

Final Project Preliminary Analysis

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Analysis of Predictors of Abortion Stances Using Bayesian Multinomial Logistic Regression

Research Questions

Can moral framing and sentiment predict abortion stance? Is there an interaction between moral framing and sentiment?

Variables

The dataset contains the following variables:

1. **Stance (Dependent Variable):**

This categorical variable represents the abortion stance of tweets. It has five levels:

- Only Prolife
- Prolife talking about Prochoice
- Prochoice talking about Prolife
- Only Prochoice
- Neither

2. **Sentiment (Predictor):**

A categorical variable (`sentiment_label`) with three levels:

- Positive
- Negative
- Neutral

3. **Moral Framing (Predictors):**

Binary variables indicating the presence or absence of moral framing in the tweet:

- Care
- Fairness
- Authority
- Loyalty
- Purity

4. **Interaction Terms:**

Interaction terms will be included between `sentiment_label` and each of the moral framing variables to test if sentiment moderates the effect of moral framing on abortion stances.

Statistical Model

We use a **Bayesian multinomial logistic regression model** to predict abortion stances (`label`) using sentiment, moral framing, and their interaction as predictors.

Mathematical Formulation The probability of a tweet being in stance k is modeled as:

$$P(Y = k) = \frac{\exp(\beta_{0k} + \beta_{1k} \cdot \text{Sentiment} + \beta_{2k} \cdot \text{Moral Framing} + \beta_{3k} \cdot (\text{Sentiment} \times \text{Moral Framing}))}{\sum_j \exp(\beta_{0j} + \beta_{1j} \cdot \text{Sentiment} + \beta_{2j} \cdot \text{Moral Framing} + \beta_{3j} \cdot (\text{Sentiment} \times \text{Moral Framing}))}$$

Where:

- Y is the abortion stance (`label`), with categories $k = 1, \dots, 5$.
 - β_{0k} : Intercept for category k .
 - β_{1k} : Coefficient for the effect of `Sentiment` on k .
 - β_{2k} : Coefficient for the effect of `Moral Framing` on k .
 - β_{3k} : Coefficient for the interaction effect of `Sentiment` and `Moral Framing` on k .
-

Rationale for Using Bayesian Multinomial Logistic Regression

1. Multinomial Outcome:

The dependent variable (`label`) has multiple categories, requiring a multinomial logistic regression model.

2. Bayesian Framework:

A Bayesian approach allows for:

- The incorporation of prior knowledge about the effects of sentiment and moral framing.
- Rich uncertainty quantification through posterior distributions.
- Flexible interpretation of model parameters as probabilities.

3. Interaction Effects:

The model tests whether sentiment moderates the relationship between moral framing and abortion stance by including interaction terms.

4. Practical Benefits:

Bayesian methods handle small sample sizes and complex models more robustly than traditional frequentist approaches.

Loading Packages

Preparing the Dataset

Fit the Model

```
formula <- bf(
  label ~ sentiment_label * (care + fairness + authority + loyalty + purity)
)

# Fit the Bayesian multinomial logistic regression model
fit <- brm(
```

```

formula = formula,
family = categorical(link = "logit"),
data = data,
backend = "cmdstanr",
iter = 4000,
warmup = 1000,
chains = 4,
cores = 4,
seed = 123
)

```

```
## Start sampling
```

```
## Running MCMC with 4 parallel chains...
```

```
##
## Chain 1 Iteration:    1 / 4000 [  0%] (Warmup)
## Chain 2 Iteration:    1 / 4000 [  0%] (Warmup)
## Chain 3 Iteration:    1 / 4000 [  0%] (Warmup)
## Chain 4 Iteration:    1 / 4000 [  0%] (Warmup)
## Chain 2 Iteration:   100 / 4000 [  2%] (Warmup)
## Chain 1 Iteration:   100 / 4000 [  2%] (Warmup)
## Chain 4 Iteration:   100 / 4000 [  2%] (Warmup)
## Chain 3 Iteration:   100 / 4000 [  2%] (Warmup)
## Chain 2 Iteration:   200 / 4000 [  5%] (Warmup)
## Chain 1 Iteration:   200 / 4000 [  5%] (Warmup)
## Chain 3 Iteration:   200 / 4000 [  5%] (Warmup)
## Chain 4 Iteration:   200 / 4000 [  5%] (Warmup)
## Chain 2 Iteration:   300 / 4000 [  7%] (Warmup)
## Chain 1 Iteration:   300 / 4000 [  7%] (Warmup)
## Chain 4 Iteration:   300 / 4000 [  7%] (Warmup)
## Chain 3 Iteration:   300 / 4000 [  7%] (Warmup)
## Chain 2 Iteration:   400 / 4000 [ 10%] (Warmup)
## Chain 1 Iteration:   400 / 4000 [ 10%] (Warmup)
## Chain 4 Iteration:   400 / 4000 [ 10%] (Warmup)
## Chain 3 Iteration:   400 / 4000 [ 10%] (Warmup)
## Chain 2 Iteration:   500 / 4000 [ 12%] (Warmup)
## Chain 1 Iteration:   500 / 4000 [ 12%] (Warmup)
## Chain 4 Iteration:   500 / 4000 [ 12%] (Warmup)
## Chain 3 Iteration:   500 / 4000 [ 12%] (Warmup)
## Chain 1 Iteration:   600 / 4000 [ 15%] (Warmup)
## Chain 2 Iteration:   600 / 4000 [ 15%] (Warmup)
## Chain 4 Iteration:   600 / 4000 [ 15%] (Warmup)
## Chain 3 Iteration:   600 / 4000 [ 15%] (Warmup)
## Chain 1 Iteration:   700 / 4000 [ 17%] (Warmup)
## Chain 2 Iteration:   700 / 4000 [ 17%] (Warmup)
## Chain 4 Iteration:   700 / 4000 [ 17%] (Warmup)
## Chain 3 Iteration:   700 / 4000 [ 17%] (Warmup)
## Chain 1 Iteration:   800 / 4000 [ 20%] (Warmup)
## Chain 2 Iteration:   800 / 4000 [ 20%] (Warmup)
## Chain 3 Iteration:   800 / 4000 [ 20%] (Warmup)
## Chain 4 Iteration:   800 / 4000 [ 20%] (Warmup)
## Chain 1 Iteration:   900 / 4000 [ 22%] (Warmup)
## Chain 2 Iteration:   900 / 4000 [ 22%] (Warmup)
## Chain 3 Iteration:   900 / 4000 [ 22%] (Warmup)

```

[illegible]

[illegible]

```

## Chain 1 Iteration: 3500 / 4000 [ 87%] (Sampling)
## Chain 3 Iteration: 3600 / 4000 [ 90%] (Sampling)
## Chain 4 Iteration: 3500 / 4000 [ 87%] (Sampling)
## Chain 2 Iteration: 3700 / 4000 [ 92%] (Sampling)
## Chain 1 Iteration: 3600 / 4000 [ 90%] (Sampling)
## Chain 3 Iteration: 3700 / 4000 [ 92%] (Sampling)
## Chain 2 Iteration: 3800 / 4000 [ 95%] (Sampling)
## Chain 4 Iteration: 3600 / 4000 [ 90%] (Sampling)
## Chain 1 Iteration: 3700 / 4000 [ 92%] (Sampling)
## Chain 2 Iteration: 3900 / 4000 [ 97%] (Sampling)
## Chain 3 Iteration: 3800 / 4000 [ 95%] (Sampling)
## Chain 4 Iteration: 3700 / 4000 [ 92%] (Sampling)
## Chain 1 Iteration: 3800 / 4000 [ 95%] (Sampling)
## Chain 3 Iteration: 3900 / 4000 [ 97%] (Sampling)
## Chain 2 Iteration: 4000 / 4000 [100%] (Sampling)
## Chain 2 finished in 367.3 seconds.
## Chain 4 Iteration: 3800 / 4000 [ 95%] (Sampling)
## Chain 1 Iteration: 3900 / 4000 [ 97%] (Sampling)
## Chain 3 Iteration: 4000 / 4000 [100%] (Sampling)
## Chain 3 finished in 374.1 seconds.
## Chain 4 Iteration: 3900 / 4000 [ 97%] (Sampling)
## Chain 1 Iteration: 4000 / 4000 [100%] (Sampling)
## Chain 1 finished in 378.9 seconds.
## Chain 4 Iteration: 4000 / 4000 [100%] (Sampling)
## Chain 4 finished in 382.9 seconds.
##
## All 4 chains finished successfully.
## Mean chain execution time: 375.8 seconds.
## Total execution time: 383.4 seconds.

```

Model Summary

```
summary(fit)
```

```

## Family: categorical
## Links: muOnlyProchoice = logit; muOnlyProlife = logit; muProchoicetalkingaboutProlife = logit; muP
## Formula: label ~ sentiment_label * (care + fairness + authority + loyalty + purity)
## Data: data (Number of observations: 10000)
## Draws: 4 chains, each with iter = 4000; warmup = 1000; thin = 1;
## total post-warmup draws = 12000
##
## Regression Coefficients:
##
## Estimate
## muOnlyProchoice_Intercept -0.63
## muOnlyProlife_Intercept -0.05
## muProchoicetalkingaboutProlife_Intercept 0.18
## muProlifetalkingaboutProchoice_Intercept -0.04
## muOnlyProchoice_sentiment_labelneutral 1.35
## muOnlyProchoice_sentiment_labelpositive 0.28
## muOnlyProchoice_care 0.38
## muOnlyProchoice_fairness 0.59
## muOnlyProchoice_authority -0.72
## muOnlyProchoice_loyalty -0.48
## muOnlyProchoice_purity -0.49

