BCb Analysis- Early March

Robert Hickman

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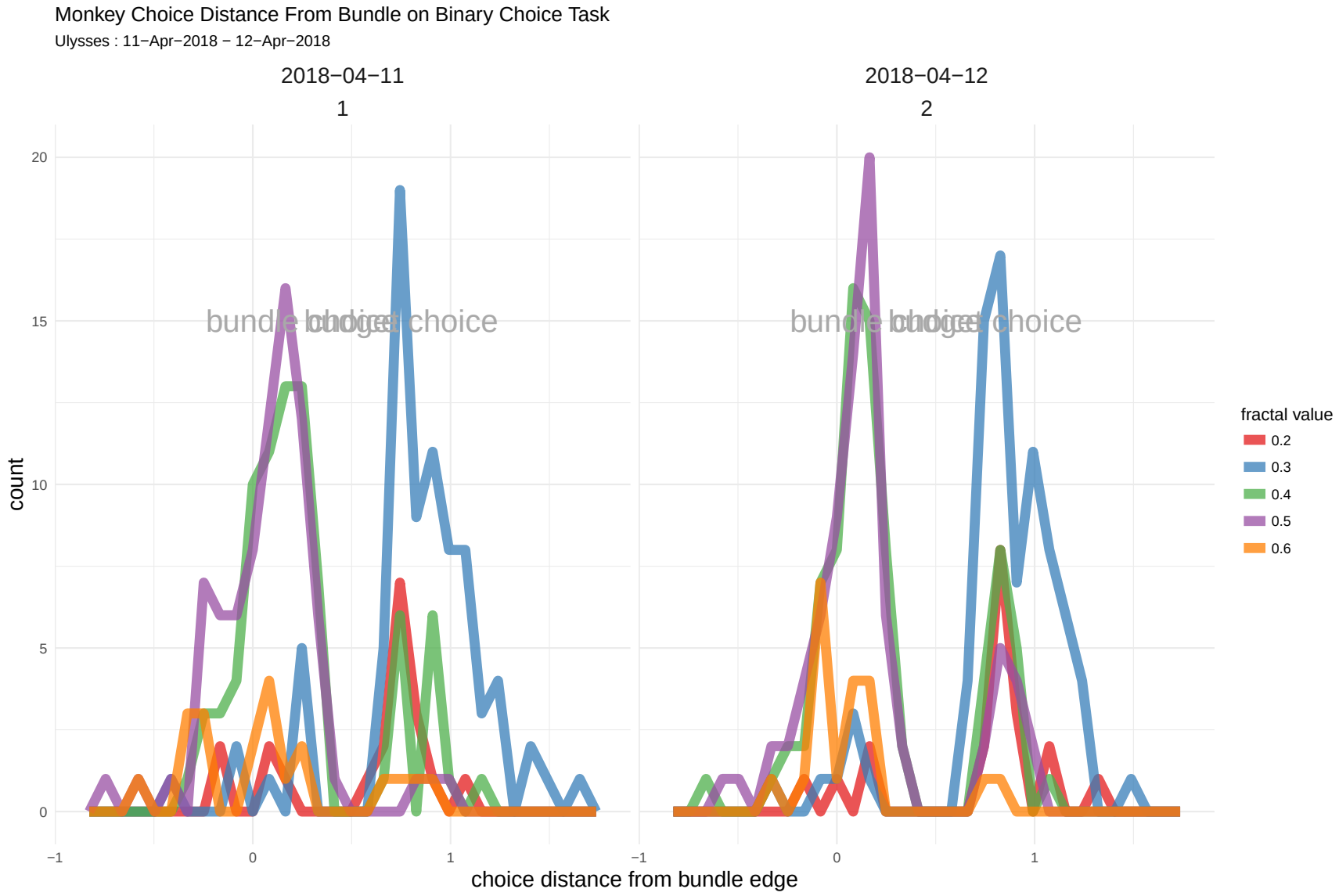
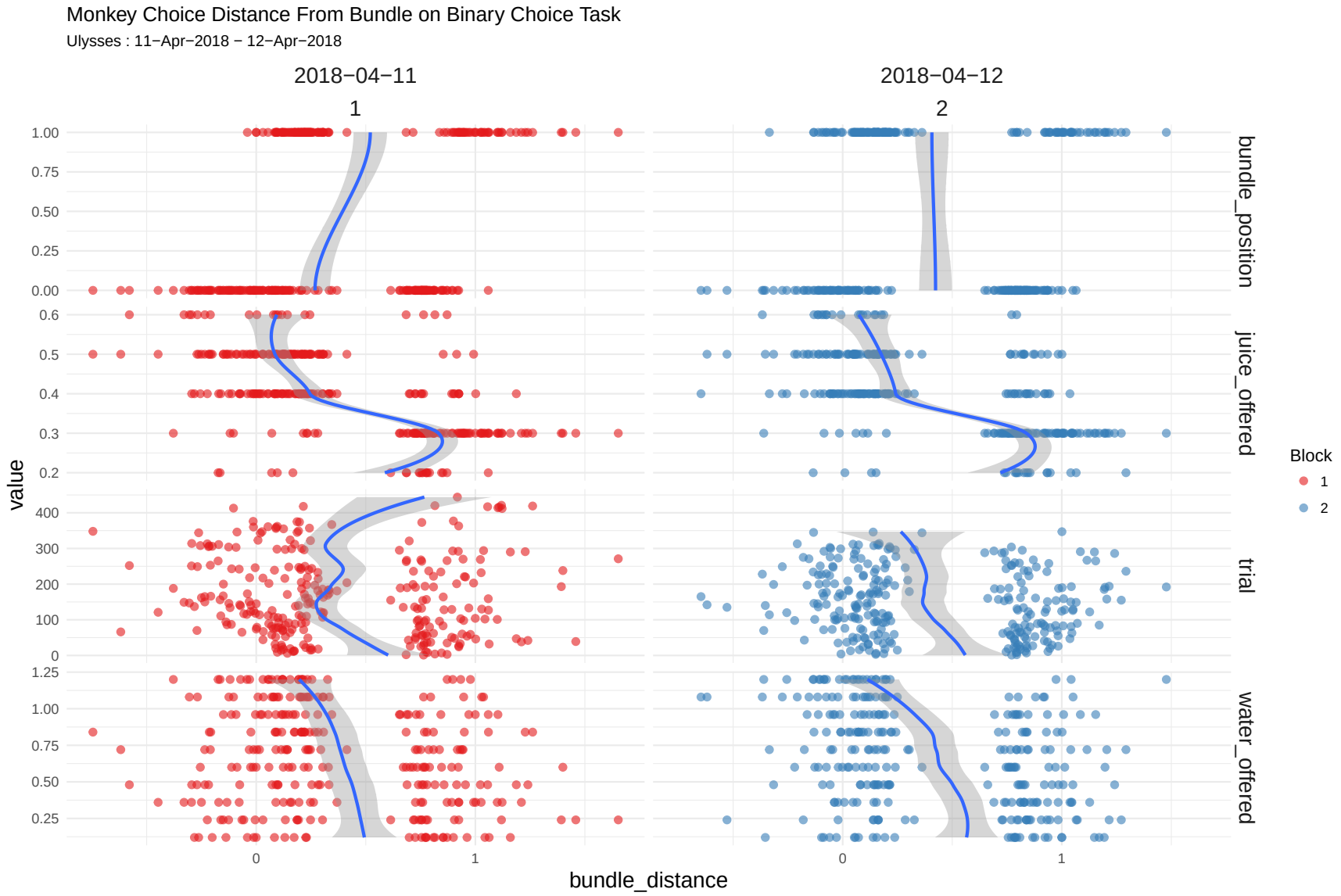
```
monkey <- "Ulysses"
today <- "12-Apr-2018"
look_back <- "11-Apr-2018"

start_trial <- 0
stop_trial <- "all"

merge_days <- TRUE
```

```
p1
```


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

```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
## -3.3328  -0.5078   0.1694   0.5637   2.5535
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)      5.524e+03  4.362e+03   1.266 0.205336
