BCb Analysis- Early March

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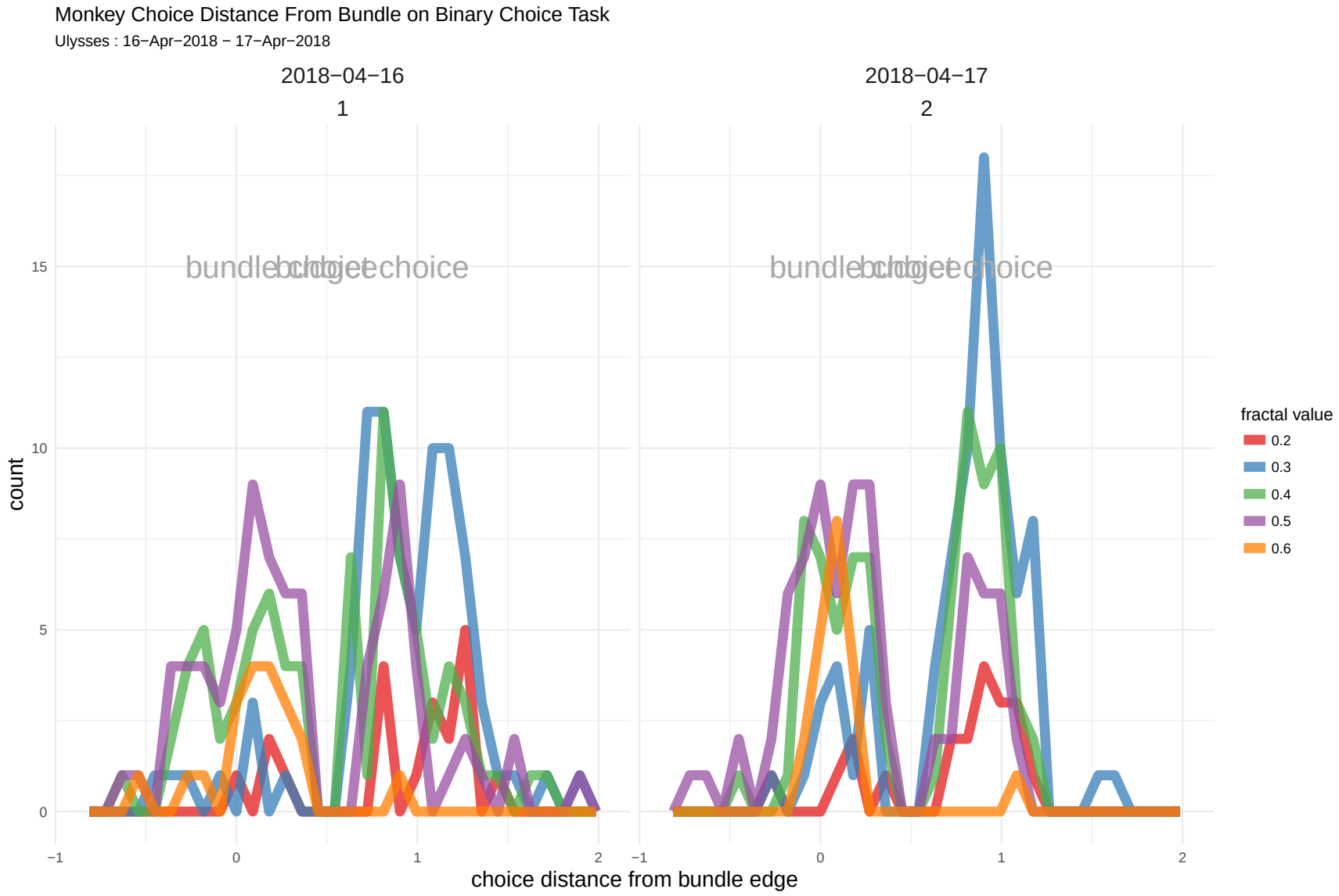
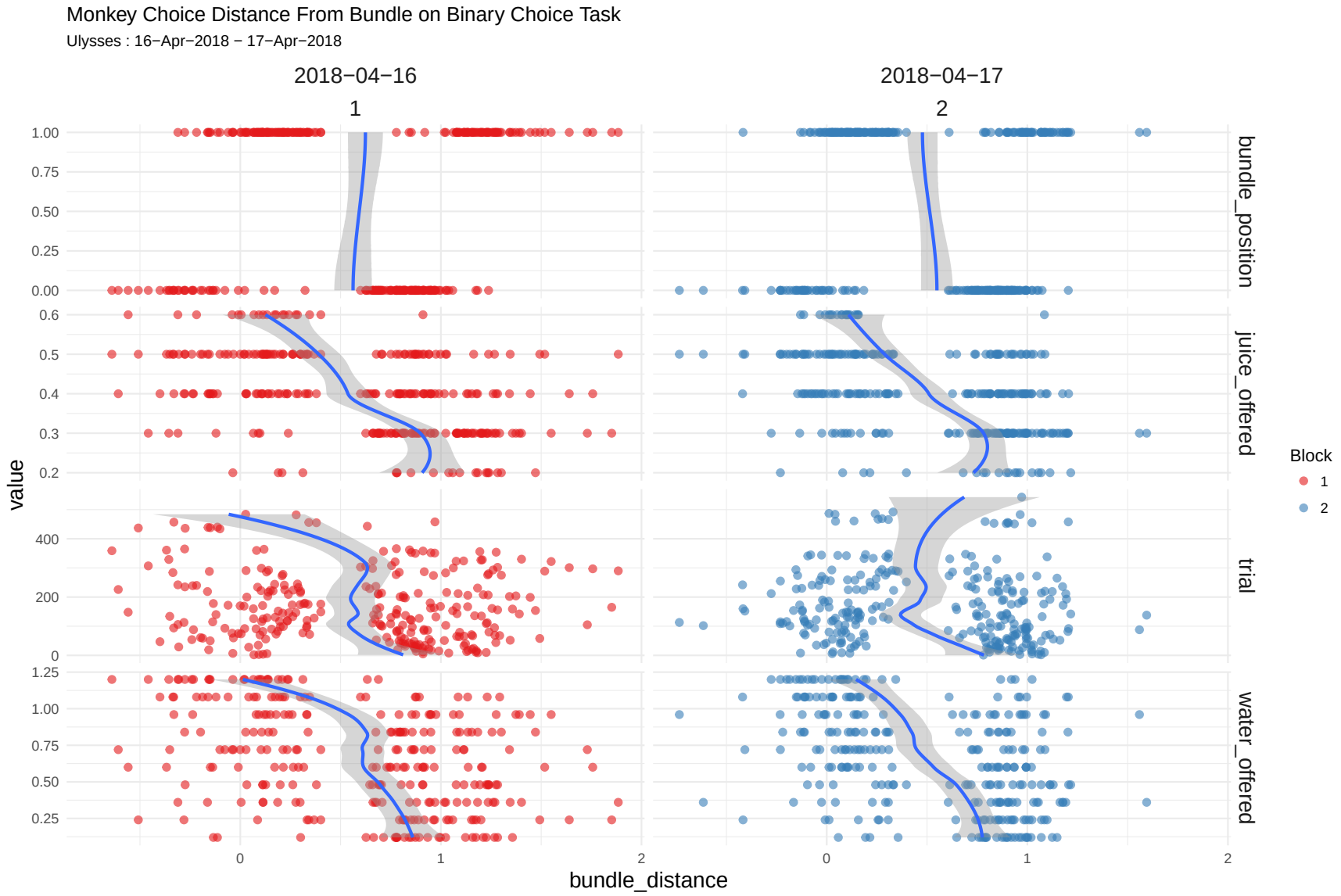
```
monkey <- "Ulysses"
today <- "17-Apr-2018"
look_back <- "16-Apr-2018"

start_trial <- 0
stop_trial <- "all"

merge_days <- TRUE
```

```
p1
```


Monkey Choice Distance From Bundle on Binary Choice Task
Ulysses : 16−Apr−2018 − 17−Apr−2018
2018−04−16
1
2018−04−17
2
bundle
object
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 : 16−Apr−2018 − 17−Apr−2018
2018−04−16
1
2018−04−17