```

## muOnlyProchoice_sentiment_labelneutral:care	-1.30
## muOnlyProchoice_sentiment_labelpositive:care	0.59
## muOnlyProchoice_sentiment_labelneutral:fairness	0.18
## muOnlyProchoice_sentiment_labelpositive:fairness	0.07
## muOnlyProchoice_sentiment_labelneutral:authority	0.02
## muOnlyProchoice_sentiment_labelpositive:authority	0.59
## muOnlyProchoice_sentiment_labelneutral:loyalty	-0.17
## muOnlyProchoice_sentiment_labelpositive:loyalty	0.12
## muOnlyProchoice_sentiment_labelneutral:purity	-0.55
## muOnlyProchoice_sentiment_labelpositive:purity	-1.18
## muOnlyProlife_sentiment_labelneutral	1.48
## muOnlyProlife_sentiment_labelpositive	0.55
## muOnlyProlife_care	0.50
## muOnlyProlife_fairness	-0.59
## muOnlyProlife_authority	-0.32
## muOnlyProlife_loyalty	-0.60
## muOnlyProlife_purity	0.28
## muOnlyProlife_sentiment_labelneutral:care	-0.52
## muOnlyProlife_sentiment_labelpositive:care	0.26
## muOnlyProlife_sentiment_labelneutral:fairness	-0.28
## muOnlyProlife_sentiment_labelpositive:fairness	-0.59
## muOnlyProlife_sentiment_labelneutral:authority	0.01
## muOnlyProlife_sentiment_labelpositive:authority	0.56
## muOnlyProlife_sentiment_labelneutral:loyalty	-0.10
## muOnlyProlife_sentiment_labelpositive:loyalty	0.58
## muOnlyProlife_sentiment_labelneutral:purity	0.03
## muOnlyProlife_sentiment_labelpositive:purity	-0.07
## muProchoicetalkingaboutProlife_sentiment_labelneutral	-0.13
## muProchoicetalkingaboutProlife_sentiment_labelpositive	-0.22
## muProchoicetalkingaboutProlife_care	0.04
## muProchoicetalkingaboutProlife_fairness	0.84
## muProchoicetalkingaboutProlife_authority	-0.81
## muProchoicetalkingaboutProlife_loyalty	0.42
## muProchoicetalkingaboutProlife_purity	0.14
## muProchoicetalkingaboutProlife_sentiment_labelneutral:care	-0.08
## muProchoicetalkingaboutProlife_sentiment_labelpositive:care	0.32
## muProchoicetalkingaboutProlife_sentiment_labelneutral:fairness	-0.15
## muProchoicetalkingaboutProlife_sentiment_labelpositive:fairness	-0.35
## muProchoicetalkingaboutProlife_sentiment_labelneutral:authority	0.39
## muProchoicetalkingaboutProlife_sentiment_labelpositive:authority	0.04
## muProchoicetalkingaboutProlife_sentiment_labelneutral:loyalty	-0.04
## muProchoicetalkingaboutProlife_sentiment_labelpositive:loyalty	0.42
## muProchoicetalkingaboutProlife_sentiment_labelneutral:purity	-0.04
## muProchoicetalkingaboutProlife_sentiment_labelpositive:purity	-0.39
## muProlifetalkingaboutProchoice_sentiment_labelneutral	0.08
## muProlifetalkingaboutProchoice_sentiment_labelpositive	-0.64
## muProlifetalkingaboutProchoice_care	0.55
## muProlifetalkingaboutProchoice_fairness	-0.52
## muProlifetalkingaboutProchoice_authority	-0.98
## muProlifetalkingaboutProchoice_loyalty	-0.85
## muProlifetalkingaboutProchoice_purity	0.41
## muProlifetalkingaboutProchoice_sentiment_labelneutral:care	-0.08
## muProlifetalkingaboutProchoice_sentiment_labelpositive:care	0.66
## muProlifetalkingaboutProchoice_sentiment_labelneutral:fairness	-0.05

## muProlifetalkingaboutProchoice_sentiment_labelpositive:fairness	-0.17
## muProlifetalkingaboutProchoice_sentiment_labelneutral:authority	0.59
## muProlifetalkingaboutProchoice_sentiment_labelpositive:authority	0.67
## muProlifetalkingaboutProchoice_sentiment_labelneutral:loyalty	0.01
## muProlifetalkingaboutProchoice_sentiment_labelpositive:loyalty	1.15
## muProlifetalkingaboutProchoice_sentiment_labelneutral:purity	0.54
## muProlifetalkingaboutProchoice_sentiment_labelpositive:purity	0.03
##	Est.Error
## muOnlyProchoice_Intercept	0.18
## muOnlyProlife_Intercept	0.17
## muProchoicetalkingaboutProlife_Intercept	0.14
## muProlifetalkingaboutProchoice_Intercept	0.17
## muOnlyProchoice_sentiment_labelneutral	0.40
## muOnlyProchoice_sentiment_labelpositive	0.26
## muOnlyProchoice_care	0.15
## muOnlyProchoice_fairness	0.12
## muOnlyProchoice_authority	0.18
## muOnlyProchoice_loyalty	0.14
## muOnlyProchoice_purity	0.13
## muOnlyProchoice_sentiment_labelneutral:care	0.31
## muOnlyProchoice_sentiment_labelpositive:care	0.21
## muOnlyProchoice_sentiment_labelneutral:fairness	0.32
## muOnlyProchoice_sentiment_labelpositive:fairness	0.18
## muOnlyProchoice_sentiment_labelneutral:authority	0.44
## muOnlyProchoice_sentiment_labelpositive:authority	0.22
## muOnlyProchoice_sentiment_labelneutral:loyalty	0.35
## muOnlyProchoice_sentiment_labelpositive:loyalty	0.20
## muOnlyProchoice_sentiment_labelneutral:purity	0.41
## muOnlyProchoice_sentiment_labelpositive:purity	0.22
## muOnlyProlife_sentiment_labelneutral	0.37
## muOnlyProlife_sentiment_labelpositive	0.24
## muOnlyProlife_care	0.16
## muOnlyProlife_fairness	0.10
## muOnlyProlife_authority	0.16
## muOnlyProlife_loyalty	0.14
## muOnlyProlife_purity	0.11
## muOnlyProlife_sentiment_labelneutral:care	0.31
## muOnlyProlife_sentiment_labelpositive:care	0.21
## muOnlyProlife_sentiment_labelneutral:fairness	0.26
## muOnlyProlife_sentiment_labelpositive:fairness	0.16
## muOnlyProlife_sentiment_labelneutral:authority	0.38
## muOnlyProlife_sentiment_labelpositive:authority	0.21
## muOnlyProlife_sentiment_labelneutral:loyalty	0.34
## muOnlyProlife_sentiment_labelpositive:loyalty	0.21
## muOnlyProlife_sentiment_labelneutral:purity	0.30
## muOnlyProlife_sentiment_labelpositive:purity	0.17
## muProchoicetalkingaboutProlife_sentiment_labelneutral	0.37
## muProchoicetalkingaboutProlife_sentiment_labelpositive	0.22
## muProchoicetalkingaboutProlife_care	0.11
## muProchoicetalkingaboutProlife_fairness	0.09
## muProchoicetalkingaboutProlife_authority	0.13
## muProchoicetalkingaboutProlife_loyalty	0.10
## muProchoicetalkingaboutProlife_purity	0.10
## muProchoicetalkingaboutProlife_sentiment_labelneutral:care	0.29

## muProchoicetalkingaboutProlife_sentiment_labelpositive:care	0.17
## muProchoicetalkingaboutProlife_sentiment_labelneutral:fairness	0.28
## muProchoicetalkingaboutProlife_sentiment_labelpositive:fairness	0.16
## muProchoicetalkingaboutProlife_sentiment_labelneutral:authority	0.37
## muProchoicetalkingaboutProlife_sentiment_labelpositive:authority	0.19
## muProchoicetalkingaboutProlife_sentiment_labelneutral:loyalty	0.30
## muProchoicetalkingaboutProlife_sentiment_labelpositive:loyalty	0.17
## muProchoicetalkingaboutProlife_sentiment_labelneutral:purity	0.32
## muProchoicetalkingaboutProlife_sentiment_labelpositive:purity	0.16
## muProlifetalkingaboutProchoice_sentiment_labelneutral	0.43
## muProlifetalkingaboutProchoice_sentiment_labelpositive	0.26
## muProlifetalkingaboutProchoice_care	0.16
## muProlifetalkingaboutProchoice_fairness	0.10
## muProlifetalkingaboutProchoice_authority	0.19
## muProlifetalkingaboutProchoice_loyalty	0.15
## muProlifetalkingaboutProchoice_purity	0.11
## muProlifetalkingaboutProchoice_sentiment_labelneutral:care	0.37
## muProlifetalkingaboutProchoice_sentiment_labelpositive:care	0.23
## muProlifetalkingaboutProchoice_sentiment_labelneutral:fairness	0.28
## muProlifetalkingaboutProchoice_sentiment_labelpositive:fairness	0.17
## muProlifetalkingaboutProchoice_sentiment_labelneutral:authority	0.46
## muProlifetalkingaboutProchoice_sentiment_labelpositive:authority	0.25
## muProlifetalkingaboutProchoice_sentiment_labelneutral:loyalty	0.42
## muProlifetalkingaboutProchoice_sentiment_labelpositive:loyalty	0.22
## muProlifetalkingaboutProchoice_sentiment_labelneutral:purity	0.31
## muProlifetalkingaboutProchoice_sentiment_labelpositive:purity	0.17
##	1-95% CI
## muOnlyProchoice_Intercept	-0.99
## muOnlyProlife_Intercept	-0.40
## muProchoicetalkingaboutProlife_Intercept	-0.08
## muProlifetalkingaboutProchoice_Intercept	-0.39
## muOnlyProchoice_sentiment_labelneutral	0.55
## muOnlyProchoice_sentiment_labelpositive	-0.23
## muOnlyProchoice_care	0.08
## muOnlyProchoice_fairness	0.37
## muOnlyProchoice_authority	-1.07
## muOnlyProchoice_loyalty	-0.75
## muOnlyProchoice_purity	-0.74
## muOnlyProchoice_sentiment_labelneutral:care	-1.91
## muOnlyProchoice_sentiment_labelpositive:care	0.18
## muOnlyProchoice_sentiment_labelneutral:fairness	-0.44
## muOnlyProchoice_sentiment_labelpositive:fairness	-0.29
## muOnlyProchoice_sentiment_labelneutral:authority	-0.85
## muOnlyProchoice_sentiment_labelpositive:authority	0.14
## muOnlyProchoice_sentiment_labelneutral:loyalty	-0.86
## muOnlyProchoice_sentiment_labelpositive:loyalty	-0.28
## muOnlyProchoice_sentiment_labelneutral:purity	-1.38
## muOnlyProchoice_sentiment_labelpositive:purity	-1.62
## muOnlyProlife_sentiment_labelneutral	0.78
## muOnlyProlife_sentiment_labelpositive	0.08
## muOnlyProlife_care	0.20
## muOnlyProlife_fairness	-0.80
## muOnlyProlife_authority	-0.63
## muOnlyProlife_loyalty	-0.89

