Binary Choice Analysis

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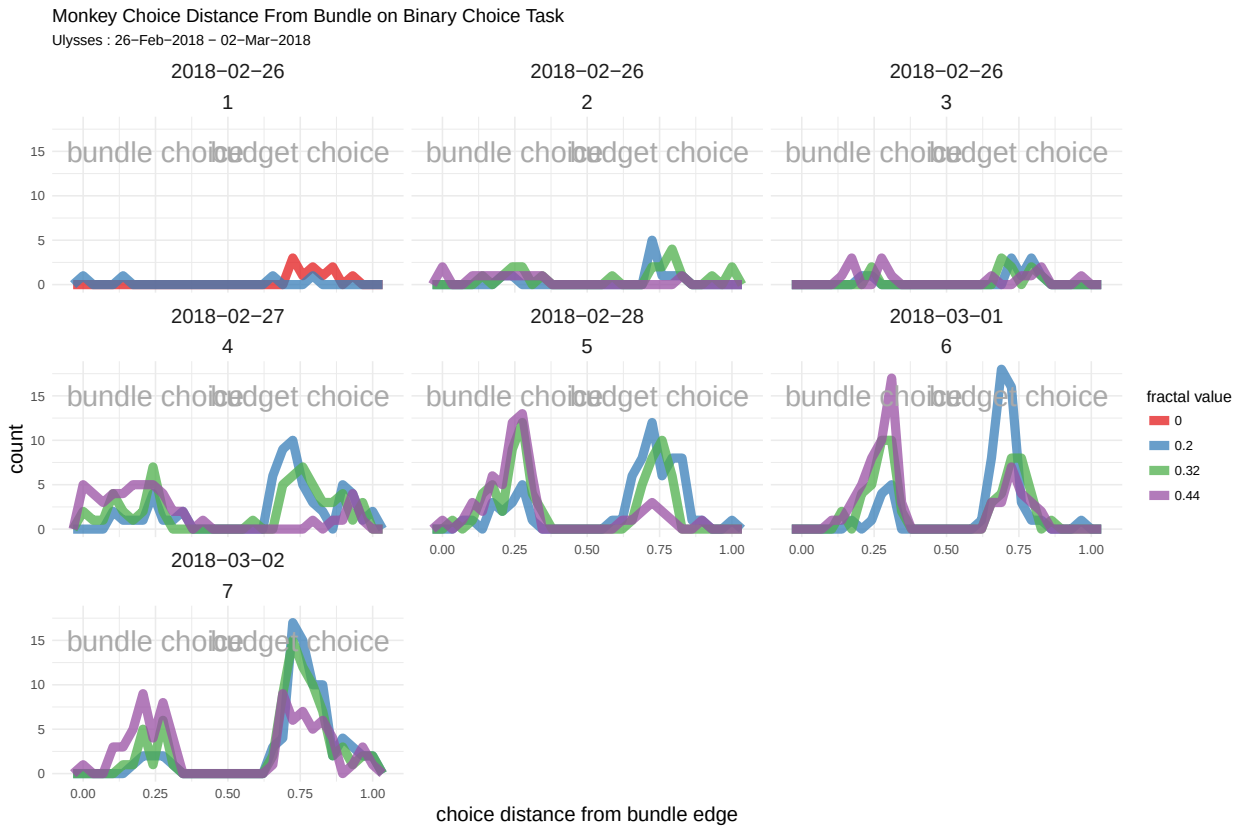
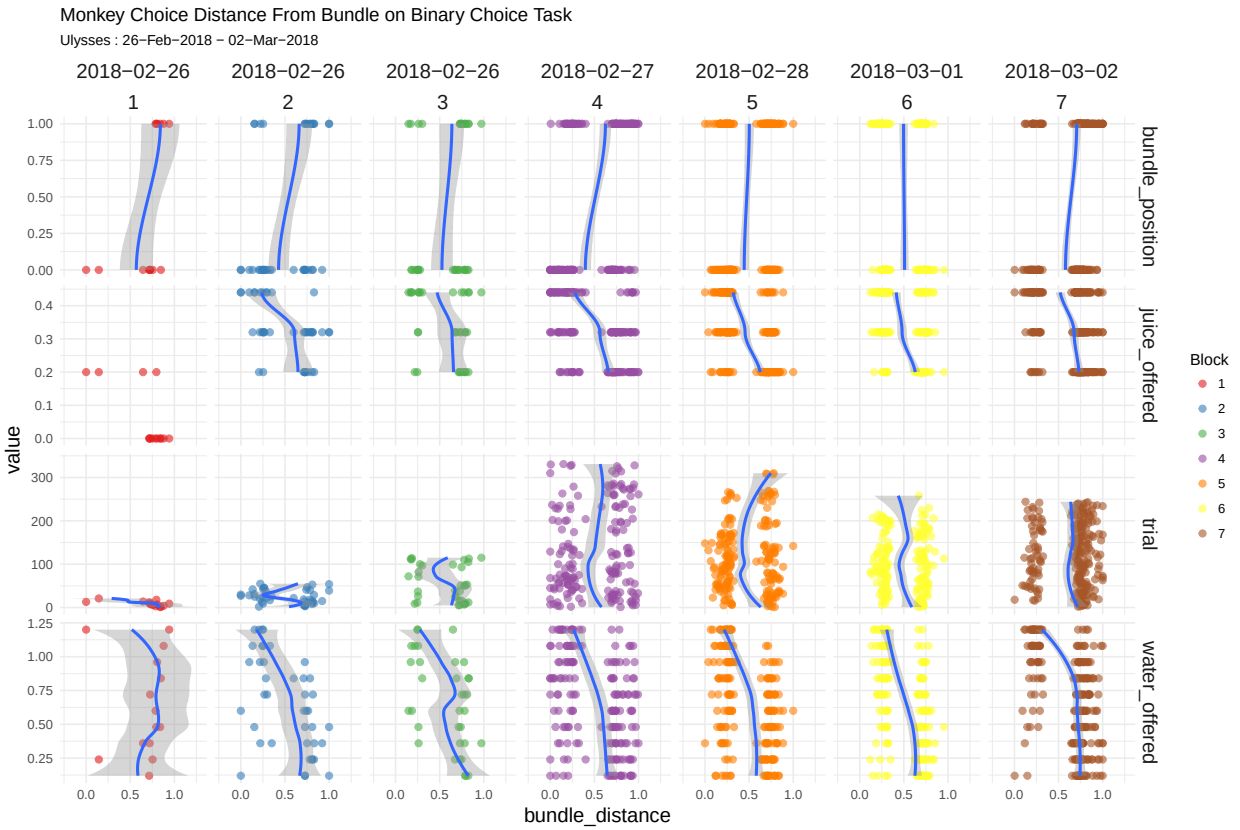
```
monkey <- "Ulysses"
today <- "02-Mar-2018"
look_back <- "26-Feb-2018"
```

```
p1
```




```
p2
```



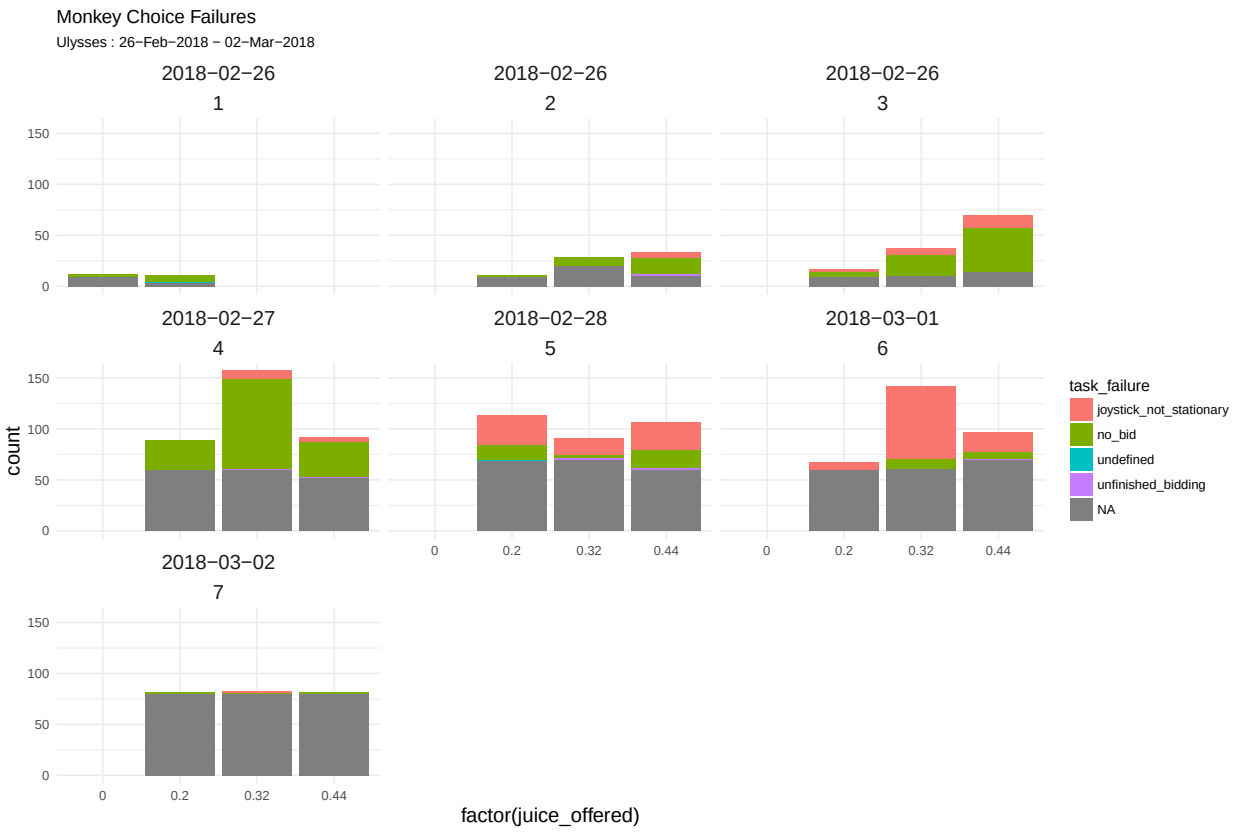

```
#generate a model of likelihood to choice for the fractal dependent on it's position,
#value and associated water
model <- glm(data = task_data,
             fractal_choice ~ bundle_position + water_offered + juice_offered + trial + date,
