BCb Analysis- Early March

Robert Hickman

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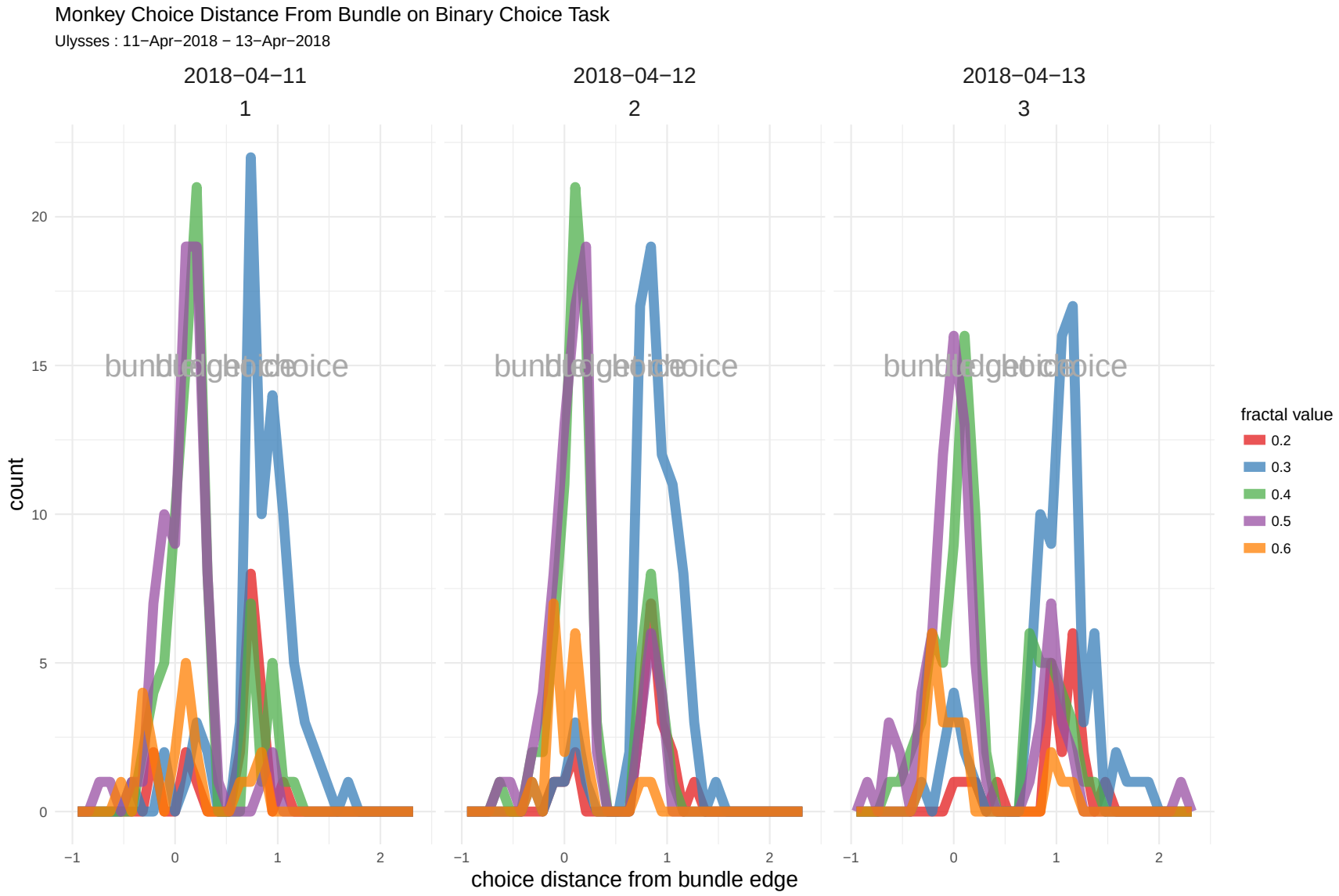
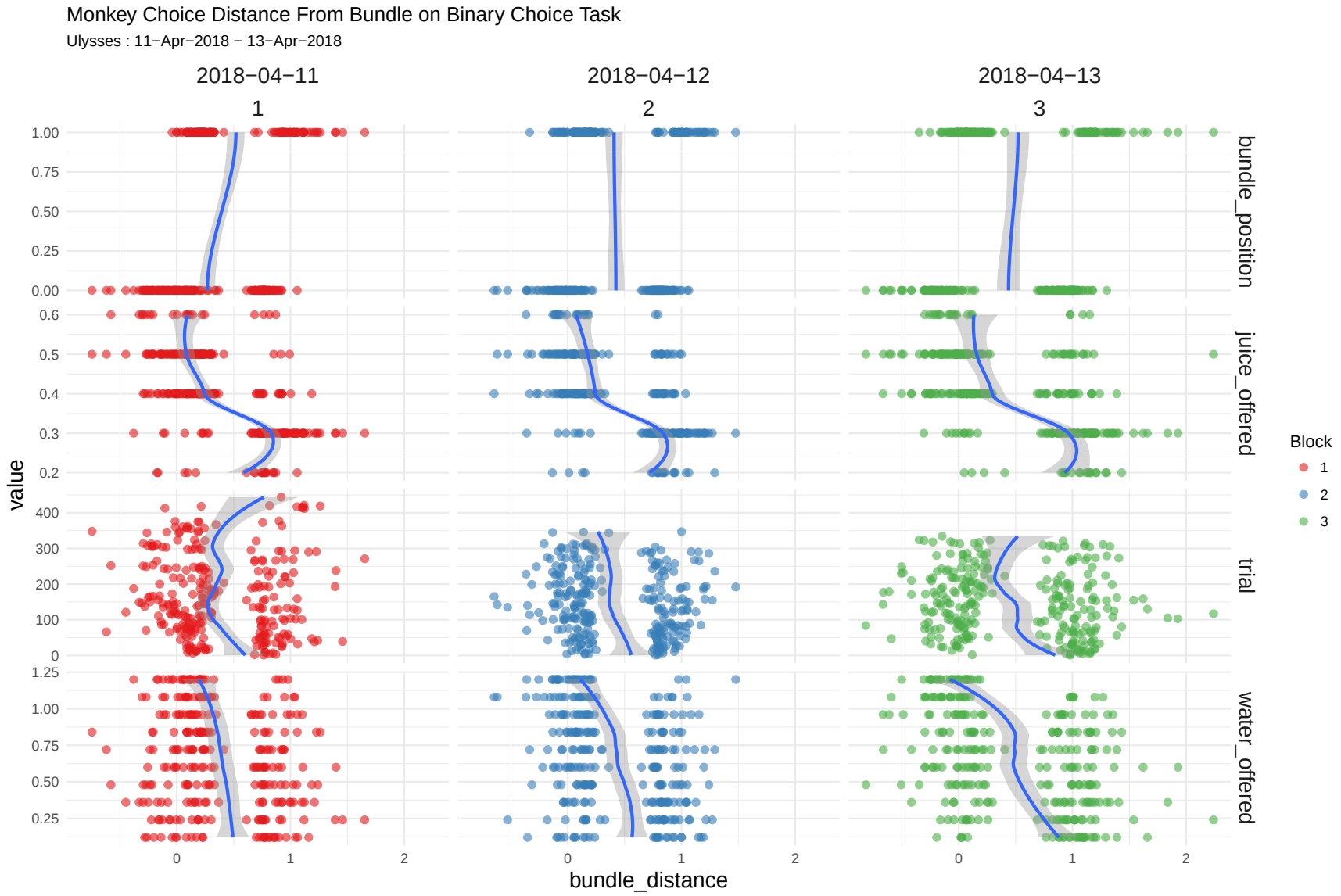
```
monkey <- "Ulysses"
today <- "13-Apr-2018"
look_back <- "11-Apr-2018"

start_trial <- 0
stop_trial <- "all"

merge_days <- TRUE
```

```
p1
```


Monkey Choice Distance From Bundle on Binary Choice Task
Ulysses : 11−Apr−2018 − 13−Apr−2018
2018−04−11
1
2018−04−12
2
2018−04−13
3
count
choice distance from bundle edge
fractal value
0.2
0.3
0.4
0.5
0.6

```
p2
```


Monkey Choice Distance From Bundle on Binary Choice Task
Ulysses : 11−Apr−2018 − 13−Apr−2018
2018−04−11
1
2018−04−12
2
2018−04−13
3
value
bundle_position
juice_offered
trial
