BCb Analysis- Early March

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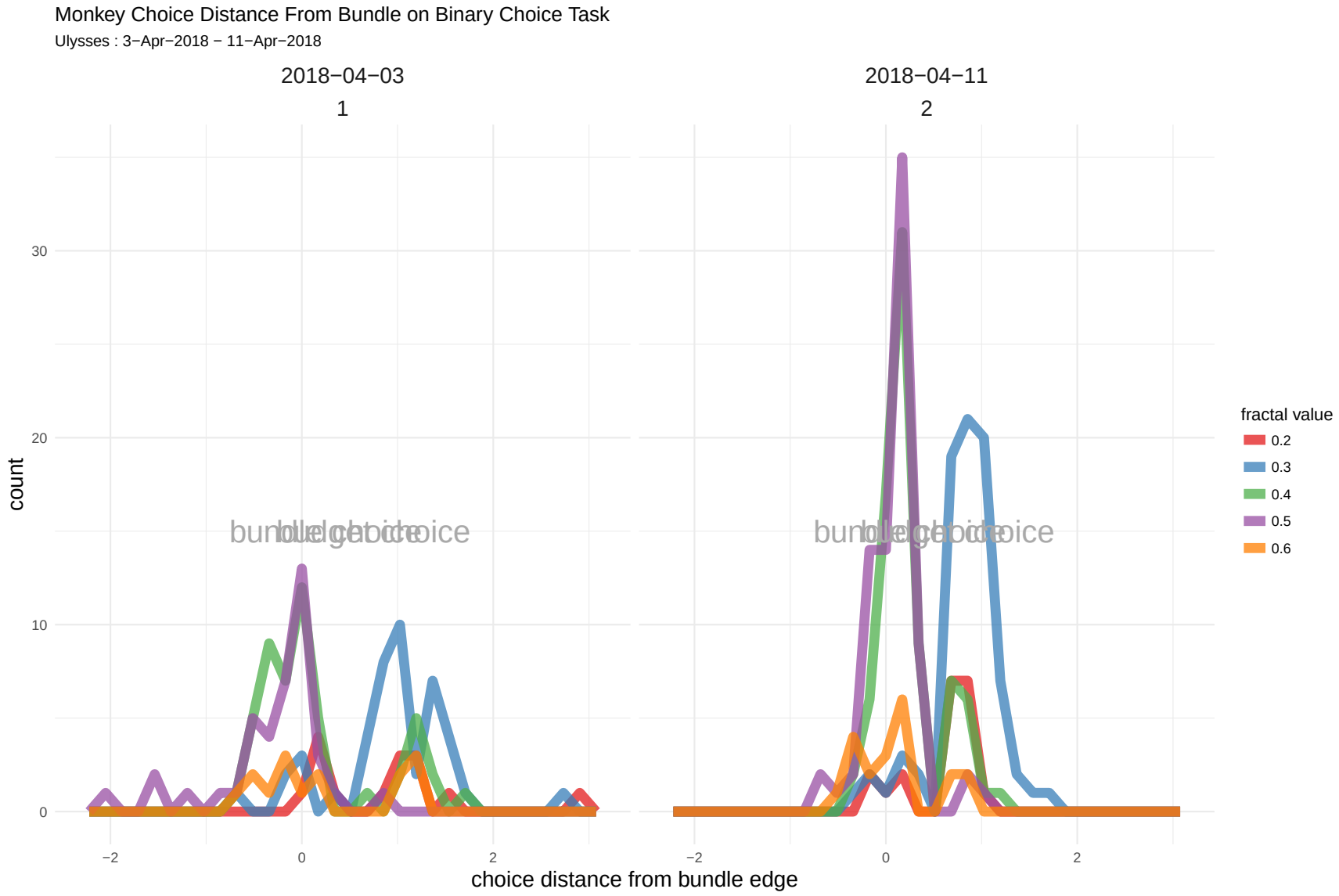
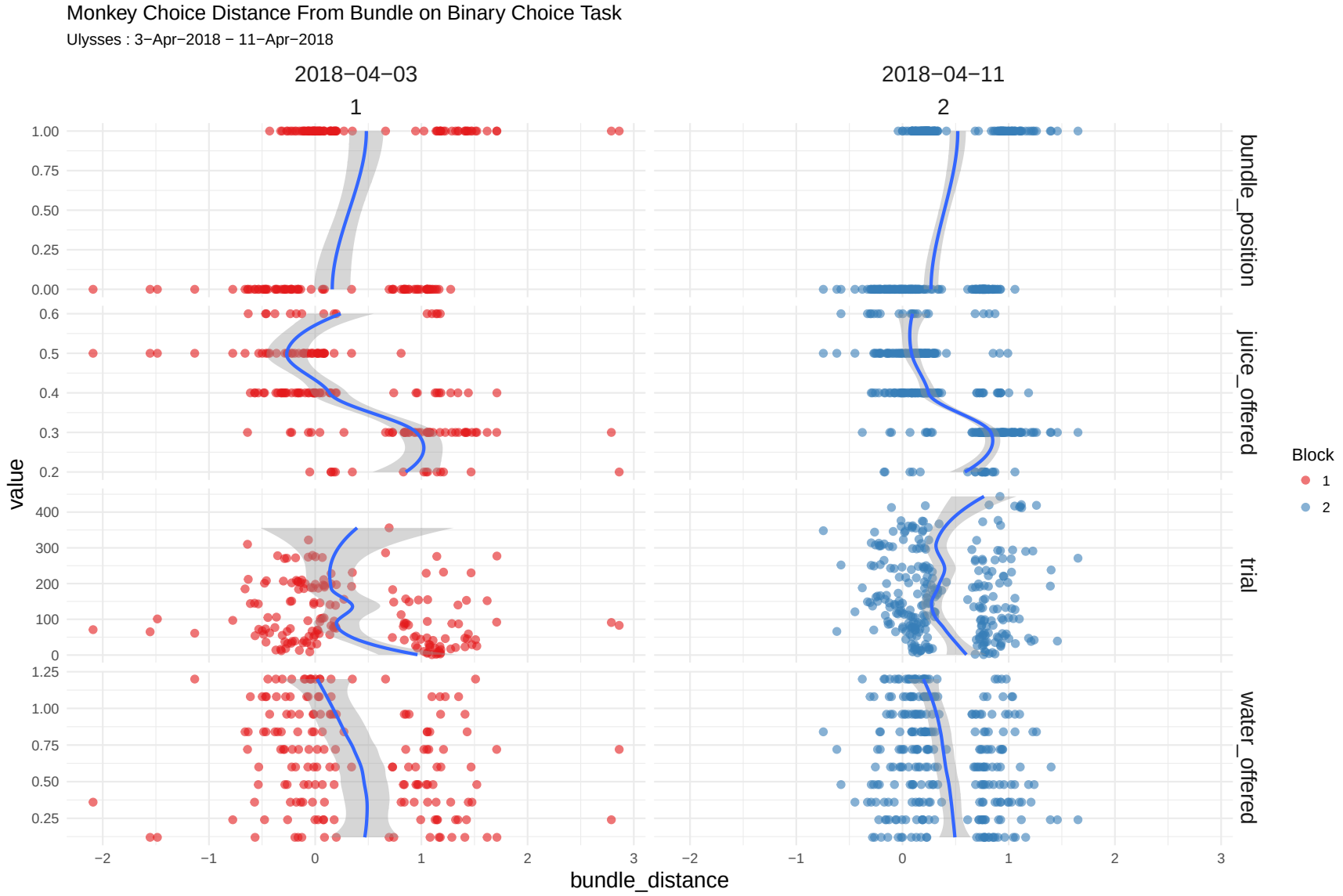
```
monkey <- "Ulysses"
today <- "11-Apr-2018"
look_back <- "3-Apr-2018"

start_trial <- 0
stop_trial <- "all"

merge_days <- TRUE
```

```
p1
```


Monkey Choice Distance From Bundle on Binary Choice Task
Ulysses : 3−Apr−2018 − 11−Apr−2018
2018−04−03
1
2018−04−11
2
count
30
20
10
0
−2
0
2
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 : 3−Apr−2018 − 11−Apr−2018
2018−04−03
1
2018−04−11
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
