Binary Choice Analysis

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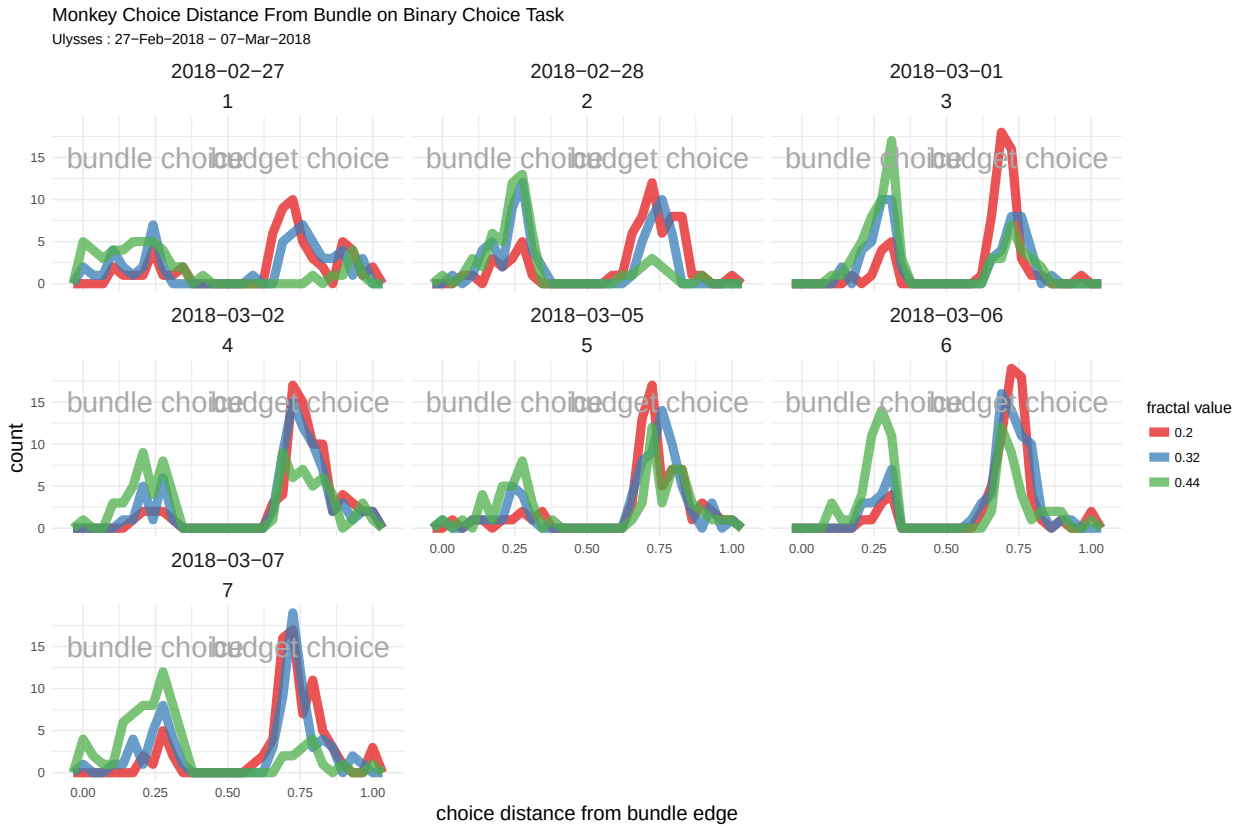
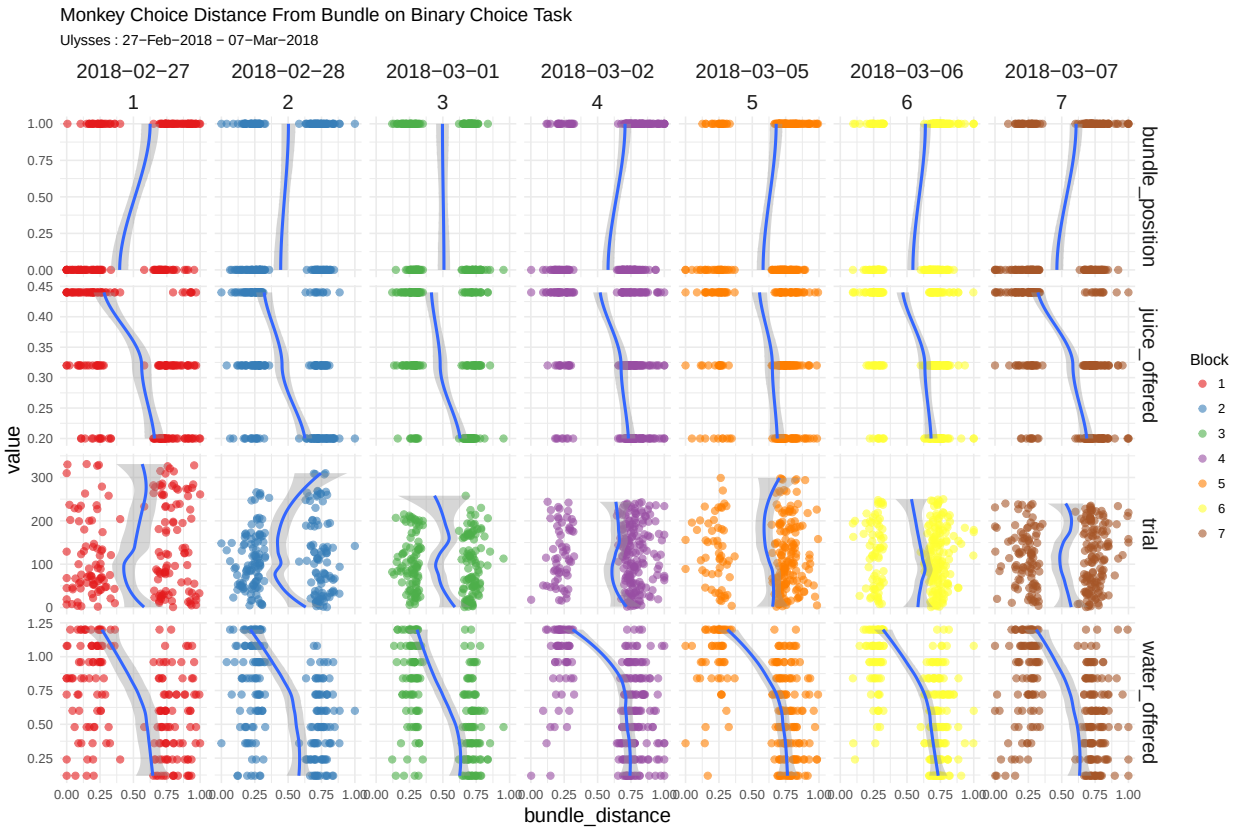
```
monkey <- "Ulysses"
today <- "07-Mar-2018"
look_back <- "27-Feb-2018"

start_trial <- 0
stop_trial <- 150
```

```
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)
```

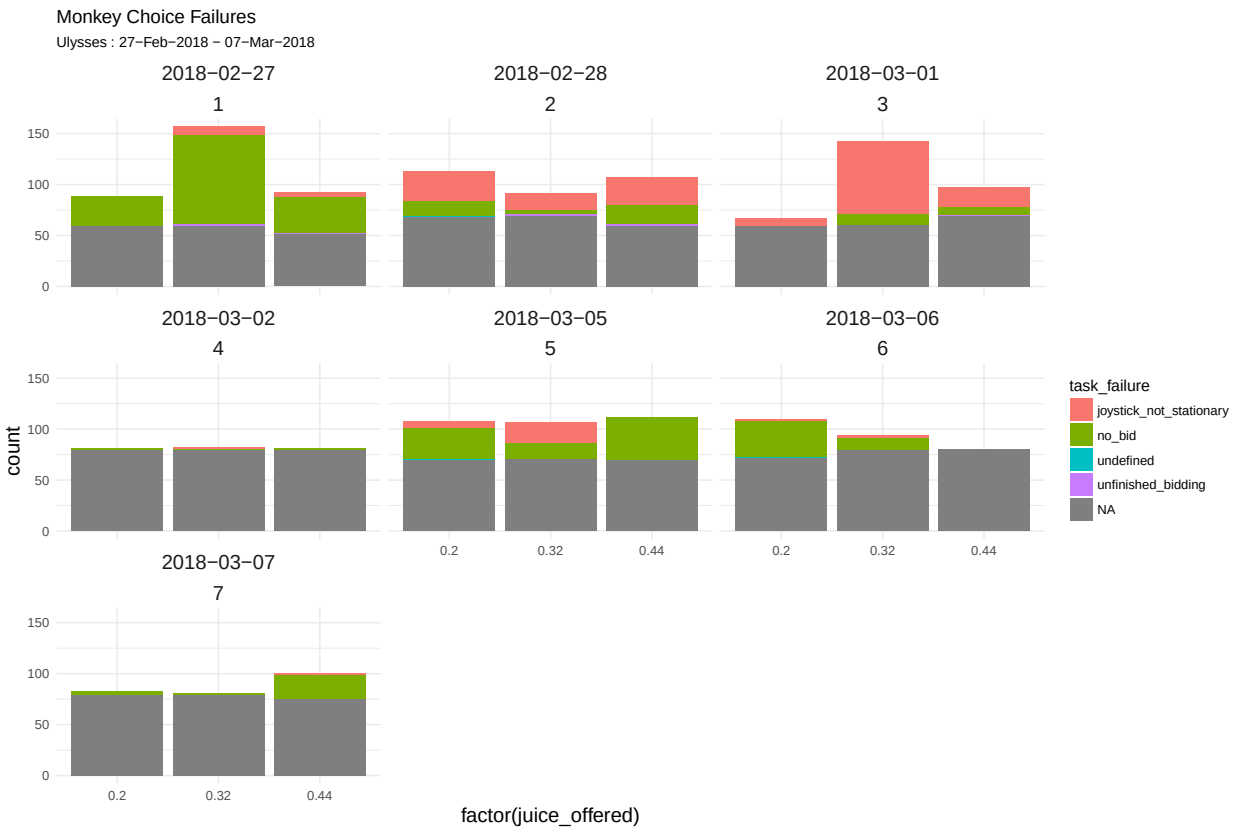
```
##
## Call:
## glm(formula = fractal_choice ~ bundle_position + water_offered +
##     juice_offered + trial + date, family = "binomial", data = task_data)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.6587  -0.5677  -0.1802   0.5048   2.8700
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)      2.729e+03  4.715e+02   5.788 7.14e-09 ***
## bundle_position -1.229e+00  1.572e-01  -7.818 5.36e-15 ***
## water_offered    5.261e+00  3.016e-01  17.442  < 2e-16 ***
## juice_offered    1.592e+01  9.946e-01  16.007  < 2e-16 ***
## trial           -2.142e-04  9.925e-04  -0.216    0.829
## date            -1.556e-01  2.681e-02  -5.805 6.43e-09 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1961.3  on 1479  degrees of freedom
## Residual deviance: 1118.7  on 1474  degrees of freedom
##   (593 observations deleted due to missingness)
## AIC: 1130.7
##
## Number of Fisher Scoring iterations: 6
```

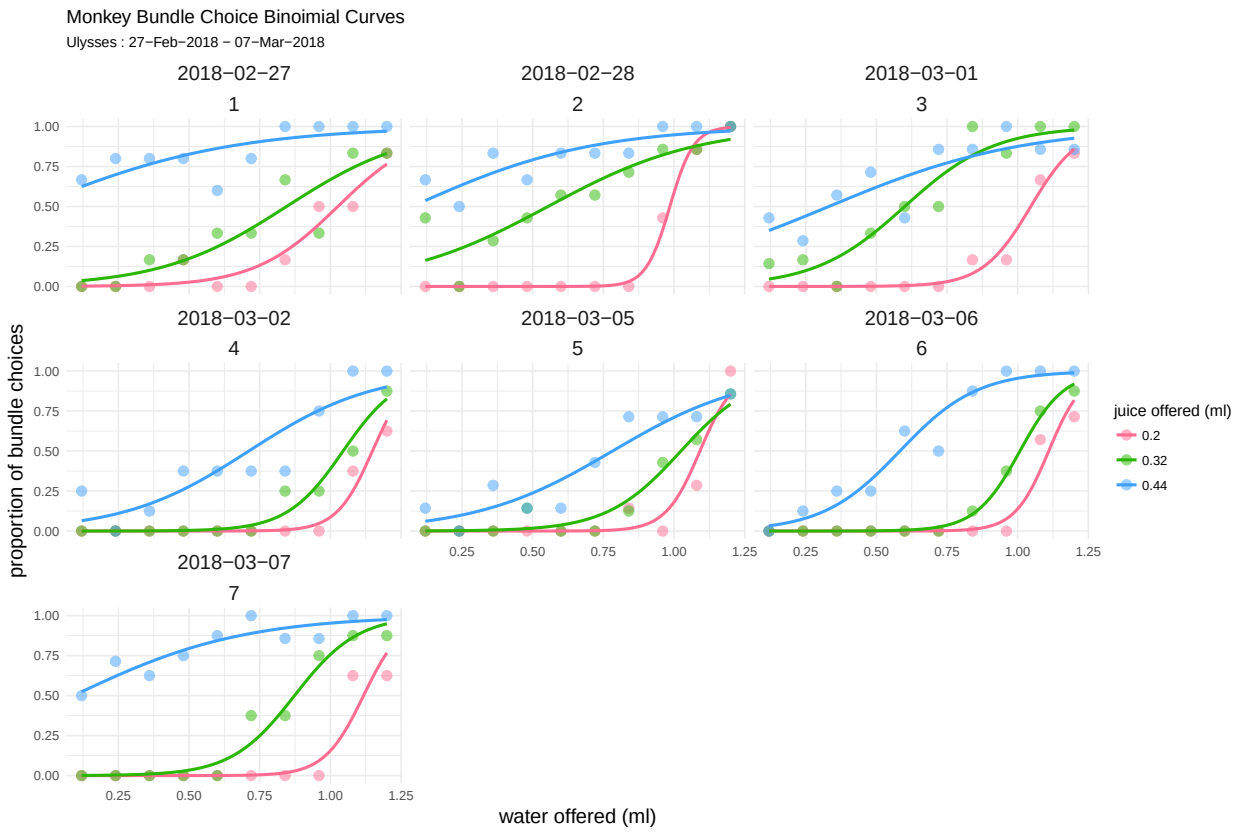
```
#generate a model of likelihood to choice for the fractal dependent on it's position,
#value and associated water
model <- glm(data = dplyr::filter(task_data, block_no == max(block_no)),
             fractal_choice ~ bundle_position + water_offered + juice_offered + trial + date,
             family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

#summarise the parameters
summary(model)
```

```