water_offered
bundle_distance
Block
1
2
3

```r
#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
## -3.2006  -0.5305   0.1684   0.5750   2.6413
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)      5.375e+03  2.168e+03   2.480   0.0131 *
## bundle_position  9.381e-01  2.036e-01   4.607 4.09e-06 ***
## water_offered    3.568e+00  3.439e-01  10.373  < 2e-16 ***
## juice_offered    1.982e+01  1.420e+00  13.957  < 2e-16 ***
## trial            5.232e-03  1.036e-03   5.050 4.43e-07 ***
## date            -3.054e-01  1.229e-01  -2.485   0.0130 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1148.42  on 839  degrees of freedom
## Residual deviance:  634.41  on 834  degrees of freedom
##   (285 observations deleted due to missingness)
## AIC: 646.41
##
## Number of Fisher Scoring iterations: 6
```

```r
#test for side bias with an exact binomial test
binom.test(c(nrow(task_data %>%
                    .[c(bundle_position != fractal_choice)]),
             nrow(task_data %>%
                    .[c(bundle_position == fractal_choice)])))
```

```
##
##  Exact binomial test
##
## data:  c(nrow(task_data %>% .[c(bundle_position != fractal_choice)]),     nrow(task_data %>% .[c(bundle_position == fractal_choice)]))
## number of successes = 363, number of trials = 840, p-value =
## 9.446e-05
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.3983365 0.4664269
## sample estimates:
## probability of success
##              0.4321429
```