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
## -2.6711  -0.5639  -0.1387   0.5486   2.9834
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -8.769e+03  4.305e+03  -2.037   0.0417 *
## bundle_position  1.899e+00  2.636e-01   7.202 5.92e-13 ***
## water_offered    4.378e+00  4.471e-01   9.791  < 2e-16 ***
## juice_offered    1.563e+01  1.565e+00   9.982  < 2e-16 ***
## trial            4.247e-03  1.039e-03   4.086 4.38e-05 ***
## date             4.965e-01  2.441e-01   2.034   0.0419 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 769.45  on 559  degrees of freedom
## Residual deviance: 428.15  on 554  degrees of freedom
##   (467 observations deleted due to missingness)
## AIC: 440.15
##
## 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 = 196, number of trials = 560, p-value =
## 1.16e-12
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.3104843 0.3911080
## sample estimates:
## probability of success
##                   0.35
```

```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)
```

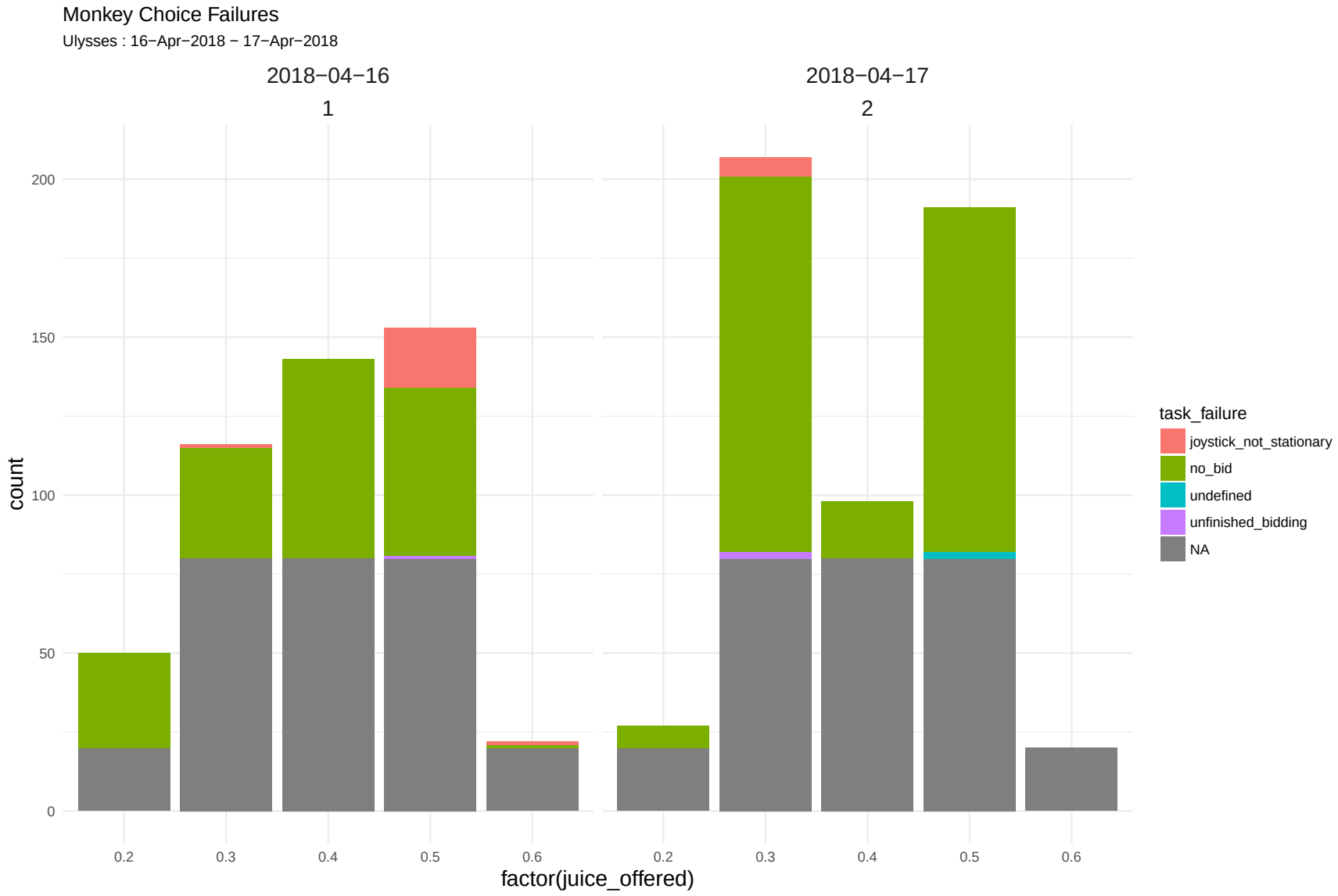
```
