

My title*

My subtitle if needed

Arav Sri Agarwal

Uma Sadhwani

October 21, 2024

First sentence. Second sentence. Third sentence. Fourth sentence.

1 Introduction

Overview paragraph:

Estimand paragraph:

Results paragraph:

Why it matters paragraph:

Telegraphing paragraph:

The remainder of this paper is structured as follows. Section 2 introduces our data and methodology, ?@sec-model presents our model, Section 4 presents our key findings, Section 5 discusses the real-world implications of these results, what we learn from them, and the potential limitations of our analysis, Section A analyzes the methodology of our chosen pollster, and Section B details an idealized methodology and survey.

2 Data

2.1 Dataset Overview

We use the statistical programming language R (R Core Team 2023).... Our data (Toronto Shelter & Support Services 2024).... Following Alexander (2023), we consider...

Overview text

*Code and data are available at:

2.2 Measurement

Some paragraphs about how we go from a phenomena in the world to an entry in the dataset.

2.3 Outcome variables

Add graphs, tables and text. Use sub-sub-headings for each outcome variable or update the subheading to be singular.

Some of our data is of _____ , from (insert citation).

Talk more about it.

And also planes (Figure 1). (You can change the height and width, but don't worry about doing that until you have finished every other aspect of the paper - Quarto will try to make it look nice and the defaults usually work well once you have enough text.)

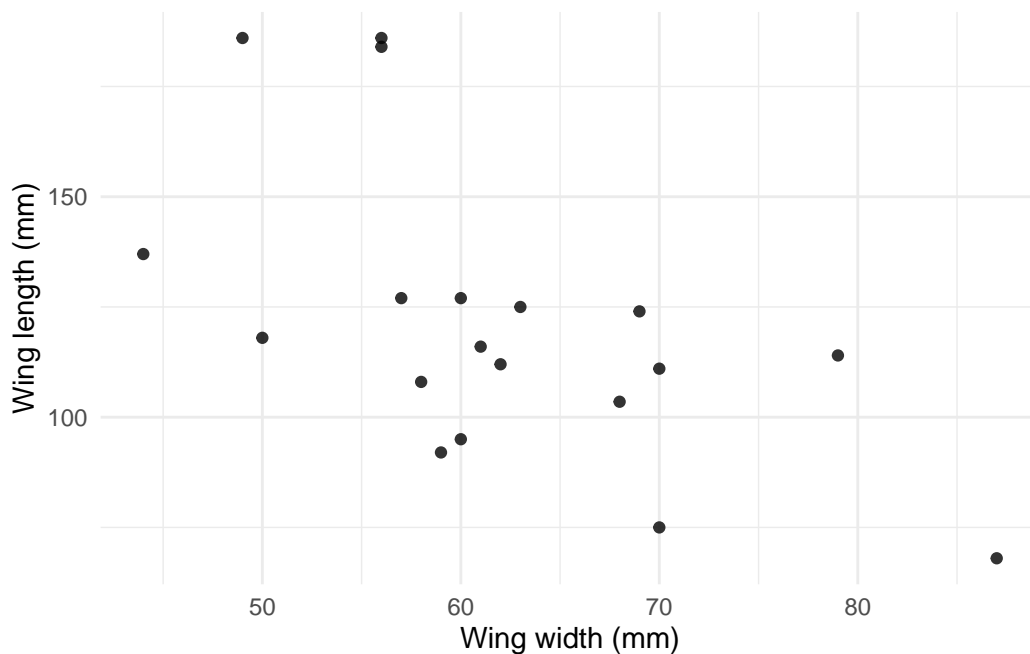


Figure 1: Relationship between wing length and width

Talk way more about it.

2.4 Predictor variables

Add graphs, tables and text.

Use sub-sub-headings for each outcome variable and feel free to combine a few into one if they go together naturally.

3 Model {sec-model}

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in Appendix [D](#).

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i | \mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$

$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$

$$\alpha \sim \text{Normal}(0, 2.5) \tag{3}$$

$$\beta \sim \text{Normal}(0, 2.5) \tag{4}$$

$$\gamma \sim \text{Normal}(0, 2.5) \tag{5}$$

$$\sigma \sim \text{Exponential}(1) \tag{6}$$

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model Justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular...

We can use maths by including latex between dollar signs, for instance θ .

Table 1: Explanatory models of flight time based on wing width and wing length

	First model
(Intercept)	1.12 (1.70)
length	0.01 (0.01)
width	−0.01 (0.02)
Num.Obs.	19
R2	0.320
R2 Adj.	0.019
Log.Lik.	−18.128
ELPD	−21.6
ELPD s.e.	2.1
LOOIC	43.2
LOOIC s.e.	4.3
WAIC	42.7
RMSE	0.60

4 Results

Our results are summarized in [Table 1](#).

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

Please don't use these as sub-heading labels - change them to be what your point actually is.