```r
#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 + as.factor(juice_offered) + trial + date,
             family = "binomial")

#summarise the parameters
summary(model)
```

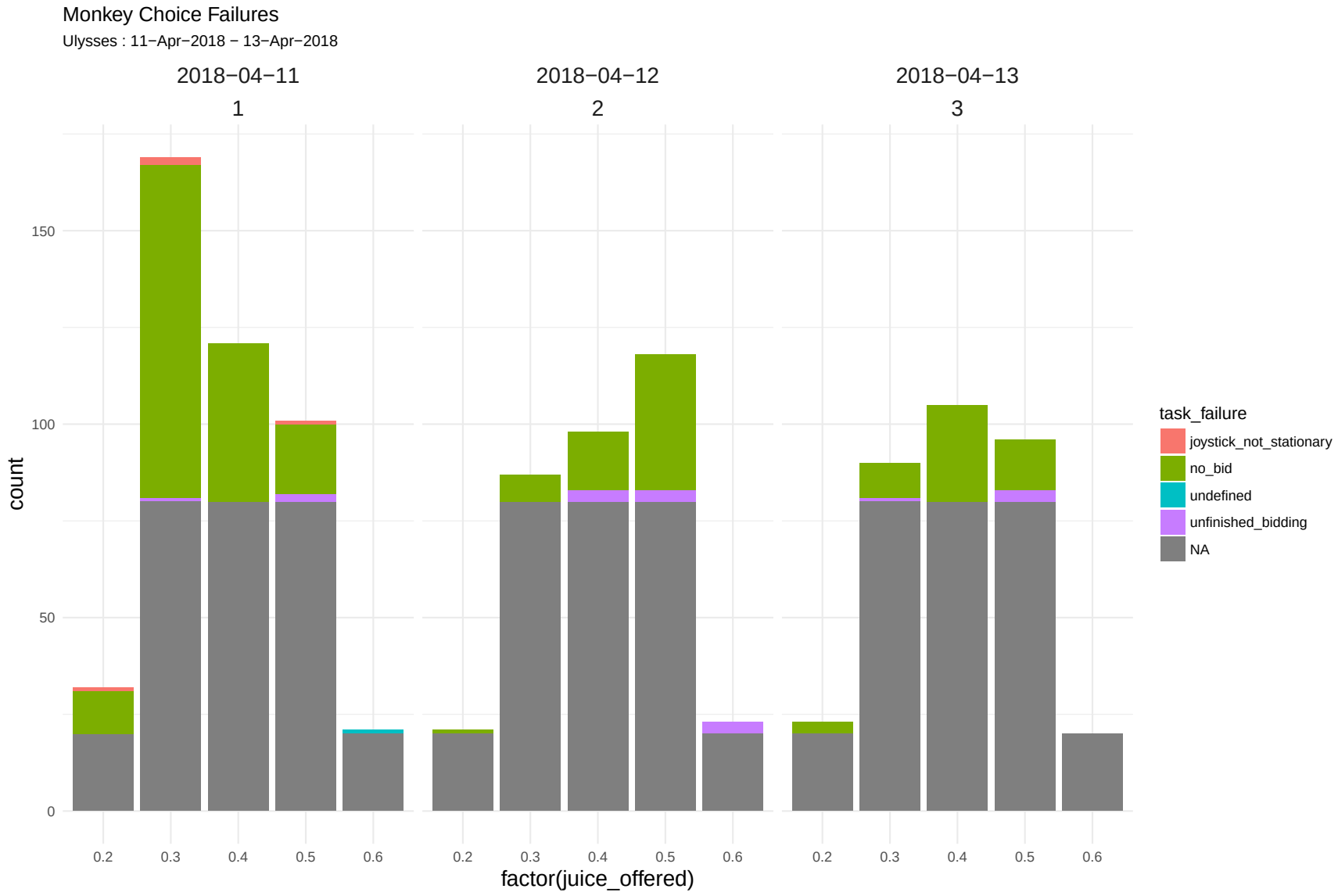
```
##
## Call:
## glm(formula = fractal_choice ~ bundle_position + water_offered +
##     as.factor(juice_offered) + trial + date, family = "binomial",
##     data = dplyr::filter(task_data, block_no == max(block_no)))
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -2.51100  -0.30530   0.04333   0.31742   2.27344
##
## Coefficients: (1 not defined because of singularities)
##                               Estimate Std. Error z value Pr(>|z|)
## (Intercept)                  -9.561610   