

# Report

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```
library(tidyverse)
library(here)
library(kableExtra)
library(ggeffects)
```

```
qtheme <- function(){
  theme_minimal(base_size = 12)
}

qtab <- function(data){
  data %>%
    kable(digits = 3) %>%
    kable_styling(bootstrap_options = c("striped", "condensed"),
                  full_width = FALSE)
}

get_threshold <- function(fit){
  -(coef(fit)[1]/coef(fit)[2])
}

get_slope <- function(fit){
  1/coef(fit)[2]
}
```

```
dat <- read_csv(here("data", "csv", "4_(2022-03-25_13-27-05).csv"))
```

```
if (dat$subject[1] == "1") {
  # reverse scores
  dat$test <- ifelse(dat$test == "same", "change", "same")
}

dat <- dat %>%
  mutate(acc = ifelse(type == test, 1, 0),
         pasf = factor(pas),
```

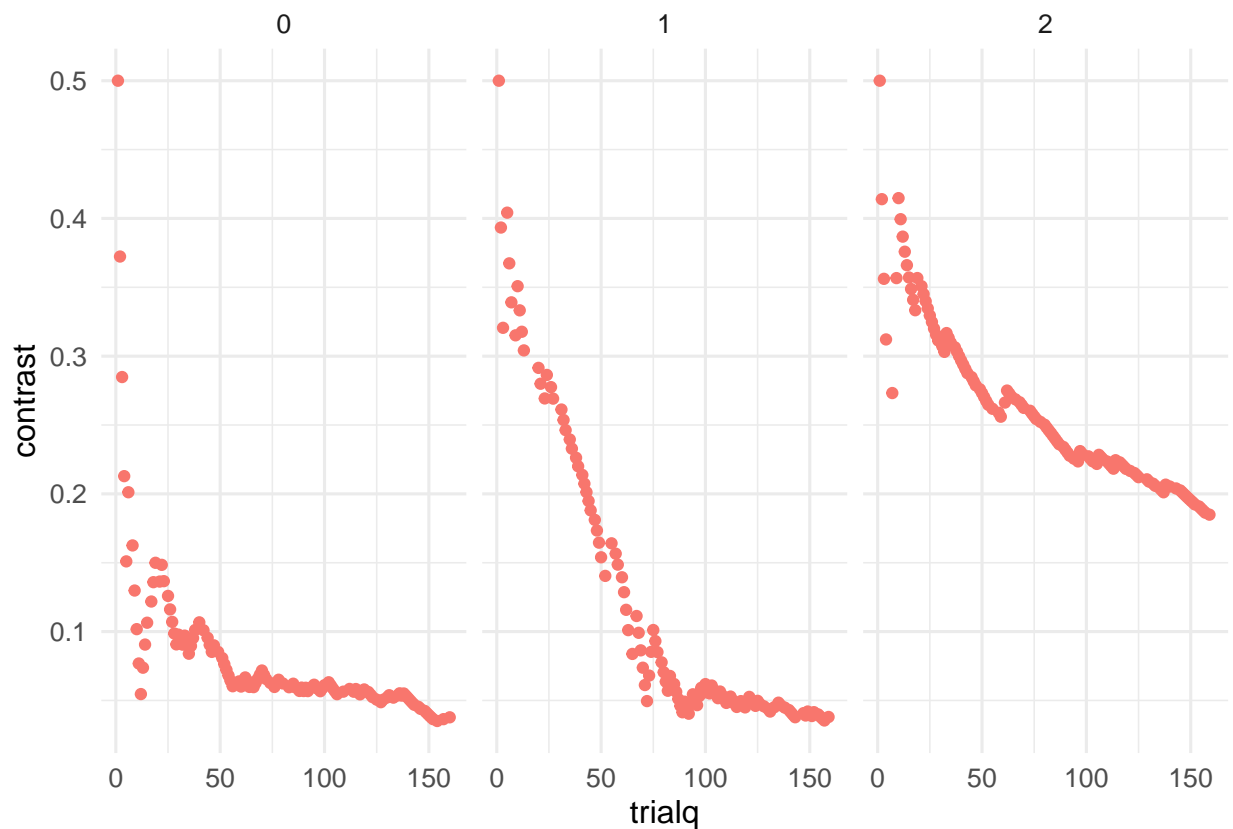
```
questf = factor(quest),
is_signal = factor(ifelse(trial_type == "valid", 1, 0)),
say_signal = factor(ifelse(pas < 2, 0, 1)))
```

# 1 Report

## 1.1 QUEST overview

This plot represent the overall QUESTs across the experiment for valid trials only. The red dot are the contrast 0 (this is an index on how low is the contrast across trials).

