BCb Analysis- Early March

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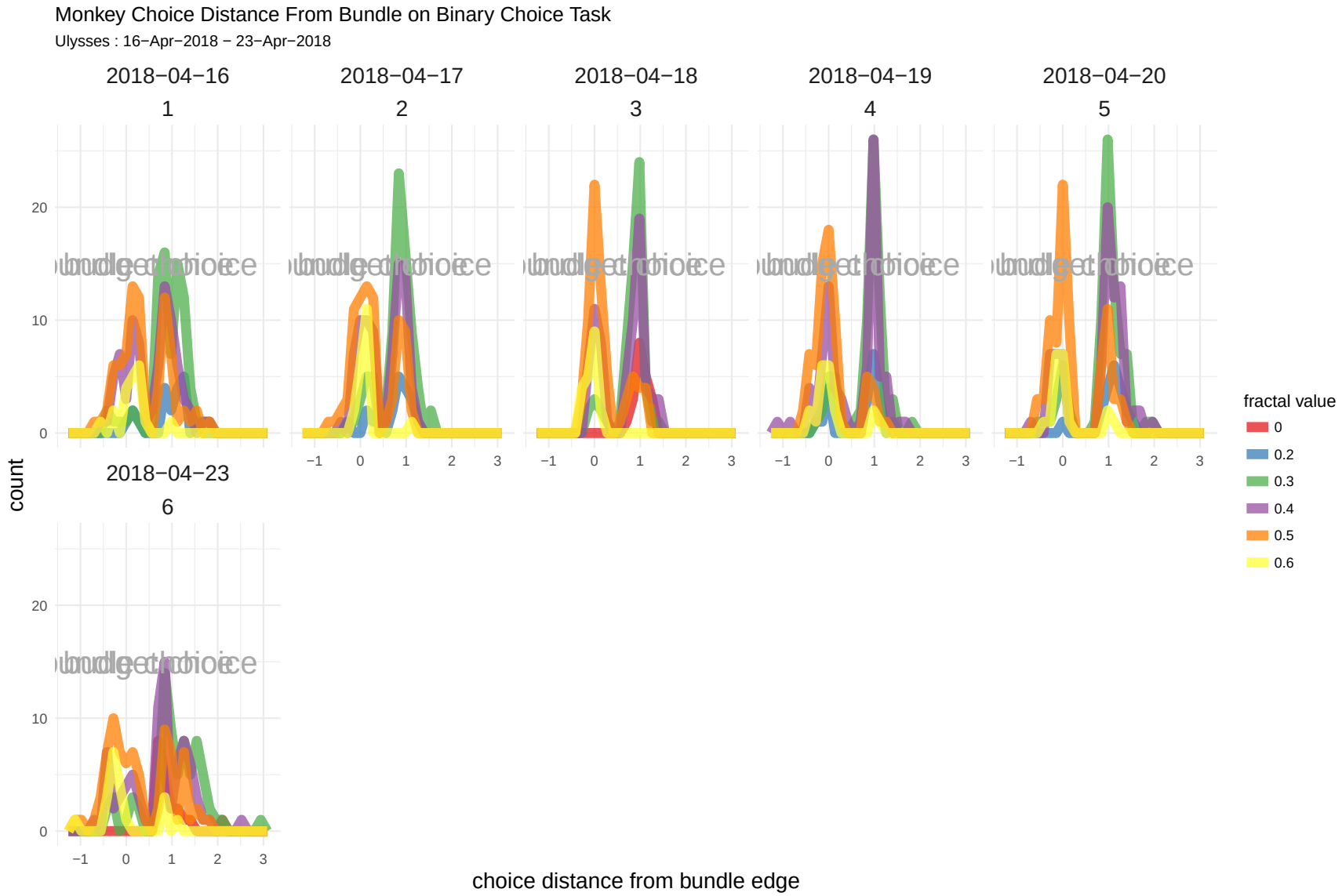
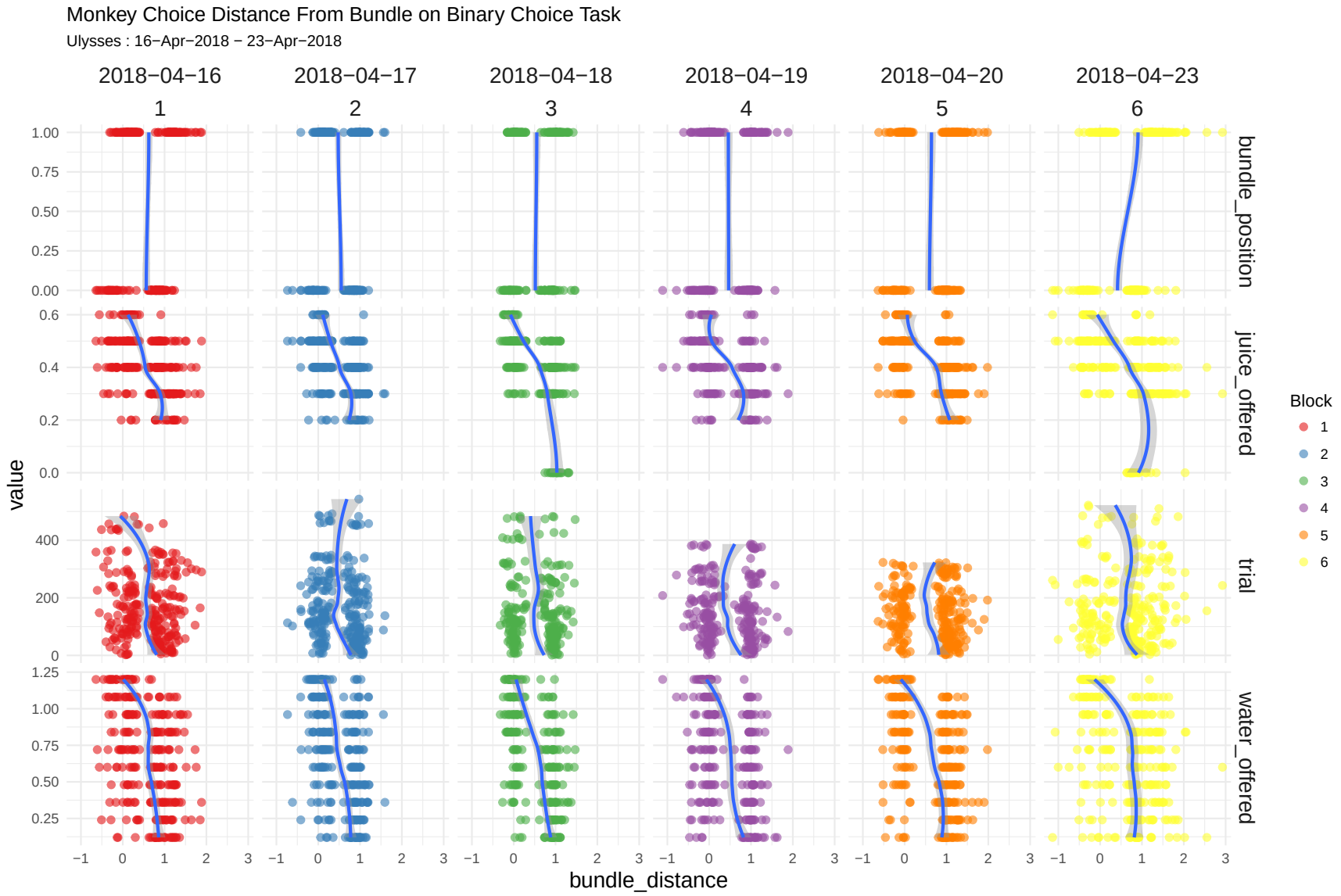
```
monkey <- "Ulysses"
today <- "23-Apr-2018"
look_back <- "16-Apr-2018"

start_trial <- 0
stop_trial <- 220

merge_days <- TRUE
```

```
p1
```


Monkey Choice Distance From Bundle on Binary Choice Task
Ulysses : 16−Apr−2018 − 23−Apr−2018
2018−04−16
1
2018−04−17
2
2018−04−18
3
2018−04−19
4
2018−04−20
5
2018−04−23
6
count
choice distance from bundle edge
fractal value
0
0.2
0.3
0.4
0.5
0.6

```
p2
```


Monkey Choice Distance From Bundle on Binary Choice Task
Ulysses : 16−Apr−2018 − 23−Apr−2018
2018−04−16