##
## Call:
## glm(formula = fractal_choice ~ bundle_position + water_offered +
##     as.factor(juice_offered) + trial + date, family = "binomial",
##     data = dplyr::filter(task_data, block_no == max(block_no)))
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -2.85347  -0.53937  -0.08876   0.48949   2.18027
##
## Coefficients: (1 not defined because of singularities)
##                               Estimate Std. Error z value Pr(>|z|)
## (Intercept)                 -6.121705   0.930999  -6.575 4.85e-11 ***
## bundle_position              2.166791   0.414595   5.226 1.73e-07 ***
## water_offered                4.841541   0.674168   7.182 6.89e-13 ***
## as.factor(juice_offered)0.3 -1.528136   0.723879  -2.111 0.034769 *
## as.factor(juice_offered)0.4  0.700019   0.668828   1.047 0.295268
## as.factor(juice_offered)0.5  2.402304   0.704090   3.412 0.000645 ***
## as.factor(juice_offered)0.6  3.755705   1.271950   2.953 0.003150 **
## trial                        0.005268   0.001608   3.276 0.001055 **
## 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: 205.79  on 272  degrees of freedom
##   (263 observations deleted due to missingness)
## AIC: 221.79
```

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

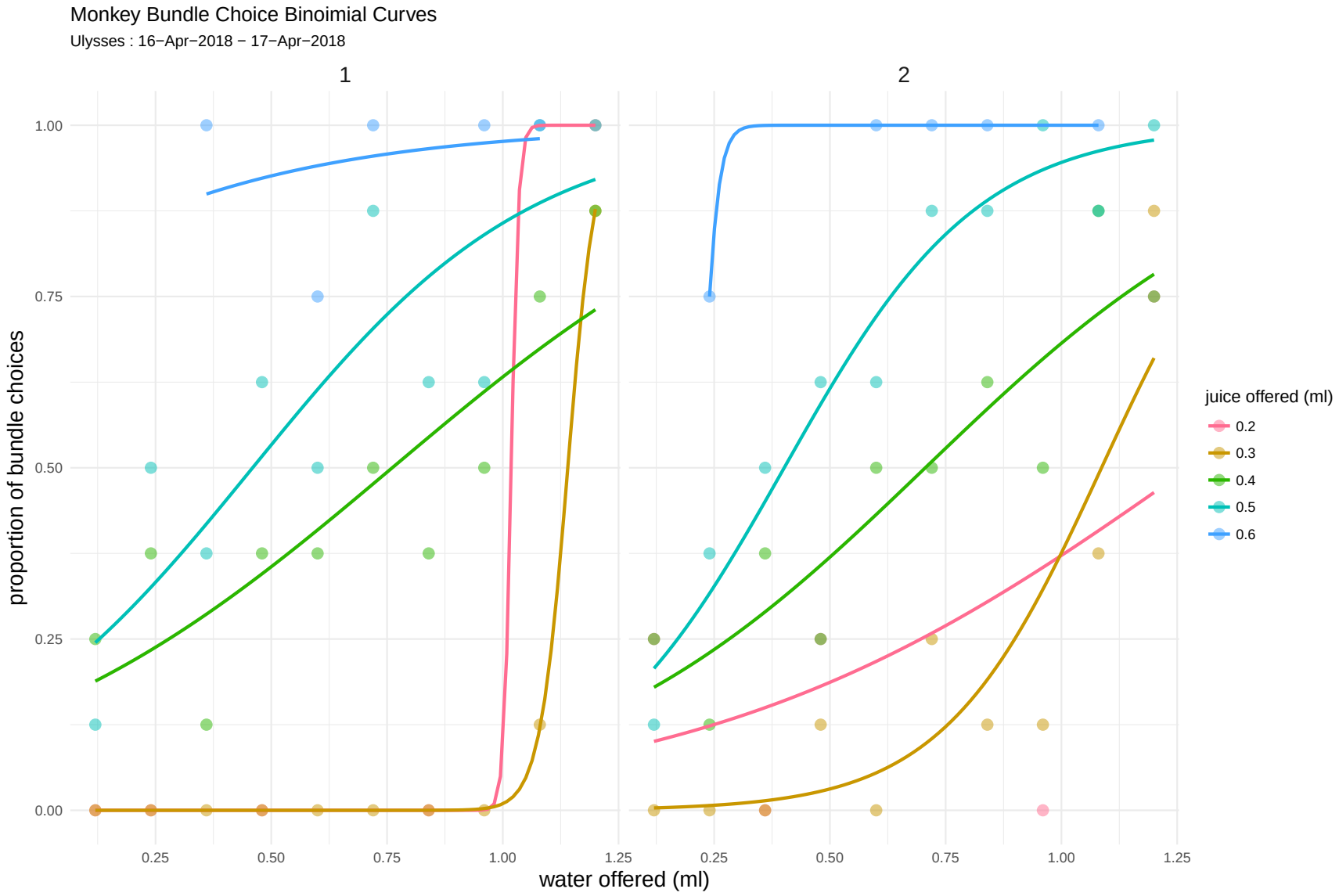
```
#test for side bias with an exact binomial test
binom.test(c(nrow(task_data %>%
                    .[c(bundle_position != fractal_choice & block_no == max(block_no))]),
             nrow(task_data %>%
                    .[c(bundle_position == fractal_choice & block_no == max(block_no))])))
```

```
##
##  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 = 97, number of trials = 280, p-value =
## 3.079e-07
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.2907989 0.4053484
