

# BCb Analysis- Early March

*Robert Hickman*

*05 April 2018*

```
monkey <- "Ulysses"  
today <- "20-Apr-2018"  
look_back <- "18-Apr-2018"
```

```
start_trial <- 0  
stop_trial <- 200
```

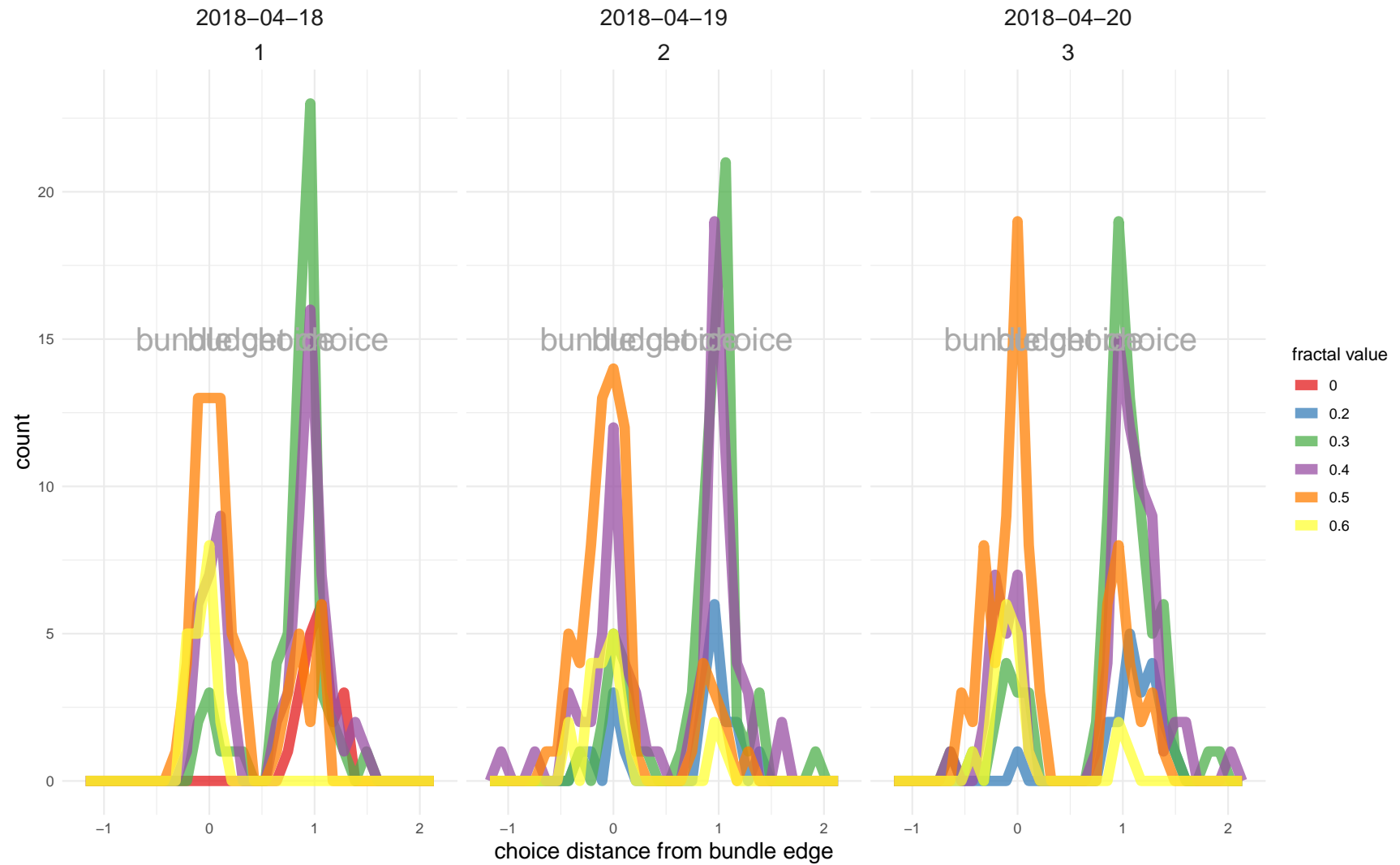
```
merge_days <- TRUE
```

```
#task_data %<>% .[is.na(task_failure), completed_trials := 1:.N, by = "block_no"] %>%  
# .[completed_trials < 181] %>%  
# .[completed_trials > 59]
```

