# Neural Decoding of Face Features in Primate AM Cortex

by

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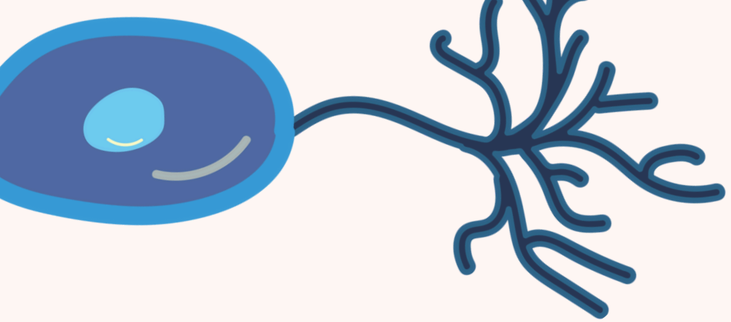
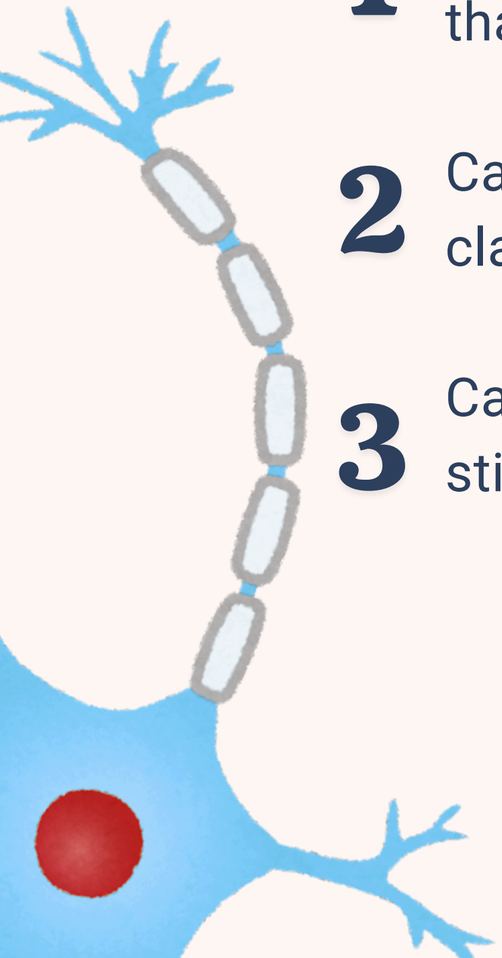
# Background & Research Questions

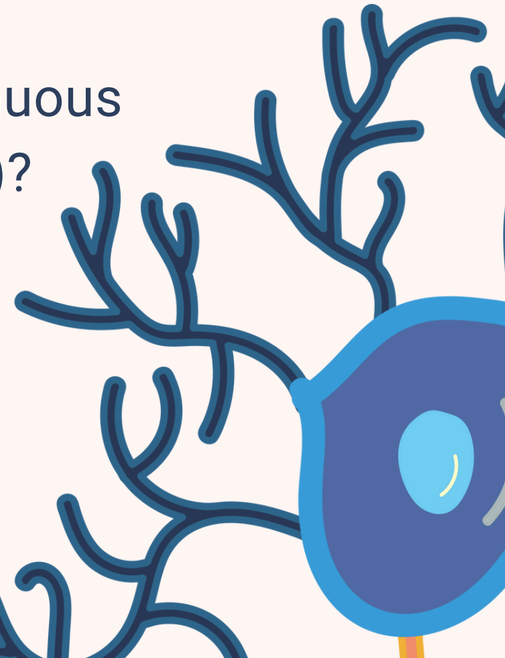
1. Do neural data recorded in the two subjects exhibit systemic differences that might influence decoding performance?

2. Can the AM population collectively classify the specific face identity (25 classes) and the head orientation (8 classes) of the presented stimulus?

3. Can the collective firing rates of the AM population predict a continuous stimulus feature, specifically the horizontal head angle (in degrees)?