##
## Call:
## glm(formula = fractal_choice ~ bundle_position + water_offered +
##     juice_offered + trial + date, family = "binomial", data = dplyr::filter(task_data,
##     block_no == max(block_no)))
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.8337  -0.2966  -0.0365   0.2012   2.5768
##
## Coefficients: (1 not defined because of singularities)
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -1.594e+01  2.382e+00  -6.695 2.16e-11 ***
## bundle_position -3.148e+00  6.246e-01  -5.039 4.67e-07 ***
## water_offered    8.267e+00  1.303e+00   6.346 2.21e-10 ***
## juice_offered    3.407e+01  5.032e+00   6.772 1.27e-11 ***
## trial            8.462e-04  3.486e-03   0.243    0.808
## date                    NA         NA      NA       NA
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 318.59  on 234  degrees of freedom
## Residual deviance: 113.44  on 230  degrees of freedom
##   (29 observations deleted due to missingness)
## AIC: 123.44
##
## Number of Fisher Scoring iterations: 7
```

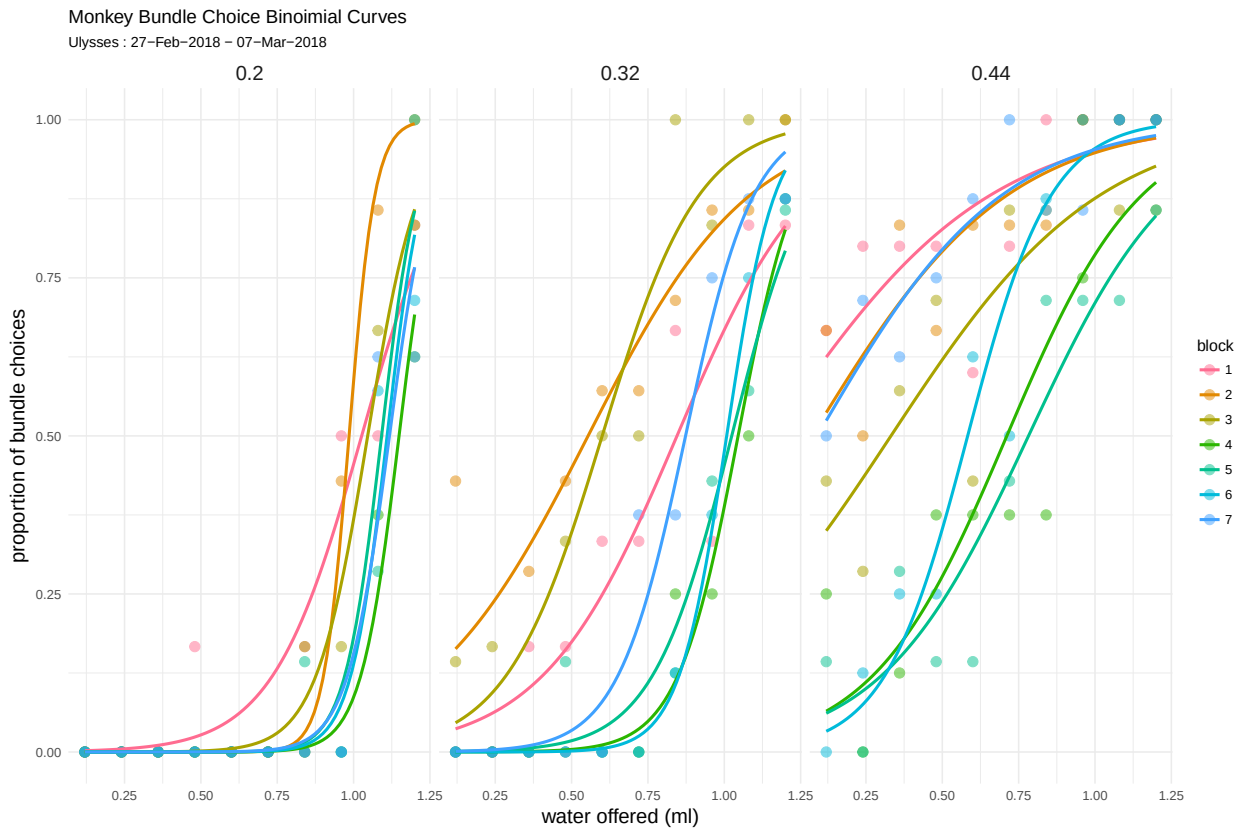
```
p3
```


Monkey Choice Failures
Ulysses : 27−Feb−2018 − 07−Mar−2018
2018−02−27
1
2018−02−28
2