p1

# Monkey Choice Distance From Bundle on Binary Choice Task

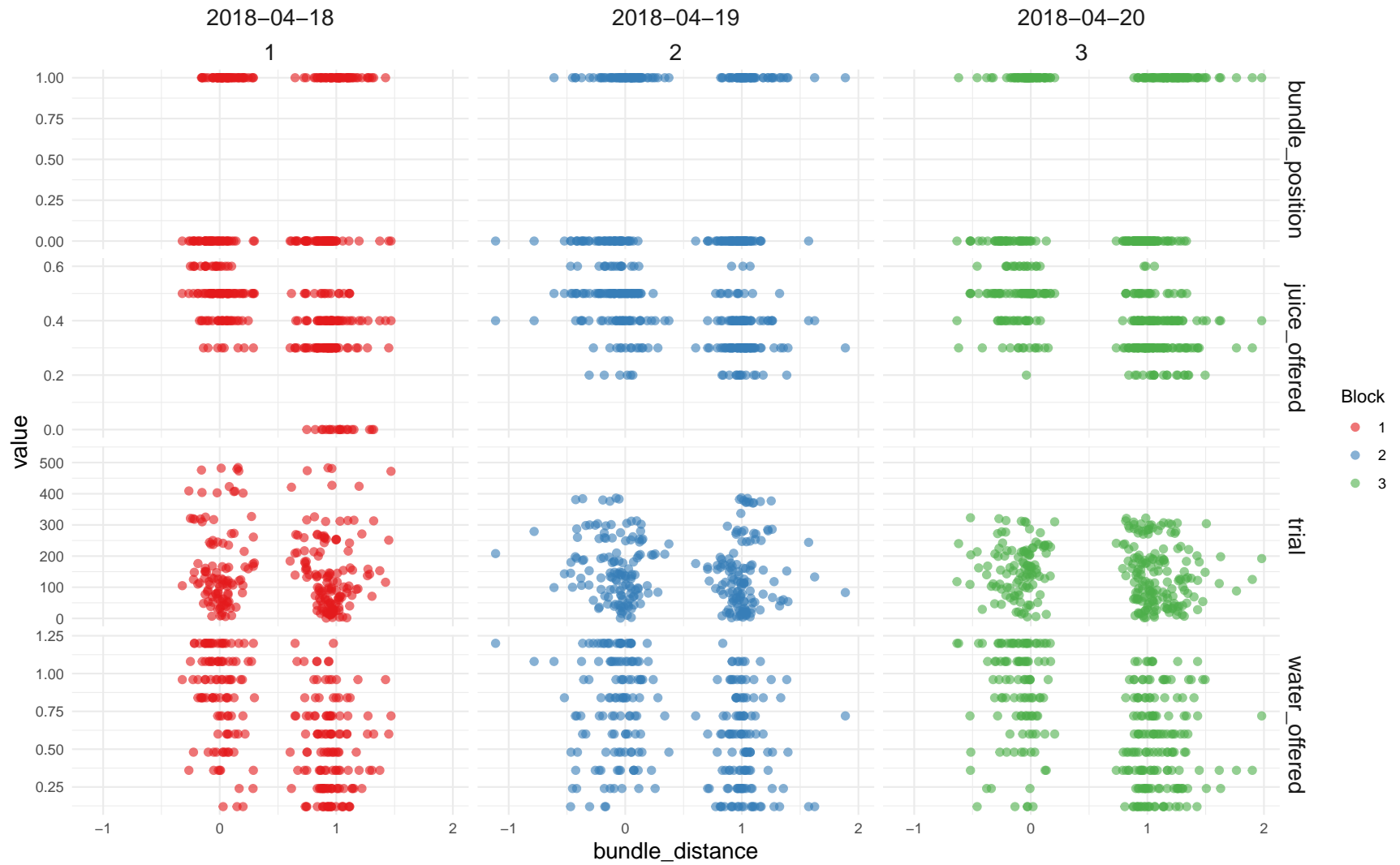
Ulysses : 18-Apr-2018 – 20-Apr-2018



p2

# Monkey Choice Distance From Bundle on Binary Choice Task

Ulysses : 18-Apr-2018 – 20-Apr-2018



```

#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
## -2.55396  -0.47860  -0.07892   0.45529   3.10781
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    2.900e+03  2.426e+03   1.195   0.232
## bundle_position  1.309e+00  2.303e-01   5.681 1.34e-08 ***
## water_offered    5.601e+00  4.547e-01  12.319 < 2e-16 ***
## juice_offered    2.073e+01  1.637e+00  12.665 < 2e-16 ***
## trial           4.290e-03  1.052e-03   4.080 4.51e-05 ***
## date            -1.652e-01  1.375e-01  -1.201   0.230
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 1075.04  on 781  degrees of freedom
## Residual deviance:  523.93  on 776  degrees of freedom
## (469 observations deleted due to missingness)
## AIC: 535.93
##
## 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)]),
            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 = 342, number of trials = 782, p-value =
## 0.000515
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.4022257 0.4729288
## sample estimates:
## probability of success
##          0.4373402