1.326896  -7.206 5.76e-13 ***
## bundle_position               2.718804   0.508331   5.348 8.87e-08 ***
## water_offered                 6.485957   0.952612   6.809 9.86e-12 ***
## as.factor(juice_offered)0.3 -1.819730   0.841420  -2.163   0.0306 *
## as.factor(juice_offered)0.4  3.915466   0.846126   4.628 3.70e-06 ***
## as.factor(juice_offered)0.5  5.012243   0.917542   5.463 4.69e-08 ***
## as.factor(juice_offered)0.6  4.721712   1.018095   4.638 3.52e-06 ***
## trial                        0.010986   0.002642   4.158 3.21e-05 ***
## 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: 387.25  on 279  degrees of freedom
## Residual deviance: 148.28  on 272  degrees of freedom
##   (54 observations deleted due to missingness)
## AIC: 164.28
```

```
##
## Number of Fisher Scoring iterations: 6
```

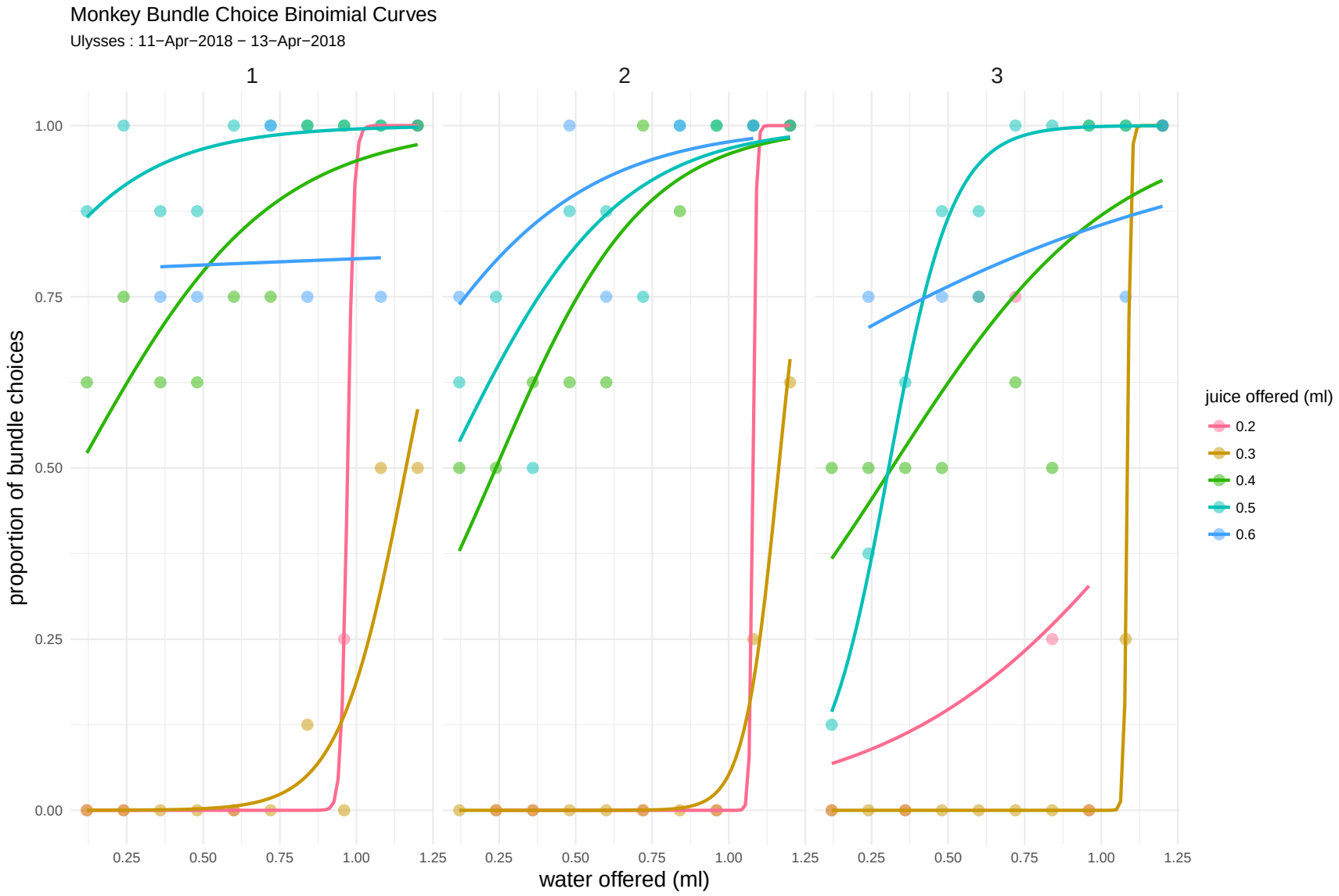
```
#test for side bias with an exact binomial test
binom.test(c(nrow(task_data %>%
                    .[c(bundle_position != fractal_choice & block_no == max(block_no))]),
             nrow(task_data %>%
                    .[c(bundle_position == fractal_choice & block_no == max(block_no))])))
```

```
##
##  Exact binomial test
##
## data:  c(nrow(task_data %>% .[c(bundle_position != fractal_choice &     block_no == max(block_no))]), nrow(task_data %>% .[c(bundle_pos
## number of successes = 113, number of trials = 280, p-value =
## 0.001493
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.3456128 0.4635936