2018−04−17
2018−04−18
2018−04−19
2018−04−20
2018−04−23
1
2
3
4
5
6
bundle_position
juice_offered
trial
water_offered
value
bundle_distance
Block
1
2
3
4
5
6

```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
## -2.6968  -0.5679  -0.1393   0.5533   3.2731
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)      1.295e+03  5.521e+02   2.346    0.019 *
## bundle_position  1.252e+00  1.482e-01   8.448  < 2e-16 ***
## water_offered    4.525e+00  2.651e-01  17.071  < 2e-16 ***
## juice_offered    1.706e+01  9.613e-01  17.747  < 2e-16 ***
## trial            3.241e-03  6.170e-04   5.252  1.5e-07 ***
## date            -7.406e-02  3.130e-02  -2.366    0.018 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 2210.2  on 1614  degrees of freedom
## Residual deviance: 1232.4  on 1609  degrees of freedom
##   (1213 observations deleted due to missingness)
## AIC: 1244.4
##
## 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 = 669, number of trials = 1615, p-value =
## 5.802e-12
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.3900822 0.4387131
## sample estimates:
## probability of success
##              0.4142415
```

```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)
```

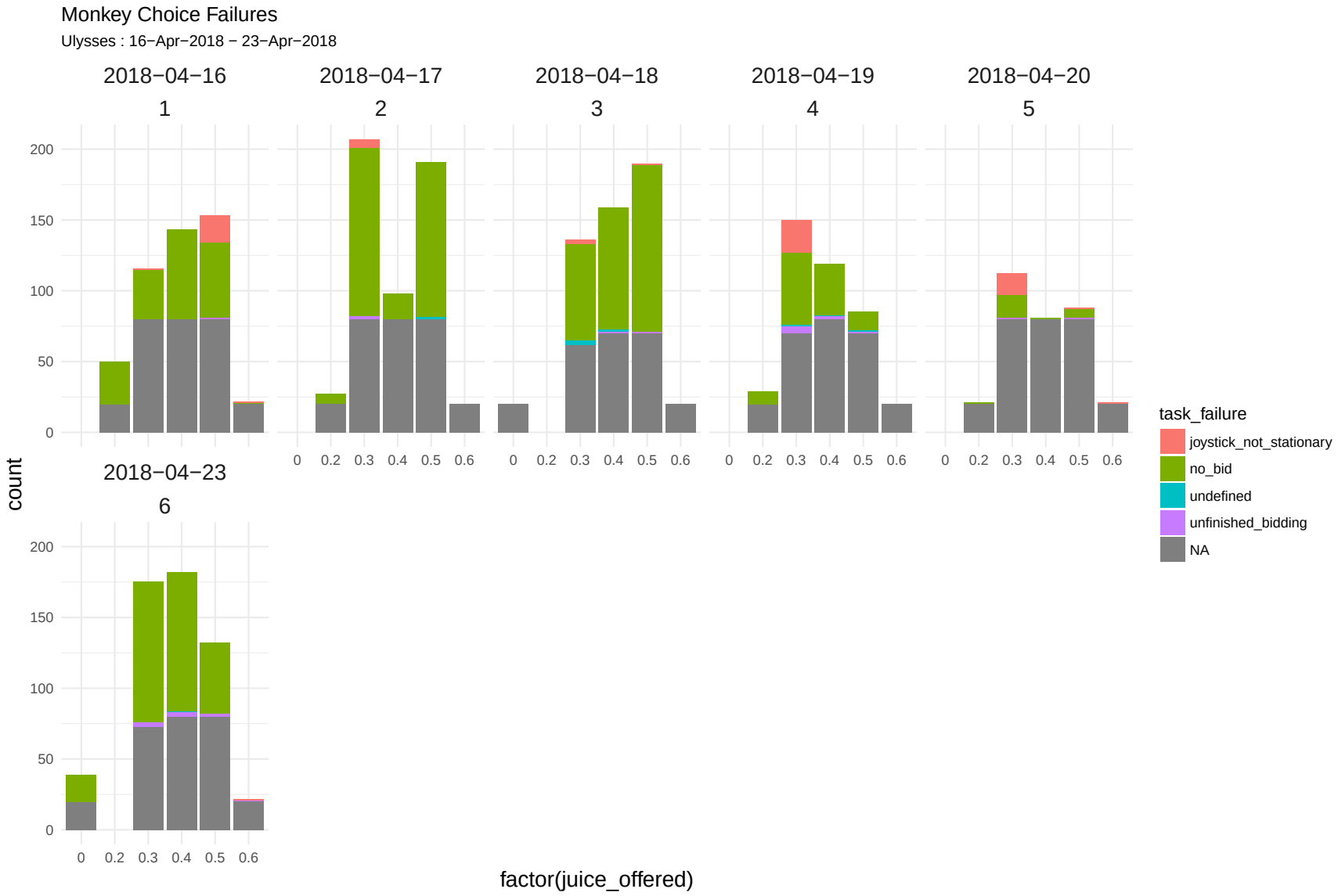
```