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

A Appendix 1

Pick one pollster in your sample, and deep-dive on their methodology in an appendix to your paper. In particular, in addition to conveying a sense of the pollster of interest, this appendix should include a discussion of the survey's methodology, and its key features, strengths, and weaknesses. For instance: - what is the population, frame, and sample; - how is the sample recruited; - what sampling approach is taken, and what are some of the trade-offs of this; - how is non-response handled; - what is good and bad about the questionnaire.

B Appendix 2

put together an idealized methodology and survey that you would run if you had a budget of \$100K and the task of forecasting the US presidential election. You should detail the sampling approach that you would use, how you would recruit respondents, data validation, and any other relevant aspects of interest. Also be careful to address any poll aggregation or other features of your methodology. You should actually implement your survey using a survey platform like Google Forms. A link to this should be included in the appendix. Additionally, a copy of the survey should be included in the appendix.

C Additional data details

D Model details

D.1 Posterior predictive check

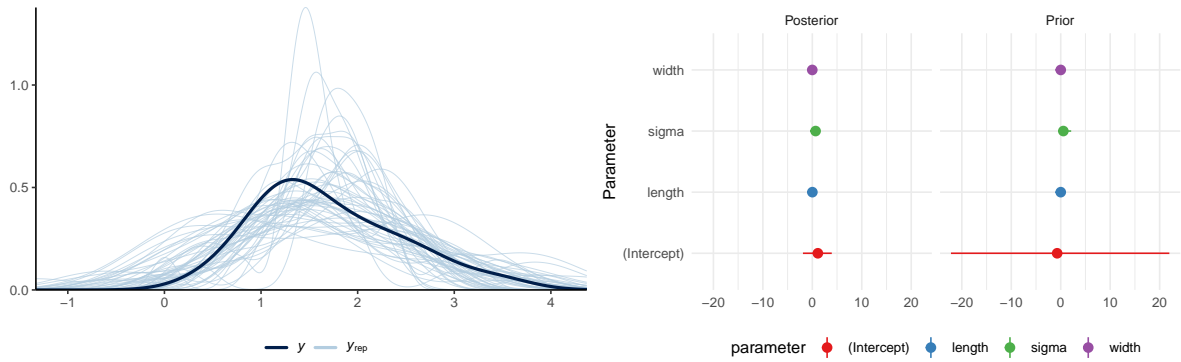
In Figure [2a](#) we implement a posterior predictive check. This shows...

In Figure [2b](#) we compare the posterior with the prior. This shows...

D.2 Diagnostics

Figure [3a](#) is a trace plot. It shows... This suggests...

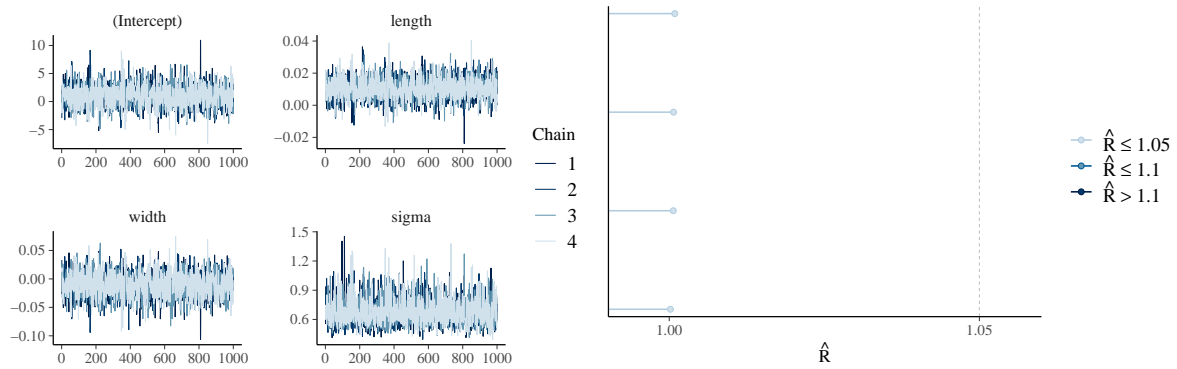
Figure [3b](#) is a Rhat plot. It shows... This suggests...



(a) Posterior prediction check

(b) Comparing the posterior with the prior

Figure 2: Examining how the model fits, and is affected by, the data



(a) Trace plot

(b) Rhat plot

Figure 3: Checking the convergence of the MCMC algorithm

References

- Alexander, Rohan. 2023. *Telling Stories with Data*. Chapman; Hall/CRC. <https://tellingstorieswithdata.com/>.
- Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. “rstanarm: Bayesian applied regression modeling via Stan.” <https://mc-stan.org/rstanarm/>.
- R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Toronto Shelter & Support Services. 2024. *Deaths of Shelter Residents*. <https://open.toronto.ca/dataset/deaths-of-shelter-residents/>.