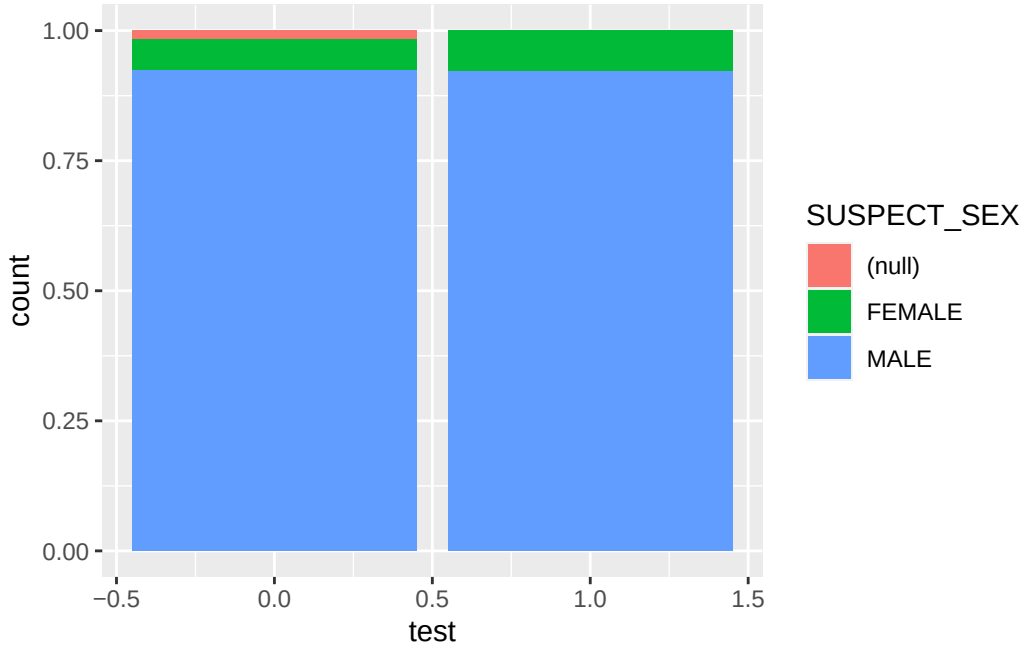

```
stop_and_frisk |>
  mutate(test = if_else(category == "Nervous/Anxious Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_SEX)) +
           geom_bar(position = "fill")
```




```
stop_and_frisk |>
  mutate(test = if_else(category == "Confused/Disoriented Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_SEX)) +
           geom_bar(position = "fill")
```




```
stop_and_frisk |>
  mutate(test = if_else(category == "Indifferent Demeanor", 1, 0)) |>
           ggplot(aes(x = test, fill = SUSPECT_SEX)) +
           geom_bar(position = "fill")
```




```
stop_and_frisk <- stop_and_frisk |>
  filter(category != "Other/Outliers")  |>
  mutate(SUSPECT_REPORTED_AGE = as.numeric(SUSPECT_REPORTED_AGE),
         SUSPECT_HEIGHT = as.numeric(SUSPECT_HEIGHT))
```

```
Warning: There were 2 warnings in `mutate()`.
The first warning was:
i In argument: `SUSPECT_REPORTED_AGE = as.numeric(SUSPECT_REPORTED_AGE)`.
Caused by warning:
! NAs introduced by coercion
i Run `dplyr::last_dplyr_warnings()` to see the 1 remaining warning.
```

```
library(nnet)
mtest <- multinom(category ~ SUSPECT_REPORTED_AGE + SUSPECT_SEX + SUSPECT_RACE_DESCRIPTION
```

```
# weights:  155 (120 variable)
initial  value 15717.770653
iter  10 value 11935.087101
iter  20 value 11766.828244
iter  30 value 11551.186810
```

```
iter  40 value 11445.677025
iter  50 value 11422.476383
iter  60 value 11415.830549
iter  70 value 11414.794381
iter  80 value 11414.094473
iter  90 value 11413.921774
iter 100 value 11413.885090
final  value 11413.885090
stopped after 100 iterations
```

```
summary(mtest)
```

```
Warning in sqrt(diag(vc)): NaNs produced
```

```
Call:
multinom(formula = category ~ SUSPECT_REPORTED_AGE + SUSPECT_SEX +
    SUSPECT_RACE_DESCRIPTION + SUSPECT_HEIGHT + SUSPECT_BODY_BUILD_TYPE +
    SUSPECT_HAIR_COLOR, data = stop_and_frisk)

Coefficients:
                            (Intercept) SUSPECT_REPORTED_AGE
Calm/Neutral Demeanor          1.131388          0.003084767
Confused/Disoriented Demeanor -1.723559          0.010162002
Indifferent Demeanor         -38.711018          0.008392412
Nervous/Anxious Demeanor       1.778101         -0.038421157
                            SUSPECT_SEXFEMALE SUSPECT_SEXMALE
Calm/Neutral Demeanor             0.04549371       0.3977244
Confused/Disoriented Demeanor    -0.40630162      -0.4937355
Indifferent Demeanor              3.83802896       4.2363080
Nervous/Anxious Demeanor         -0.11283480       0.3857833
                            SUSPECT_RACE_DESCRIPTIONAMERICAN INDIAN/ALASKAN NATIVE
Calm/Neutral Demeanor                                                   -0.3747454
Confused/Disoriented Demeanor                                            0.9895262
Indifferent Demeanor                                                    -7.3909885
Nervous/Anxious Demeanor                                                -1.1832115
                            SUSPECT_RACE_DESCRIPTIONASIAN / PACIFIC ISLANDER