##
## Call:
## glm(formula = fractal_choice ~ bundle_position + water_offered +
##     as.factor(juice_offered) + trial + date, family = "binomial",
##     data = dplyr::filter(task_data, block_no == max(block_no)))
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.5107  -0.6802  -0.2495   0.6776   2.4688
##
## Coefficients: (1 not defined because of singularities)
##                                Estimate Std. Error z value Pr(>|z|)
## (Intercept)                 -19.959422 847.236776  -0.024    0.981
## bundle_position               0.207185   0.324801   0.638    0.524
## water_offered                 3.445791   0.545740   6.314 2.72e-10 ***
## as.factor(juice_offered)0.3  15.157811 847.236737   0.018    0.986
## as.factor(juice_offered)0.4  16.406327 847.236700   0.019    0.985
## as.factor(juice_offered)0.5  17.973381 847.236699   0.021    0.983
## as.factor(juice_offered)0.6  19.340251 847.236927   0.023    0.982
## trial                         0.001171   0.001225   0.956    0.339
## 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: 360.83  on 272  degrees of freedom
## Residual deviance: 234.73  on 265  degrees of freedom
##   (277 observations deleted due to missingness)
## AIC: 250.73
```

```
##
## Number of Fisher Scoring iterations: 16
```

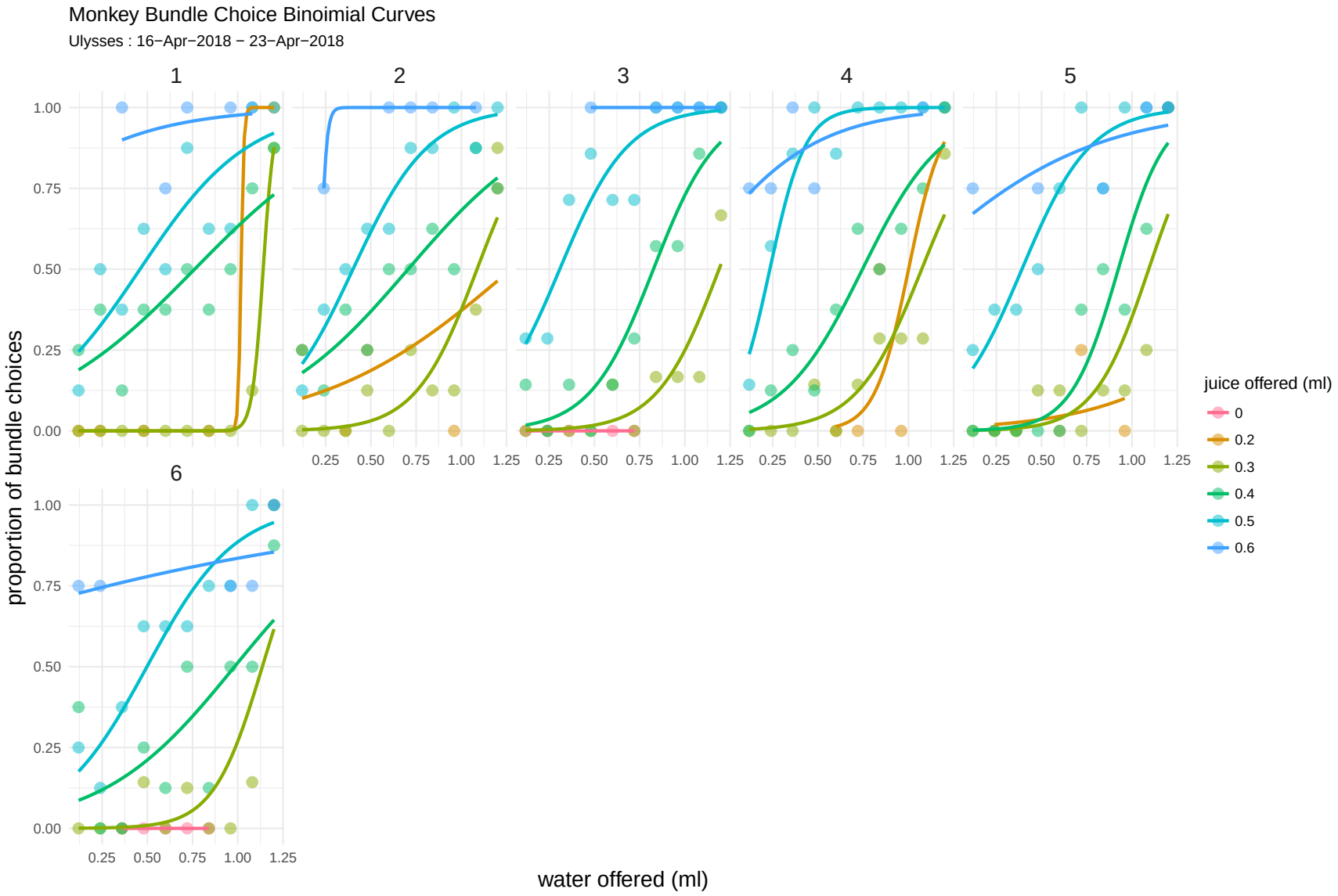
```
#test for side bias with an exact binomial test
binom.test(c(nrow(task_data %>%