## bundle_position  4.719e-01  2.475e-01   1.907 0.056532 .
## water_offered    3.293e+00  4.185e-01   7.870 3.55e-15 ***
## juice_offered    2.105e+01  1.808e+00  11.643  < 2e-16 ***
## trial            4.304e-03  1.210e-03   3.558 0.000374 ***
## date            -3.139e-01  2.474e-01  -1.269 0.204456
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 758.37  on 559  degrees of freedom
## Residual deviance: 417.74  on 554  degrees of freedom
##   (231 observations deleted due to missingness)
## AIC: 429.74
##
## 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 = 250, number of trials = 560, p-value =
## 0.01259
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.4047392 0.4886859
## sample estimates:
## probability of success
##              0.4464286
```

```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)
```

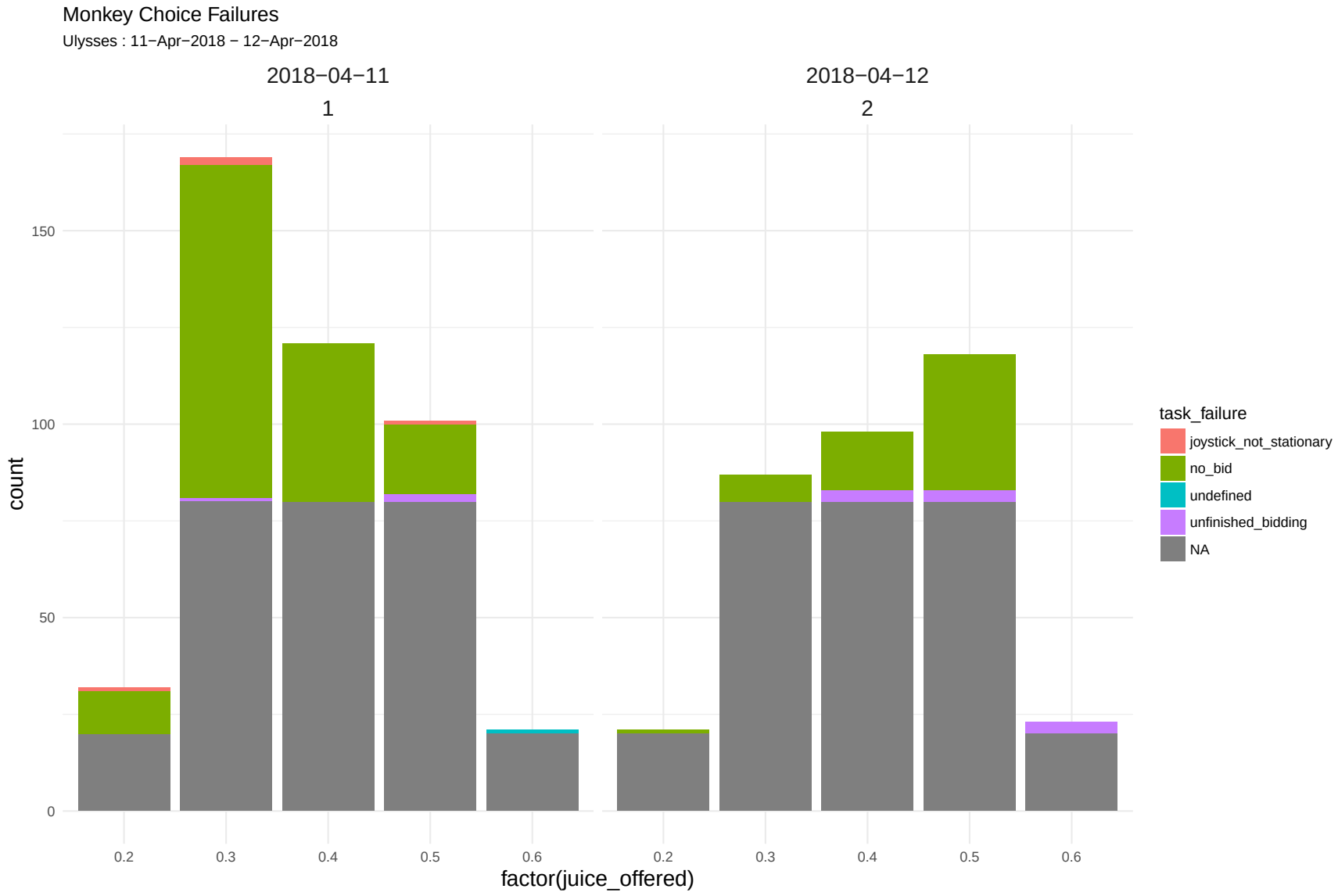
```
##
## Call:
## glm(formula = fractal_choice ~ bundle_position + water_offered +
##     as.factor(juice_offered) + trial + date, family = "binomial",
##     data = dplyr::filter(task_data, block_no == max(block_no)))
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -2.45713  -0.18833   0.06506   0.27717   2.31811