Calm/Neutral Demeanor                                              0.4856221
Confused/Disoriented Demeanor                                      1.0089881
Indifferent Demeanor                                              16.6661621
Nervous/Anxious Demeanor                                          -0.1465952
                            SUSPECT_RACE_DESCRIPTIONBLACK
```

```
Calm/Neutral Demeanor                          -0.6702448
Confused/Disoriented Demeanor                  -0.4728514
Indifferent Demeanor                           13.8723737
Nervous/Anxious Demeanor                       -0.8072631
                           SUSPECT_RACE_DESCRIPTIONBLACK HISPANIC
Calm/Neutral Demeanor                                 -0.3179926
Confused/Disoriented Demeanor                         -0.3022990
Indifferent Demeanor                                  14.4567245
Nervous/Anxious Demeanor                              -0.3241850
                           SUSPECT_RACE_DESCRIPTIONMIDDLE EASTERN/SOUTHWEST ASIAN
Calm/Neutral Demeanor                                                   0.5122117
Confused/Disoriented Demeanor                                          -0.8499675
Indifferent Demeanor                                                  -18.8152652
Nervous/Anxious Demeanor                                               -0.3917428
                           SUSPECT_RACE_DESCRIPTIONWHITE
Calm/Neutral Demeanor                       -0.03748699
Confused/Disoriented Demeanor                0.31682476
Indifferent Demeanor                        13.88961176
Nervous/Anxious Demeanor                    -0.54853912
                           SUSPECT_RACE_DESCRIPTIONWHITE HISPANIC
Calm/Neutral Demeanor                                -0.18695963
Confused/Disoriented Demeanor                        -0.07062561
Indifferent Demeanor                                 13.44759199
Nervous/Anxious Demeanor                             -0.40584221
                           SUSPECT_HEIGHT SUSPECT_BODY_BUILD_TYPEHEA
Calm/Neutral Demeanor         -0.01183737                -0.6371166
Confused/Disoriented Demeanor -0.00318074                -1.0742954
Indifferent Demeanor          -0.20426631                -0.5496085
Nervous/Anxious Demeanor      -0.08670181                 0.1610473
                           SUSPECT_BODY_BUILD_TYPEMED
Calm/Neutral Demeanor                    -0.69557135
Confused/Disoriented Demeanor            -0.93928256
Indifferent Demeanor                     -1.57166353
Nervous/Anxious Demeanor                  0.06065937
                           SUSPECT_BODY_BUILD_TYPETHN
Calm/Neutral Demeanor                     -0.6789448
Confused/Disoriented Demeanor             -0.9442239
Indifferent Demeanor                      -0.8159729
Nervous/Anxious Demeanor                   0.0528794
                           SUSPECT_BODY_BUILD_TYPEU
Calm/Neutral Demeanor                   -1.2529740
Confused/Disoriented Demeanor           -1.0381261
Indifferent Demeanor                    -1.7286406