                    .[c(bundle_position != fractal_choice & block_no == max(block_no))]),
             nrow(task_data %>%
                    .[c(bundle_position == fractal_choice & block_no == max(block_no))])))
```

```
##
##  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 = 131, number of trials = 273, p-value =
## 0.5451
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.419261 0.540888
## sample estimates:
## probability of success
##              0.4798535
```

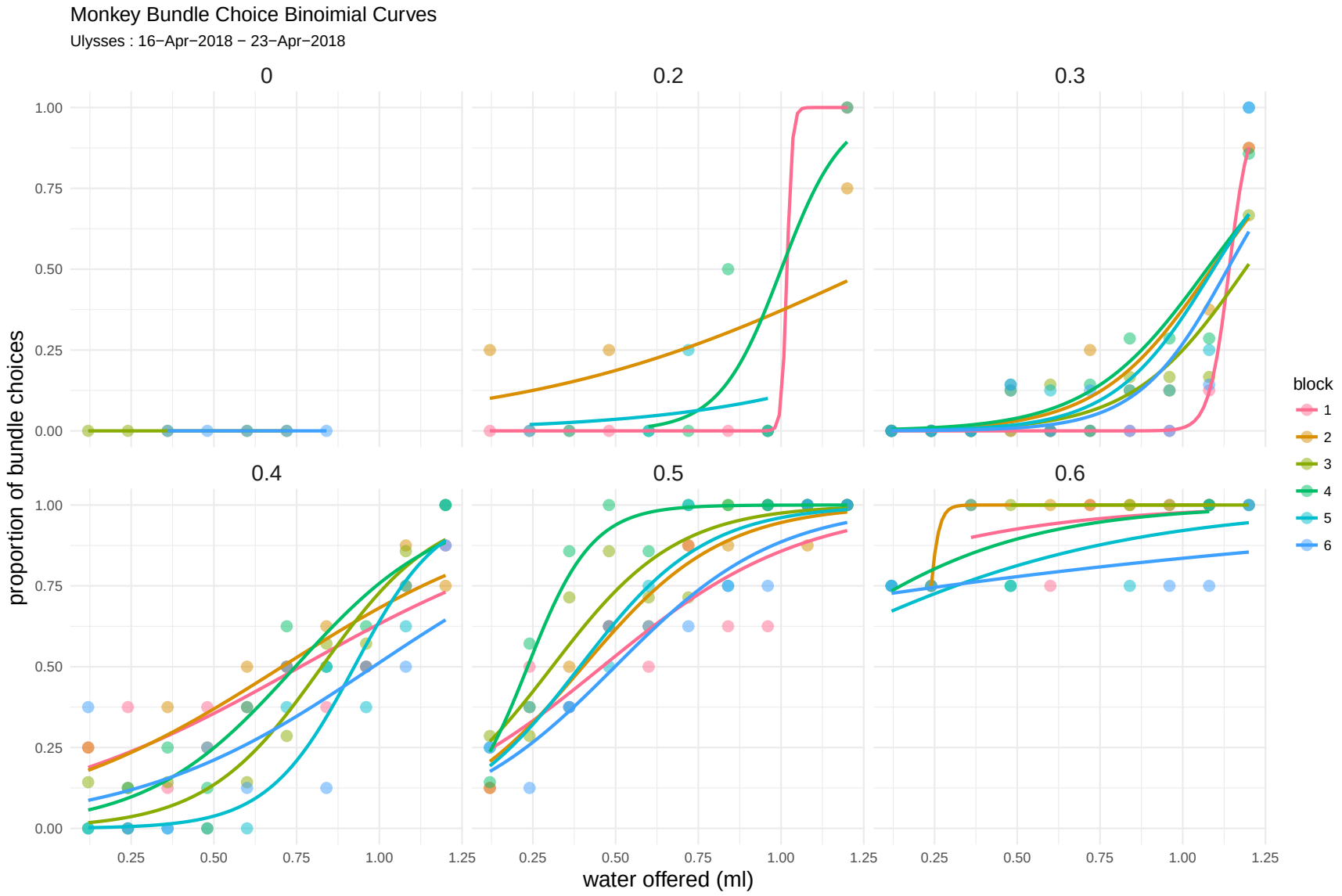
```
p3
```


Monkey Choice Failures
Ulysses : 16−Apr−2018 − 23−Apr−2018
2018−04−16
1
2018−04−17
2
2018−04−18
3
2018−04−19
4
2018−04−20
5
2018−04−23
6
count
factor(juice_offered)
task_failure