## -3.2286  -0.5768   0.2469   0.6175   2.4911
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)      8.064e+02  6.242e+02   1.292  0.19638
## bundle_position -7.411e-04  2.644e-01  -0.003  0.99776
## water_offered    2.911e+00  4.365e-01   6.668 2.59e-11 ***
## juice_offered    1.816e+01  1.770e+00  10.263  < 2e-16 ***
## trial            5.005e-03  1.294e-03   3.867  0.00011 ***
## date            -4.626e-02  3.541e-02  -1.306  0.19148
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 591.87  on 443  degrees of freedom
## Residual deviance: 358.91  on 438  degrees of freedom
##   (377 observations deleted due to missingness)
## AIC: 370.91
##
## Number of Fisher Scoring iterations: 5
```

```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 = 217, number of trials = 444, p-value =
## 0.6693
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.4413258 0.5363026
## sample estimates:
## probability of success
##              0.4887387
```

```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)
```

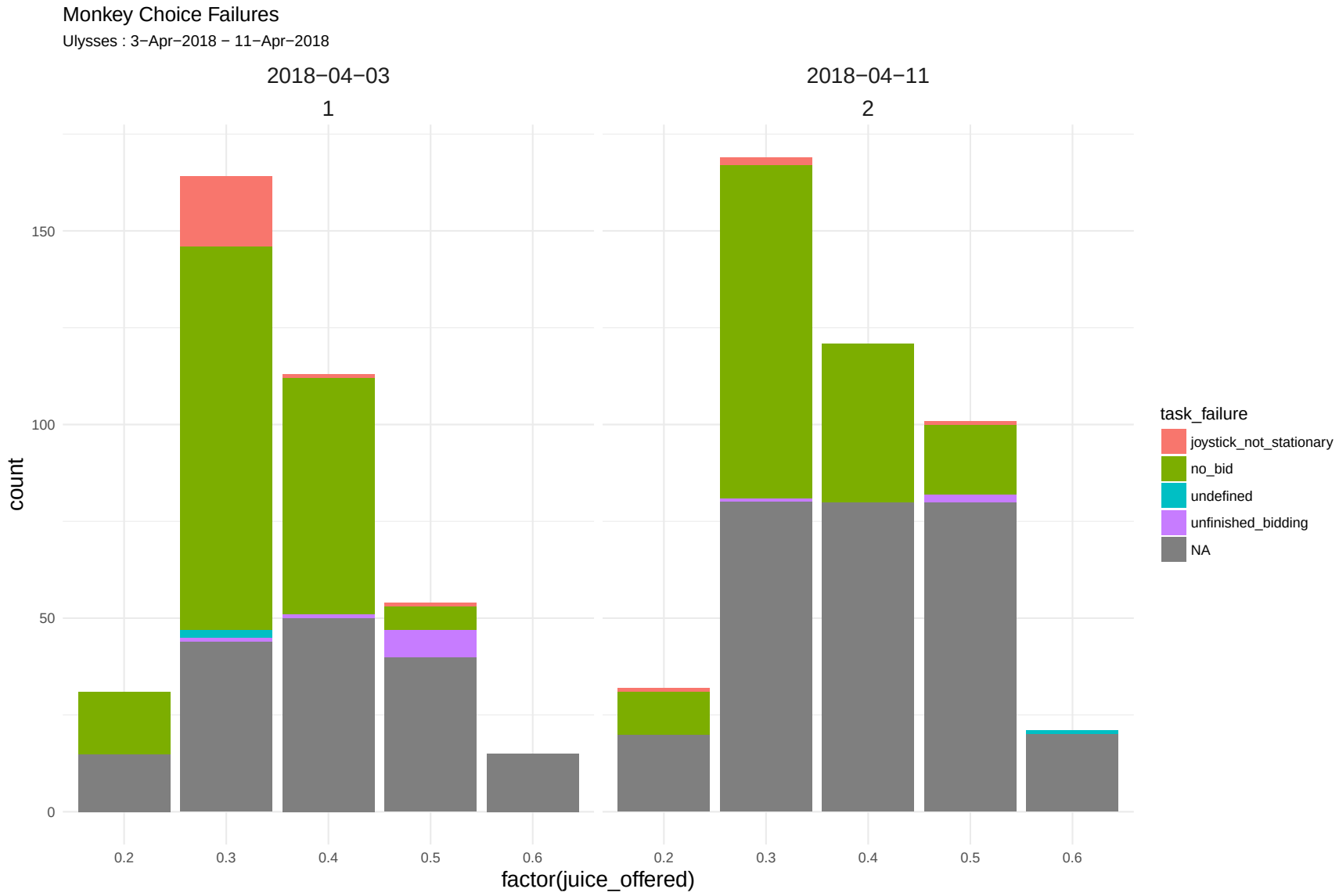
```
##
## Call:
## glm(formula = fractal_choice ~ bundle_position + water_offered +
##     as.factor(juice_offered) + trial + date, family = "binomial",
##     data = dplyr::filter(task_data, block_no == max(block_no)))
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.6594  -0.2399   0.1137   0.3700   2.0269