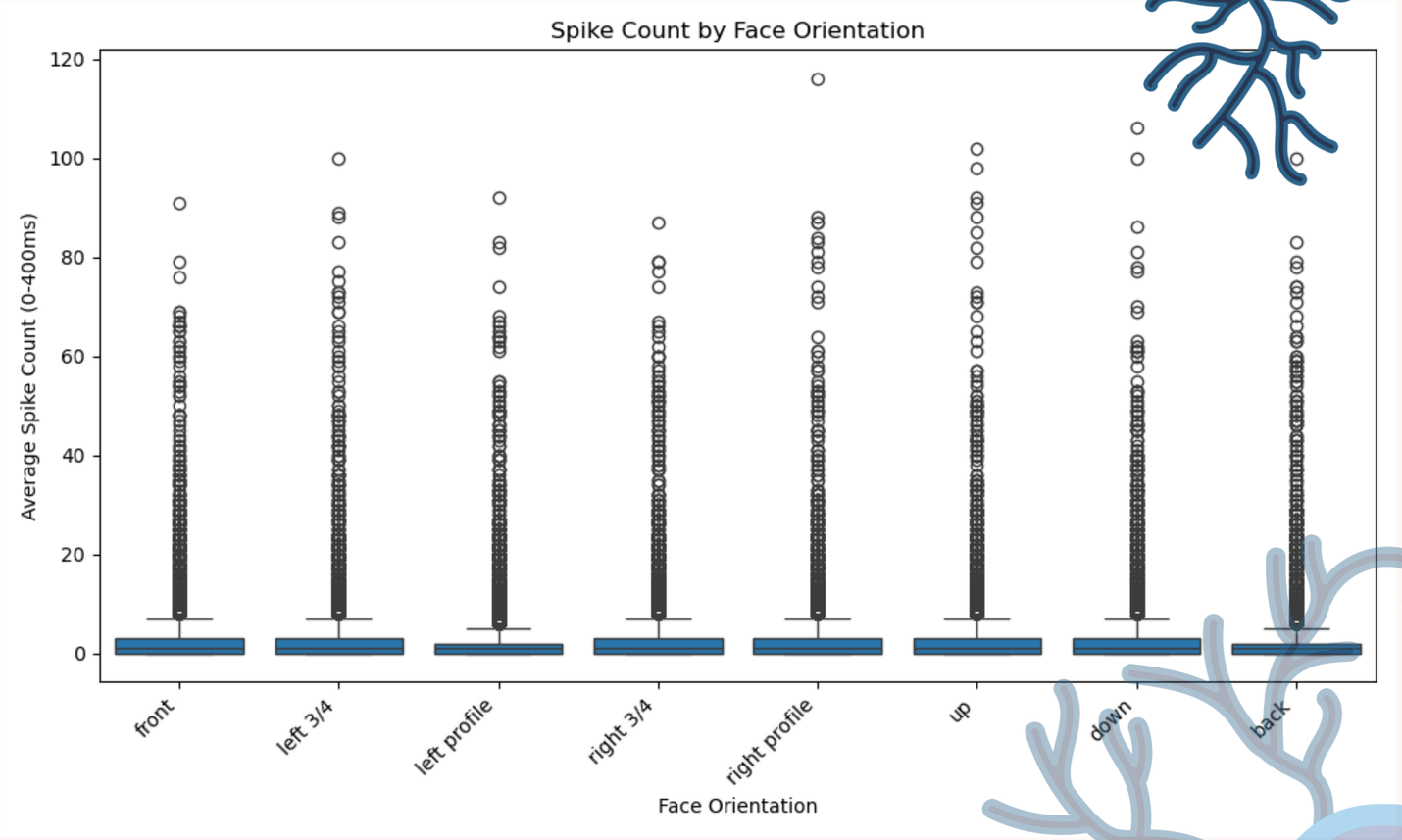




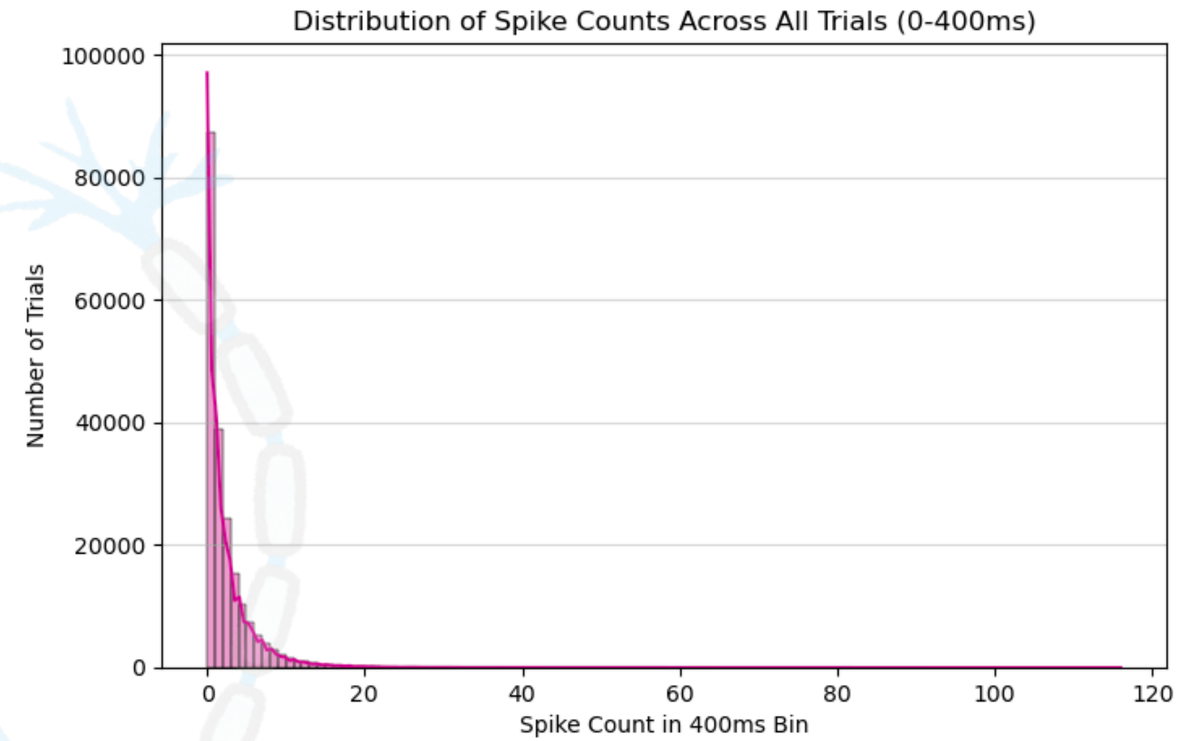


# Data

1. Bert and Lupo
2. 193 CSV Files
3. Over 200,000 trial-level rows