joystick_not_stationary
no_bid
undefined
unfinished_bidding
NA

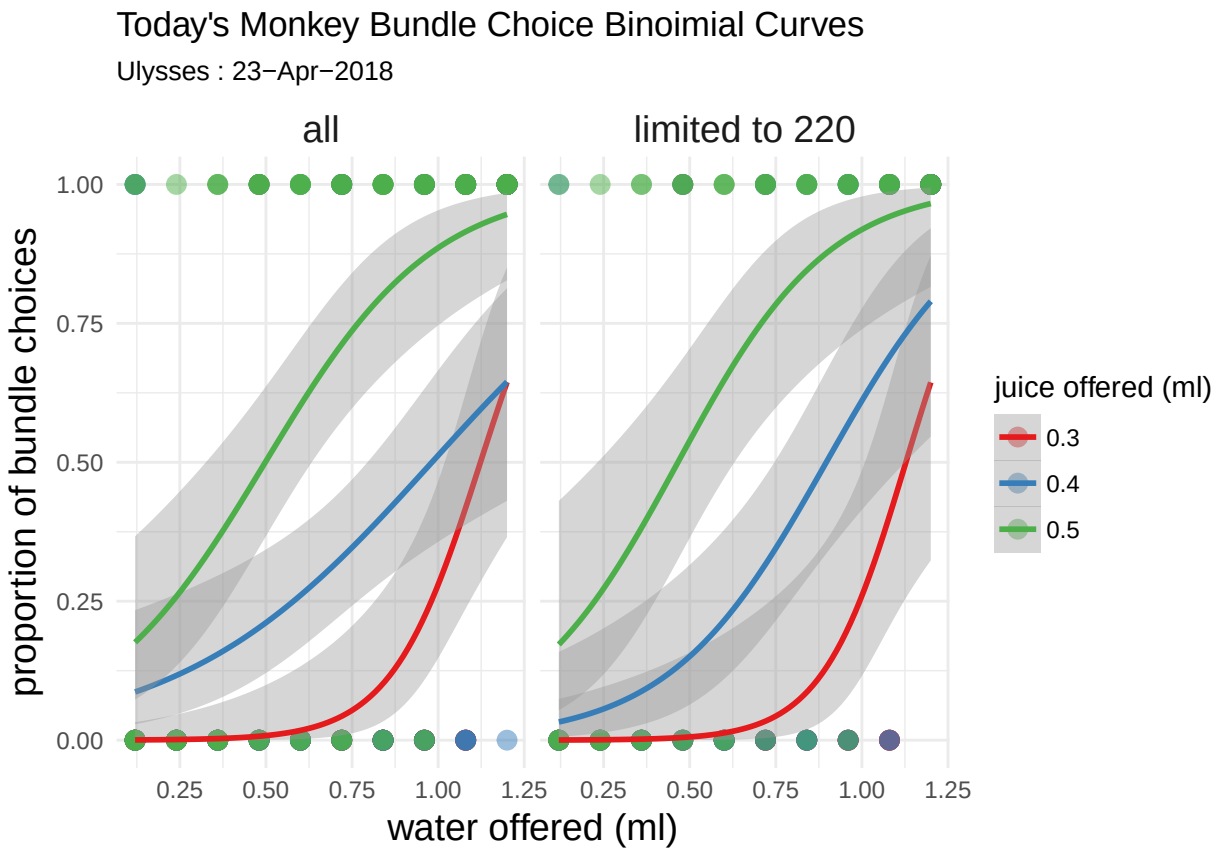
```
p4
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 16−Apr−2018 − 23−Apr−2018
1
2
3
4
5
6
proportion of bundle choices
water offered (ml)
juice offered (ml)
0
0.2
0.3
0.4
0.5
0.6

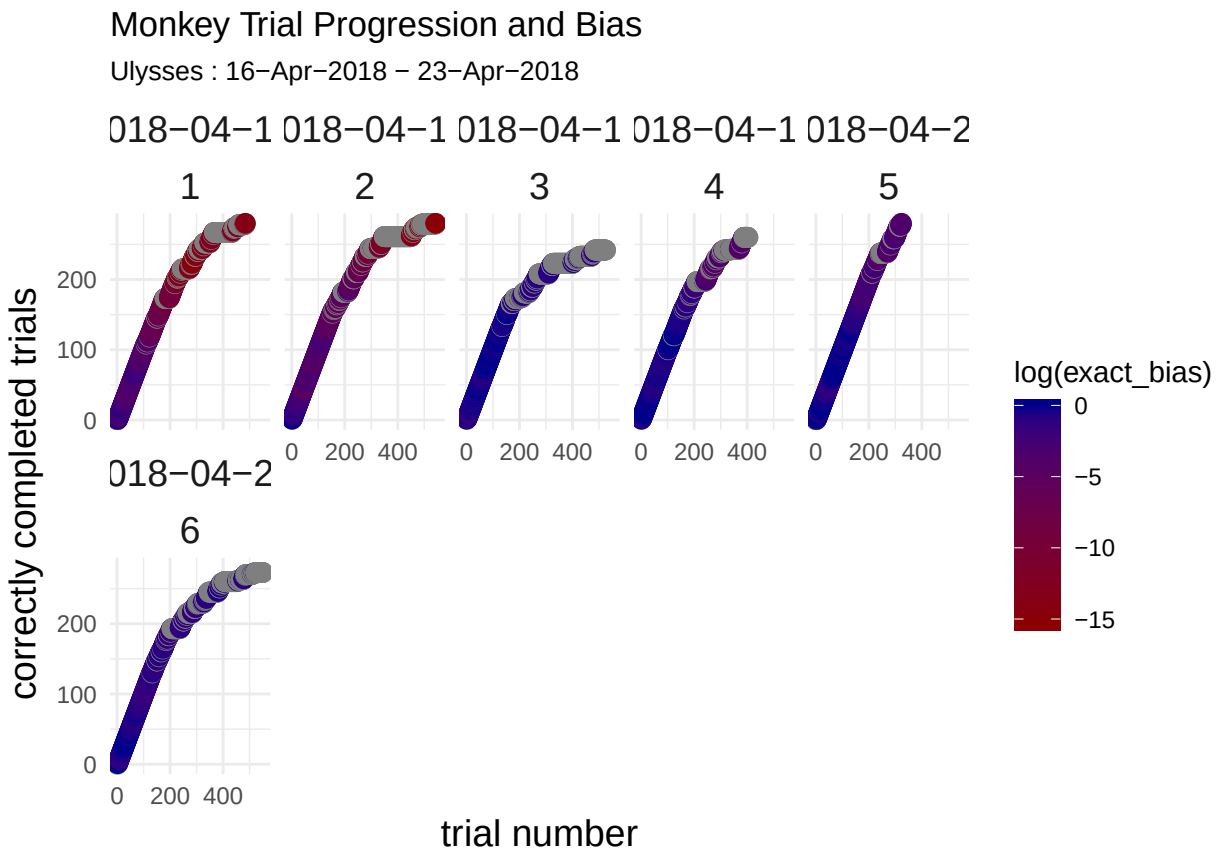
```
p5
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 16−Apr−2018 − 23−Apr−2018
0
0.2
0.3
0.4
0.5
0.6
proportion of bundle choices
water offered (ml)
block
1
2
3
4
5
6

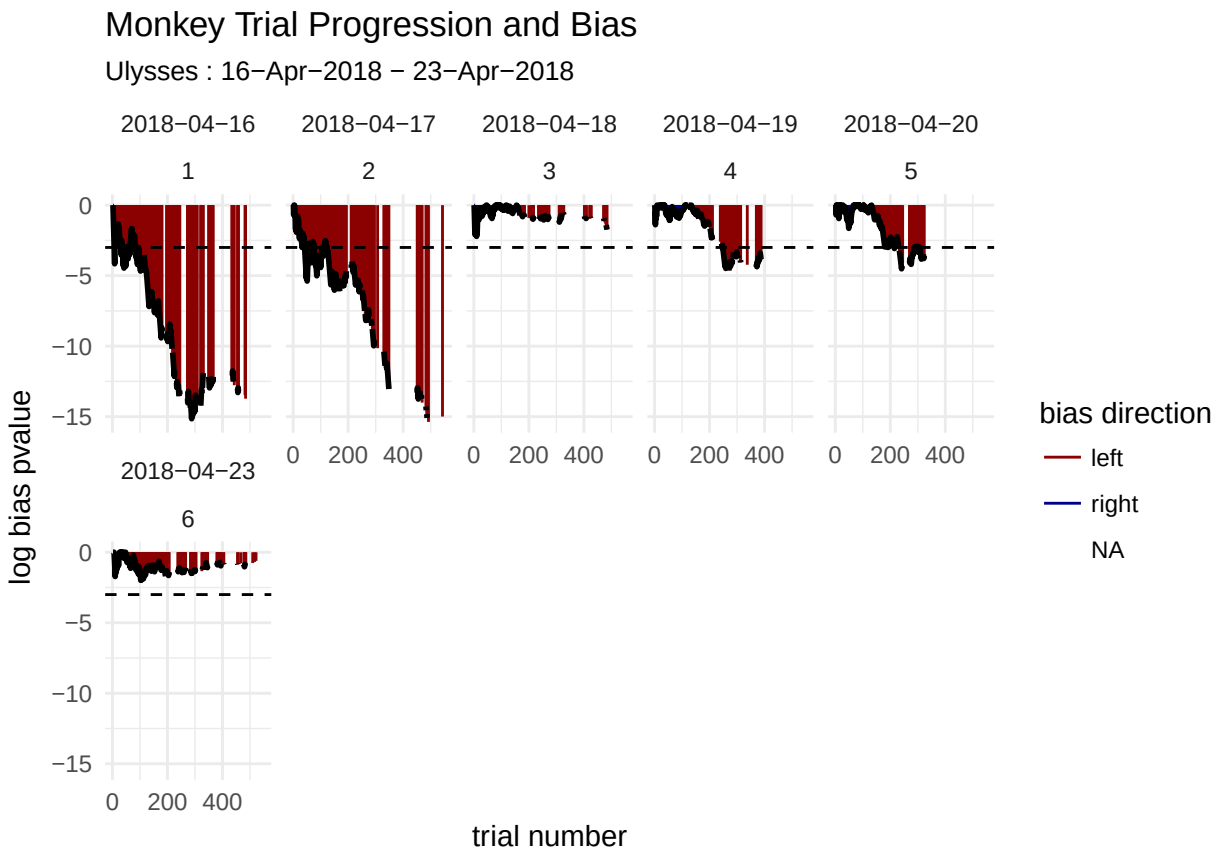
```
p6
```


Today's Monkey Bundle Choice Binoimial Curves
Ulysses : 23−Apr−2018
all
limited to 220