             family = "binomial")

#summarise the parameters
summary(model)
```

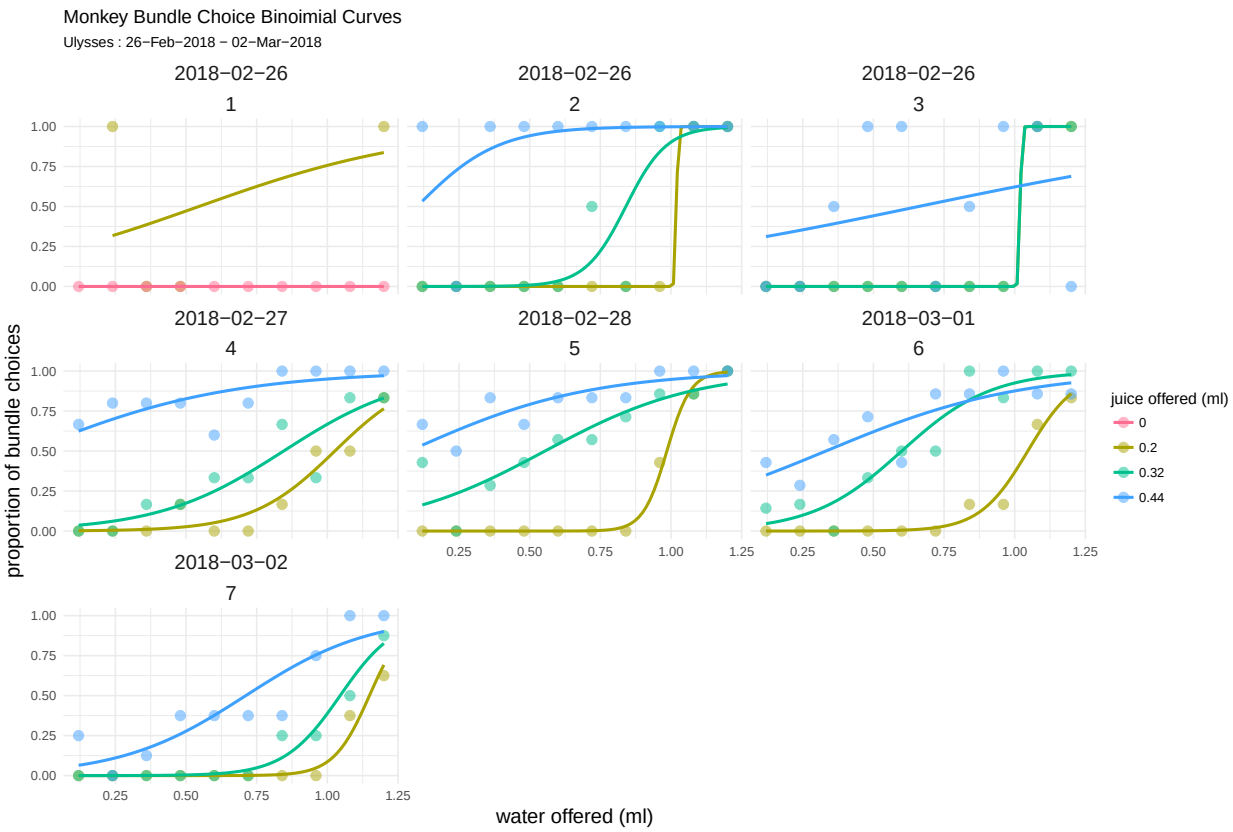
```
##
## Call:
## glm(formula = fractal_choice ~ bundle_position + water_offered +
##     juice_offered + trial + date, family = "binomial", data = task_data)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.2082  -0.6238  -0.1969   0.6012   2.7761
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)      6.809e+03  1.312e+03   5.189 2.12e-07 ***