##
## Coefficients: (1 not defined because of singularities)
##                               Estimate Std. Error z value Pr(>|z|)
## (Intercept)                 -5.426890   1.094773  -4.957 7.16e-07 ***
## bundle_position             -0.333946   0.460184  -0.726  0.46804
## water_offered                4.562174   0.866711   5.264 1.41e-07 ***
## as.factor(juice_offered)0.3 -1.359720   0.815218  -1.668  0.09533 .
## as.factor(juice_offered)0.4  3.863619   0.898663   4.299 1.71e-05 ***
## as.factor(juice_offered)0.5  6.019091   1.071595   5.617 1.94e-08 ***
## as.factor(juice_offered)0.6  3.474090   0.956214   3.633  0.00028 ***
## trial                        0.005266   0.001955   2.693  0.00708 **
## 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: 373.40  on 279  degrees of freedom
## Residual deviance: 150.08  on 272  degrees of freedom
##   (164 observations deleted due to missingness)
## AIC: 166.08
```

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

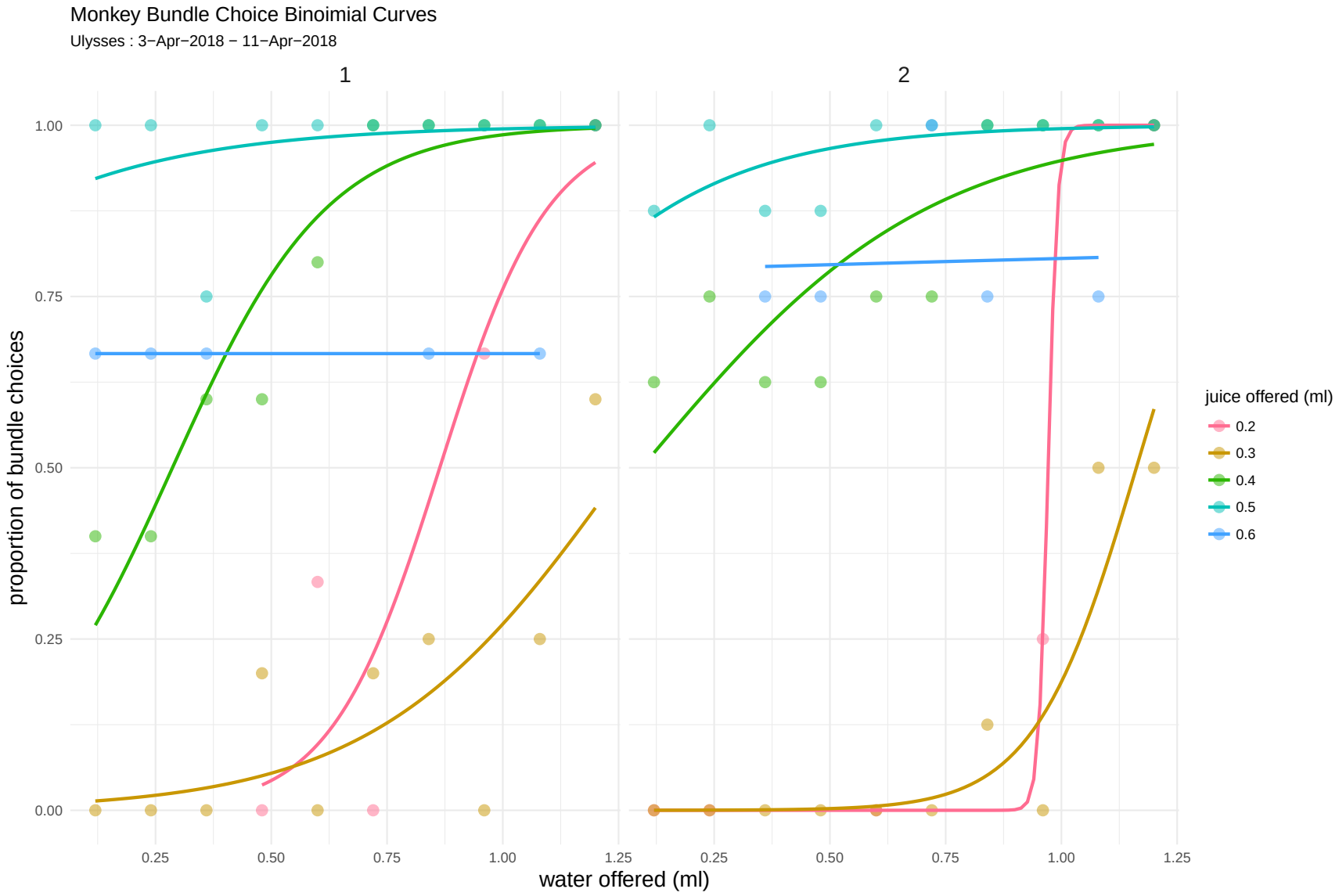
```