##
## Coefficients: (1 not defined because of singularities)
##                               Estimate Std. Error z value Pr(>|z|)
## (Intercept)                  -8.826124   1.429421  -6.175 6.63e-10 ***
## bundle_position               2.264338   0.534549   4.236 2.28e-05 ***
## water_offered                 6.540830   1.092013   5.990 2.10e-09 ***
## as.factor(juice_offered)0.3 -2.208347   0.875427  -2.523  0.01165 *
## as.factor(juice_offered)0.4  4.671066   0.960376   4.864 1.15e-06 ***
## as.factor(juice_offered)0.5  5.426584   1.007813   5.385 7.26e-08 ***
## as.factor(juice_offered)0.6  5.386787   1.321249   4.077 4.56e-05 ***
## trial                        0.008131   0.002557   3.180  0.00147 **
## 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: 383.52  on 279  degrees of freedom
## Residual deviance: 135.86  on 272  degrees of freedom
##   (67 observations deleted due to missingness)
## AIC: 151.86
```

```
##
## Number of Fisher Scoring iterations: 7
```

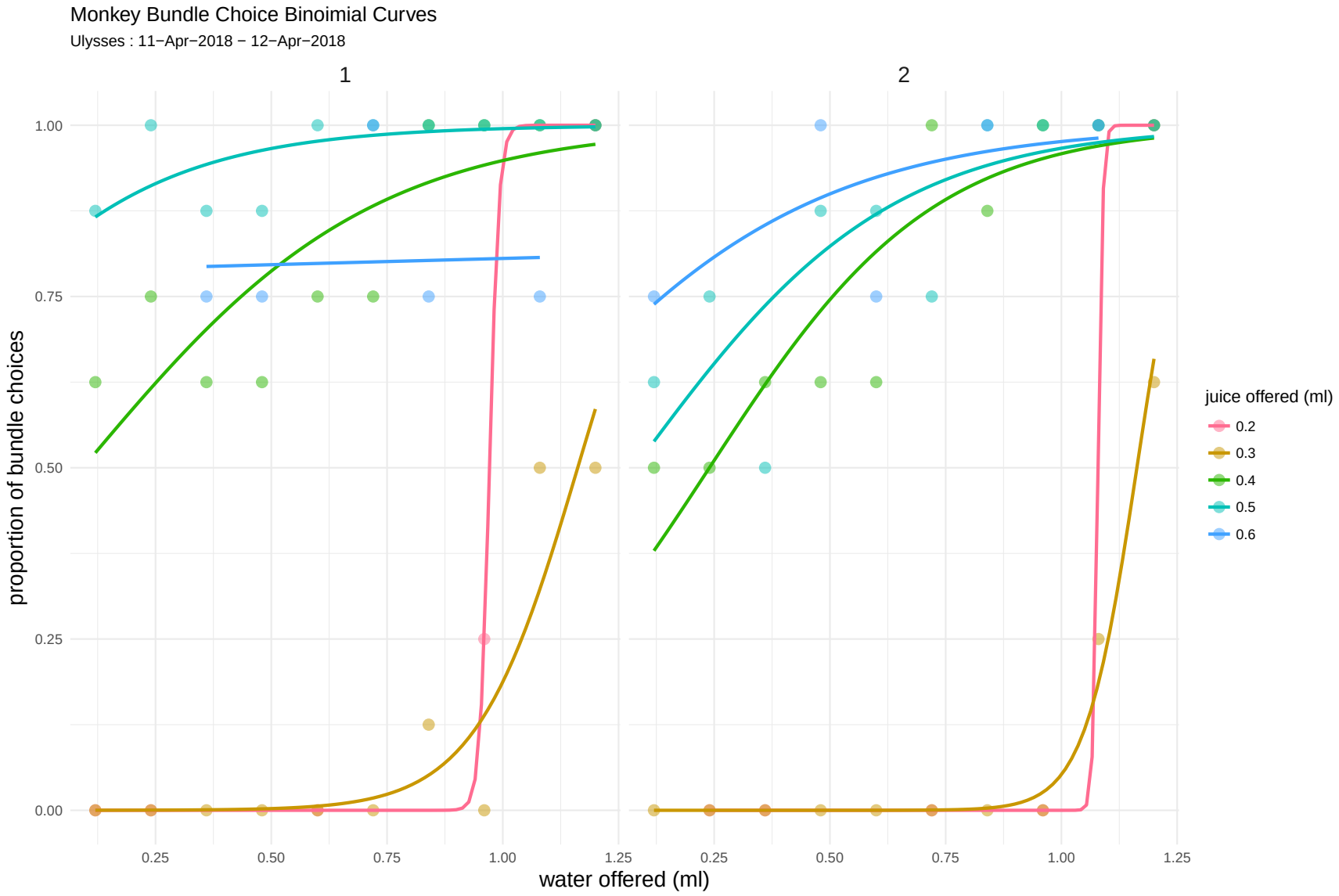
```
#test for side bias with an exact binomial test
binom.test(c(nrow(task_data %>%
                    .[c(bundle_position != fractal_choice & block_no == max(block_no))]),