```
dat %>%
  group_by(quest) %>%
  mutate(trialq = 1:n(),
         contr = ifelse(contrast == 0, 0, 1)) %>%
  ungroup() %>%
  filter(trial_type == "valid") %>%
  ggplot(aes(x = trialq, y = contrast, color = factor(contr))) +
  geom_point(show.legend = FALSE) +
  facet_wrap(~quest) +
  qtheme()
```



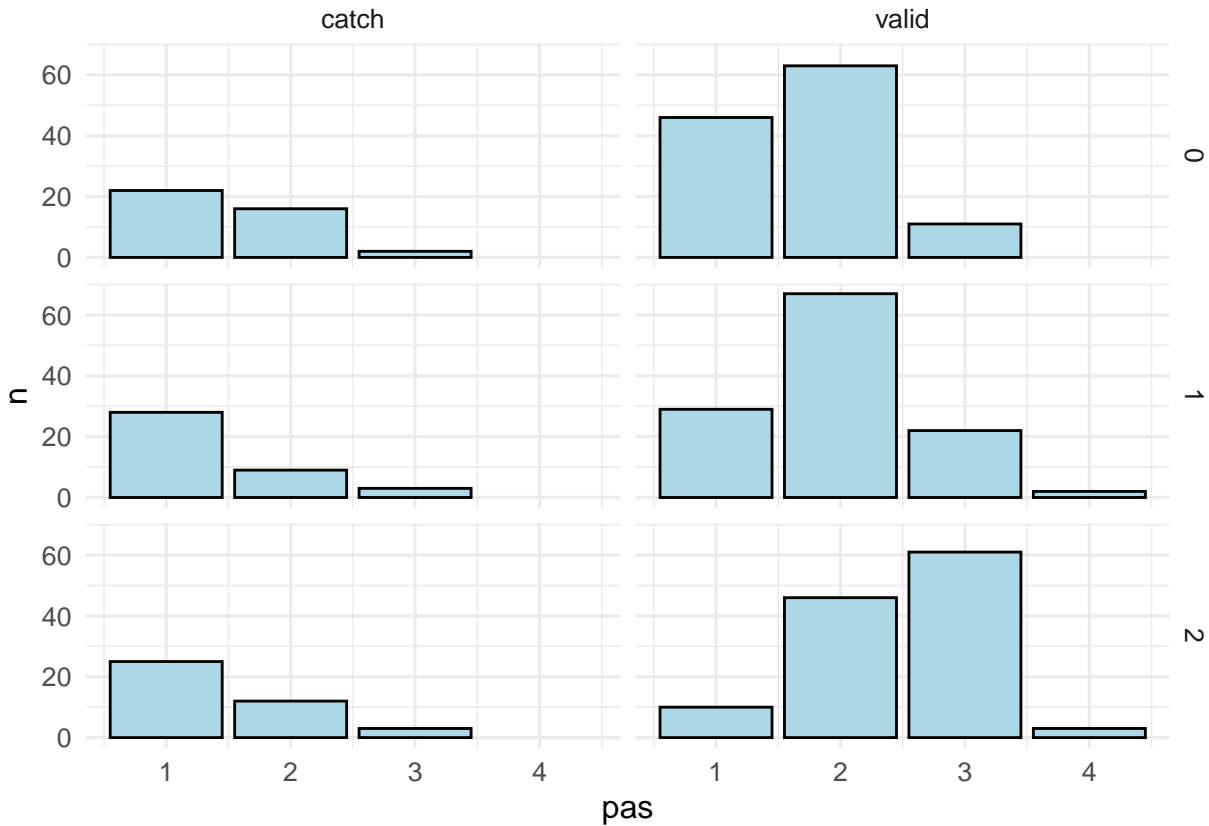
| quest | mean  | sd    | min   | first_quantile | median | third_quantile | max |
|-------|-------|-------|-------|----------------|--------|----------------|-----|
| 0     | 0.082 | 0.060 | 0.035 | 0.056          | 0.062  | 0.090          | 0.5 |
| 1     | 0.120 | 0.105 | 0.035 | 0.047          | 0.059  | 0.175          | 0.5 |
| 2     | 0.264 | 0.060 | 0.185 | 0.220          | 0.253  | 0.303          | 0.5 |

This table is the average contrast with variability for each QUEST:

```
dat %>%
  filter(trial_type == "valid") %>%
  group_by(quest) %>%
  summarise(mean = mean(contrast),
            sd = sd(contrast),
            min = min(contrast),
            first_quantile = quantile(contrast, 0.25),
            median = median(contrast),
            third_quantile = quantile(contrast, 0.75),
            max = max(contrast)) %>%
  qtab()
```

This is the PAS distribution for QUEST and trial type (catch and valid):

```
dat %>%
  count(pas, trial_type, quest) %>%
  ggplot(aes(x = pas, y = n)) +
  geom_col(color = "black", fill = "lightblue") +
  facet_grid(quest~trial_type) +
  qtheme()
```



This is the table for PAS and QUEST contrast with variability:

```
dat %>%
  group_by(quest, pas) %>%
  summarise(mean = mean(contrast),
            sd = sd(contrast),
            ntrials = n(),
            min = min(contrast),
            first_quantile = quantile(contrast, 0.25),
            median = median(contrast),
            third_quantile = quantile(contrast, 0.75),
            max = max(contrast)) %>%
  qtab()
```

This table is the accuracy as a function of PAS and QUEST

```
dat %>%
  group_by(quest, pas) %>%
  summarise(acc = mean(acc),
            ntrials = n(),
            contrast = mean(contrast)) %>%
  qtab()
```

This is the relationship between accuracy and contrast:

| quest | pas | mean  | sd    | ntrials | min   | first_quantile | median | third_quantile | max   |
|-------|-----|-------|-------|---------|-------|----------------|--------|----------------|-------|
| 0     | 1   | 0.048 | 0.040 | 68      | 0.000 | 0.000          | 0.056  | 0.063          | 0.151 |
| 0     | 2   | 0.074 | 0.079 | 79      | 0.000 | 0.042          | 0.059  | 0.088          | 0.500 |
| 0     | 3   | 0.058 | 0.033 | 13      | 0.000 | 0.052          | 0.061  | 0.068          | 0.107 |
| 1     | 1   | 0.040 | 0.069 | 57      | 0.000 | 0.000          | 0.035  | 0.048          | 0.321 |
| 1     | 2   | 0.100 | 0.099 | 76      | 0.000 | 0.045          | 0.054  | 0.131          | 0.393 |
| 1     | 3   | 0.164 | 0.134 | 25      | 0.000 | 0.056          | 0.157  | 0.233          | 0.500 |
| 1     | 4   | 0.173 | 0.135 | 2       | 0.078 | 0.126          | 0.173  | 0.221          | 0.269 |
| 2     | 1   | 0.076 | 0.125 | 35      | 0.000 | 0.000          | 0.000  | 0.210          | 0.357 |
| 2     | 2   | 0.210 | 0.127 | 58      | 0.000 | 0.188          | 0.225  | 0.284          | 0.500 |
| 2     | 3   | 0.251 | 0.073 | 64      | 0.000 | 0.220          | 0.255  | 0.291          | 0.399 |
| 2     | 4   | 0.255 | 0.061 | 3       | 0.200 | 0.223          | 0.246  | 0.283          | 0.320 |

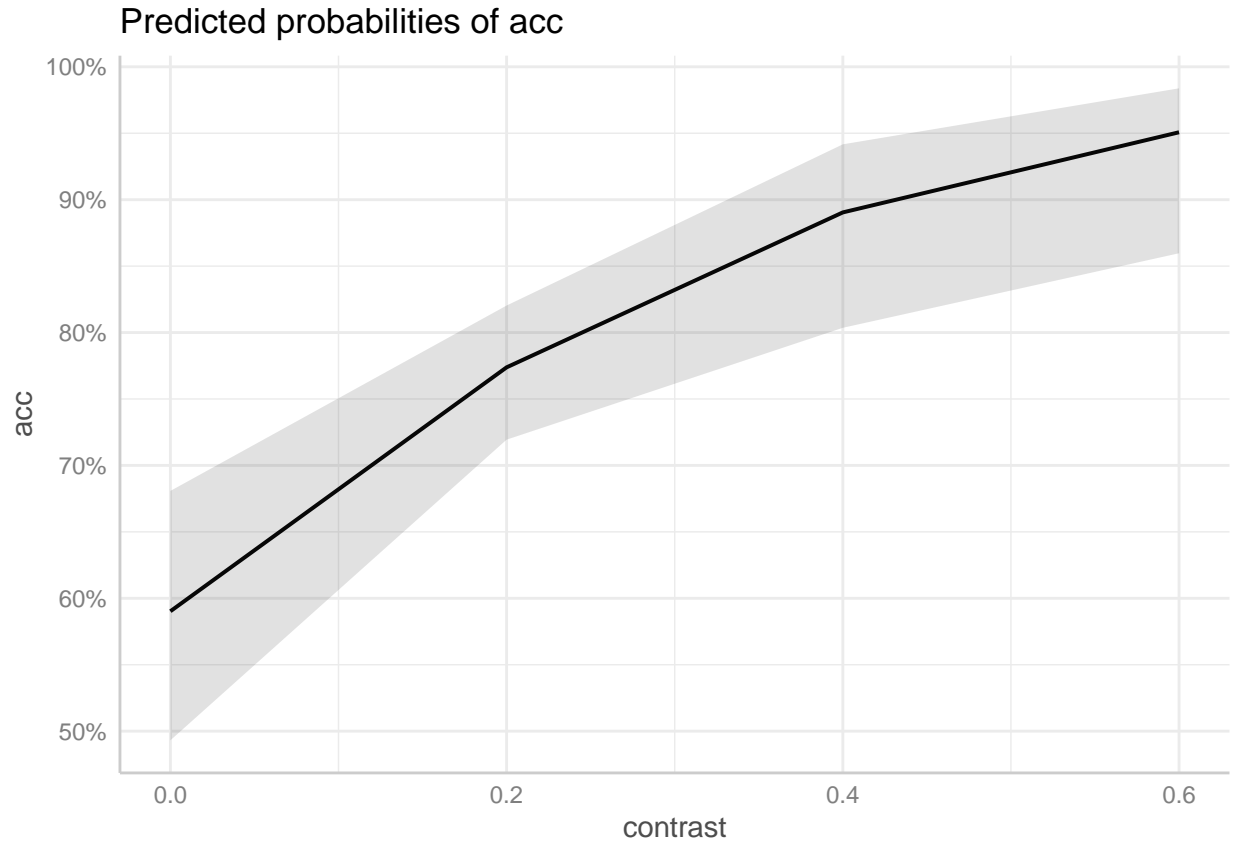
| quest | pas | acc   | ntrials | contrast |
|-------|-----|-------|---------|----------|
| 0     | 1   | 0.500 | 68      | 0.048    |
| 0     | 2   | 0.633 | 79      | 0.074    |
| 0     | 3   | 0.692 | 13      | 0.058    |
| 1     | 1   | 0.474 | 57      | 0.040    |
| 1     | 2   | 0.750 | 76      | 0.100    |
| 1     | 3   | 0.720 | 25      | 0.164    |
| 1     | 4   | 1.000 | 2       | 0.173    |
| 2     | 1   | 0.371 | 35      | 0.076    |
| 2     | 2   | 0.672 | 58      | 0.210    |
| 2     | 3   | 0.922 | 64      | 0.251    |
| 2     | 4   | 1.000 | 3       | 0.255    |

