Brief Analysis of Tagu's 2025 Data

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First, we need to get set up:

```
library(tidyverse)
library(cmdstanr)
library(patchwork)

source("../../functions/import_data.R")
source("../../functions/post_functions.R")
source("../../functions/plot_model.R")

knitr::opts_chunk$set(echo = TRUE,
                      dev = "ragg_png",
                      dpi = 400)
```

Import

Loading Data

```
d <- import_data("tagu2025")

summary(d$found)
```

```
    condition         trial            person     targ_type
 negative:28800   Min.   :   1.0   Min.   : 1   Length:86400
 neutral :28800   1st Qu.: 900.8   1st Qu.:19   Class :character
 positive:28800   Median :1800.5   Median :38   Mode  :character
                  Mean   :1800.5   Mean   :38
                  3rd Qu.:2700.2   3rd Qu.:57
```

```
                 Max.   :3600.0   Max.   :75
       id               x                y               found
 Min.   : 1.00   Min.   :0.0000   Min.   :0.0000   Min.   : 1.00
 1st Qu.: 6.75   1st Qu.:0.1831   1st Qu.:0.1368   1st Qu.: 6.75
 Median :12.50   Median :0.4554   Median :0.3410   Median :12.50
 Mean   :12.50   Mean   :0.4997   Mean   :0.3077   Mean   :12.50
 3rd Qu.:18.25   3rd Qu.:0.7277   3rd Qu.:0.4785   3rd Qu.:18.25
 Max.   :24.00   Max.   :1.0000   Max.   :0.6153   Max.   :24.00
   item_class     trial_p
 Min.   :1.0   Min.   : 1.00
 1st Qu.:1.0   1st Qu.: 4.75
 Median :1.5   Median : 8.50
 Mean   :1.5   Mean   : 8.50
 3rd Qu.:2.0   3rd Qu.:12.25
 Max.   :2.0   Max.   :16.00
```

```r
summary(d$stim)
```

```
     person      condition          trial              id
 Min.   : 1   negative:28800   Min.   :   1.0   Min.   : 1.00
 1st Qu.:19   neutral :28800   1st Qu.: 900.8   1st Qu.: 6.75
 Median :38   positive:28800   Median :1800.5   Median :12.50
 Mean   :38                    Mean   :1800.5   Mean   :12.50
 3rd Qu.:57                    3rd Qu.:2700.2   3rd Qu.:18.25
 Max.   :75                    Max.   :3600.0   Max.   :24.00
       x                y             item_class     trial_p
 Min.   :0.0000   Min.   :0.0000   Min.   :1.0   Min.   : 1.00
 1st Qu.:0.1831   1st Qu.:0.1368   1st Qu.:1.0   1st Qu.: 4.75
 Median :0.4554   Median :0.3410   Median :1.5   Median : 8.50
 Mean   :0.4997   Mean   :0.3077   Mean   :1.5   Mean   : 8.50
 3rd Qu.:0.7277   3rd Qu.:0.4785   3rd Qu.:2.0   3rd Qu.:12.25
 Max.   :1.0000   Max.   :0.6153   Max.   :2.0   Max.   :16.00
```

Loading Model

The model was previously run and saved

```r
m <- readRDS("../1_fit_models/scratch/models/tagu2025all1_0.model")

m$summary()
```