## sample estimates:
## probability of success
##              0.3464286
```

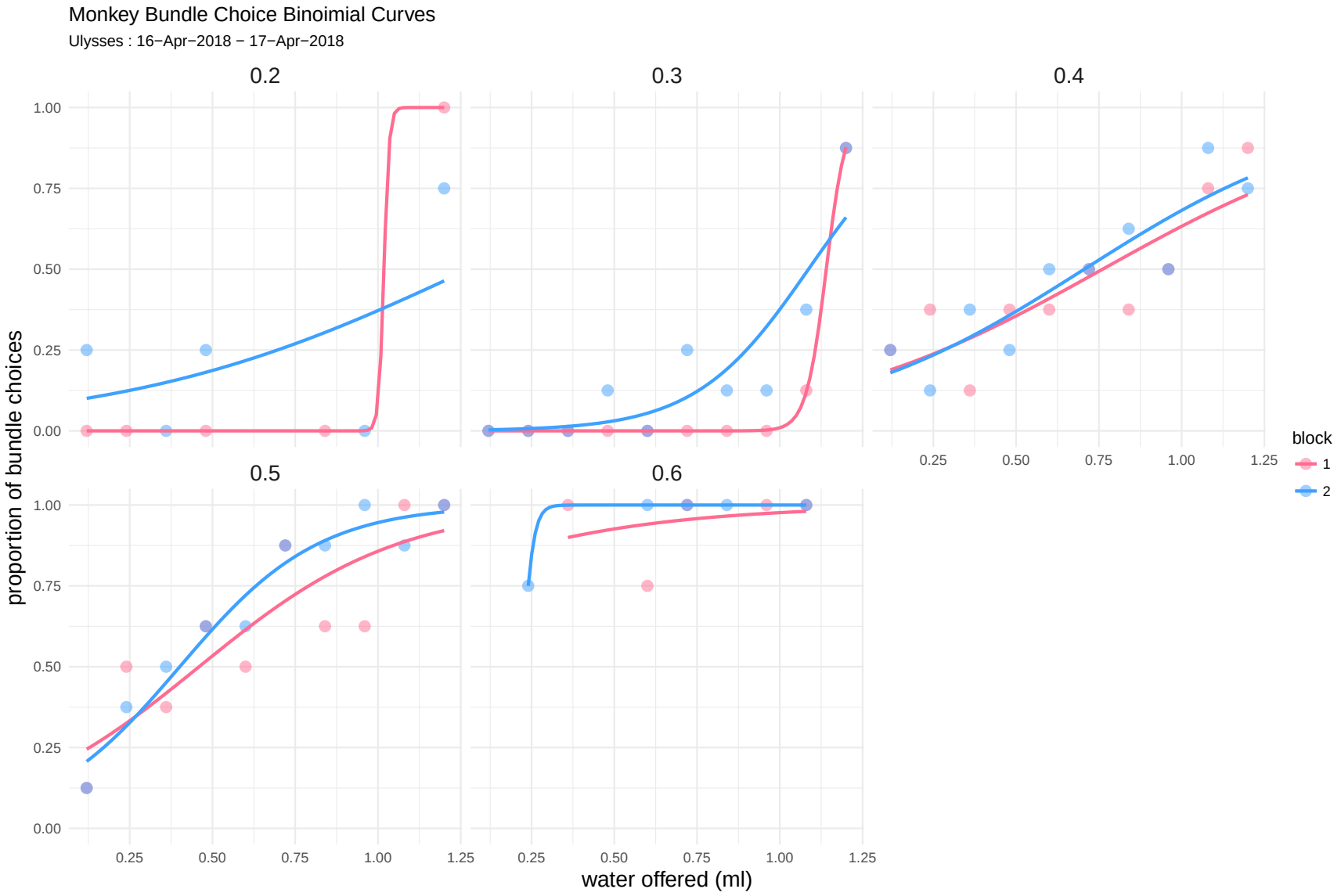
```
p3
```


Monkey Choice Failures
Ulysses : 16−Apr−2018 − 17−Apr−2018
2018−04−16
1
2018−04−17
2
count
200
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

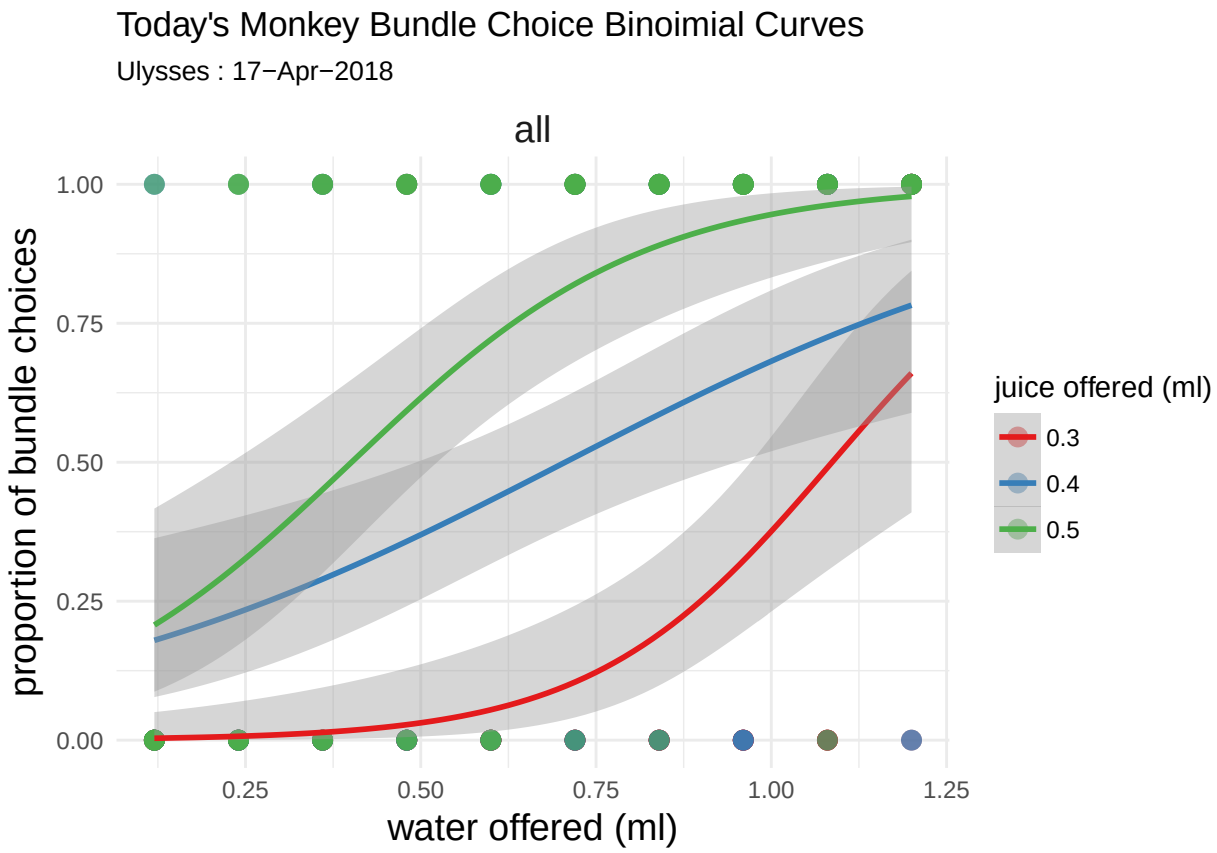
```
p4
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 16−Apr−2018 − 17−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

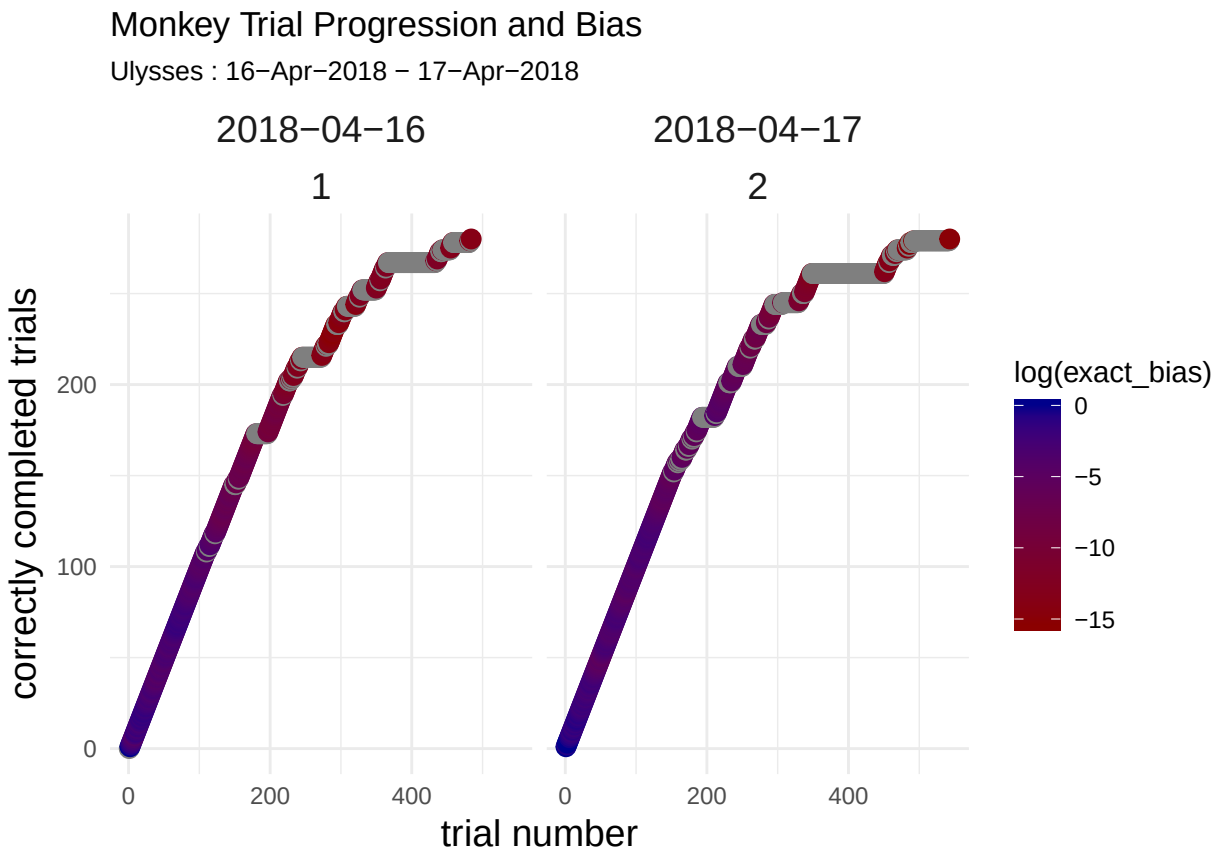
```
p5
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 16−Apr−2018 − 17−Apr−2018
0.2
0.3
0.4
0.5