```
fit_con <- glm(acc ~ contrast,
               data = dat %>% filter(trial_type == "valid"),
               family = binomial(link = "logit"))
```

```
plot(ggeffect(fit_con))
```

```
## $contrast
```

| quest | cr | fa | hit | miss | fa_rate | hit_rate | dprime | crit   |
|-------|----|----|-----|------|---------|----------|--------|--------|
| 0     | 22 | 18 | 74  | 46   | 0.450   | 0.617    | 0.422  | -0.086 |
| 1     | 28 | 12 | 91  | 29   | 0.300   | 0.758    | 1.225  | -0.088 |
| 2     | 25 | 15 | 110 | 10   | 0.375   | 0.917    | 1.702  | -0.532 |



This is the signal detection analysis. Negative criterion value represent a tendency toward responding “yes” (liberal criterion)

```
dat %>%
  mutate(sdt = case_when(is_signal == 1 & say_signal == 1 ~ "hit",
                        is_signal == 1 & say_signal == 0 ~ "miss",
                        is_signal == 0 & say_signal == 1 ~ "fa",
                        is_signal == 0 & say_signal == 0 ~ "cr")) %>%
  count(sdt, quest) %>%
  pivot_wider(names_from = sdt, values_from = n) %>%
  mutate(fa_rate = fa/(fa + cr),
         hit_rate = hit/(hit + miss),
         dprime = qnorm(hit_rate) - qnorm(fa_rate),
         crit = -((qnorm(hit_rate) + qnorm(fa_rate))/2)) %>%
  qtab()
```

This is the psychometric function considering PAS 1 as 0 and PAS 234 as 1.