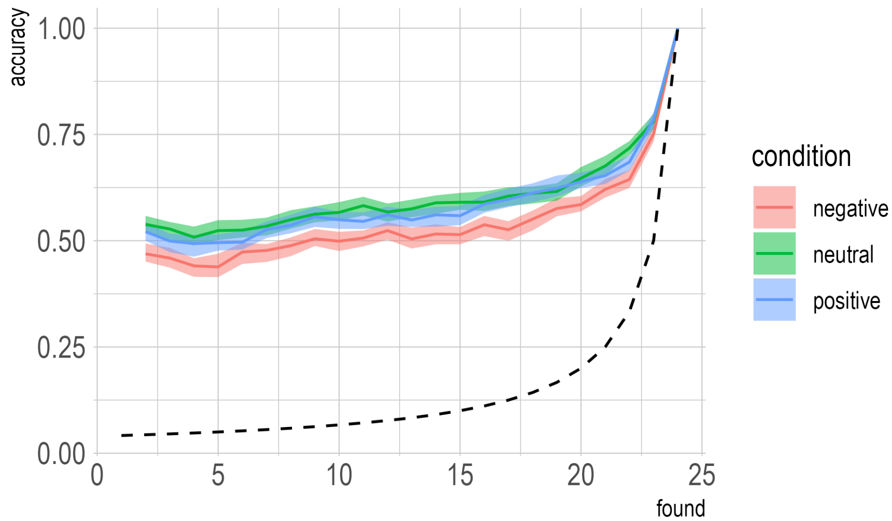
```
# A tibble: 262,073 x 10
   variable        mean   median      sd    mad       q5      q95  rhat ess_bulk
   <chr>          <dbl>    <dbl>   <dbl>  <dbl>    <dbl>    <dbl> <dbl>    <dbl>
 1 lp__         -8.15e+4 -8.15e+4 44.0    0       -8.15e+4 -8.14e+4 1.01      117.
 2 b_a[1]       -8.20e-2 -8.34e-2  0.0283 0.0302 -1.27e-1 -3.68e-2 1.02      383.
 3 b_a[2]        1.43e-1  1.43e-1  0.0200 0.0200  1.1 e-1  1.75e-1 1.01      356.
 4 b_a[3]        6.63e-2  6.50e-2  0.0329 0.0328  1.48e-2  1.22e-1 1.01      399.
 5 b_stick[1]    6.74e-1  6.74e-1  0.0459 0.0445  5.96e-1  7.49e-1 1.00      417.
 6 b_stick[2]    4.52e-1  4.50e-1  0.0292 0.0274  4.09e-1  5.02e-1 1.01      310.
 7 b_stick[3]    4.46e-1  4.47e-1  0.0322 0.0311  3.90e-1  5.01e-1 1.00      430.
 8 rho_delta[~   1.91e+1  1.91e+1  0.415  0.445   1.85e+1  1.98e+1 1.00      415.
 9 rho_delta[~   2.32e+1  2.32e+1  0.393  0.445   2.26e+1  2.38e+1 1.00      415.
10 rho_delta[~   2.21e+1  2.21e+1  0.425  0.445   2.14e+1  2.28e+1 0.999     393.
# i 262,063 more rows
# i 1 more variable: ess_tail <dbl>
```

Now extract posterior samples and predictions.

```
pred <- extract_pred(m, d)
post <- extract_post(m, d)
```

Accuracy

```
acc <- summarise_acc(pred)
plot_model_accuracy(acc)
```

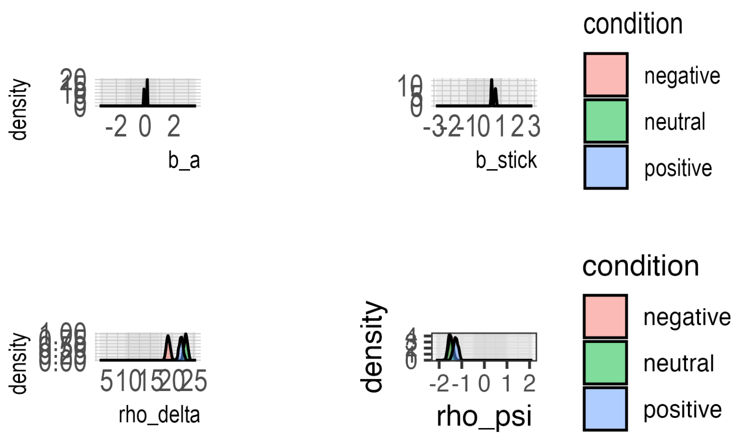


Looks like the model does a pretty good job of predicting which item will be selected next in all three conditions.