```

```

#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
## -2.5624  -0.4286  -0.1099   0.3050   2.7162
##
## Coefficients: (1 not defined because of singularities)
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -9.706232    1.565947  -6.198 5.71e-10 ***
## bundle_position     1.401659    0.417420   3.358 0.000785 ***
## water_offered      6.358429    0.867770   7.327 2.35e-13 ***
## as.factor(juice_offered)0.3  1.007568    1.189428   0.847 0.396938
## as.factor(juice_offered)0.4  2.031525    1.178455   1.724 0.084728 .
## as.factor(juice_offered)0.5  5.516698    1.260932   4.375 1.21e-05 ***
## as.factor(juice_offered)0.6  6.582925    1.462312   4.502 6.74e-06 ***
## trial            0.006687    0.002233   2.994 0.002749 **
## 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: 376.06  on 279  degrees of freedom
## Residual deviance: 174.67  on 272  degrees of freedom
## (43 observations deleted due to missingness)
## AIC: 190.67

```

```
##
```

```
## 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 = 121, number of trials = 280, p-value =
```

```
## 0.02685
```

```
## alternative hypothesis: true probability of success is not equal to 0.5
```

```
## 95 percent confidence interval:
```

```
## 0.3733256 0.4924117
```

```
## sample estimates:
```

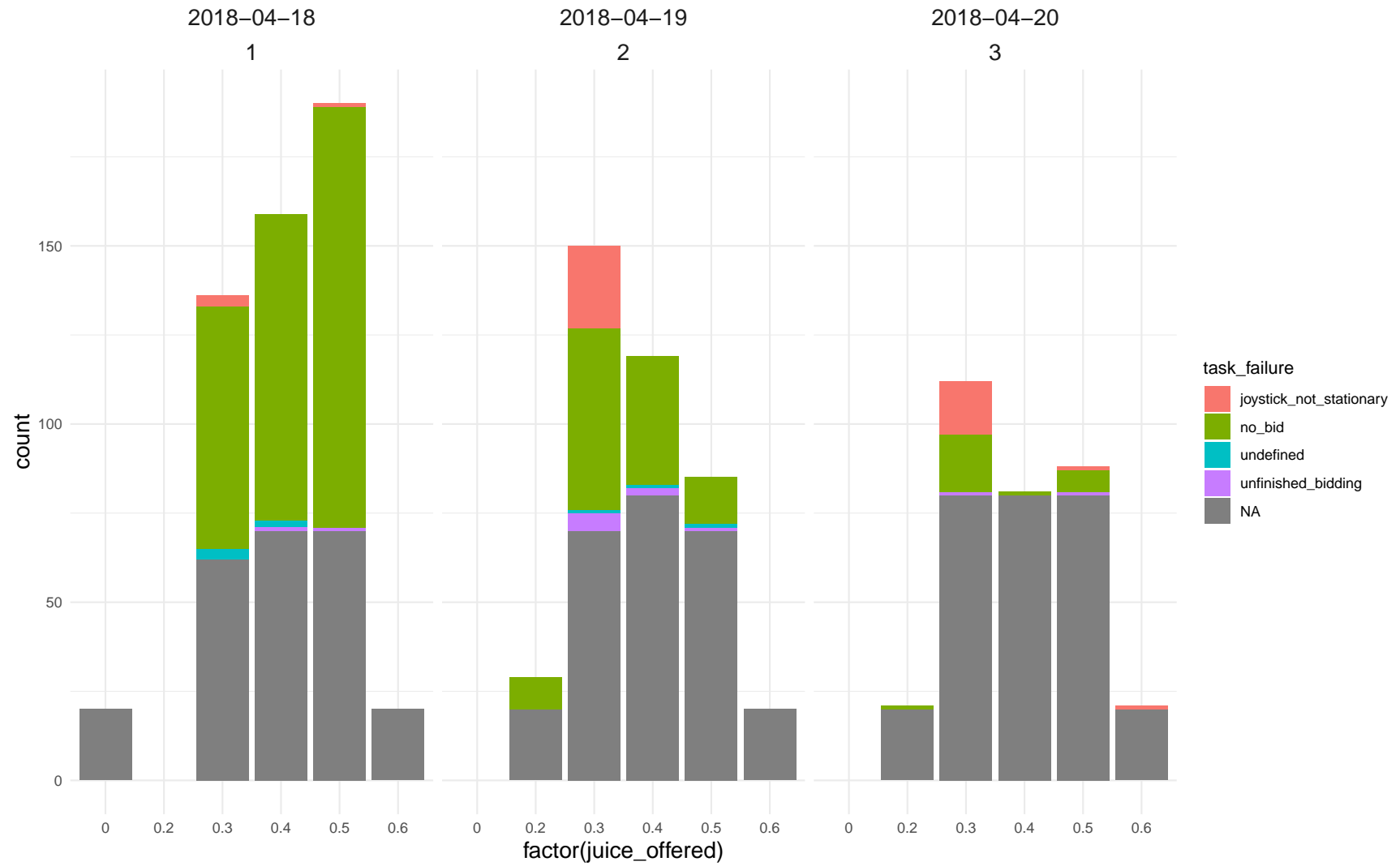
```
## probability of success
```

```
## 0.4321429
```