## muOnlyProlife_purity	0.06	
## muOnlyProlife_sentiment_labelneutral:care	-1.14	
## muOnlyProlife_sentiment_labelpositive:care	-0.16	
## muOnlyProlife_sentiment_labelneutral:fairness	-0.77	
## muOnlyProlife_sentiment_labelpositive:fairness	-0.91	
## muOnlyProlife_sentiment_labelneutral:authority	-0.73	
## muOnlyProlife_sentiment_labelpositive:authority	0.15	
## muOnlyProlife_sentiment_labelneutral:loyalty	-0.77	
## muOnlyProlife_sentiment_labelpositive:loyalty	0.17	
## muOnlyProlife_sentiment_labelneutral:purity	-0.54	
## muOnlyProlife_sentiment_labelpositive:purity	-0.39	
## muProchoicetalkingaboutProlife_sentiment_labelneutral	-0.84	
## muProchoicetalkingaboutProlife_sentiment_labelpositive	-0.64	
## muProchoicetalkingaboutProlife_care	-0.18	
## muProchoicetalkingaboutProlife_fairness	0.66	
## muProchoicetalkingaboutProlife_authority	-1.07	
## muProchoicetalkingaboutProlife_loyalty	0.23	
## muProchoicetalkingaboutProlife_purity	-0.05	
## muProchoicetalkingaboutProlife_sentiment_labelneutral:care	-0.65	
## muProchoicetalkingaboutProlife_sentiment_labelpositive:care	-0.01	
## muProchoicetalkingaboutProlife_sentiment_labelneutral:fairness	-0.70	
## muProchoicetalkingaboutProlife_sentiment_labelpositive:fairness	-0.67	
## muProchoicetalkingaboutProlife_sentiment_labelneutral:authority	-0.34	
## muProchoicetalkingaboutProlife_sentiment_labelpositive:authority	-0.34	
## muProchoicetalkingaboutProlife_sentiment_labelneutral:loyalty	-0.63	
## muProchoicetalkingaboutProlife_sentiment_labelpositive:loyalty	0.10	
## muProchoicetalkingaboutProlife_sentiment_labelneutral:purity	-0.67	
## muProchoicetalkingaboutProlife_sentiment_labelpositive:purity	-0.70	
## muProlifetalkingaboutProchoice_sentiment_labelneutral	-0.75	
## muProlifetalkingaboutProchoice_sentiment_labelpositive	-1.15	
## muProlifetalkingaboutProchoice_care	0.25	
## muProlifetalkingaboutProchoice_fairness	-0.72	
## muProlifetalkingaboutProchoice_authority	-1.36	
## muProlifetalkingaboutProchoice_loyalty	-1.15	
## muProlifetalkingaboutProchoice_purity	0.20	
## muProlifetalkingaboutProchoice_sentiment_labelneutral:care	-0.80	
## muProlifetalkingaboutProchoice_sentiment_labelpositive:care	0.22	
## muProlifetalkingaboutProchoice_sentiment_labelneutral:fairness	-0.61	
## muProlifetalkingaboutProchoice_sentiment_labelpositive:fairness	-0.50	
## muProlifetalkingaboutProchoice_sentiment_labelneutral:authority	-0.33	
## muProlifetalkingaboutProchoice_sentiment_labelpositive:authority	0.18	
## muProlifetalkingaboutProchoice_sentiment_labelneutral:loyalty	-0.83	
## muProlifetalkingaboutProchoice_sentiment_labelpositive:loyalty	0.72	
## muProlifetalkingaboutProchoice_sentiment_labelneutral:purity	-0.06	
## muProlifetalkingaboutProchoice_sentiment_labelpositive:purity	-0.31	
##	u-95% CI	Rhat
## muOnlyProchoice_Intercept	-0.29	1.00
## muOnlyProlife_Intercept	0.28	1.00
## muProchoicetalkingaboutProlife_Intercept	0.45	1.00
## muProlifetalkingaboutProchoice_Intercept	0.30	1.00
## muOnlyProchoice_sentiment_labelneutral	2.13	1.00
## muOnlyProchoice_sentiment_labelpositive	0.78	1.00
## muOnlyProchoice_care	0.68	1.00
## muOnlyProchoice_fairness	0.82	1.00

## muOnlyProchoice_authority	-0.38	1.00
## muOnlyProchoice_loyalty	-0.20	1.00
## muOnlyProchoice_purity	-0.24	1.00
## muOnlyProchoice_sentiment_labelneutral:care	-0.70	1.00
## muOnlyProchoice_sentiment_labelpositive:care	1.00	1.00
## muOnlyProchoice_sentiment_labelneutral:fairness	0.80	1.00
## muOnlyProchoice_sentiment_labelpositive:fairness	0.42	1.00
## muOnlyProchoice_sentiment_labelneutral:authority	0.88	1.00
## muOnlyProchoice_sentiment_labelpositive:authority	1.03	1.00
## muOnlyProchoice_sentiment_labelneutral:loyalty	0.52	1.00
## muOnlyProchoice_sentiment_labelpositive:loyalty	0.52	1.00
## muOnlyProchoice_sentiment_labelneutral:purity	0.25	1.00
## muOnlyProchoice_sentiment_labelpositive:purity	-0.77	1.00
## muOnlyProlife_sentiment_labelneutral	2.21	1.00
## muOnlyProlife_sentiment_labelpositive	1.02	1.00
## muOnlyProlife_care	0.81	1.00
## muOnlyProlife_fairness	-0.39	1.00
## muOnlyProlife_authority	-0.01	1.00
## muOnlyProlife_loyalty	-0.32	1.00
## muOnlyProlife_purity	0.49	1.00
## muOnlyProlife_sentiment_labelneutral:care	0.08	1.00
## muOnlyProlife_sentiment_labelpositive:care	0.67	1.00
## muOnlyProlife_sentiment_labelneutral:fairness	0.23	1.00
## muOnlyProlife_sentiment_labelpositive:fairness	-0.28	1.00
## muOnlyProlife_sentiment_labelneutral:authority	0.76	1.00
## muOnlyProlife_sentiment_labelpositive:authority	0.97	1.00
## muOnlyProlife_sentiment_labelneutral:loyalty	0.56	1.00
## muOnlyProlife_sentiment_labelpositive:loyalty	0.99	1.00
## muOnlyProlife_sentiment_labelneutral:purity	0.63	1.00
## muOnlyProlife_sentiment_labelpositive:purity	0.26	1.00
## muProchoicetalkingaboutProlife_sentiment_labelneutral	0.60	1.00
## muProchoicetalkingaboutProlife_sentiment_labelpositive	0.20	1.00
## muProchoicetalkingaboutProlife_care	0.26	1.00
## muProchoicetalkingaboutProlife_fairness	1.03	1.00
## muProchoicetalkingaboutProlife_authority	-0.55	1.00
## muProchoicetalkingaboutProlife_loyalty	0.62	1.00
## muProchoicetalkingaboutProlife_purity	0.33	1.00
## muProchoicetalkingaboutProlife_sentiment_labelneutral:care	0.48	1.00
## muProchoicetalkingaboutProlife_sentiment_labelpositive:care	0.65	1.00
## muProchoicetalkingaboutProlife_sentiment_labelneutral:fairness	0.39	1.00
## muProchoicetalkingaboutProlife_sentiment_labelpositive:fairness	-0.02	1.00
## muProchoicetalkingaboutProlife_sentiment_labelneutral:authority	1.11	1.00
## muProchoicetalkingaboutProlife_sentiment_labelpositive:authority	0.42	1.00
## muProchoicetalkingaboutProlife_sentiment_labelneutral:loyalty	0.55	1.00
## muProchoicetalkingaboutProlife_sentiment_labelpositive:loyalty	0.75	1.00
## muProchoicetalkingaboutProlife_sentiment_labelneutral:purity	0.56	1.00
## muProchoicetalkingaboutProlife_sentiment_labelpositive:purity	-0.06	1.00
## muProlifetalkingaboutProchoice_sentiment_labelneutral	0.93	1.00
## muProlifetalkingaboutProchoice_sentiment_labelpositive	-0.13	1.00
## muProlifetalkingaboutProchoice_care	0.86	1.00
## muProlifetalkingaboutProchoice_fairness	-0.31	1.00
## muProlifetalkingaboutProchoice_authority	-0.61	1.00
## muProlifetalkingaboutProchoice_loyalty	-0.56	1.00
## muProlifetalkingaboutProchoice_purity	0.62	1.00

## muProlifetalkingaboutProchoice_sentiment_labelneutral:care	0.65	1.00
## muProlifetalkingaboutProchoice_sentiment_labelpositive:care	1.11	1.00
## muProlifetalkingaboutProchoice_sentiment_labelneutral:fairness	0.49	1.00
## muProlifetalkingaboutProchoice_sentiment_labelpositive:fairness	0.16	1.00
## muProlifetalkingaboutProchoice_sentiment_labelneutral:authority	1.49	1.00
## muProlifetalkingaboutProchoice_sentiment_labelpositive:authority	1.16	1.00
## muProlifetalkingaboutProchoice_sentiment_labelneutral:loyalty	0.80	1.00
## muProlifetalkingaboutProchoice_sentiment_labelpositive:loyalty	1.58	1.00
## muProlifetalkingaboutProchoice_sentiment_labelneutral:purity	1.16	1.00
## muProlifetalkingaboutProchoice_sentiment_labelpositive:purity	0.36	1.00
##	Bulk_ESS	
## muOnlyProchoice_Intercept	6972	
## muOnlyProlife_Intercept	6874	
## muProchoicetalkingaboutProlife_Intercept	6455	
## muProlifetalkingaboutProchoice_Intercept	7160	
## muOnlyProchoice_sentiment_labelneutral	6160	
## muOnlyProchoice_sentiment_labelpositive	6504	
## muOnlyProchoice_care	7158	
## muOnlyProchoice_fairness	9215	
## muOnlyProchoice_authority	9978	
## muOnlyProchoice_loyalty	9703	
## muOnlyProchoice_purity	9088	
## muOnlyProchoice_sentiment_labelneutral:care	7105	
## muOnlyProchoice_sentiment_labelpositive:care	7319	
## muOnlyProchoice_sentiment_labelneutral:fairness	8541	
## muOnlyProchoice_sentiment_labelpositive:fairness	8507	
## muOnlyProchoice_sentiment_labelneutral:authority	10935	
## muOnlyProchoice_sentiment_labelpositive:authority	9882	
## muOnlyProchoice_sentiment_labelneutral:loyalty	10547	
## muOnlyProchoice_sentiment_labelpositive:loyalty	8747	
## muOnlyProchoice_sentiment_labelneutral:purity	10860	
## muOnlyProchoice_sentiment_labelpositive:purity	9058	
## muOnlyProlife_sentiment_labelneutral	5731	
## muOnlyProlife_sentiment_labelpositive	5768	
## muOnlyProlife_care	7449	
## muOnlyProlife_fairness	8837	
## muOnlyProlife_authority	10452	
## muOnlyProlife_loyalty	9863	
## muOnlyProlife_purity	8258	
## muOnlyProlife_sentiment_labelneutral:care	6551	
## muOnlyProlife_sentiment_labelpositive:care	6810	
## muOnlyProlife_sentiment_labelneutral:fairness	8285	
## muOnlyProlife_sentiment_labelpositive:fairness	7857	
## muOnlyProlife_sentiment_labelneutral:authority	10351	
## muOnlyProlife_sentiment_labelpositive:authority	10011	
## muOnlyProlife_sentiment_labelneutral:loyalty	10129	
## muOnlyProlife_sentiment_labelpositive:loyalty	9210	
## muOnlyProlife_sentiment_labelneutral:purity	9234	
## muOnlyProlife_sentiment_labelpositive:purity	7172	
## muProchoicetalkingaboutProlife_sentiment_labelneutral	5793	
## muProchoicetalkingaboutProlife_sentiment_labelpositive	5885	
## muProchoicetalkingaboutProlife_care	6961	
## muProchoicetalkingaboutProlife_fairness	8359	
## muProchoicetalkingaboutProlife_authority	9894	