## bundle_position -9.710e-01  1.912e-01  -5.077 3.83e-07 ***
## water_offered    4.675e+00  3.516e-01  13.298  < 2e-16 ***
## juice_offered    1.502e+01  1.186e+00  12.669  < 2e-16 ***
## trial           -6.163e-04  1.185e-03  -0.520    0.603
## date            -3.875e-01  7.460e-02  -5.194 2.05e-07 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1208.78  on 890  degrees of freedom
## Residual deviance:  720.89  on 885  degrees of freedom
##   (526 observations deleted due to missingness)
## AIC: 732.89
##
## Number of Fisher Scoring iterations: 5
```

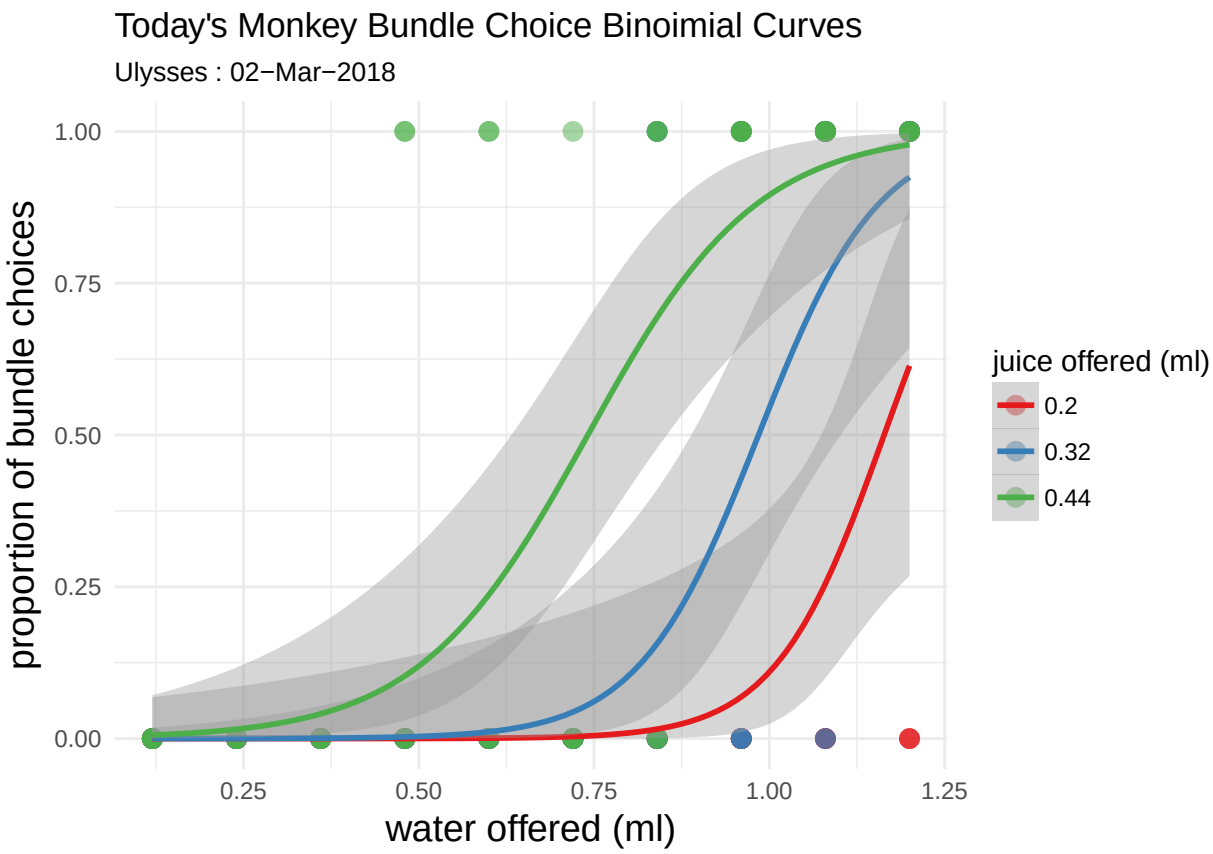
```
p3
```




```
p4
```

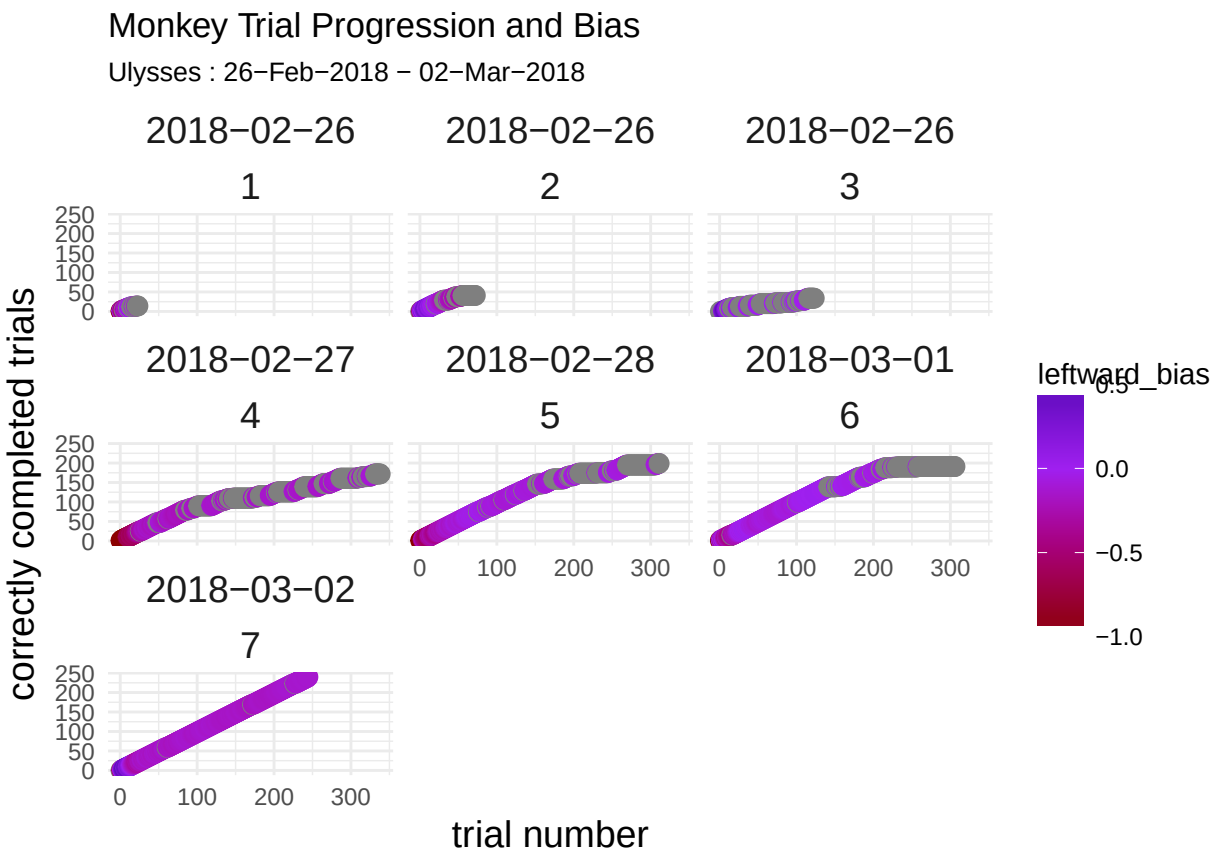

Monkey Bundle Choice Binoimial Curves
Ulysses : 26−Feb−2018 − 02−Mar−2018
2018−02−26
1
2018−02−26
2
2018−02−26
3
2018−02−27
4
2018−02−28
5
2018−03−01
6
2018−03−02
7
proportion of bundle choices
water offered (ml)
juice offered (ml)
0
0.2
0.32
0.44

p5




```
p6 <- task_data %>%
  .[order(block_no, trial)] %>%
  .[,correct := cumsum(is.na(task_failure)), by = block_no] %>%