p3

### Monkey Choice Failures

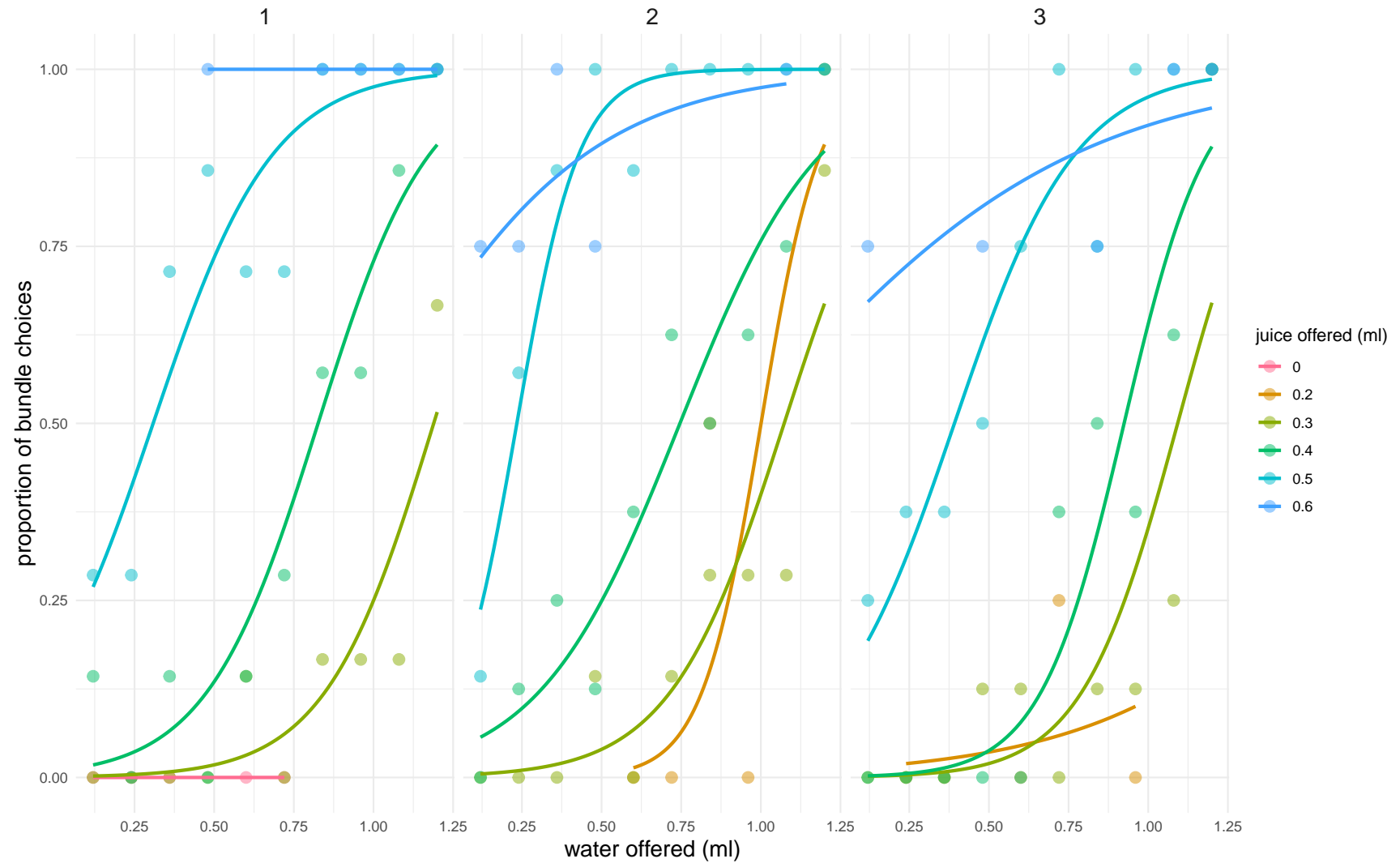
Ulysses : 18-Apr-2018 – 20-Apr-2018