4. 25 unique Person IDs
5. 8 unique Head Orientations



# Methodology

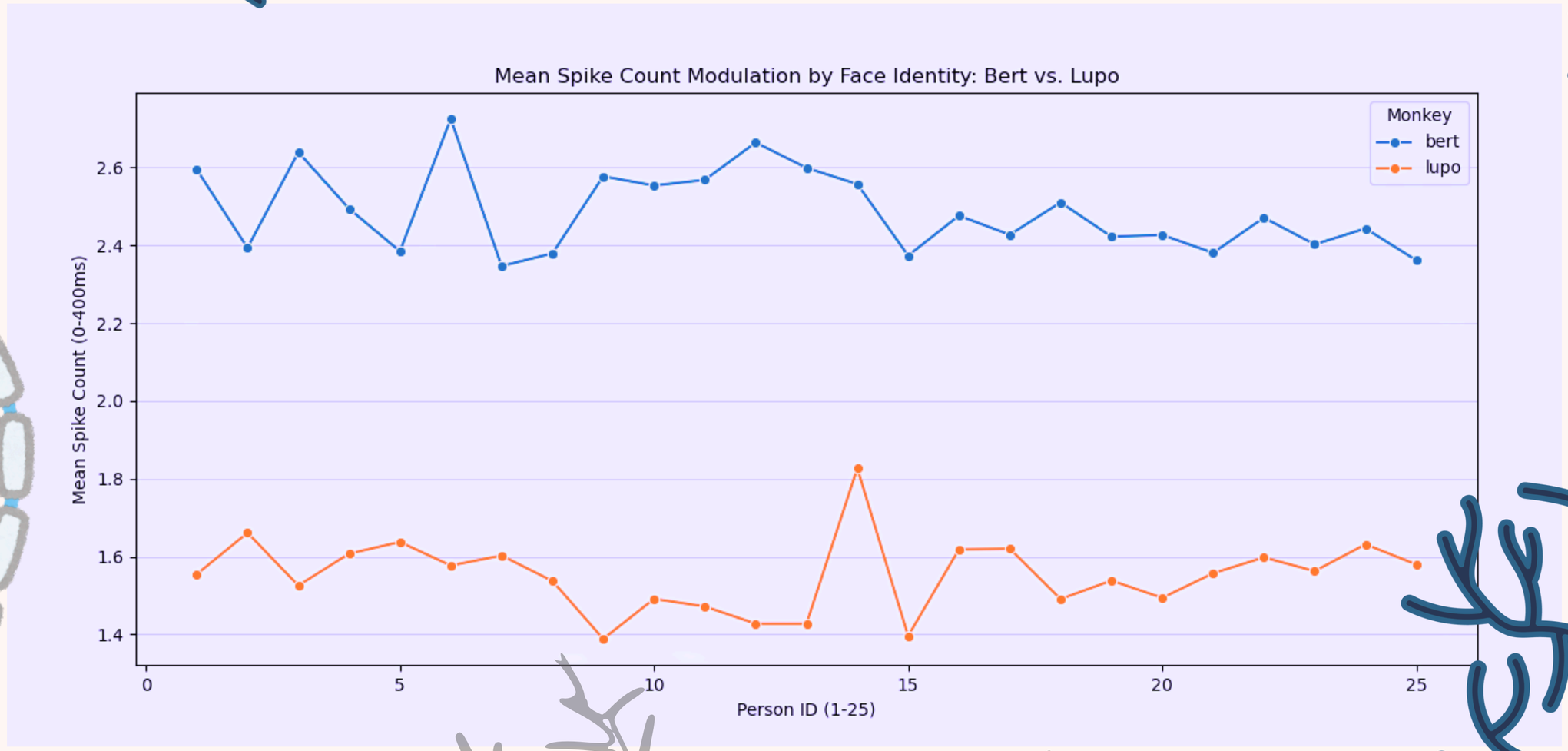



-Data: 154 neuronal features

-Feature: Total Spike Count (0-400ms)