2018−03−01
3
2018−03−02
4
2018−03−05
5
2018−03−06
6
2018−03−07
7
count
150
100
50
0
0.2
0.32
0.44
factor(juice_offered)
task_failure
joystick_not_stationary
no_bid
undefined
unfinished_bidding
NA

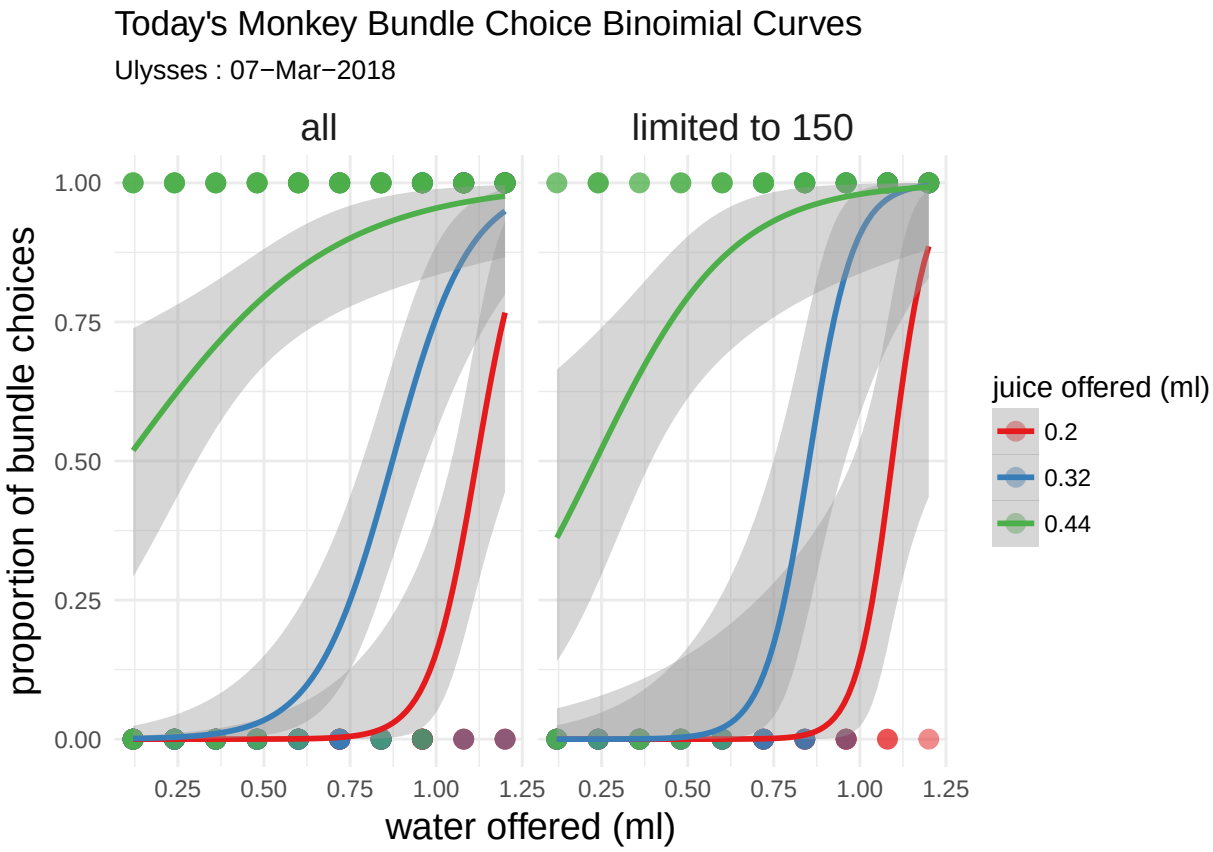
```
p4
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 27−Feb−2018 − 07−Mar−2018
2018−02−27
1
2018−02−28
2
2018−03−01
3
2018−03−02
4
2018−03−05
5
2018−03−06
6
2018−03−07
7
proportion of bundle choices
water offered (ml)
juice offered (ml)
0.2
0.32
0.44

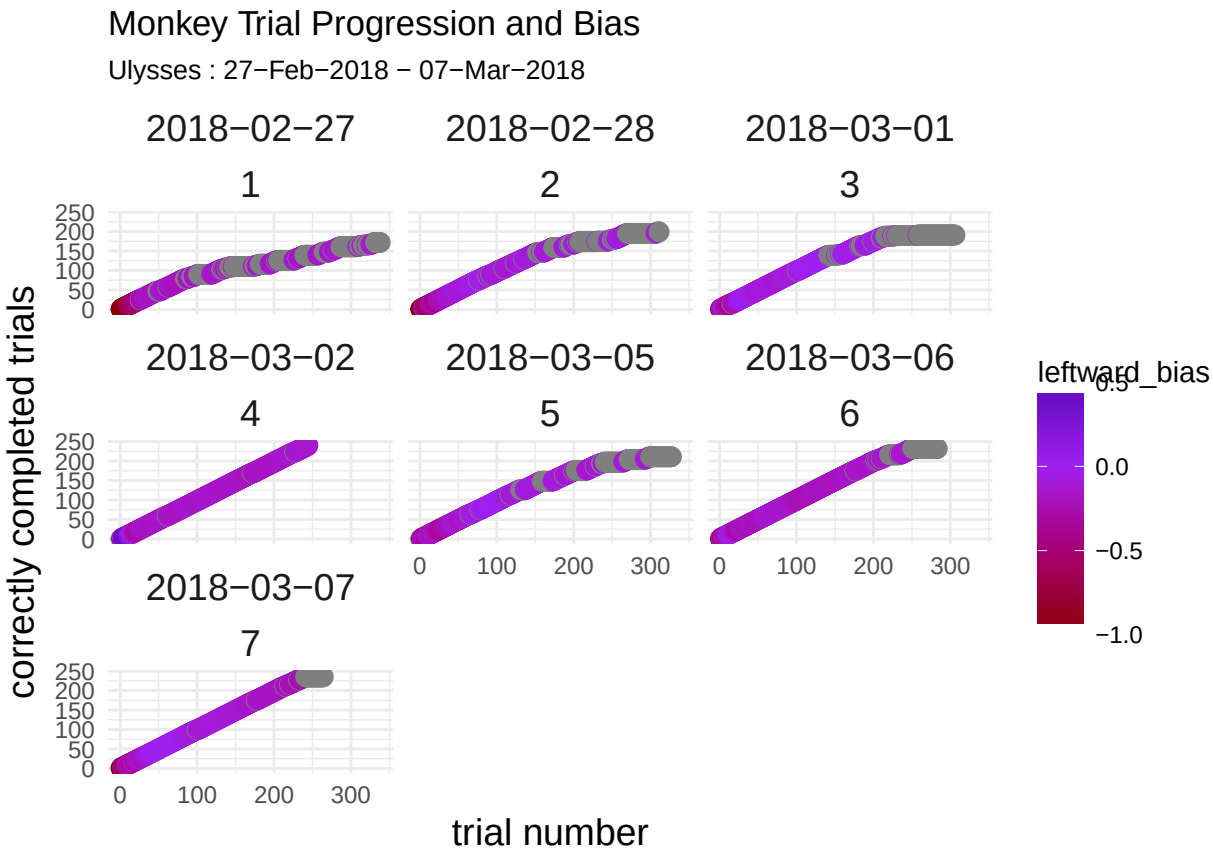
p5


Monkey Bundle Choice Binoimial Curves
Ulysses : 27−Feb−2018 − 07−Mar−2018
0.2
0.32
0.44
proportion of bundle choices
water offered (ml)
block
1
2
3
4
5
6
7

p6


Today's Monkey Bundle Choice Binoimial Curves
Ulysses : 07−Mar−2018
all
limited to 150
proportion of bundle choices
1.00
0.75
0.50
0.25
0.00
0.25
0.50
0.75
1.00
1.25
water offered (ml)
juice offered (ml)
0.2
0.32
0.44

```
p7
```


Monkey Trial Progression and Bias
Ulysses : 27−Feb−2018 − 07−Mar−2018
2018−02−27
1
2018−02−28
2
2018−03−01
3
2018−03−02
4
2018−03−05
5
2018−03−06
6
2018−03−07
7
correctly completed trials
trial number
leftward_bias
0.5
0.0
−0.5
−1.0