             nrow(task_data %>%
                    .[c(bundle_position == fractal_choice & block_no == max(block_no))])))
```

```
##
##  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 = 107, number of trials = 280, p-value =
## 9.575e-05
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.3249597 0.4418490
## sample estimates:
## probability of success
##              0.3821429
```

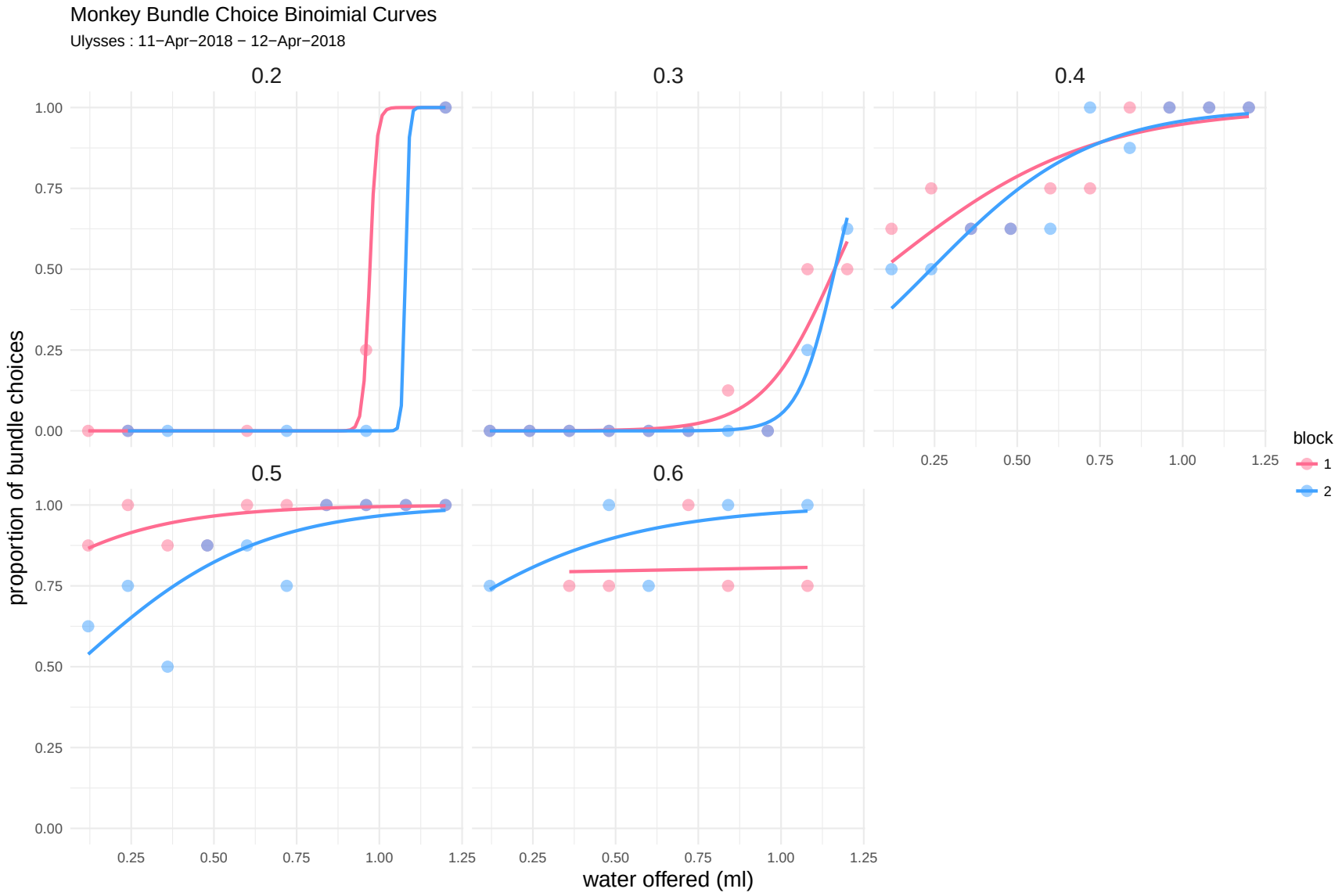
```
p3
```


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

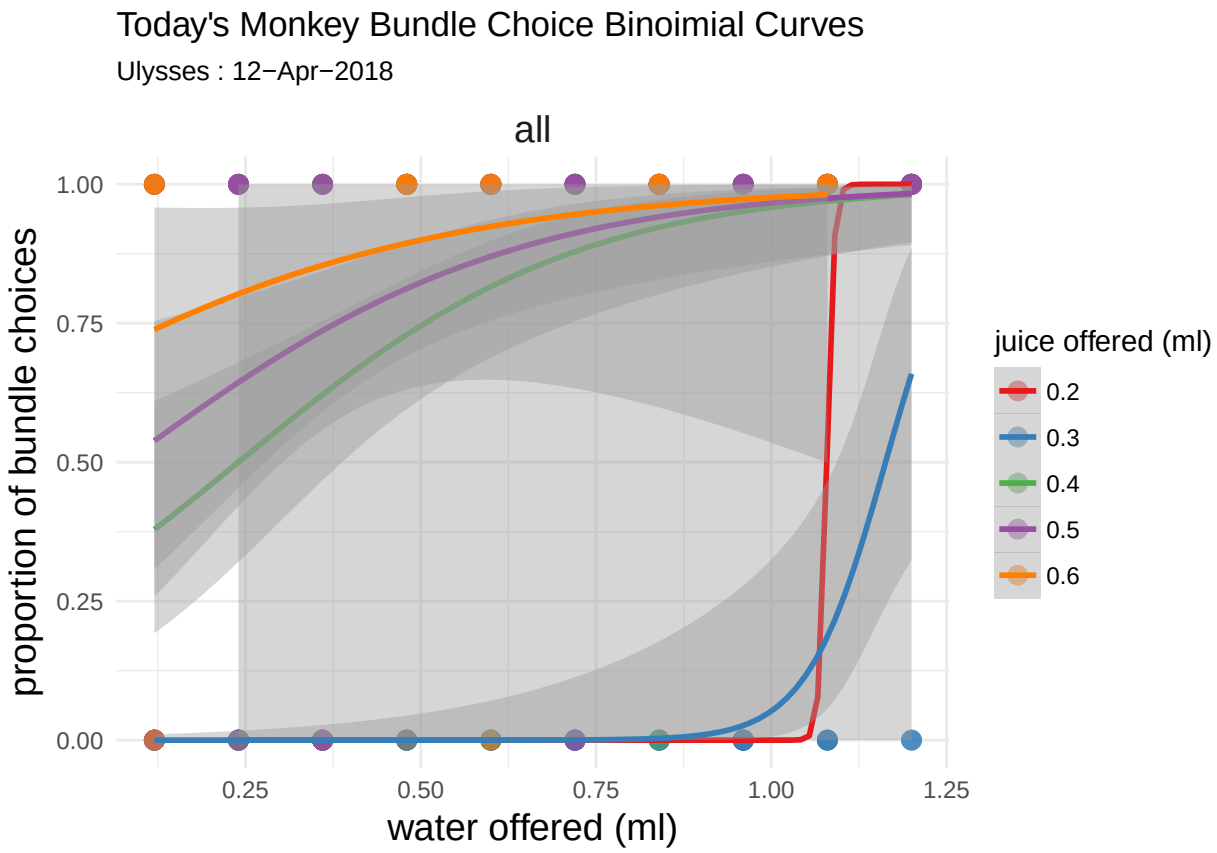
```
p4
