Analysis of Ratings for Interaction Scenarios

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Contents

Introduction

This file is to reproduce the means and 95% highest density intervals for the ratings per interaction scenario that we show in Figure 3.

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Setup

First, we load the rethinking package, which we need to fit and sample from models. We also load the ggplot2 package for creating plots and formatR for formatting.

```
library(formatR)  # for formatting
library(ggplot2)  # For plots
library(rethinking)  # For Bayesian models
```

Also, we set the number of iterations and number of chains used for fitting the models.

```
# For fitting models
NUM_ITERATIONS = 2000  # our value: 2000
NUM_CHAINS = 4  # our value: 4
```

Data files

We load the pre-processed data.

```
df = read.csv(file = "Data/all_coded_data.csv")
```

Highest density interval per interaction scenario

Now we compute the mean and 95% highest density interval for each interaction scenario.

```
resp_types = c(c("gp_relapse"), c("gp_start"), c("discussion_so"),
    c("tell_se"), c("motivational_messages"), c("failing_pa_goals"),
    c("hrs_reflection_pa"), c("hrs_reflection_smoking"),
    c("hrs_help_button_pa"), c("hrs_help_button_smoking"),
    c("hrs_plan_pa"), c("hrs_plan_smoking"), c("pa_program"))

creds_low = numeric(length(resp_types))
creds_high = numeric(length(resp_types))
means = numeric(length(resp_types))
nums = numeric(length(resp_types))

i = 1

# For each interaction scenario
for (r in resp_types) {

    df_temp = df[df$response_type %in% r, ]

    # Create a data list to be used for the
    # model
    dat_list <- list(rating = df_temp$rating)

    set.seed(18)  # For reproducibility

    # Fit model
    ml <- ulam(alist(rating ~ normal(mu, sigma),
        mu <- a_bar, a_bar ~ dnorm(0, 10), sigma ~
            dexp(1)), data = dat_list, chains = NUM_CHAINS,
        log_lik = TRUE, cores = NUM_CHAINS, iter = NUM_ITERATIONS)

    res = precis(ml, prob = 0.95)

    means[i] = res[1, 1]
    nums[i] = length(df_temp$rating)

    # Sample from posterior
    set.seed(18)  # For reproducibility
    samples <- extract.samples(ml, n = 10000)

    # Compute 95% HDI
    hdpi <- HPDI(samples$a_bar, prob = 0.95)
    creds_low[i] = hdpi[1]
    creds_high[i] = hdpi[2]

    i = i + 1

    rm(ml)
}
```

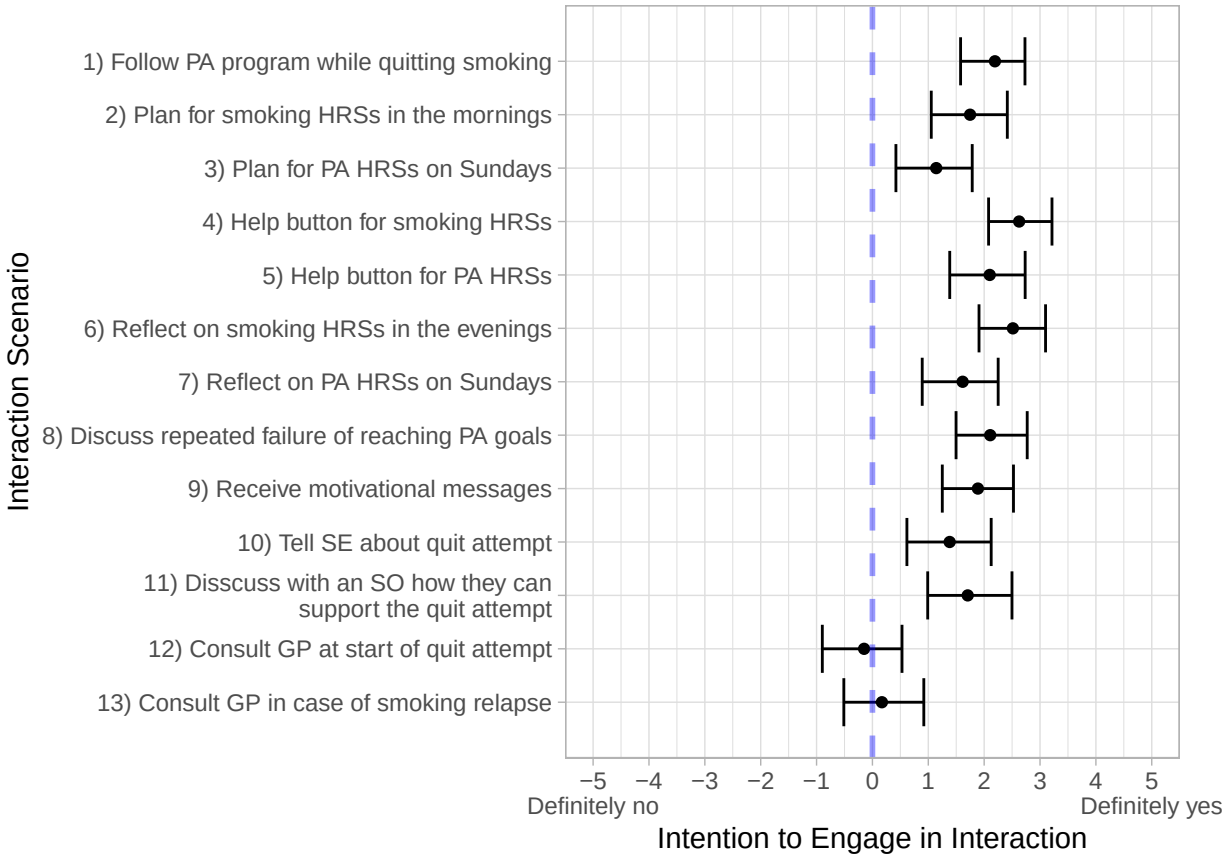
Create plot

Now we plot the mean and 95% highest density interval of the ratings per interaction scenario in a single figure.

```
  data = data.frame(means, nums, creds_low, creds_high)  # create data frame
  data$row_num <- seq.int(nrow(data))  # add row number

  ggplot(data, aes(means, row_num)) +        # ggplot2 plot with confidence intervals
  geom_point() +
  geom_errorbar(aes(xmin = creds_low, xmax = creds_high)) +
  theme_light() +
  ylab("Interaction Scenario") +
  scale_y_discrete(limits = c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13), labels = c("13) Consult GP in
  theme(plot.margin = margin(t = 0.1, r = 0.9, b = 0.1, l = 0.1, "cm"))
```

```
## Warning: Continuous limits supplied to discrete scale.
## Did you mean 'limits = factor(...)' or 'scale_*_continuous()'?
```




```
# Save image
pdf_file <- "Figures/interaction_scenarios_ratings_hdis.pdf"
ggsave(pdf_file, dpi=1500)
```

```
## Saving 6.5 x 4.5 in image
```