```

```
Nervous/Anxious Demeanor                    -0.6639438
                            SUSPECT_BODY_BUILD_TYPEXXX SUSPECT_HAIR_COLORBLD
Calm/Neutral Demeanor                      -0.05498954             0.5445884
Confused/Disoriented Demeanor              -20.78748891             0.9051787
Indifferent Demeanor                       -25.56365791            19.1341227
Nervous/Anxious Demeanor                     0.80570758             0.3640268
                            SUSPECT_HAIR_COLORBLK SUSPECT_HAIR_COLORBLN
Calm/Neutral Demeanor                      0.3732958             0.5540067
Confused/Disoriented Demeanor              1.4839024             0.3957790
Indifferent Demeanor                      18.7546907            20.4682422
Nervous/Anxious Demeanor                   0.1935724             0.1947418
                            SUSPECT_HAIR_COLORBRO SUSPECT_HAIR_COLORGRY
Calm/Neutral Demeanor                      0.3678211             0.4167008
Confused/Disoriented Demeanor              1.5292866             1.4642808
Indifferent Demeanor                      19.1399489           -12.7894079
Nervous/Anxious Demeanor                   0.0489335            -0.1937708
                            SUSPECT_HAIR_COLORORG SUSPECT_HAIR_COLORPLE
Calm/Neutral Demeanor                     -0.3210408             18.797441
Confused/Disoriented Demeanor              1.8862755             -1.865884
Indifferent Demeanor                      -3.6739690             -0.107620
Nervous/Anxious Demeanor                  -0.9155140             19.452830
                            SUSPECT_HAIR_COLORPNK SUSPECT_HAIR_COLORRED
Calm/Neutral Demeanor                      0.8683145             0.5276550
Confused/Disoriented Demeanor              2.9955226             1.3242968
Indifferent Demeanor                      -1.2062768            20.3103540
Nervous/Anxious Demeanor                 -14.5683179             0.2845904
                            SUSPECT_HAIR_COLORSDY SUSPECT_HAIR_COLORWHI
Calm/Neutral Demeanor                      0.3587606             0.9167759
Confused/Disoriented Demeanor            -11.9788132             2.6088075
Indifferent Demeanor                      -2.7545492            -5.7186258
Nervous/Anxious Demeanor                 -17.7789922            -0.4496505
                            SUSPECT_HAIR_COLORXXX SUSPECT_HAIR_COLORZZZ
Calm/Neutral Demeanor                  0.005962369             0.8774351
Confused/Disoriented Demeanor          1.218914237             1.4335419
Indifferent Demeanor                  19.094087191            -9.3234901
Nervous/Anxious Demeanor               0.199290858             1.4327263

Std. Errors:
                            (Intercept) SUSPECT_REPORTED_AGE
Calm/Neutral Demeanor         0.7193387          0.002410478
Confused/Disoriented Demeanor 1.4286888          0.004861724
Indifferent Demeanor          1.1831024          0.011351666
Nervous/Anxious Demeanor      0.7857759          0.003049560
```