#test for side bias with an exact binomial test
binom.test(c(nrow(task_data %>%
                    .[c(bundle_position != fractal_choice & block_no == max(block_no))]),
             nrow(task_data %>%
                    .[c(bundle_position == fractal_choice & block_no == max(block_no))])))
```

```
##
##  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 = 143, number of trials = 280, p-value =
## 0.7651
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.4505330 0.5706664
## sample estimates:
## probability of success
##              0.5107143
```

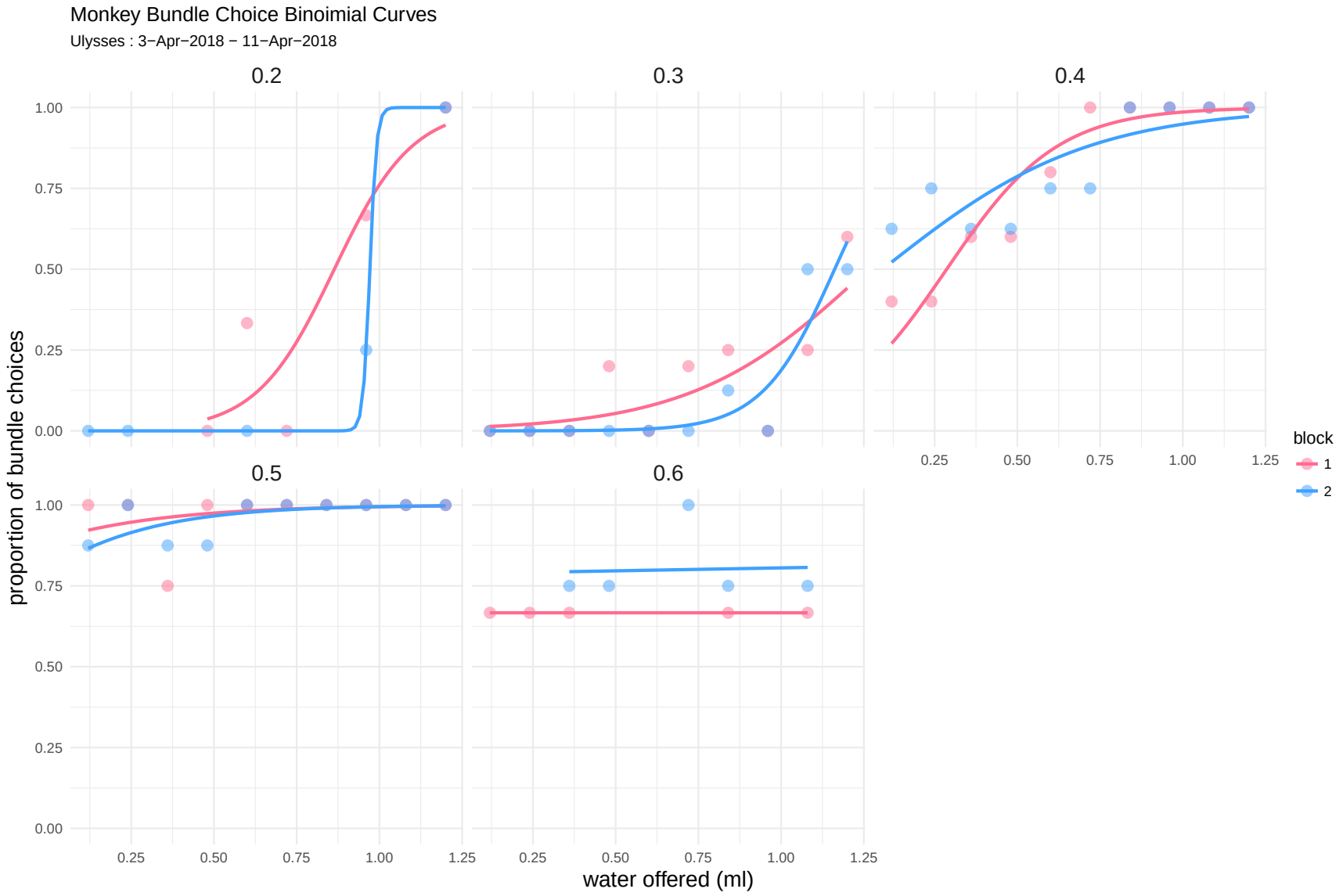
```
p3
```


Monkey Choice Failures
Ulysses : 3−Apr−2018 − 11−Apr−2018
2018−04−03
1
2018−04−11
2
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

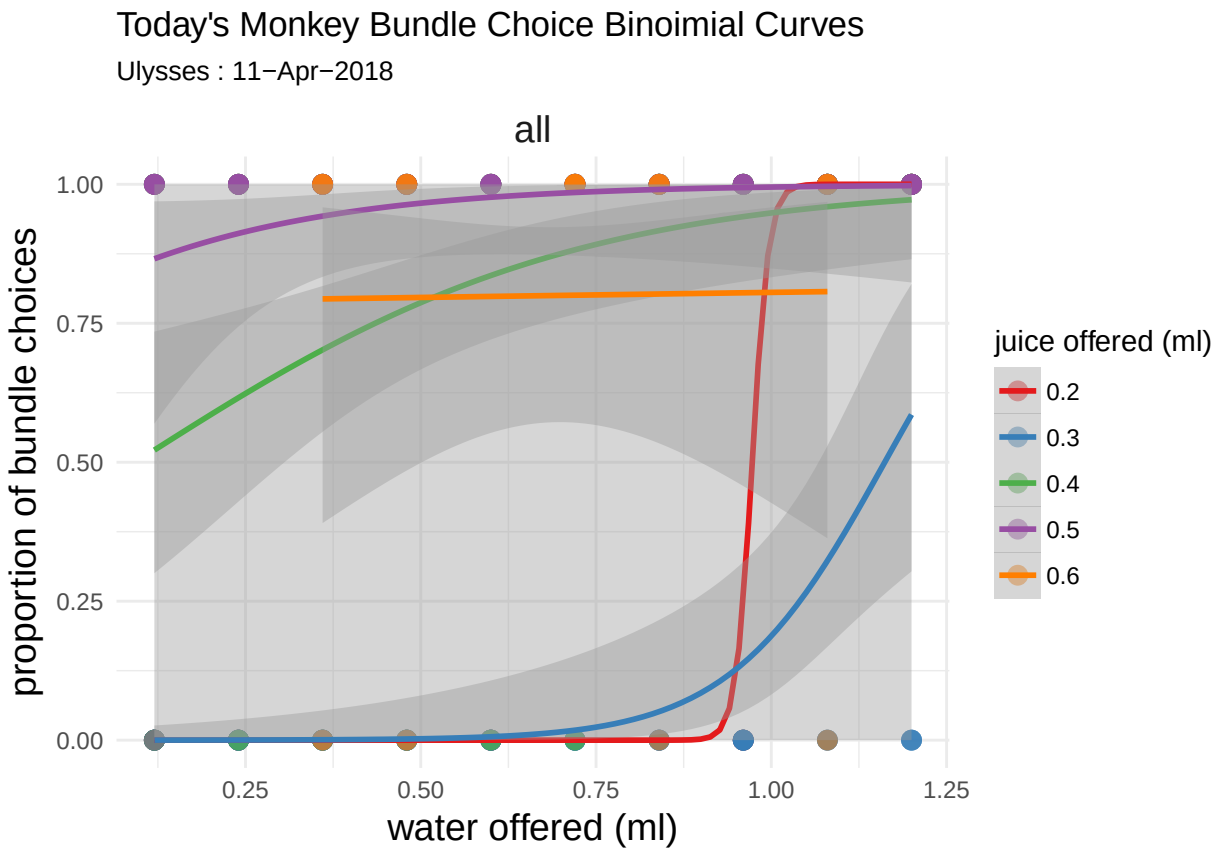
```
p4
```


Monkey Bundle Choice Binoimial Curves
Ulysses : 3−Apr−2018 − 11−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

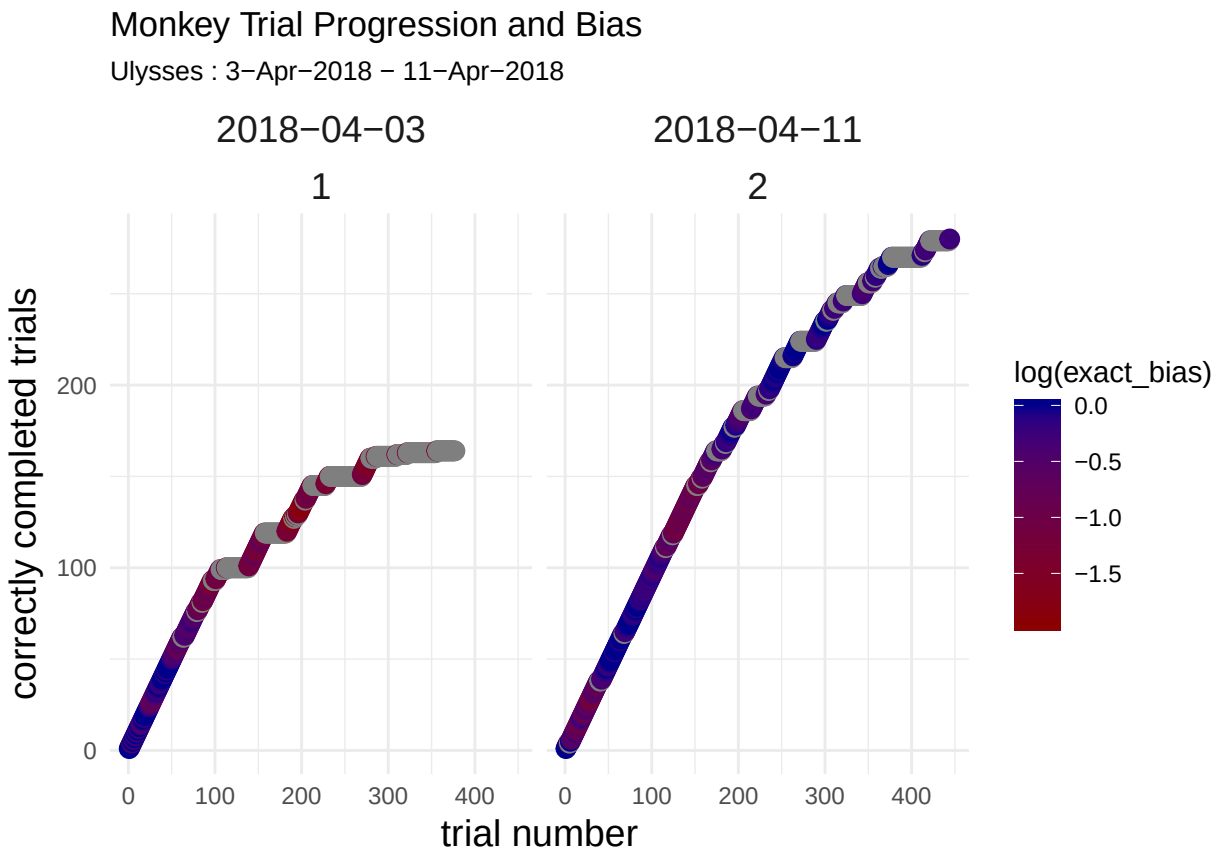
```
p5
```


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