## sample estimates:
## probability of success
##              0.4035714
```

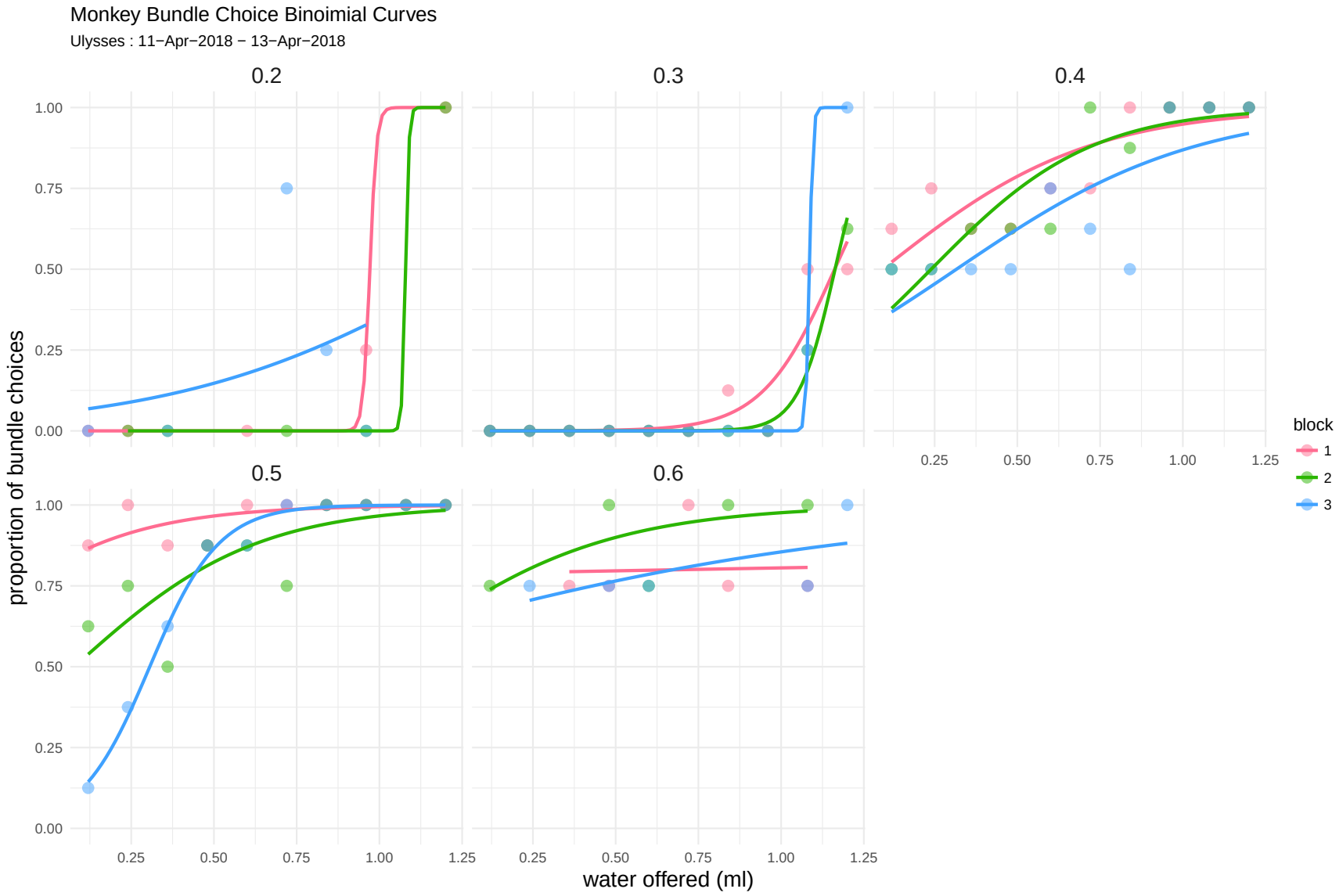
```
p3
```


Monkey Choice Failures
Ulysses : 11−Apr−2018 − 13−Apr−2018
2018−04−11
1
2018−04−12
2
2018−04−13
3
count
150
100
50
0
0.2
0.3
0.4
0.5
0.6
factor(juice_offered)
task_failure
joystick_not_stationary
no_bid
undefined
unfinished_bidding
NA

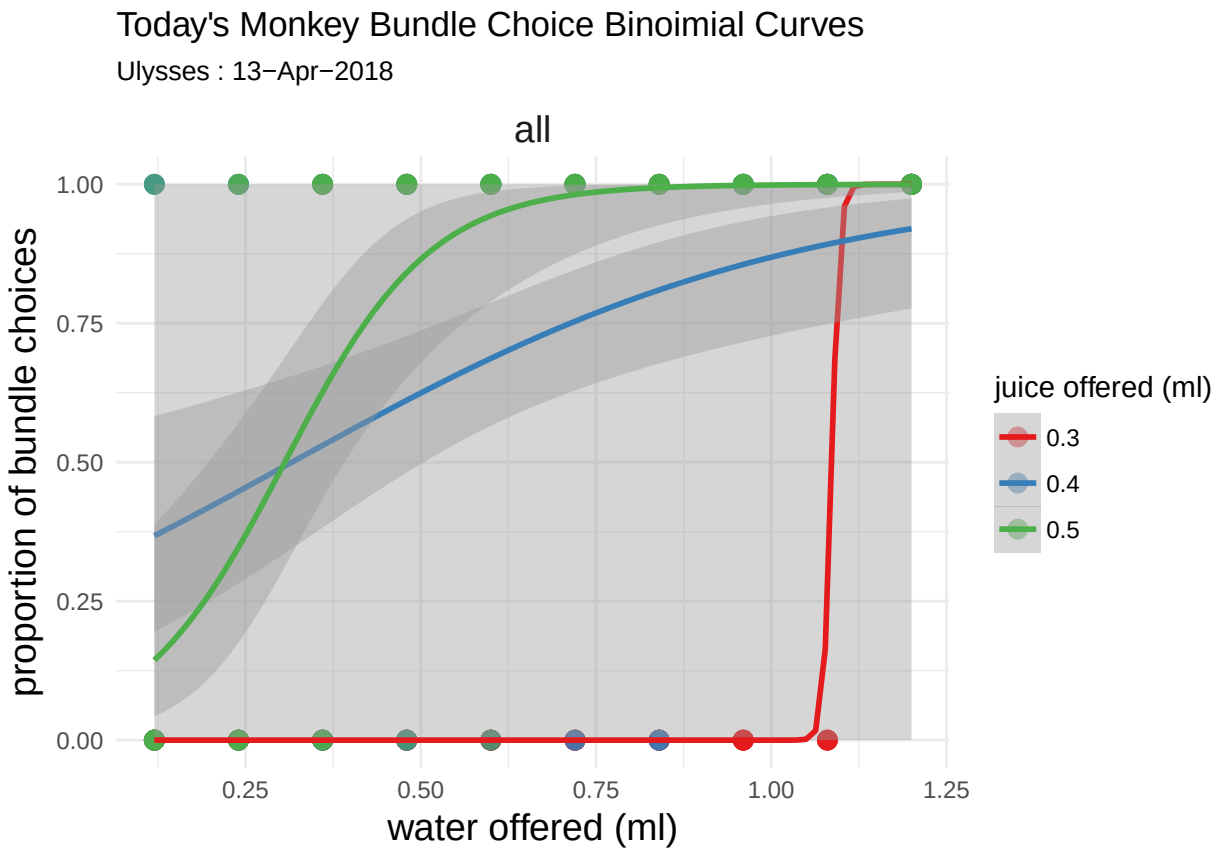
```
p4
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 11−Apr−2018 − 13−Apr−2018
1
2
3
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
0.3
0.4
0.5
0.6

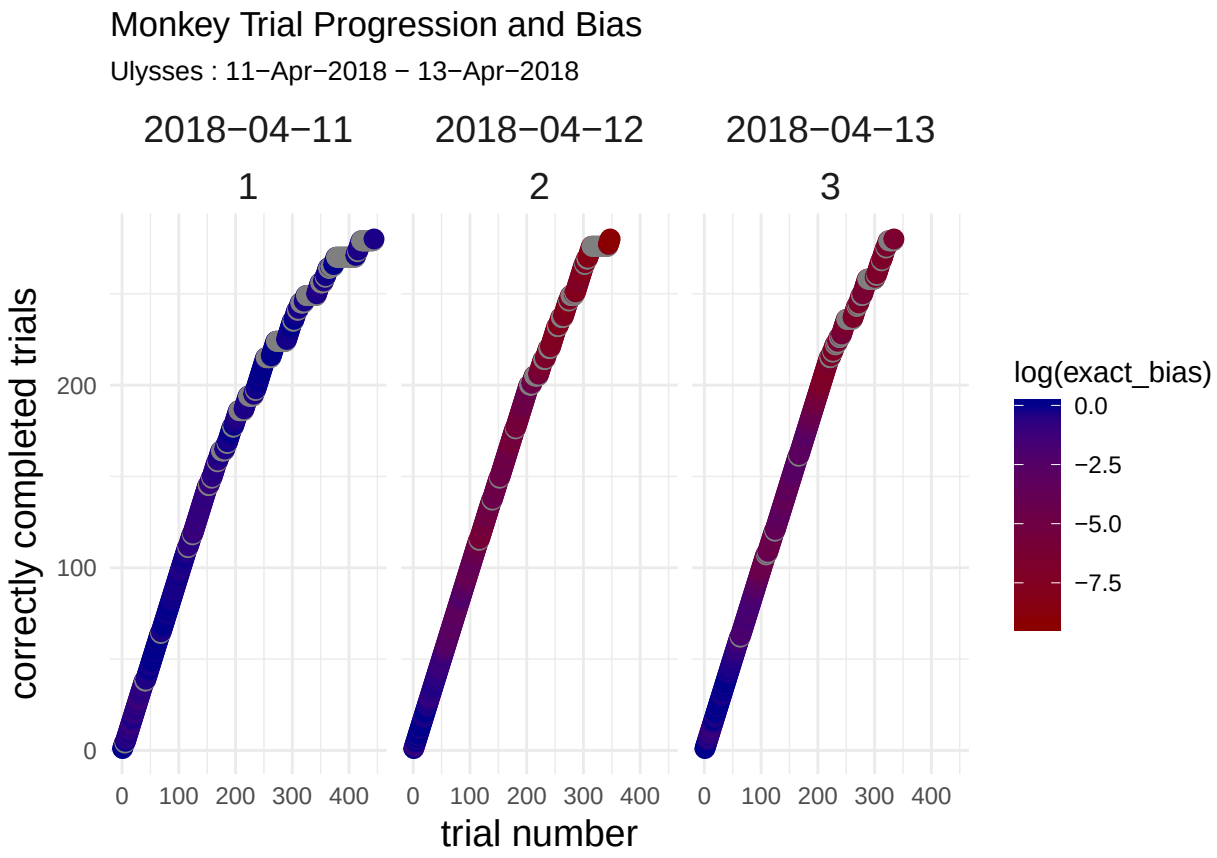
```
p5
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 11−Apr−2018 − 13−Apr−2018