| | SUSPECT_SEXFEMALE | SUSPECT_SEXMALE |
|---|---|---|
| Calm/Neutral Demeanor | 0.5447610 | 0.5351819 |
| Confused/Disoriented Demeanor | 0.9007063 | 0.8796556 |
| Indifferent Demeanor | 0.6379122 | 0.6584028 |
| Nervous/Anxious Demeanor | 0.5814192 | 0.5684266 |

| | SUSPECT_RACE_DESCRIPTIONAMERICAN INDIAN/ALASKAN NATIVE |
|---|---|
| Calm/Neutral Demeanor | 7.567694e-01 |
| Confused/Disoriented Demeanor | 1.095043e+00 |
| Indifferent Demeanor | 4.861435e-11 |
| Nervous/Anxious Demeanor | 9.753743e-01 |

| | SUSPECT_RACE_DESCRIPTIONASIAN / PACIFIC ISLANDER |
|---|---|
| Calm/Neutral Demeanor | 0.3971194 |
| Confused/Disoriented Demeanor | 0.7034078 |
| Indifferent Demeanor | 0.4528616 |
| Nervous/Anxious Demeanor | 0.4333615 |

| | SUSPECT_RACE_DESCRIPTIONBLACK |
|---|---|
| Calm/Neutral Demeanor | 0.3102615 |
| Confused/Disoriented Demeanor | 0.6073486 |
| Indifferent Demeanor | 0.3302120 |
| Nervous/Anxious Demeanor | 0.3256541 |

| | SUSPECT_RACE_DESCRIPTIONBLACK HISPANIC |
|---|---|
| Calm/Neutral Demeanor | 0.3207767 |
| Confused/Disoriented Demeanor | 0.6328476 |
| Indifferent Demeanor | 0.4046623 |
| Nervous/Anxious Demeanor | 0.3366901 |

| | SUSPECT_RACE_DESCRIPTIONMIDDLE EASTERN/SOUTHWEST ASIAN |
|---|---|
| Calm/Neutral Demeanor | 0.4619460 |
| Confused/Disoriented Demeanor | 1.2113556 |
| Indifferent Demeanor | NaN |
| Nervous/Anxious Demeanor | 0.5160329 |

| | SUSPECT_RACE_DESCRIPTIONWHITE |
|---|---|
| Calm/Neutral Demeanor | 0.3293648 |
| Confused/Disoriented Demeanor | 0.6357329 |
| Indifferent Demeanor | 0.5313533 |
| Nervous/Anxious Demeanor | 0.3529997 |

| | SUSPECT_RACE_DESCRIPTIONWHITE HISPANIC |
|---|---|
| Calm/Neutral Demeanor | 0.3148938 |
| Confused/Disoriented Demeanor | 0.6162409 |
| Indifferent Demeanor | 0.4262749 |
| Nervous/Anxious Demeanor | 0.3310208 |

| | SUSPECT_HEIGHT | SUSPECT_BODY_BUILD_TYPEHEA |
|---|---|---|
| Calm/Neutral Demeanor | 0.07089166 | 0.2581568 |
| Confused/Disoriented Demeanor | 0.15003686 | 0.4747640 |

| | | |
|---|---|---|
| Indifferent Demeanor | 0.34635229 | 1.0928710 |
| Nervous/Anxious Demeanor | 0.07819003 | 0.3094928 |

| | SUSPECT_BODY_BUILD_TYPEMED |
|---|---|
| Calm/Neutral Demeanor | 0.2455444 |
| Confused/Disoriented Demeanor | 0.4396639 |
| Indifferent Demeanor | 1.0678344 |
| Nervous/Anxious Demeanor | 0.2960151 |

| | SUSPECT_BODY_BUILD_TYPETHN |
|---|---|
| Calm/Neutral Demeanor | 0.2444287 |
| Confused/Disoriented Demeanor | 0.4370304 |
| Indifferent Demeanor | 1.0425052 |
| Nervous/Anxious Demeanor | 0.2946033 |