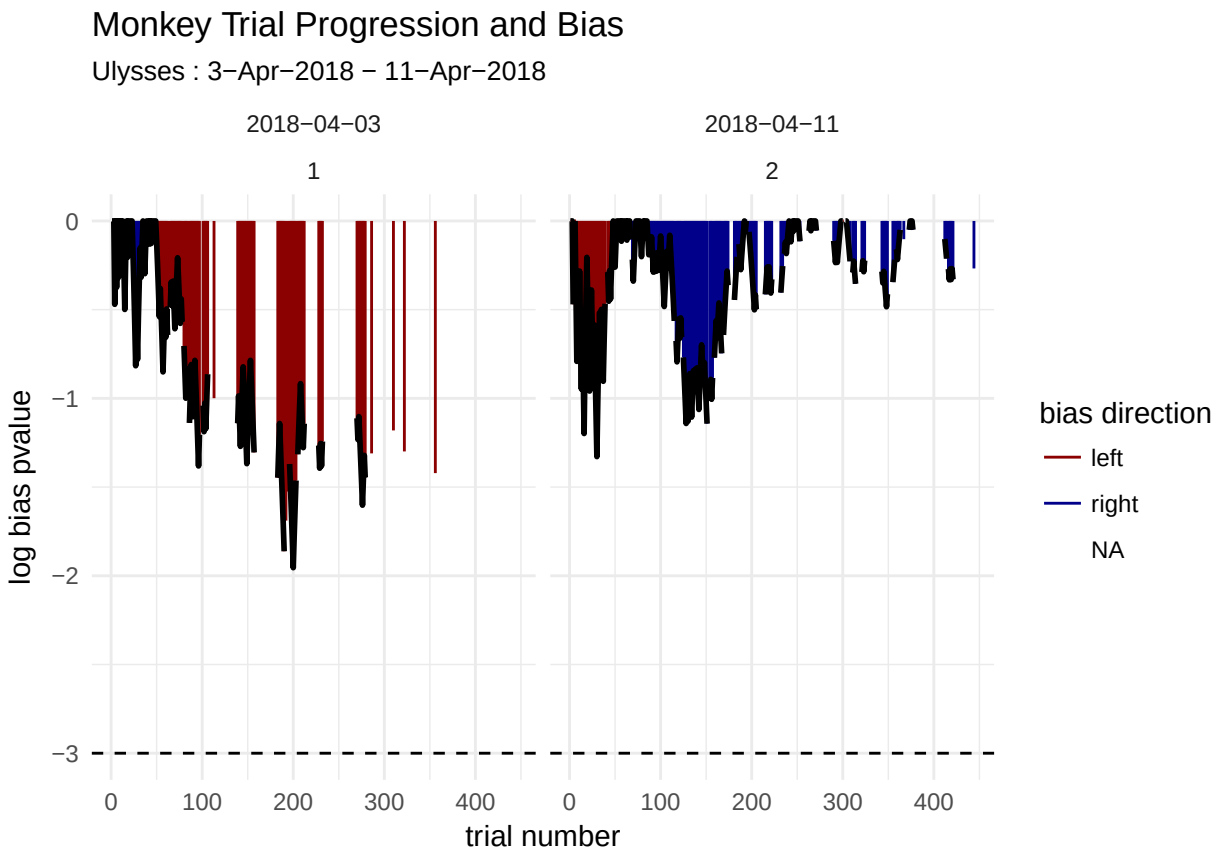
```
p6
```


Today's Monkey Bundle Choice Binoimial Curves
Ulysses : 11−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 : 3−Apr−2018 − 11−Apr−2018
2018−04−03
1
2018−04−11
2
correctly completed trials
0
100
200
0
100
200
300
400
trial number
log(exact_bias)
0.0
−0.5
−1.0
−1.5

```
p8
```


Monkey Trial Progression and Bias
Ulysses : 3−Apr−2018 − 11−Apr−2018
2018−04−03
2018−04−11
1
2
0
−1
−2
−3
log bias pvalue
0
100
200
300
400
trial number
bias direction
left
right
NA