Project 1 Interim

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Outline

- Background
- Data Management
- Exploratory Data Analysis
- Main Aims and Preliminary Models
- Future Work

Background

- With an aging population, car companies must keep the interests of the elderly in mind.
- One particular issue they face is simply getting in and out of the vehicle.

Background

- Dr. Galecki provided two specific aims for us to answer, but I also wanted to focus my analysis towards results we can implement.

Data Management

Data Management

1. Discarded shoe size variable completely from the first dataset.

Data Management

2. Took the **peak performance** of all repeated measurements
   - Knee Extension Strength
   - Hip Abduction Strength
   - Hip Abduction Rate of Torque
   - Grip Strength
   - Timed Up and Go
   - One Leg Balancing

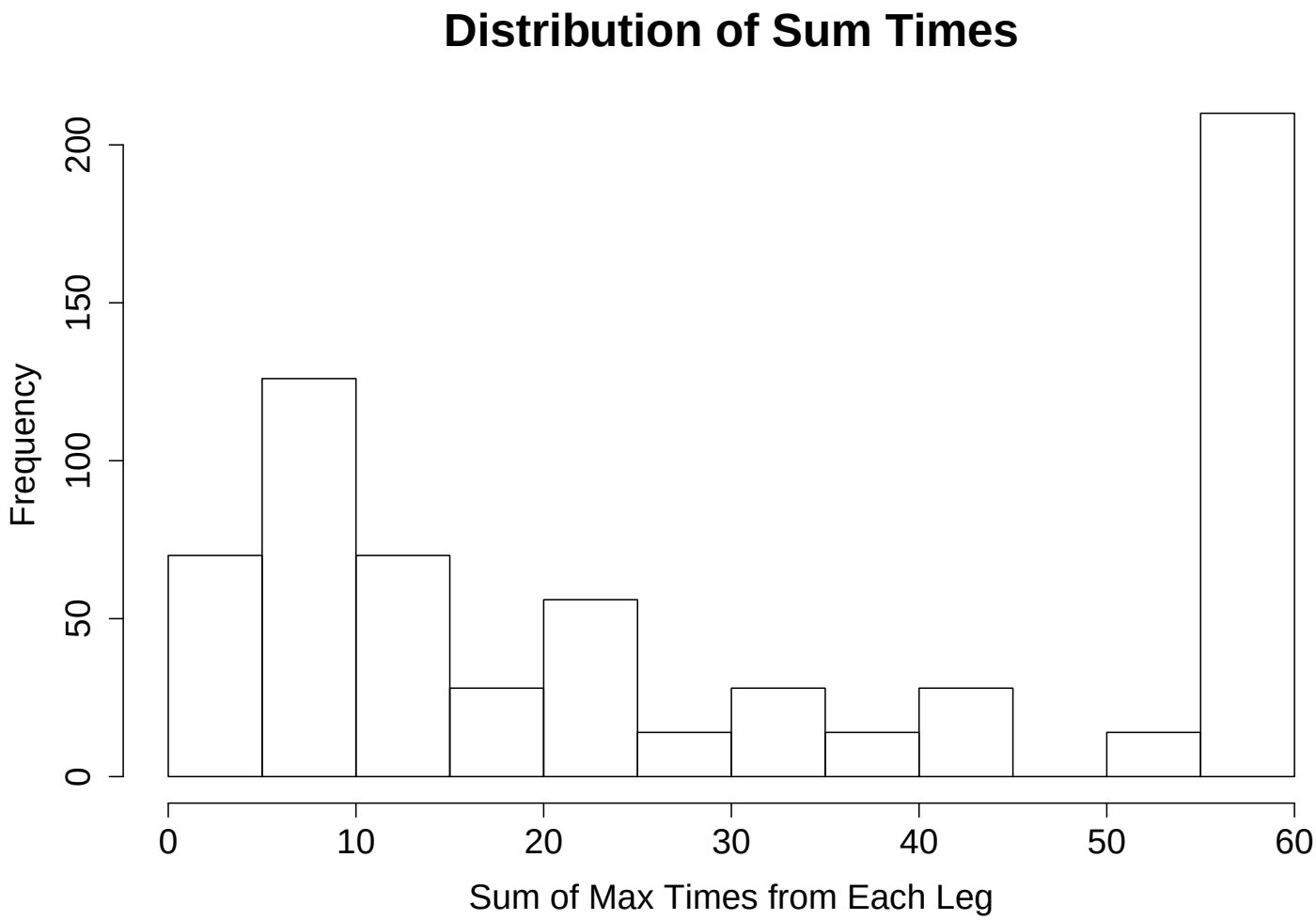
Data Management

3. Kept track of number of missing measurements for each subject
    - Not worried about One Leg Balancing Measurements

Data Management

4. Created categorical One Leg Balancing variable
    - Sum of peak performance in each leg
    - Poor balance if less than 15