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 11−Apr−2018 − 12−Apr−2018
1
2
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

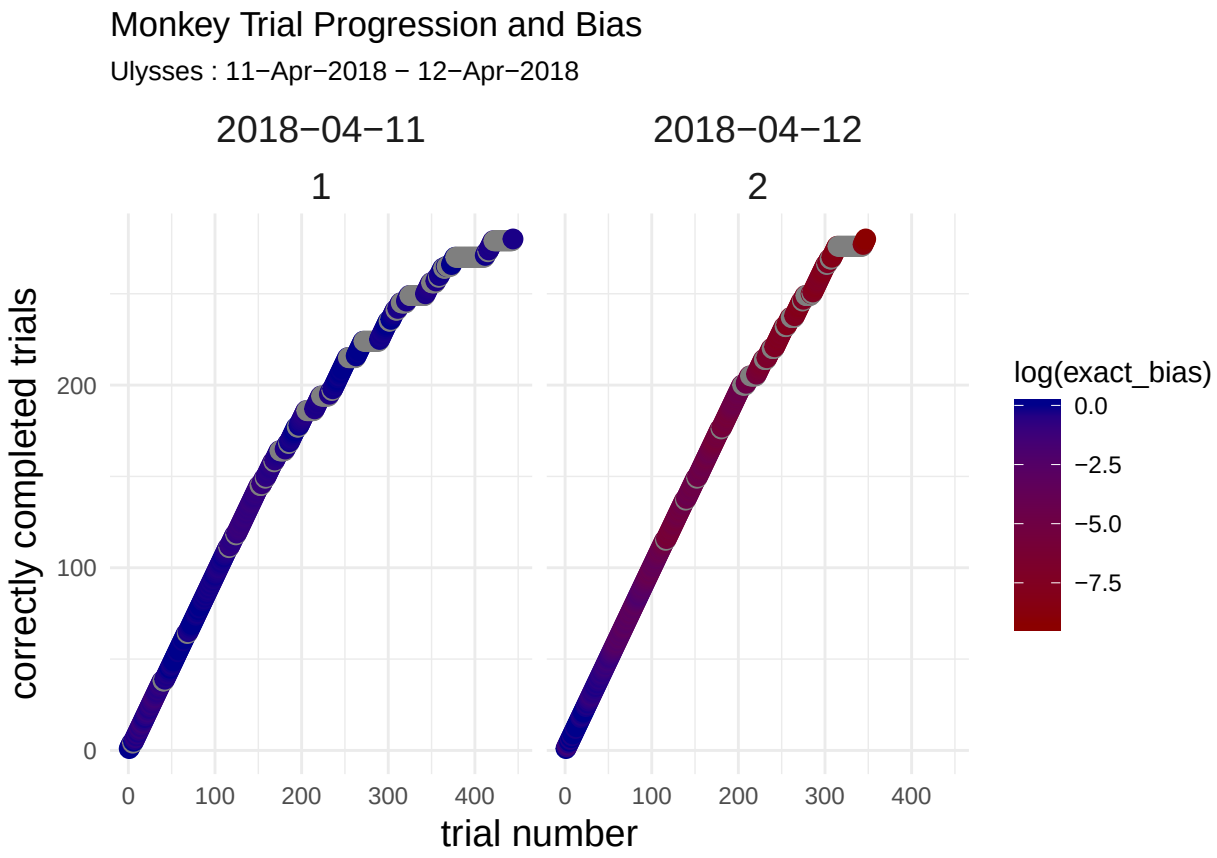
```
p5
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 11−Apr−2018 − 12−Apr−2018
0.2
0.3
0.4
0.5
0.6
proportion of bundle choices
water offered (ml)
block
1
2

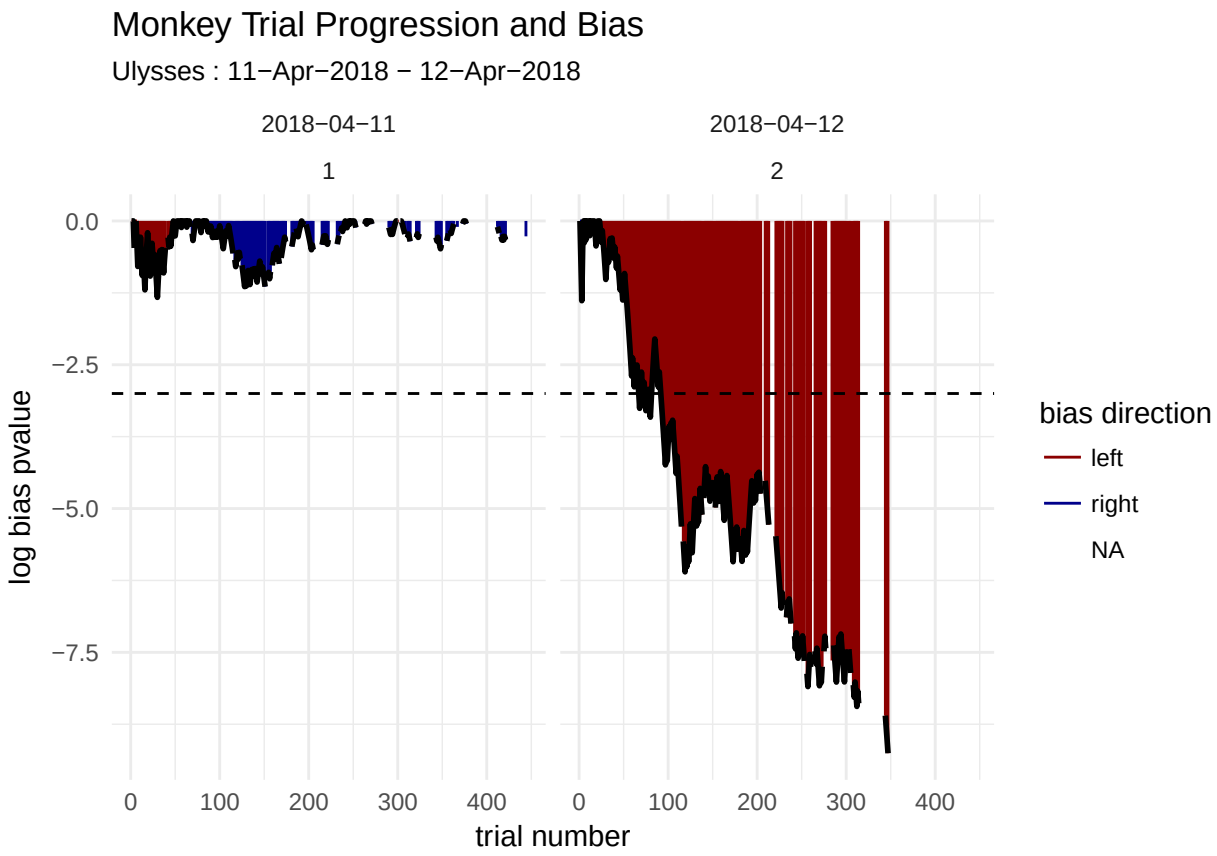
```
p6
```


Today's Monkey Bundle Choice Binoimial Curves
Ulysses : 12−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)
0.2
0.3
0.4
0.5
0.6

```
p7
```


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