-Process: Parallel loading and pivoting to create Feature Matrix X

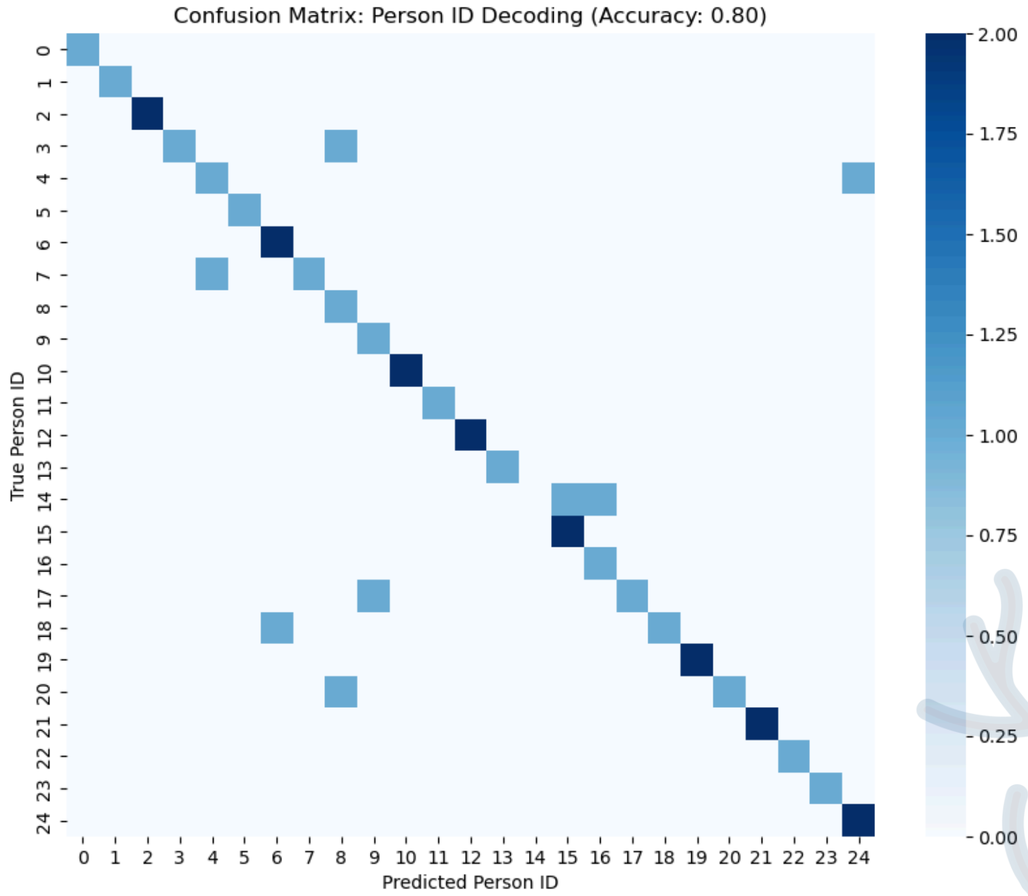
# Subject Specific Difference



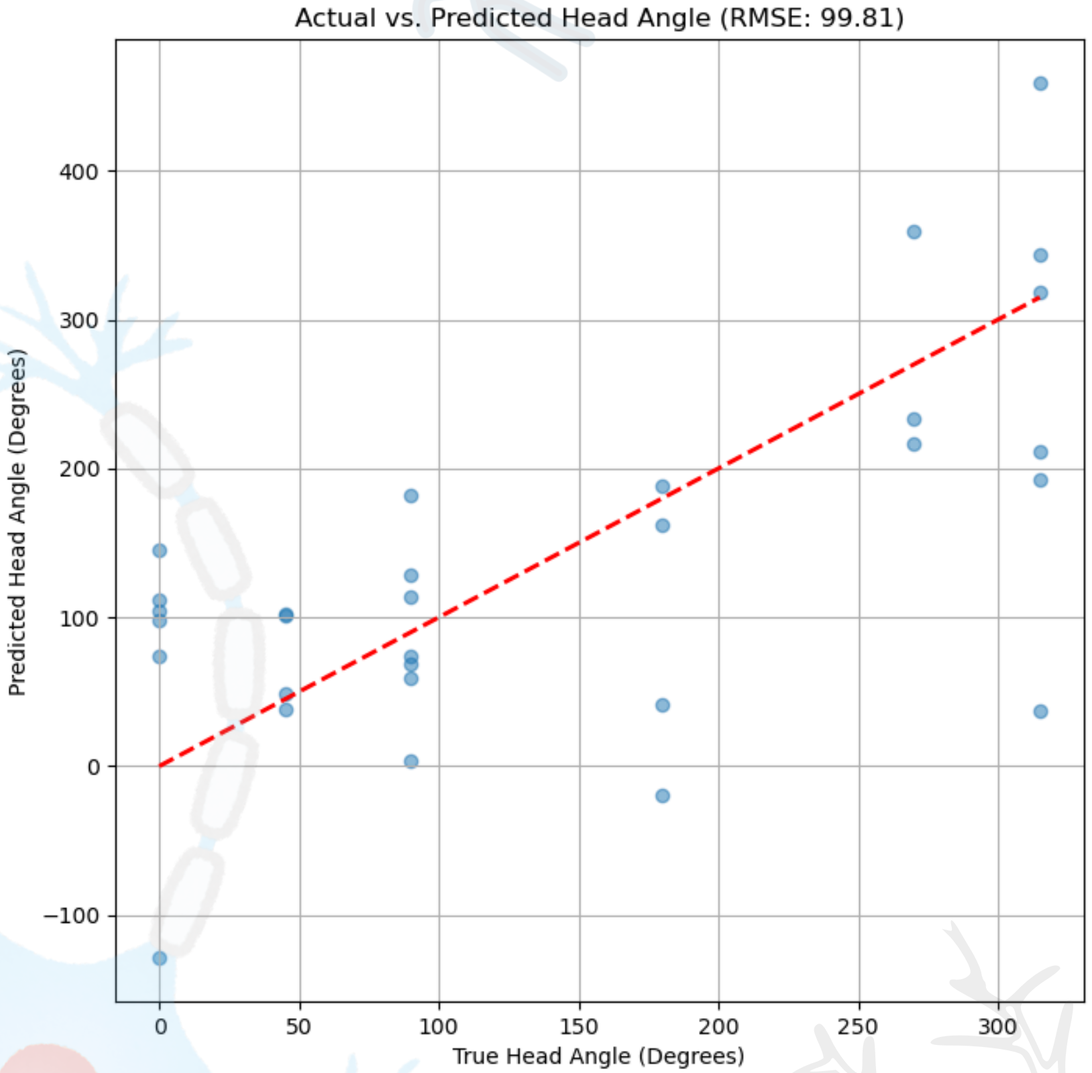
# Classification Decoding Results

- Identity (25 classes): 80.0% Accuracy (4.0% chance)

- Orientation (8 classes): 72.0% Accuracy (12.5% chance).



# Regression Decoding Results




- Target: Continuous Horizontal Head Angle (0 to 315 degrees)

- Model: Ridge Regression

- Goal: Test for a Parametric Code for the view

- RMSE: 99.81 degrees

- $R^2$ Score: 0.27

# Conclusion

- Strong, linear code for discrete identity (80% accuracy) and discrete orientation
- Simple linear Ridge Regression failed to decode the continuous horizontal head angle
- Implement Circular Regression to handle the angular boundary correctly
- Explore non-linear models

# Thank You