## muProchoicetalkingaboutProlife_loyalty	8824
## muProchoicetalkingaboutProlife_purity	7729
## muProchoicetalkingaboutProlife_sentiment_labelneutral:care	6778
## muProchoicetalkingaboutProlife_sentiment_labelpositive:care	7358
## muProchoicetalkingaboutProlife_sentiment_labelneutral:fairness	8399
## muProchoicetalkingaboutProlife_sentiment_labelpositive:fairness	7880
## muProchoicetalkingaboutProlife_sentiment_labelneutral:authority	10514
## muProchoicetalkingaboutProlife_sentiment_labelpositive:authority	10089
## muProchoicetalkingaboutProlife_sentiment_labelneutral:loyalty	9460
## muProchoicetalkingaboutProlife_sentiment_labelpositive:loyalty	8590
## muProchoicetalkingaboutProlife_sentiment_labelneutral:purity	9794
## muProchoicetalkingaboutProlife_sentiment_labelpositive:purity	7540
## muProlifetalkingaboutProchoice_sentiment_labelneutral	6529
## muProlifetalkingaboutProchoice_sentiment_labelpositive	6416
## muProlifetalkingaboutProchoice_care	7560
## muProlifetalkingaboutProchoice_fairness	9022
## muProlifetalkingaboutProchoice_authority	11018
## muProlifetalkingaboutProchoice_loyalty	9869
## muProlifetalkingaboutProchoice_purity	8517
## muProlifetalkingaboutProchoice_sentiment_labelneutral:care	7843
## muProlifetalkingaboutProchoice_sentiment_labelpositive:care	7498
## muProlifetalkingaboutProchoice_sentiment_labelneutral:fairness	8684
## muProlifetalkingaboutProchoice_sentiment_labelpositive:fairness	7940
## muProlifetalkingaboutProchoice_sentiment_labelneutral:authority	11315
## muProlifetalkingaboutProchoice_sentiment_labelpositive:authority	10253
## muProlifetalkingaboutProchoice_sentiment_labelneutral:loyalty	11138
## muProlifetalkingaboutProchoice_sentiment_labelpositive:loyalty	9860
## muProlifetalkingaboutProchoice_sentiment_labelneutral:purity	9563
## muProlifetalkingaboutProchoice_sentiment_labelpositive:purity	7711
##	Tail_ESS
## muOnlyProchoice_Intercept	9071
## muOnlyProlife_Intercept	8273
## muProchoicetalkingaboutProlife_Intercept	8524
## muProlifetalkingaboutProchoice_Intercept	9043
## muOnlyProchoice_sentiment_labelneutral	8092
## muOnlyProchoice_sentiment_labelpositive	8468
## muOnlyProchoice_care	8940
## muOnlyProchoice_fairness	9179
## muOnlyProchoice_authority	9507
## muOnlyProchoice_loyalty	9449
## muOnlyProchoice_purity	9383
## muOnlyProchoice_sentiment_labelneutral:care	8820
## muOnlyProchoice_sentiment_labelpositive:care	8912
## muOnlyProchoice_sentiment_labelneutral:fairness	9645
## muOnlyProchoice_sentiment_labelpositive:fairness	8799
## muOnlyProchoice_sentiment_labelneutral:authority	9996
## muOnlyProchoice_sentiment_labelpositive:authority	9495
## muOnlyProchoice_sentiment_labelneutral:loyalty	9607
## muOnlyProchoice_sentiment_labelpositive:loyalty	9416
## muOnlyProchoice_sentiment_labelneutral:purity	9621
## muOnlyProchoice_sentiment_labelpositive:purity	8678
## muOnlyProlife_sentiment_labelneutral	7714
## muOnlyProlife_sentiment_labelpositive	7258
## muOnlyProlife_care	8408

## muOnlyProlife_fairness	9694
## muOnlyProlife_authority	9793
## muOnlyProlife_loyalty	9060
## muOnlyProlife_purity	8592
## muOnlyProlife_sentiment_labelneutral:care	8425
## muOnlyProlife_sentiment_labelpositive:care	8190
## muOnlyProlife_sentiment_labelneutral:fairness	8745
## muOnlyProlife_sentiment_labelpositive:fairness	9193
## muOnlyProlife_sentiment_labelneutral:authority	9345
## muOnlyProlife_sentiment_labelpositive:authority	9303
## muOnlyProlife_sentiment_labelneutral:loyalty	9270
## muOnlyProlife_sentiment_labelpositive:loyalty	9258
## muOnlyProlife_sentiment_labelneutral:purity	9499
## muOnlyProlife_sentiment_labelpositive:purity	8902
## muProchoicetalkingaboutProlife_sentiment_labelneutral	7640
## muProchoicetalkingaboutProlife_sentiment_labelpositive	8241
## muProchoicetalkingaboutProlife_care	7825
## muProchoicetalkingaboutProlife_fairness	9215
## muProchoicetalkingaboutProlife_authority	9639
## muProchoicetalkingaboutProlife_loyalty	9139
## muProchoicetalkingaboutProlife_purity	8438
## muProchoicetalkingaboutProlife_sentiment_labelneutral:care	8715
## muProchoicetalkingaboutProlife_sentiment_labelpositive:care	8958
## muProchoicetalkingaboutProlife_sentiment_labelneutral:fairness	9160
## muProchoicetalkingaboutProlife_sentiment_labelpositive:fairness	8921
## muProchoicetalkingaboutProlife_sentiment_labelneutral:authority	9823
## muProchoicetalkingaboutProlife_sentiment_labelpositive:authority	9516
## muProchoicetalkingaboutProlife_sentiment_labelneutral:loyalty	9149
## muProchoicetalkingaboutProlife_sentiment_labelpositive:loyalty	8959
## muProchoicetalkingaboutProlife_sentiment_labelneutral:purity	9849
## muProchoicetalkingaboutProlife_sentiment_labelpositive:purity	8173
## muProlifetalkingaboutProchoice_sentiment_labelneutral	7583
## muProlifetalkingaboutProchoice_sentiment_labelpositive	7740
## muProlifetalkingaboutProchoice_care	8285
## muProlifetalkingaboutProchoice_fairness	9287
## muProlifetalkingaboutProchoice_authority	9958
## muProlifetalkingaboutProchoice_loyalty	9622
## muProlifetalkingaboutProchoice_purity	9168
## muProlifetalkingaboutProchoice_sentiment_labelneutral:care	8824
## muProlifetalkingaboutProchoice_sentiment_labelpositive:care	8771
## muProlifetalkingaboutProchoice_sentiment_labelneutral:fairness	9715
## muProlifetalkingaboutProchoice_sentiment_labelpositive:fairness	9303
## muProlifetalkingaboutProchoice_sentiment_labelneutral:authority	9557
## muProlifetalkingaboutProchoice_sentiment_labelpositive:authority	9465
## muProlifetalkingaboutProchoice_sentiment_labelneutral:loyalty	9945
## muProlifetalkingaboutProchoice_sentiment_labelpositive:loyalty	9423
## muProlifetalkingaboutProchoice_sentiment_labelneutral:purity	9451
## muProlifetalkingaboutProchoice_sentiment_labelpositive:purity	8663
##	
## Draws were sampled using sample(hmc). For each parameter, Bulk_ESS	
## and Tail_ESS are effective sample size measures, and Rhat is the potential	
## scale reduction factor on split chains (at convergence, Rhat = 1).	

```
# Check R-hat values for convergence
```

```
# Extract R-hat values  
rhat_values <- rhat(fit)
```

```
# View R-hat values  
print(rhat_values)
```

```
##                                b_muOnlyProchoice_Intercept  
##                                1.0002093  
##                                b_muOnlyProlife_Intercept  
##                                0.9999746  
##                                b_muProchoicetalkingaboutProlife_Intercept  
##                                1.0001489  
##                                b_muProlifetalkingaboutProchoice_Intercept  
##                                1.0000662  
##                                b_muOnlyProchoice_sentiment_labelneutral  
##                                1.0006411  
##                                b_muOnlyProchoice_sentiment_labelpositive  
##                                1.0000455  
##                                b_muOnlyProchoice_care  
##                                1.0003606  
##                                b_muOnlyProchoice_fairness  
##                                1.0005393  
##                                b_muOnlyProchoice_authority  
##                                1.0002389  
##                                b_muOnlyProchoice_loyalty  
##                                1.0004488  
##                                b_muOnlyProchoice_purity  
##                                0.9999604  
##                                b_muOnlyProchoice_sentiment_labelneutral:care  
##                                1.0003961  
##                                b_muOnlyProchoice_sentiment_labelpositive:care  
##                                1.0003634  
##                                b_muOnlyProchoice_sentiment_labelneutral:fairness  
##                                1.0003749  
##                                b_muOnlyProchoice_sentiment_labelpositive:fairness  
##                                1.0002524  
##                                b_muOnlyProchoice_sentiment_labelneutral:authority  
##                                0.9998546  
##                                b_muOnlyProchoice_sentiment_labelpositive:authority  
##                                1.0001521  
##                                b_muOnlyProchoice_sentiment_labelneutral:loyalty  
##                                1.0001270  
##                                b_muOnlyProchoice_sentiment_labelpositive:loyalty  
##                                1.0008145  
##                                b_muOnlyProchoice_sentiment_labelneutral:purity  
##                                1.0000212  
##                                b_muOnlyProchoice_sentiment_labelpositive:purity  
##                                1.0003978  
##                                b_muOnlyProlife_sentiment_labelneutral  
##                                1.0005481  
##                                b_muOnlyProlife_sentiment_labelpositive  
##                                1.0004298
```

```

##          b_muOnlyProlife_care
##          0.9999382
##          b_muOnlyProlife_fairness
##          1.0001768
##          b_muOnlyProlife_authority
##          0.9999446
##          b_muOnlyProlife_loyalty
##          1.0001779
##          b_muOnlyProlife_purity
##          1.0001604
##          b_muOnlyProlife_sentiment_labelneutral:care
##          1.0007189
##          b_muOnlyProlife_sentiment_labelpositive:care
##          1.0001143
##          b_muOnlyProlife_sentiment_labelneutral:fairness
##          1.0000376
##          b_muOnlyProlife_sentiment_labelpositive:fairness
##          1.0000991
##          b_muOnlyProlife_sentiment_labelneutral:authority
##          0.9999565
##          b_muOnlyProlife_sentiment_labelpositive:authority
##          1.0001708
##          b_muOnlyProlife_sentiment_labelneutral:loyalty
##          1.0004107
##          b_muOnlyProlife_sentiment_labelpositive:loyalty
##          1.0004896
##          b_muOnlyProlife_sentiment_labelneutral:purity
##          1.0000601
##          b_muOnlyProlife_sentiment_labelpositive:purity
##          1.0002605
##          b_muProchoicetalkingaboutProlife_sentiment_labelneutral
##          1.0006002
##          b_muProchoicetalkingaboutProlife_sentiment_labelpositive
##          0.9998835
##          b_muProchoicetalkingaboutProlife_care
##          1.0004729
##          b_muProchoicetalkingaboutProlife_fairness
##          1.0003584
##          b_muProchoicetalkingaboutProlife_authority
##          1.0000831
##          b_muProchoicetalkingaboutProlife_loyalty
##          1.0003184
##          b_muProchoicetalkingaboutProlife_purity
##          1.0000691
##          b_muProchoicetalkingaboutProlife_sentiment_labelneutral:care
##          1.0003480
##          b_muProchoicetalkingaboutProlife_sentiment_labelpositive:care
##          1.0001789
##          b_muProchoicetalkingaboutProlife_sentiment_labelneutral:fairness
##          1.0003342
##          b_muProchoicetalkingaboutProlife_sentiment_labelpositive:fairness
##          1.0002586
##          b_muProchoicetalkingaboutProlife_sentiment_labelneutral:authority
##          0.9999791