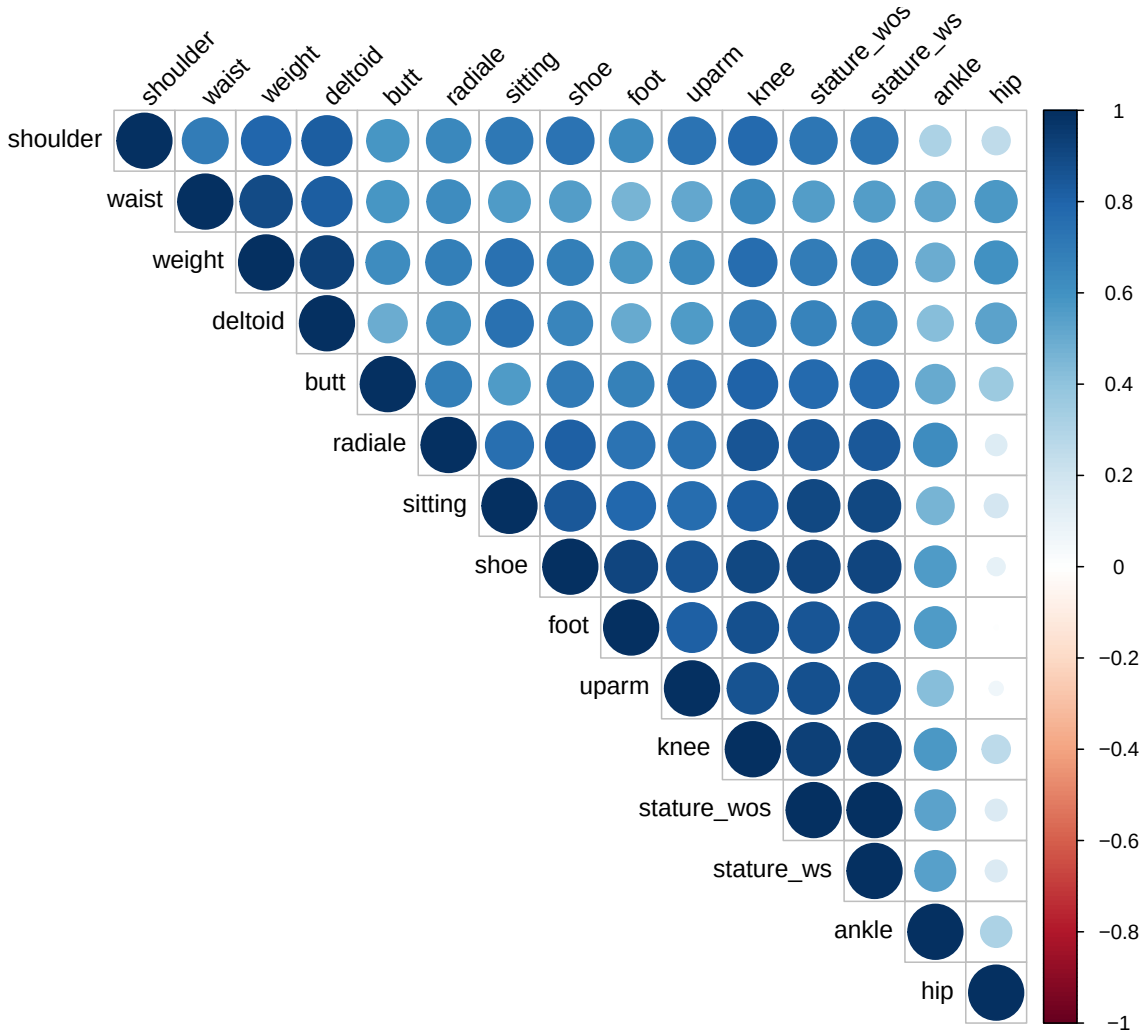
Data Management



Data Management

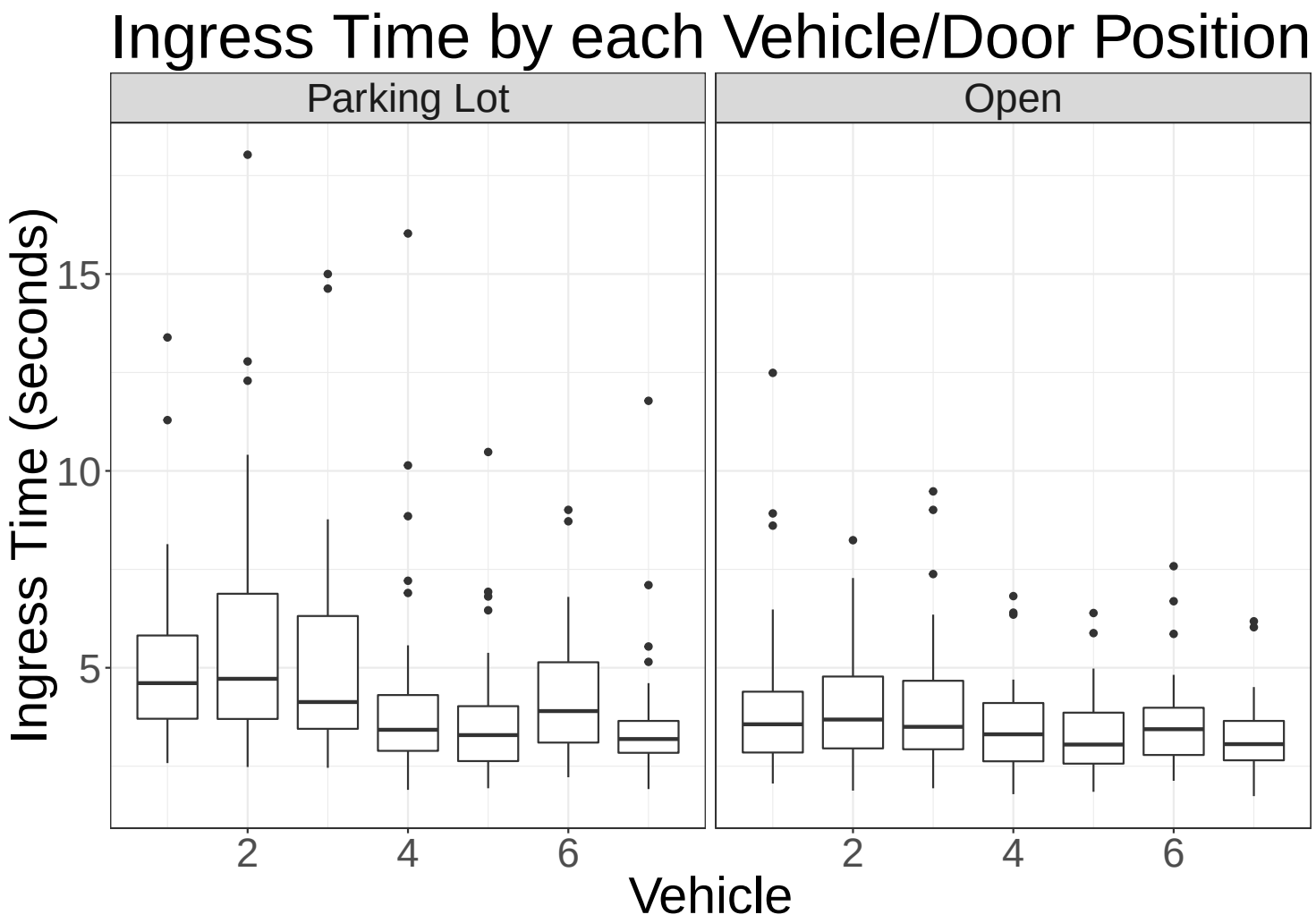
5. Analyzed correlation structures in each of the following categories to find a single representative variable
    - Anthropometric
    - Strength
    - Mobility