0.2
0.3
0.4
0.5
0.6
proportion of bundle choices
water offered (ml)
block
1
2
3

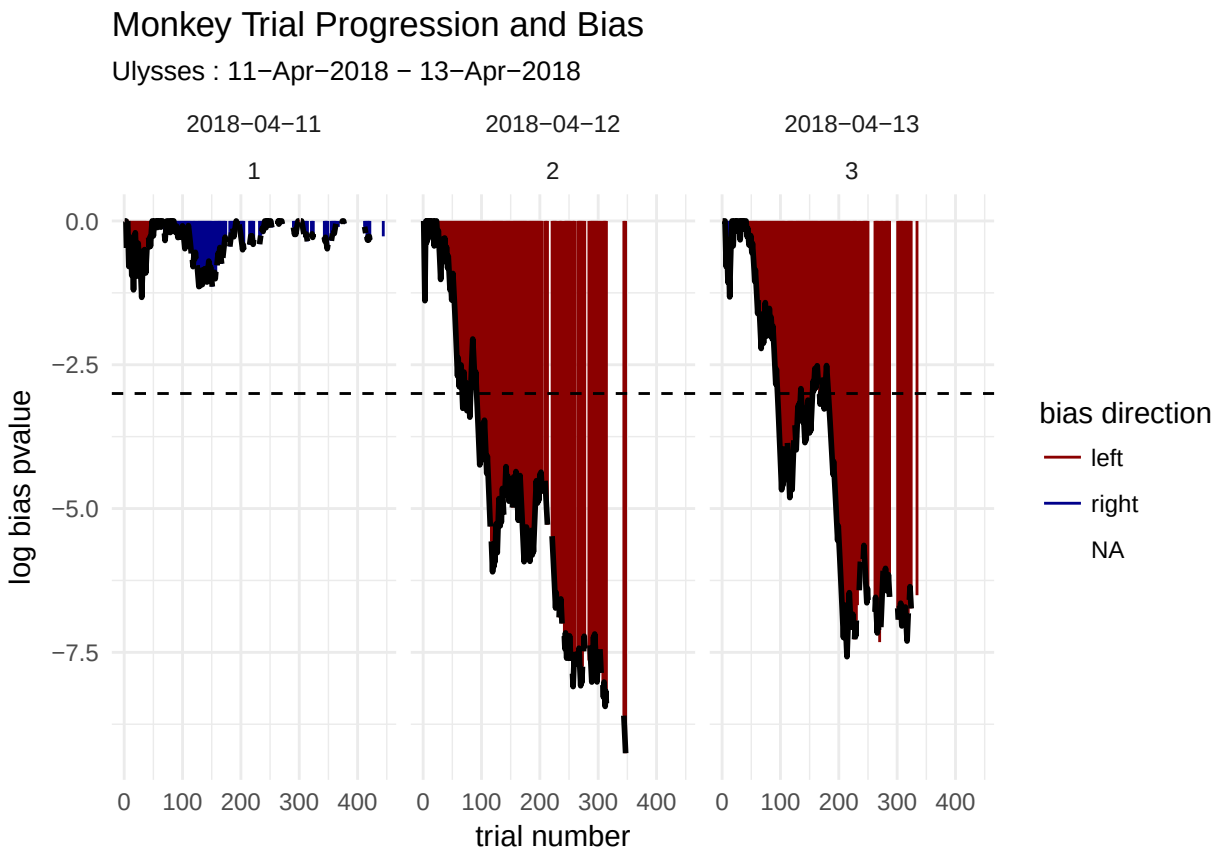
```
p6
```


Today's Monkey Bundle Choice Binoimial Curves
Ulysses : 13−Apr−2018
all
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)
0.3
0.4
0.5

```
p7
```


Monkey Trial Progression and Bias
Ulysses : 11−Apr−2018 − 13−Apr−2018
2018−04−11
2018−04−12
2018−04−13
1
2
3
correctly completed trials
0
100
200
0
100
200
300
400
trial number
log(exact_bias)
0.0
−2.5
−5.0
−7.5

```
p8
```


Monkey Trial Progression and Bias
Ulysses : 11−Apr−2018 − 13−Apr−2018
2018−04−11
2018−04−12
2018−04−13
1
2
3
0.0
−2.5
−5.0
−7.5
log bias pvalue
0
100
200
300
400
trial number
bias direction
left
right
NA