```



```

## b_muProchoicetalkingaboutProlife_sentiment_labelpositive:authority
## 1.0005762
## b_muProchoicetalkingaboutProlife_sentiment_labelneutral:loyalty
## 1.0002196
## b_muProchoicetalkingaboutProlife_sentiment_labelpositive:loyalty
## 1.0006462
## b_muProchoicetalkingaboutProlife_sentiment_labelneutral:purity
## 1.0003880
## b_muProchoicetalkingaboutProlife_sentiment_labelpositive:purity
## 0.9999275
## b_muProlifetalkingaboutProchoice_sentiment_labelneutral
## 1.0002423
## b_muProlifetalkingaboutProchoice_sentiment_labelpositive
## 1.0006039
## b_muProlifetalkingaboutProchoice_care
## 1.0001685
## b_muProlifetalkingaboutProchoice_fairness
## 1.0002490
## b_muProlifetalkingaboutProchoice_authority
## 0.9997978
## b_muProlifetalkingaboutProchoice_loyalty
## 1.0005579
## b_muProlifetalkingaboutProchoice_purity
## 1.0003578
## b_muProlifetalkingaboutProchoice_sentiment_labelneutral:care
## 1.0001899
## b_muProlifetalkingaboutProchoice_sentiment_labelpositive:care
## 1.0003616
## b_muProlifetalkingaboutProchoice_sentiment_labelneutral:fairness
## 1.0001153
## b_muProlifetalkingaboutProchoice_sentiment_labelpositive:fairness
## 1.0001558
## b_muProlifetalkingaboutProchoice_sentiment_labelneutral:authority
## 1.0000620
## b_muProlifetalkingaboutProchoice_sentiment_labelpositive:authority
## 1.0002464
## b_muProlifetalkingaboutProchoice_sentiment_labelneutral:loyalty
## 0.9999382
## b_muProlifetalkingaboutProchoice_sentiment_labelpositive:loyalty
## 1.0001395
## b_muProlifetalkingaboutProchoice_sentiment_labelneutral:purity
## 0.9999185
## b_muProlifetalkingaboutProchoice_sentiment_labelpositive:purity
## 1.0002597
## Intercept_muOnlyProchoice
## 1.0002926
## Intercept_muOnlyProlife
## 1.0001322
## Intercept_muProchoicetalkingaboutProlife
## 1.0001192
## Intercept_muProlifetalkingaboutProchoice
## 1.0002063
## lprior
## 1.0000062

```

```
##
##
## lp__
## 1.0004377
```

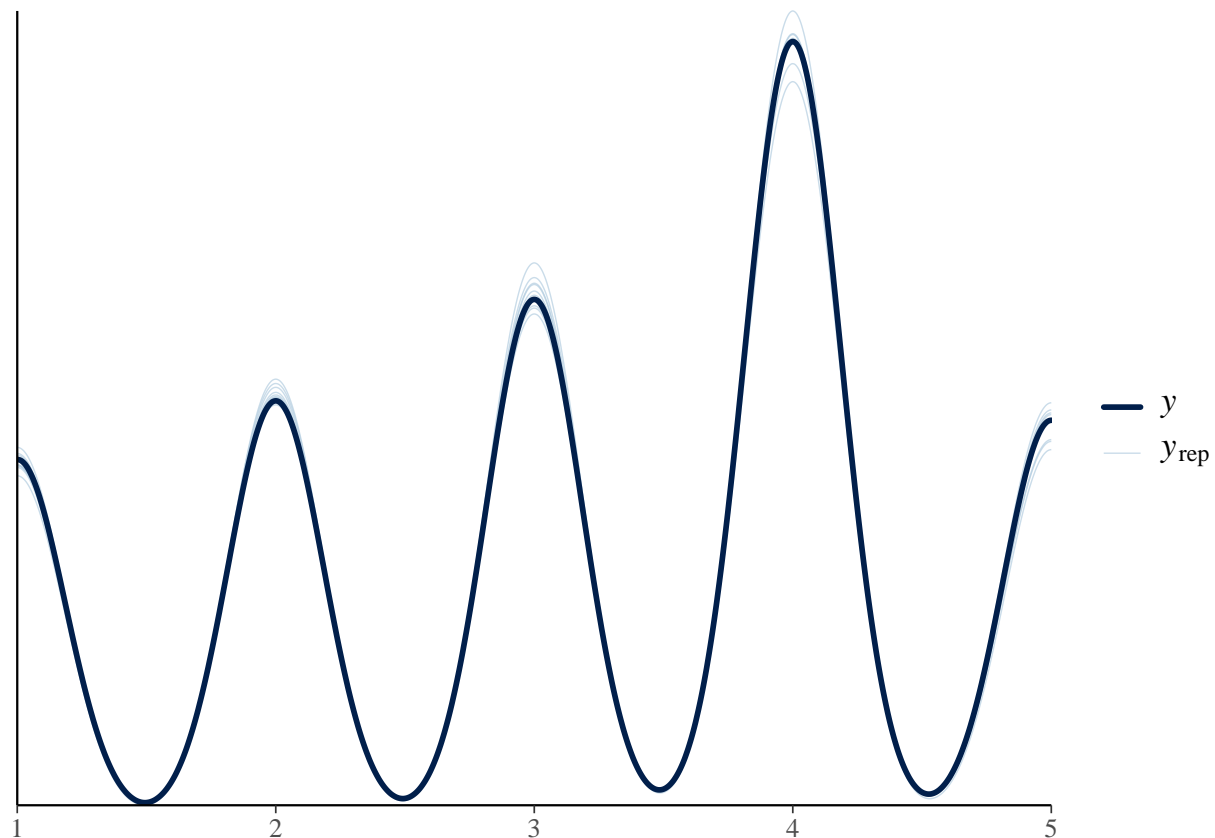
```
# Check problematic parameters with R-hat > 1.01
high_rhat <- rhat_values[rhat_values > 1.01]
print(high_rhat)
```

```
## named numeric(0)
```

Posterior predictive checks

```
pp_check(fit)
```

```
## Using 10 posterior draws for ppc type 'dens_overlay' by default.
```



```
### Posterior Distributions for the Predictor
```

```
library(bayesplot)
```

```
# Function to shorten parameter names for better readability
shorten_names <- function(name) {
  name <- gsub("^b_", "", name)
  name <- gsub("_", " ", name)
  return(name)
}
```

```
# Extract posterior draws
posterior_draws <- as.data.frame(fit)
```

```

# Select all parameters starting with "b_"
selected_params <- grep("^b_", colnames(posterior_draws), value = TRUE)

# Function to plot a subset of parameters
plot_subset <- function(subset_keyword) {
  # Filter parameters based on the subset keyword
  subset_params <- grep(subset_keyword, selected_params, value = TRUE)
  shortened_names <- sapply(subset_params, shorten_names)

  # Plot for the subset
  subset_plot <- mcmc_areas(
    as.matrix(fit, pars = subset_params),
    prob = 0.8,      # Display 80% credible interval
    prob_outer = 0.95 # Display 95% credible interval
  ) +
  ggplot2::scale_y_discrete(labels = shortened_names) +
  ggplot2::theme_bw(base_size = 14) +
  ggplot2::theme(
    axis.text.y = ggplot2::element_text(size = 8),
    axis.text.x = ggplot2::element_text(size = 10),
    strip.text = ggplot2::element_text(size = 10)
  ) +
  ggplot2::labs(
    title = paste("Posterior Estimates for", subset_keyword, "Parameters"),
    x = "Posterior Estimate",
    y = "Parameters"
  )

  return(subset_plot)
}

```

```

# Plot subsets based on different keywords
plot_care <- plot_subset("care")

```

```

## Warning: Argument 'pars' is deprecated. Please use 'variable' instead.
## Scale for y is already present.
## Adding another scale for y, which will replace the existing scale.
plot_fairness <- plot_subset("fairness")

```

```

## Warning: Argument 'pars' is deprecated. Please use 'variable' instead.
## Scale for y is already present.
## Adding another scale for y, which will replace the existing scale.
plot_authority <- plot_subset("authority")

```

```

## Warning: Argument 'pars' is deprecated. Please use 'variable' instead.
## Scale for y is already present.
## Adding another scale for y, which will replace the existing scale.
plot_loyalty <- plot_subset("loyalty")

```

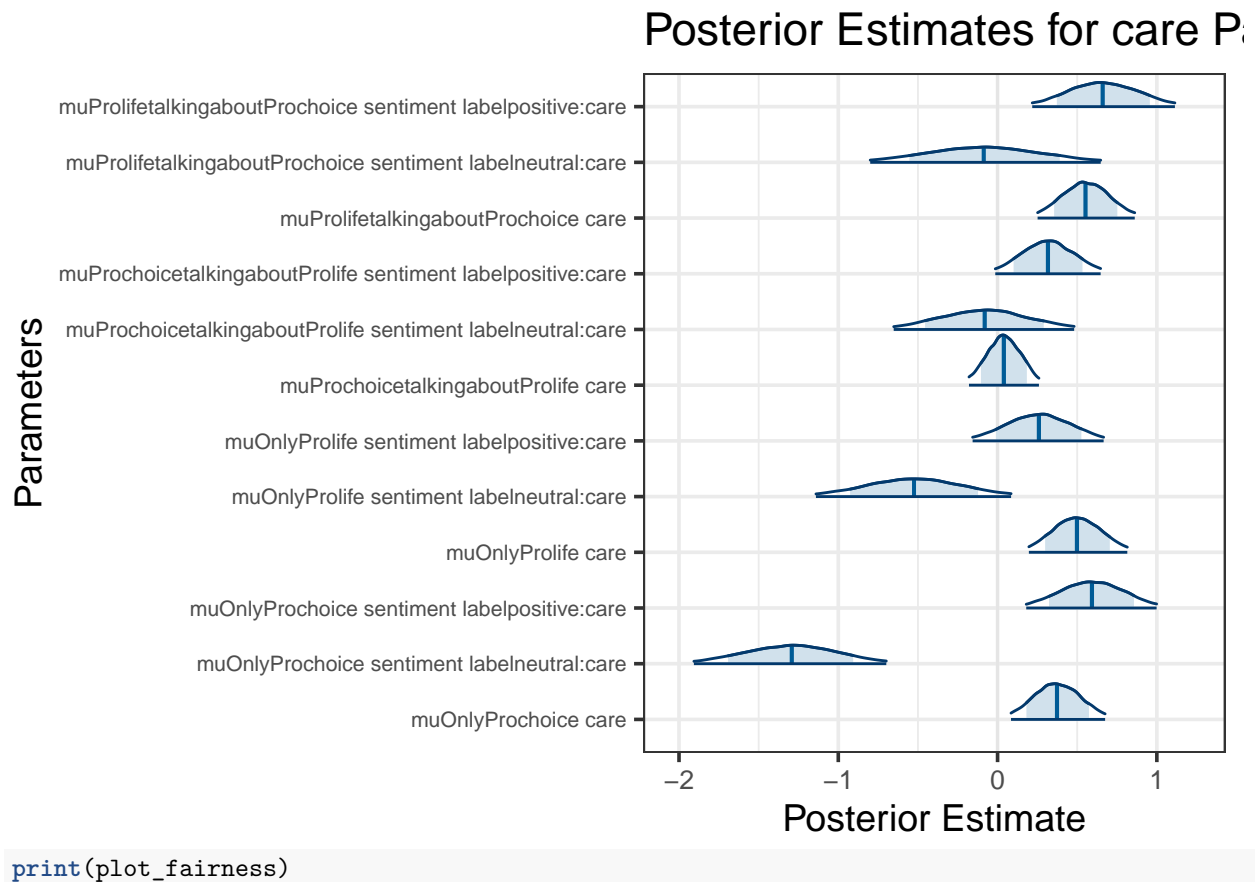
```

## Warning: Argument 'pars' is deprecated. Please use 'variable' instead.
## Scale for y is already present.

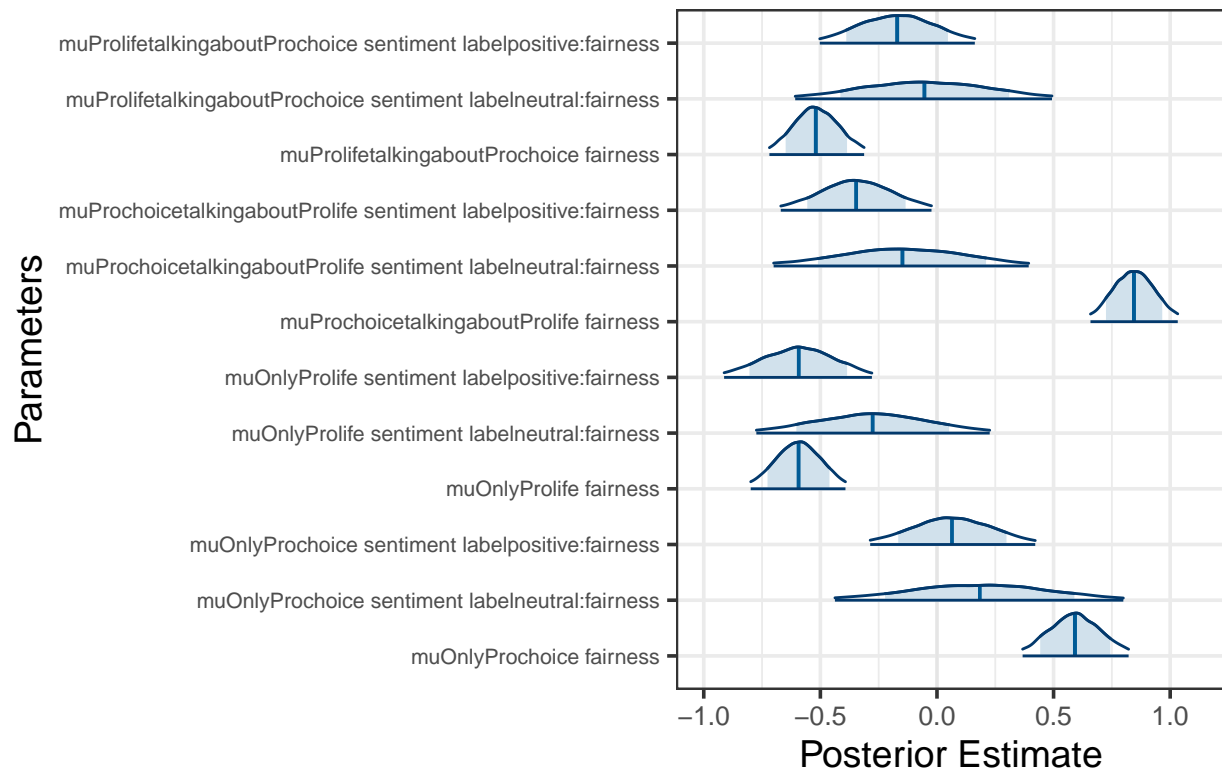
```

```
## Adding another scale for y, which will replace the existing scale.
plot_purity <- plot_subset("purity")

## Warning: Argument 'pars' is deprecated. Please use 'variable' instead.
## Scale for y is already present.
## Adding another scale for y, which will replace the existing scale.
# Print the plots
print(plot_care)
```