| | SUSPECT_BODY_BUILD_TYPEU |
|---|---|
| Calm/Neutral Demeanor | 0.2881220 |
| Confused/Disoriented Demeanor | 0.5318439 |
| Indifferent Demeanor | 1.4419845 |
| Nervous/Anxious Demeanor | 0.3519796 |

| | SUSPECT_BODY_BUILD_TYPEXXX | SUSPECT_HAIR_COLORBLD |
|---|---|---|
| Calm/Neutral Demeanor | 6.955572e-01 | 0.2834990 |
| Confused/Disoriented Demeanor | 1.505214e-09 | 0.8481063 |
| Indifferent Demeanor | 1.177541e-11 | 0.6295300 |
| Nervous/Anxious Demeanor | 7.239586e-01 | 0.3337260 |

| | SUSPECT_HAIR_COLORBLK | SUSPECT_HAIR_COLORBLN |
|---|---|---|
| Calm/Neutral Demeanor | 0.2480132 | 0.3595718 |
| Confused/Disoriented Demeanor | 0.7719486 | 1.0759755 |
| Indifferent Demeanor | 0.3495859 | 0.6254705 |
| Nervous/Anxious Demeanor | 0.2824615 | 0.4236256 |

| | SUSPECT_HAIR_COLORBRO | SUSPECT_HAIR_COLORGRY |
|---|---|---|
| Calm/Neutral Demeanor | 0.2622586 | 3.185658e-01 |
| Confused/Disoriented Demeanor | 0.7886701 | 8.534544e-01 |
| Indifferent Demeanor | 0.4456273 | 2.109828e-14 |
| Nervous/Anxious Demeanor | 0.2994653 | 4.422859e-01 |

| | SUSPECT_HAIR_COLORORG | SUSPECT_HAIR_COLORPLE |
|---|---|---|
| Calm/Neutral Demeanor | 8.645275e-01 | 7.622774e-01 |
| Confused/Disoriented Demeanor | 1.403255e+00 | 2.892876e-10 |
| Indifferent Demeanor | 1.166413e-11 | NaN |
| Nervous/Anxious Demeanor | 1.193578e+00 | 7.622774e-01 |

| | SUSPECT_HAIR_COLORPNK | SUSPECT_HAIR_COLORRED |
|---|---|---|
| Calm/Neutral Demeanor | 1.189073e+00 | 0.4609531 |
| Confused/Disoriented Demeanor | 1.624739e+00 | 1.1023976 |
| Indifferent Demeanor | 8.001648e-11 | 0.9522628 |
| Nervous/Anxious Demeanor | 9.496318e-07 | 0.5308826 |

| | SUSPECT_HAIR_COLORSDY | SUSPECT_HAIR_COLORWHI |
|---|---|---|

```
Calm/Neutral Demeanor                  8.926595e-01          6.845475e-01
Confused/Disoriented Demeanor          4.567568e-06          1.130874e+00
Indifferent Demeanor                   1.286082e-11          2.003423e-12
Nervous/Anxious Demeanor               2.053158e-08          1.198048e+00
                                SUSPECT_HAIR_COLORXXX SUSPECT_HAIR_COLORZZZ
Calm/Neutral Demeanor                       0.2622381          5.708557e-01
Confused/Disoriented Demeanor               0.7945817          1.338177e+00
Indifferent Demeanor                        0.4585510          5.526632e-14
Nervous/Anxious Demeanor                    0.2956501          5.954992e-01

Residual Deviance: 22827.77
AIC: 23067.77
```

nested test??