0.6
proportion of bundle choices
water offered (ml)
block
1
2

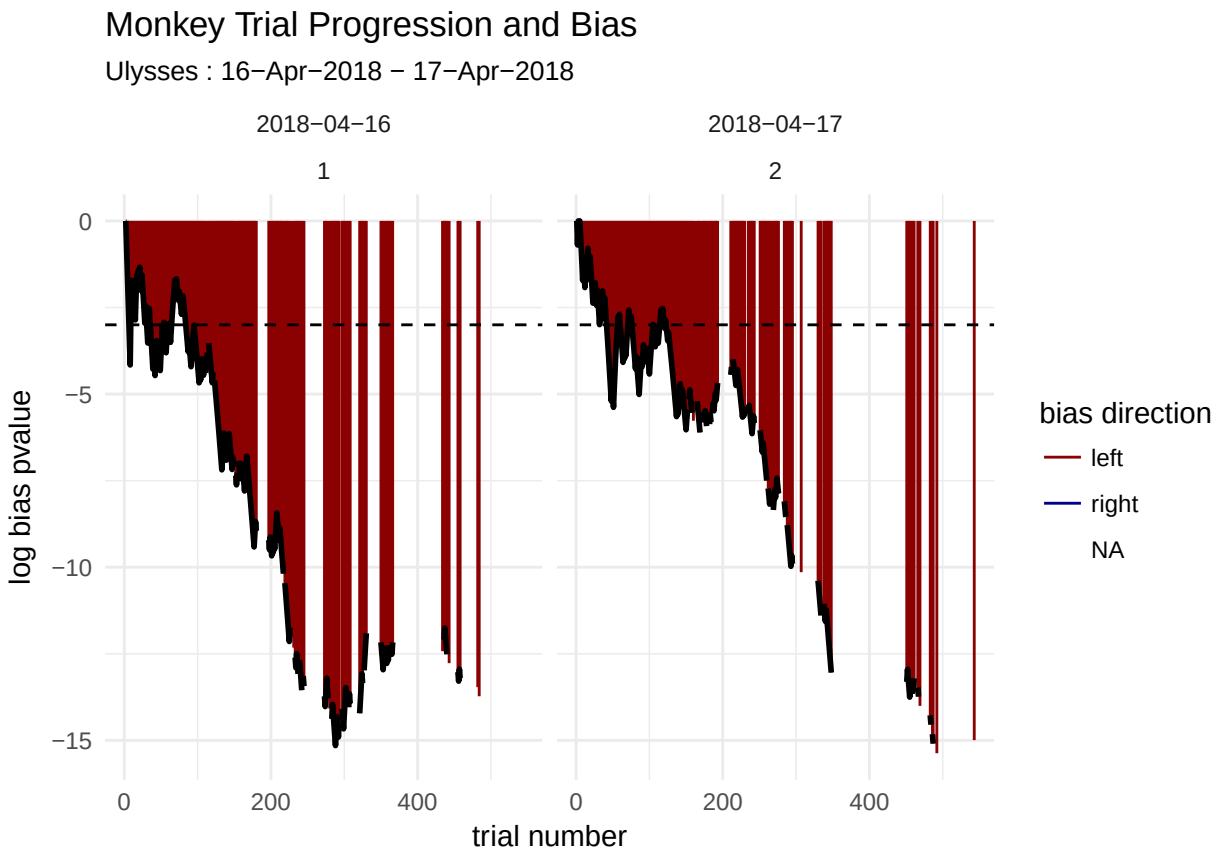
```
p6
```


Today's Monkey Bundle Choice Binoimial Curves
Ulysses : 17−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 : 16−Apr−2018 − 17−Apr−2018
2018−04−16
1
2018−04−17
2
correctly completed trials
0
100
200
0
200
400
0
200
400
trial number
log(exact_bias)
0
−5
−10
−15

```
p8
```


Monkey Trial Progression and Bias
Ulysses : 16−Apr−2018 − 17−Apr−2018
2018−04−16
2018−04−17
1
2
0
−5
−10
−15
log bias pvalue
0
200
400
trial number
bias direction
left
right
NA