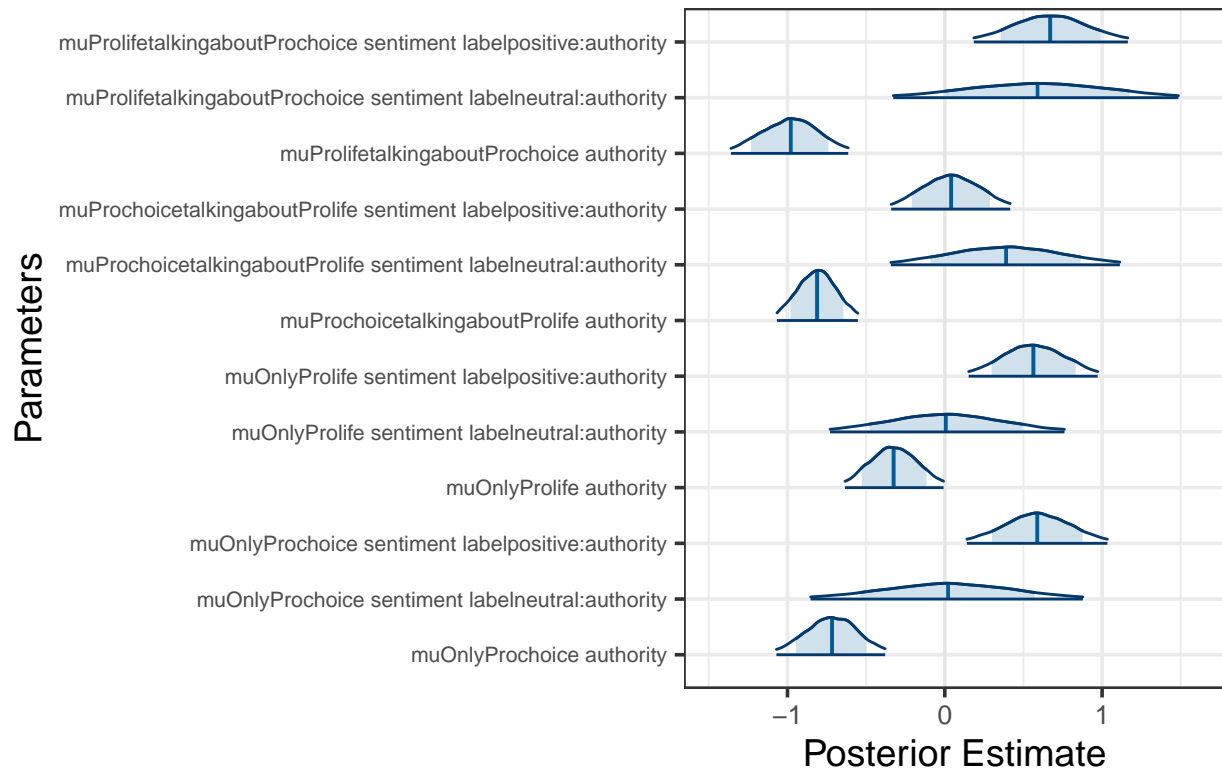


Posterior Estimates for fairness

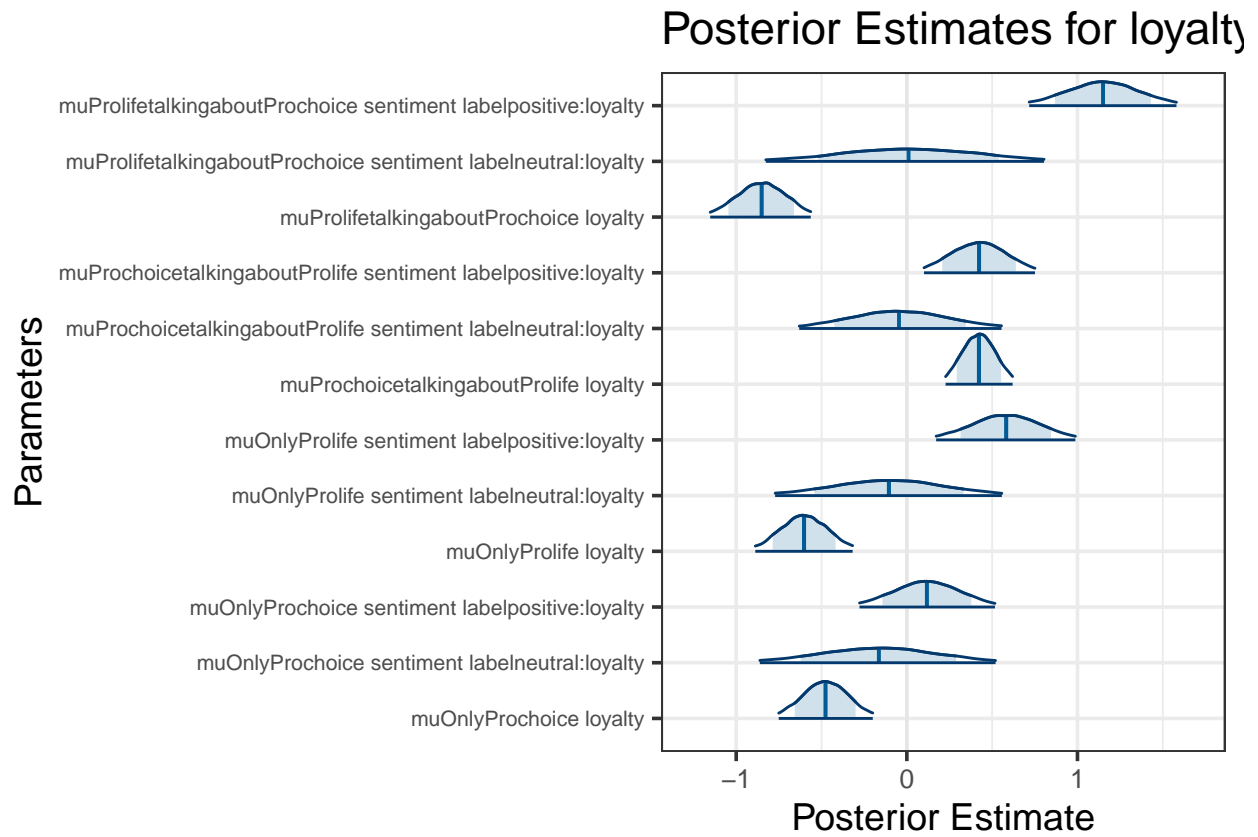


```
print(plot_authority)
```

Posterior Estimates for authority

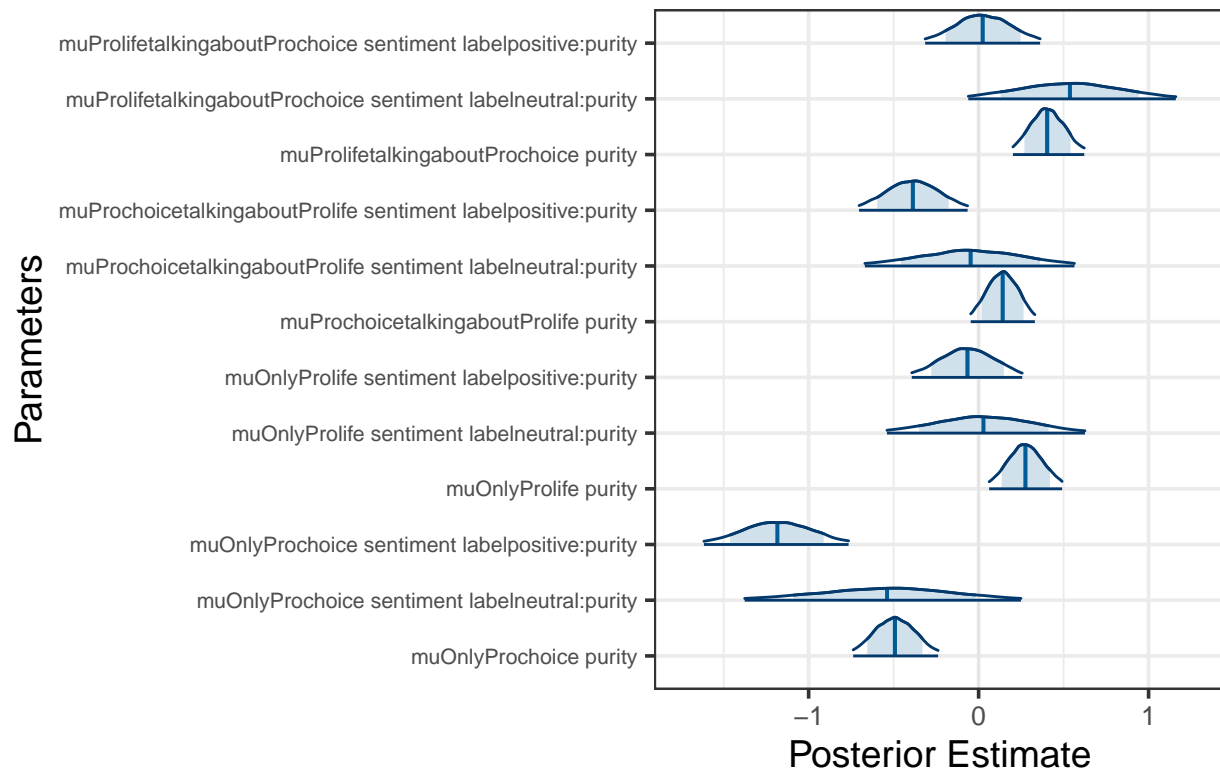


```
print(plot_loyalty)
```



```
print(plot_purity)
```