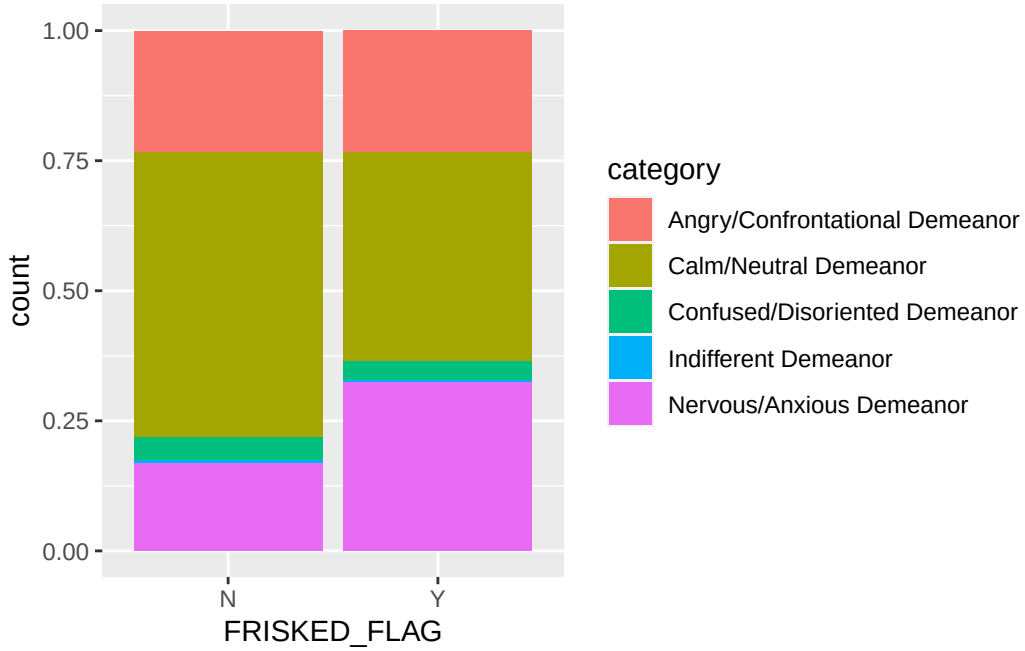
```
    z <- summary(mtest)$coefficients/summary(mtest)$standard.errors
```

```
Warning in sqrt(diag(vc)): NaNs produced

Warning in sqrt(diag(vc)): NaNs produced
```

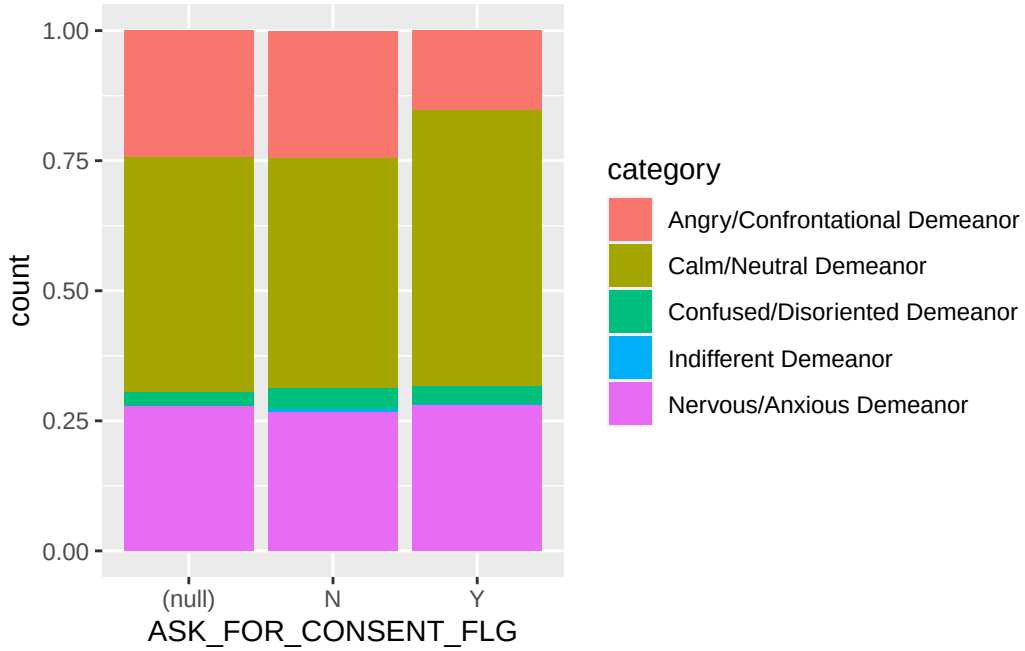
```
    # 2-tailed Wald z tests to test significance of coefficients
    p <- (1 - pnorm(abs(z), 0, 1)) * 2
```

```
  stop_and_frisk |>
    ggplot(aes(x = FRISKED_FLAG, fill = category)) +
    geom_bar(position = "fill")
```




```
stop_and_frisk |>
  ggplot(aes(x = SEARCHED_FLAG, fill = category)) +
  geom_bar(position = "fill")
```

```
stop_and_frisk |>
  ggplot(aes(x = ASK_FOR_CONSENT_FLG, fill = category)) +
  geom_bar(position = "fill")
```