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

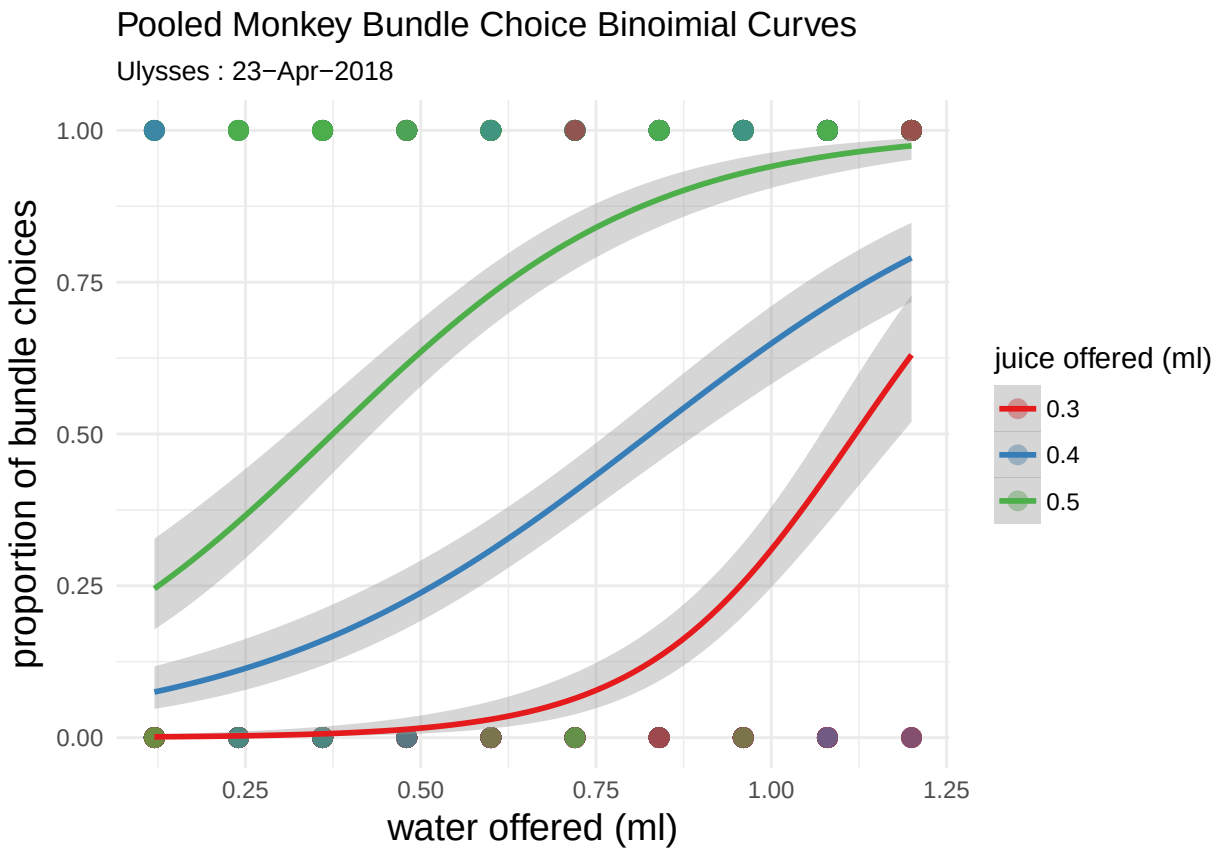
```
p7
```


Monkey Trial Progression and Bias
Ulysses : 16−Apr−2018 − 23−Apr−2018
018−04−1
018−04−1
018−04−1
018−04−1
018−04−2
1
2
3
4
5
018−04−2
6
correctly completed trials
trial number
log(exact_bias)
0
−5
−10
−15

```
p8
```


Monkey Trial Progression and Bias
Ulysses : 16−Apr−2018 − 23−Apr−2018
2018−04−16
2018−04−17
2018−04−18
2018−04−19
2018−04−20
2018−04−23
1
2
3
4
5
6
0
−5
−10
−15
0
200
400
log bias pvalue
trial number
bias direction
left
right
NA

```
p9
```


Pooled Monkey Bundle Choice Binoimial Curves
Ulysses : 23−Apr−2018
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