Posterior Estimates for purity



Cross Validation

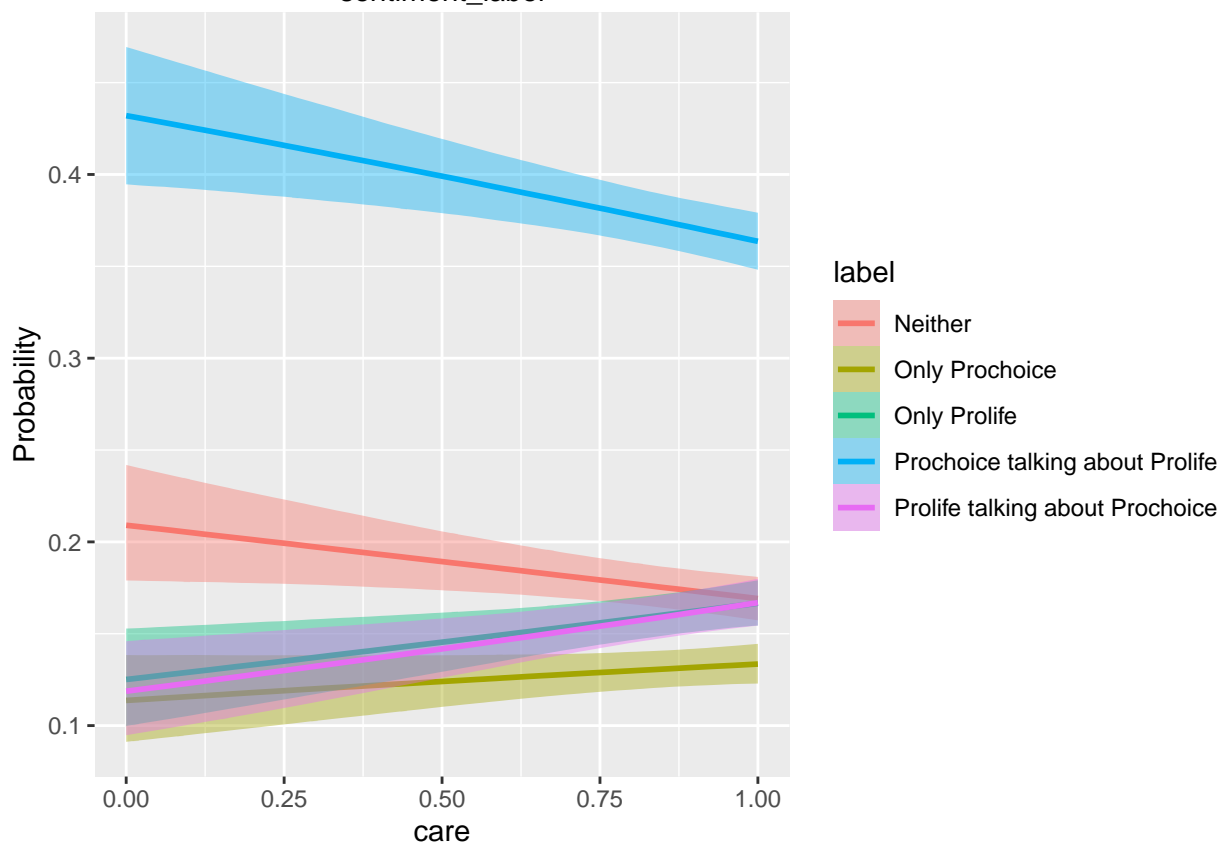
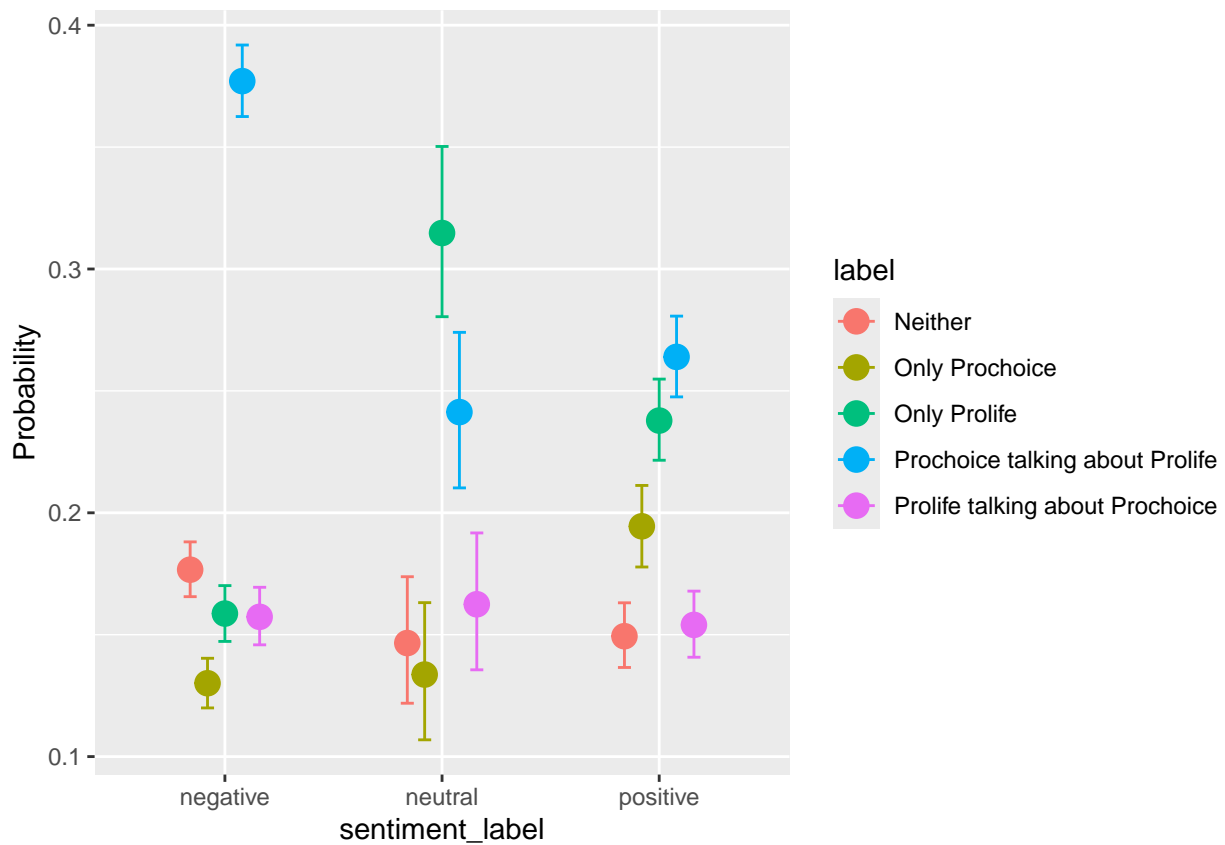
```
loo_fit <- loo(fit)
print(loo_fit)
```