Pattern

Visualizing missingness

Clean dataset

Select Variables

Set calm/neutral as baseline

Evaluate Model - testing + training

Assumption - independence & alternative

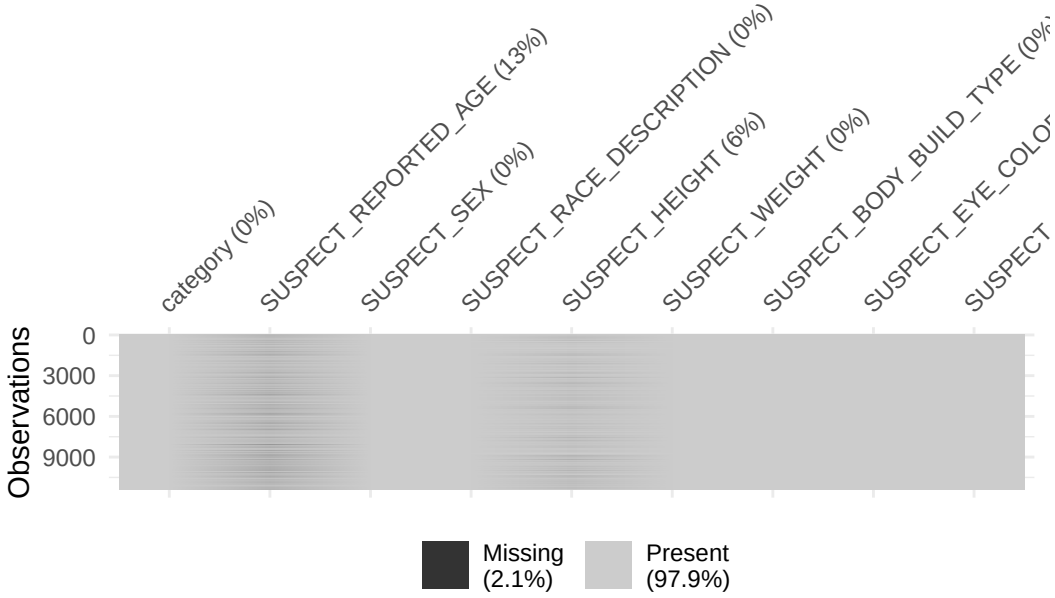
Do a logistic model: “calm” “ ”

```
install.packages("naniar")
```

```
Installing package into '/home/guest/R/x86_64-pc-linux-gnu-library/4.3'
(as 'lib' is unspecified)
```

```
library(visdat)
stop_and_frisk <- stop_and_frisk |>
  select(category, SUSPECT_REPORTED_AGE, SUSPECT_SEX, SUSPECT_RACE_DESCRIPTION, SUSPECT_HE
```

```
vis_miss(stop_and_frisk)
```




limitations:

-missingness

-definition of categories

-"reported age", weight - rather arbitrary when considering what's a "physical characteristic"

## Methodology

### Justification for Multinomial Regression Model

### Model Assumptions Diagnosis

### Interactions

## Result

## Discussion