Posterior Distributions

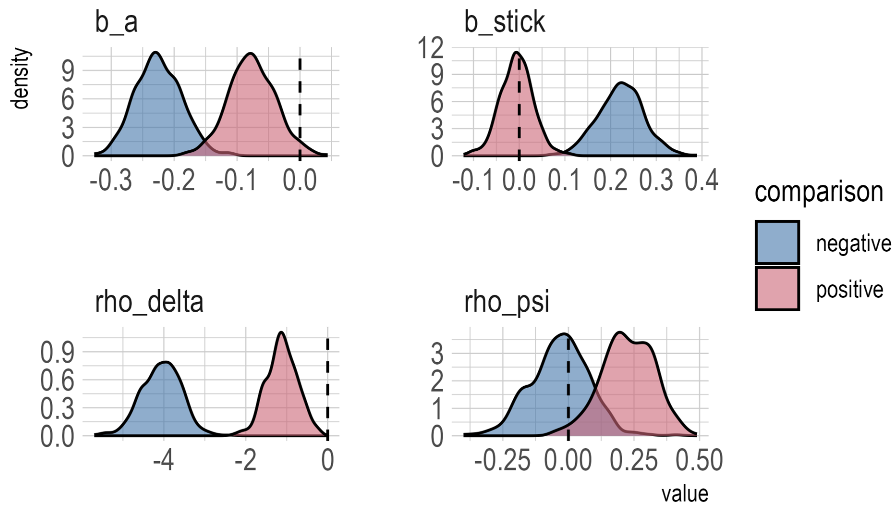
Parameter Estimates

```
plot_model_fixed(post) + theme_bw()
```



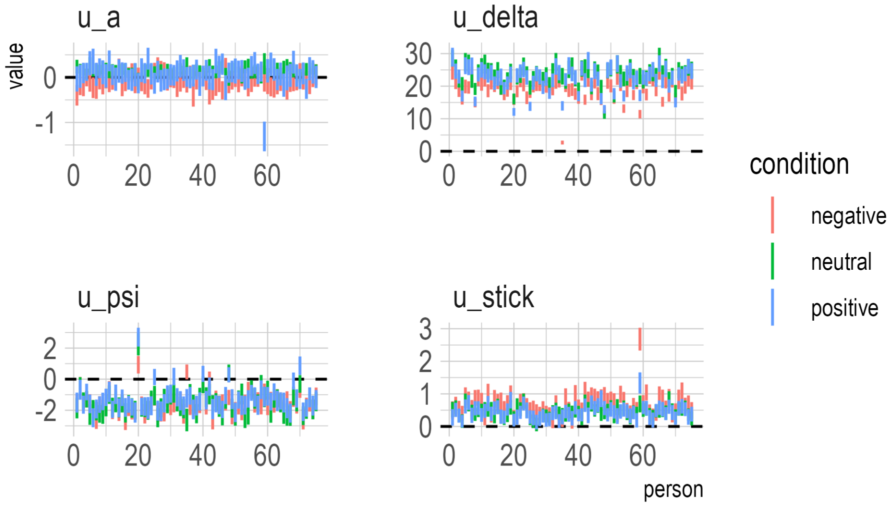
Differences between Conditions

```
# are there differences between conditions?
post$fixed %>%
  pivot_longer(-c(.draw, condition), names_to = "param") %>%
  pivot_wider(names_from = "condition") %>%
  group_by(.draw, param) %>%
  mutate(negative = negative - neutral,
         positive = positive - neutral,
         .keep = "none") %>%
  pivot_longer(c(negative, positive), names_to = "comparison") %>%
  ggplot(aes(value, fill = comparison)) +
  geom_density(alpha = 0.6) +
  geom_vline(xintercept = 0, linetype = 2) +
  facet_wrap(~param, scales = "free")
```



Individual Differences

```
plot_model_random(post)
```


u_a
u_delta
u_psi
u_stick
value
person
condition
negative
neutral
positive