  .[bundle_position == fractal_choice, left_bid := 1] %>%
  .[bundle_position != fractal_choice, left_bid := -1] %>%
  .[!is.na(left_bid), leftward_bias := cumsum(left_bid) / trial, by = block_no] %>%
  #.[, res := rollapplyr(progression, 1:.N, mean), by = block_no]
  ggplot(., aes(x = trial, y = correct)) +
  geom_point(size = 3, aes(colour = leftward_bias)) +
  scale_colour_gradient2(low = "darkred", high = "darkblue", midpoint = 0, mid = "purple") +
  xlab("trial number") +
  ylab("correctly completed trials") +
  ggtitle("Monkey Trial Progression and Bias",
          subtitle = paste(monkey, ":", look_back, "-", today)) +
  theme_minimal() +
  theme(strip.text.x = element_text(size = 14)) +
  theme(axis.title.x = element_text(size = 14)) +
  theme(axis.title.y = element_text(size = 14)) +
  facet_wrap(~date + block_no)

p6
```


Monkey Trial Progression and Bias
Ulysses : 26−Feb−2018 − 02−Mar−2018
2018−02−26
1
2018−02−26
2
2018−02−26
3
2018−02−27
4
2018−02−28
5
2018−03−01
6
2018−03−02
7
correctly completed trials
trial number
leftward_bias
0.5
0.0
−0.5
−1.0