Data Management

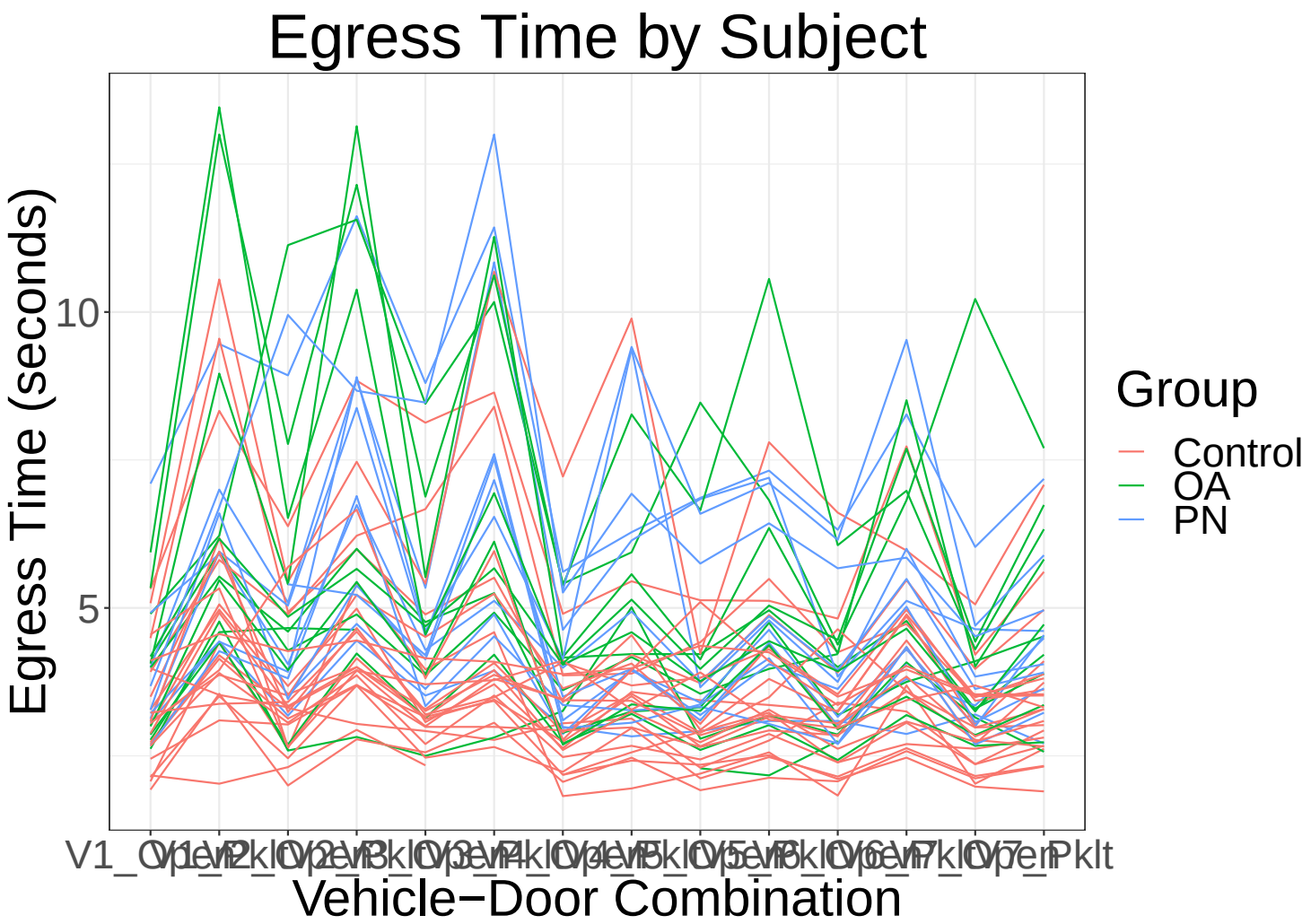


Exploratory Data Analysis

EDA


Ingress Time by each Vehicle/Door Position
Parking Lot
Open
Ingress Time (seconds)
15
10
5
2
4
6
Vehicle

EDA


Egress Time by Subject
Egress Time (seconds)
10
5
Vehicle−Door Combination
Group
Control
OA
PN

EDA Summary

- Random effects appear to be appropriate for both vehicles and subjects
- What makes Vehicle #2 and Vehicle #7 different?

Main Aims and Preliminary Models

Aim #1

Does egress (ingress) strategy affect driver egress (ingress) time in the elderly?

Do mobility impairments affect driver egress (ingress) time in the elderly?

Aim #2

Identify the human capacities that best explain the variation in egress (ingress) time between drivers.

Preliminary Models

- Linear model adjusting for age, gender, vehicle, door position, weight, hip strength, poor balance, group, and strategy
  - ingress strategy nearly significant (p=0.06)
  - egress strategy nearly significant (p=0.06)

Preliminary Models

- Linear mixed model with random intercepts for vehicle and subject
  - ingress strategy highly significant ($p<0.01$)
  - egress strategy not significant ($p=0.18$)

Preliminary Models

- Linear mixed model with random intercept for vehicle and random slope for door position by vehicle
  - Resulted in a singular fit
  - Too few random effect levels (7)
  - Indicates overfitting the model

Future Work

Future Work

- Identify the human capacities that best explain variation in ingress/egress times (Aim #2)

Future Work

- Identify which dimensions (if any) have a significant effect on ingress/egress times
  - An explanation to why drivers did better with certain vehicles
  - Give information to engineers so they can design “elderly-friendly” vehicles

Questions???