```

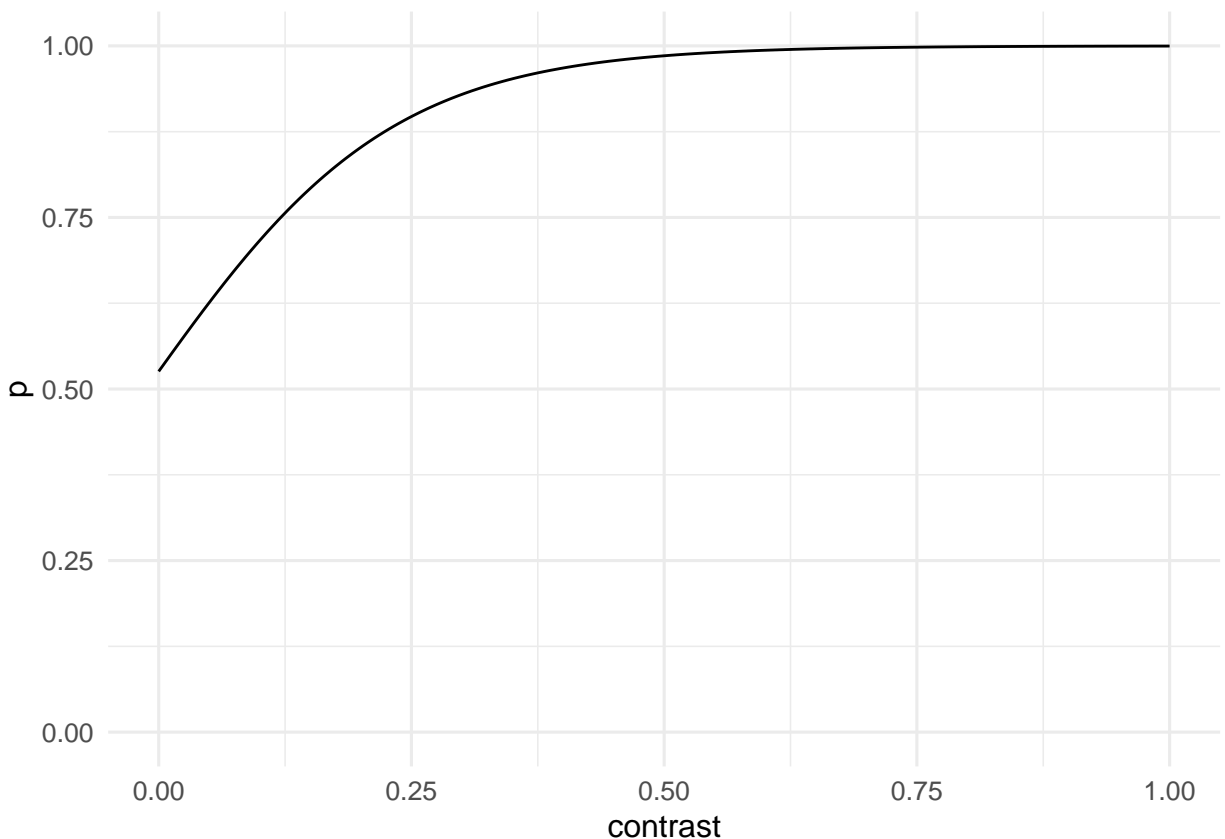
fit_pas1_234 <- glm(vis ~ contrast,
  data = dat %>% filter(trial_type == "valid"),
  family = binomial(link = "logit"))

newdata <- data.frame(contrast = seq(0,1,0.001))

newdata$p <- predict(fit_pas1_234, newdata = newdata, type = "response")

ggplot(newdata) +
  geom_line(aes(x = contrast, y = p)) +
  ylim(c(0,1)) +
  qtheme()

```



The estimated 50% threshold is -0.012 and the slope is 0.121

This is the psychometric function considering PAS 12 as 0 and PAS 34 as 1. I'm not sure if this is meaningful but is a more plausible psychometric function

```

dat$vis12 <- ifelse(dat$pas <= 2, 0, 1)

fit_pas12_34 <- glm(vis12 ~ contrast,
  data = dat %>% filter(trial_type == "valid"),
  family = binomial(link = "logit"))

```

```

newdata <- data.frame(contrast = seq(0,1,0.001))

newdata$p <- predict(fit_pas12_34, newdata = newdata, type = "response")

ggplot(newdata) +
  geom_line(aes(x = contrast, y = p)) +
  ylim(c(0,1)) +
  qtheme()

```