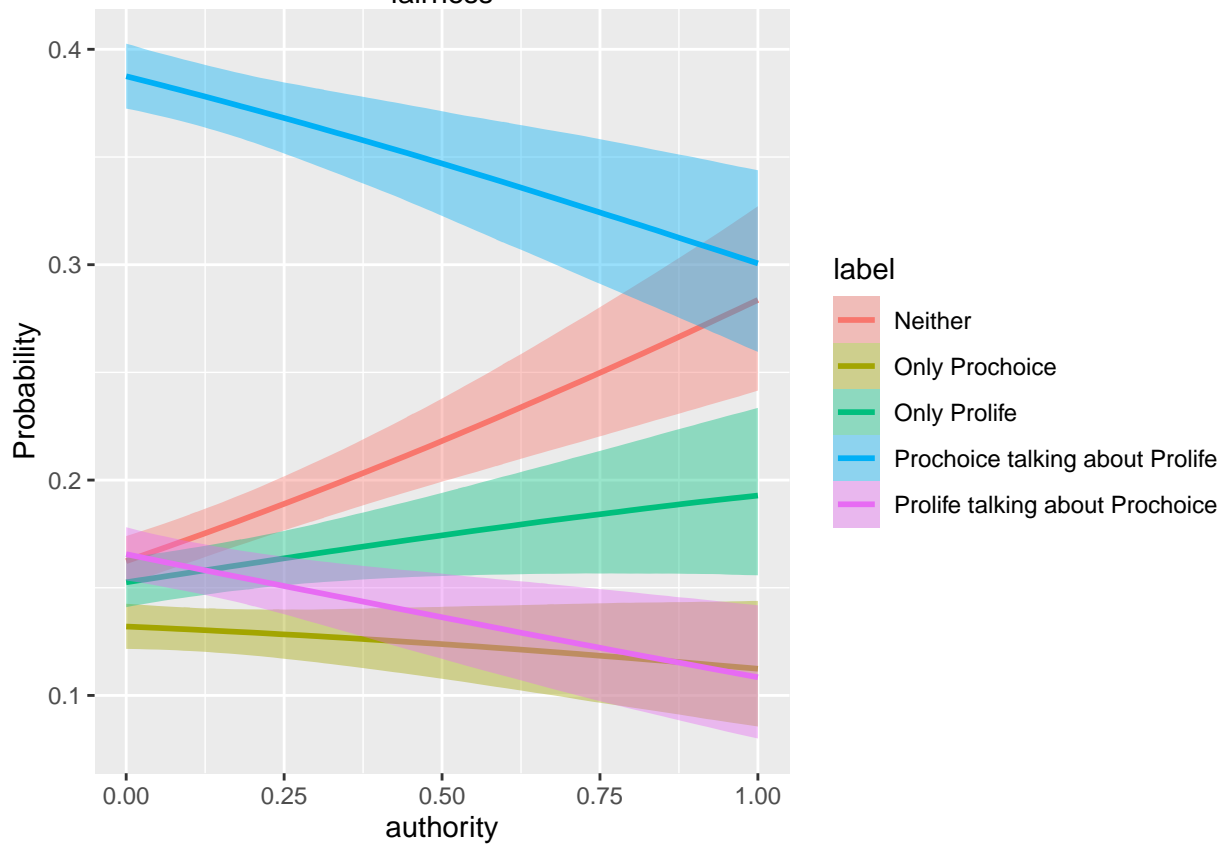
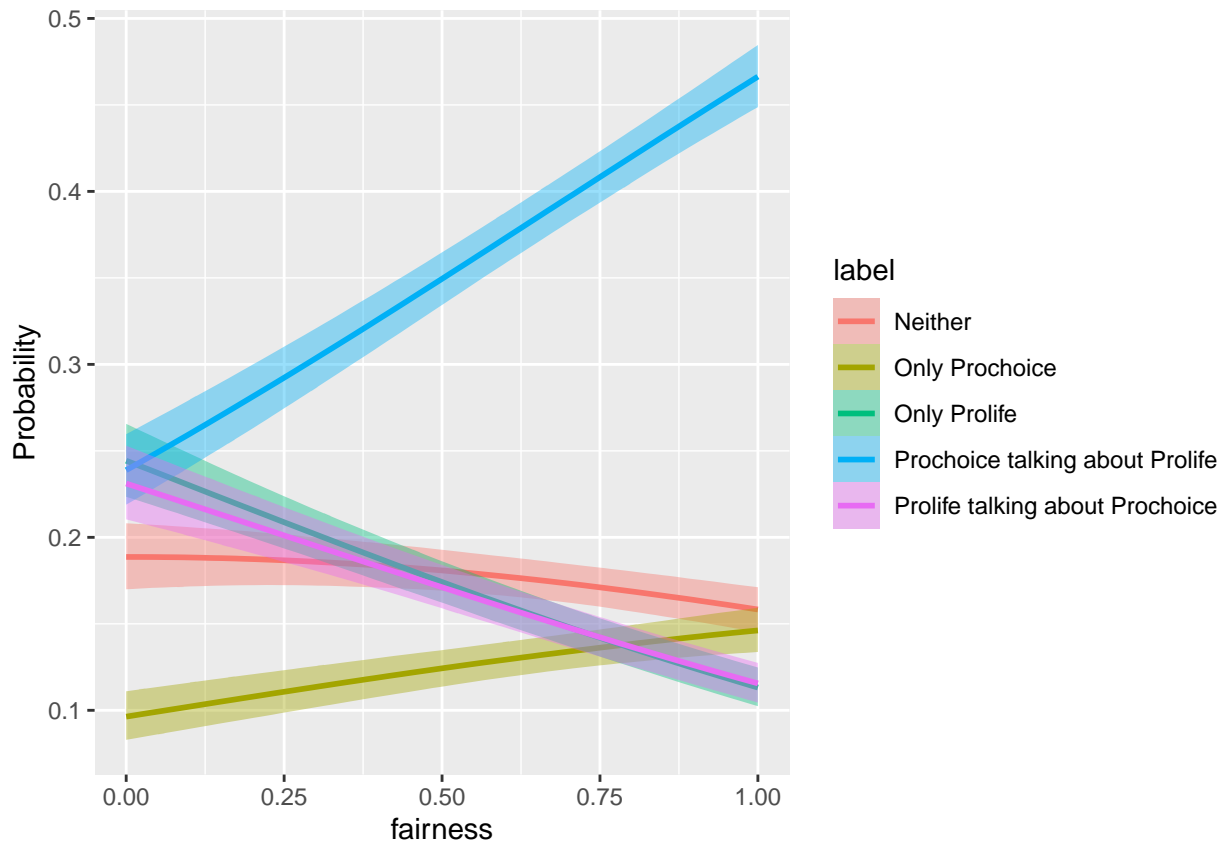
```
##
## Computed from 12000 by 10000 log-likelihood matrix.
##
##      Estimate    SE
## elpd_loo -14378.9  58.9
## p_loo      73.2   1.1
## looic     28757.8 117.8
## -----
## MCSE of elpd_loo is 0.1.
## MCSE and ESS estimates assume MCMC draws (r_eff in [0.4, 1.4]).
##
## All Pareto k estimates are good (k < 0.7).
## See help('pareto-k-diagnostic') for details.
```

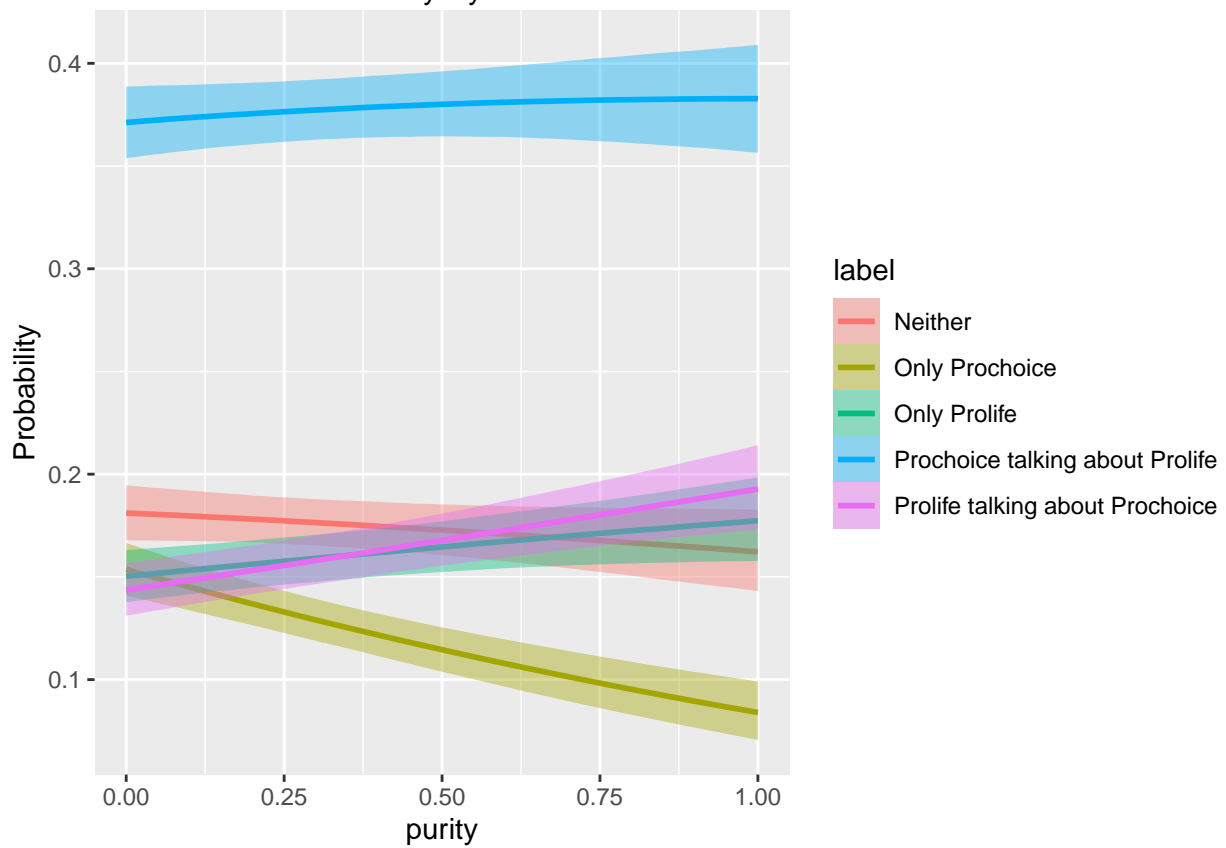
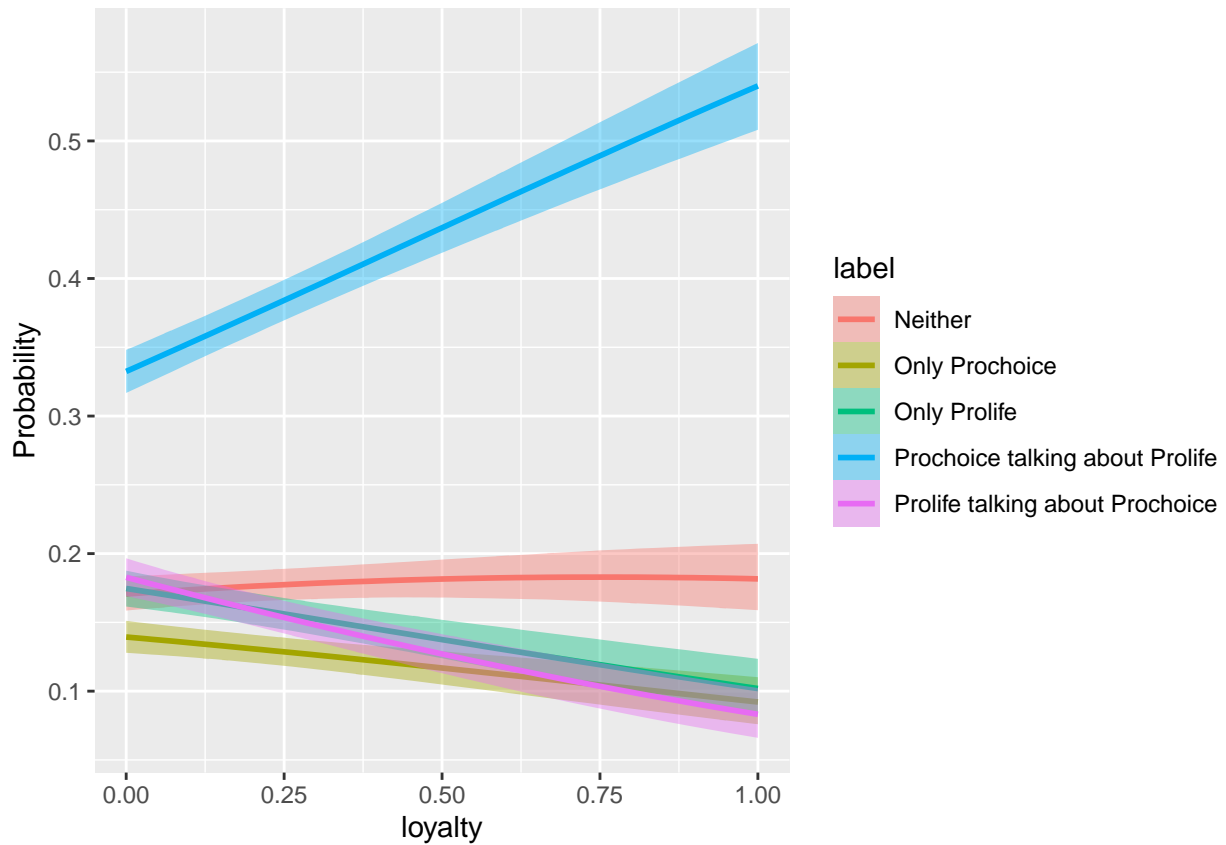
Effect for main predictors

```
plot(conditional_effects(fit, categorical = TRUE))
```

```
## Warning: Interactions cannot be plotted directly if 'categorical' is TRUE.
## Please use argument 'conditions' instead.
```







Plot for Significant Interactions

```

conditions <- data.frame(sentiment_label = unique(data$sentiment_label))
effects <- conditional_effects(fit, categorical = TRUE, effects = "care", conditions = conditions)
plot(effects)

```