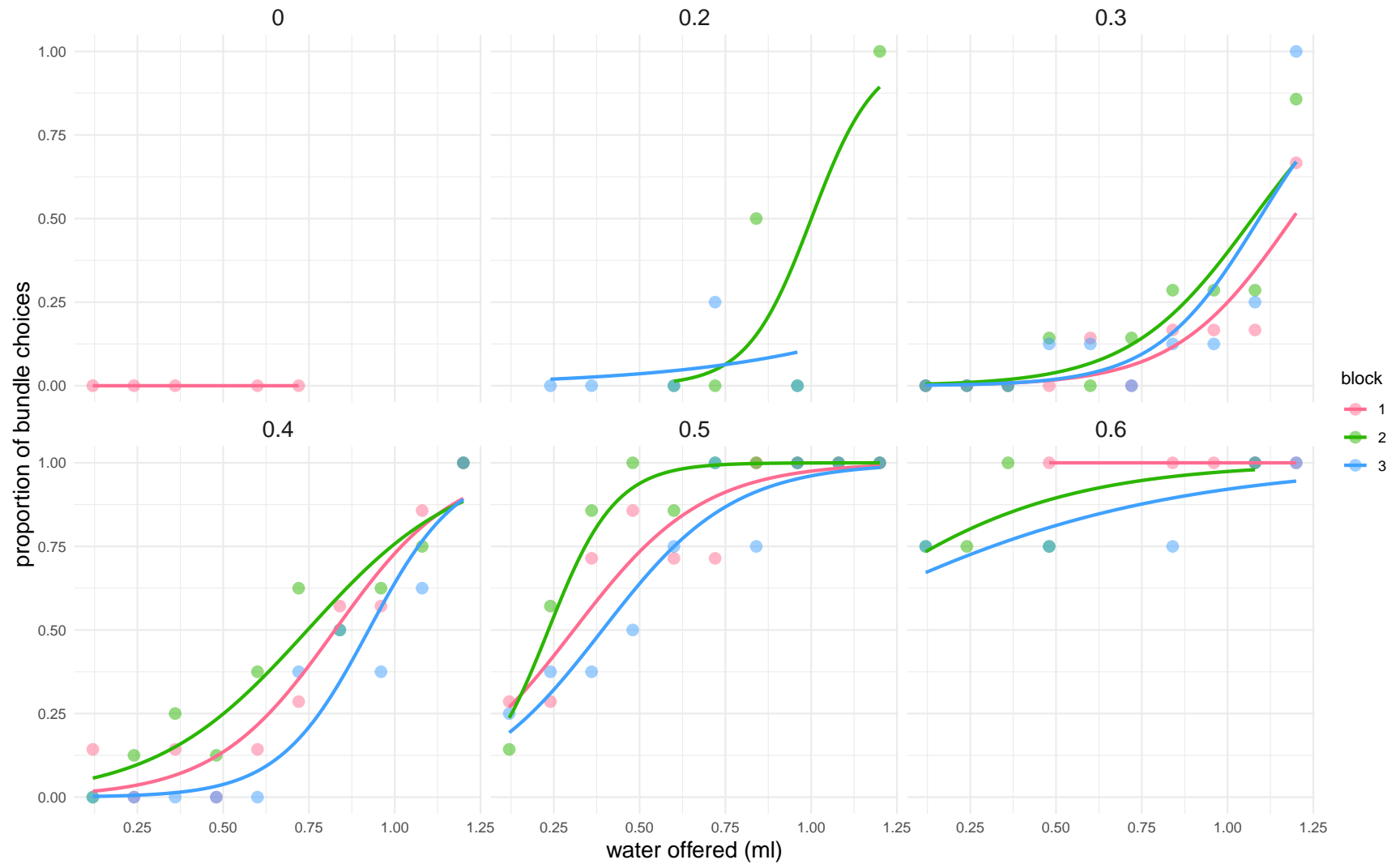
## Monkey Bundle Choice Binoimial Curves

Ulysses : 18-Apr-2018 – 20-Apr-2018



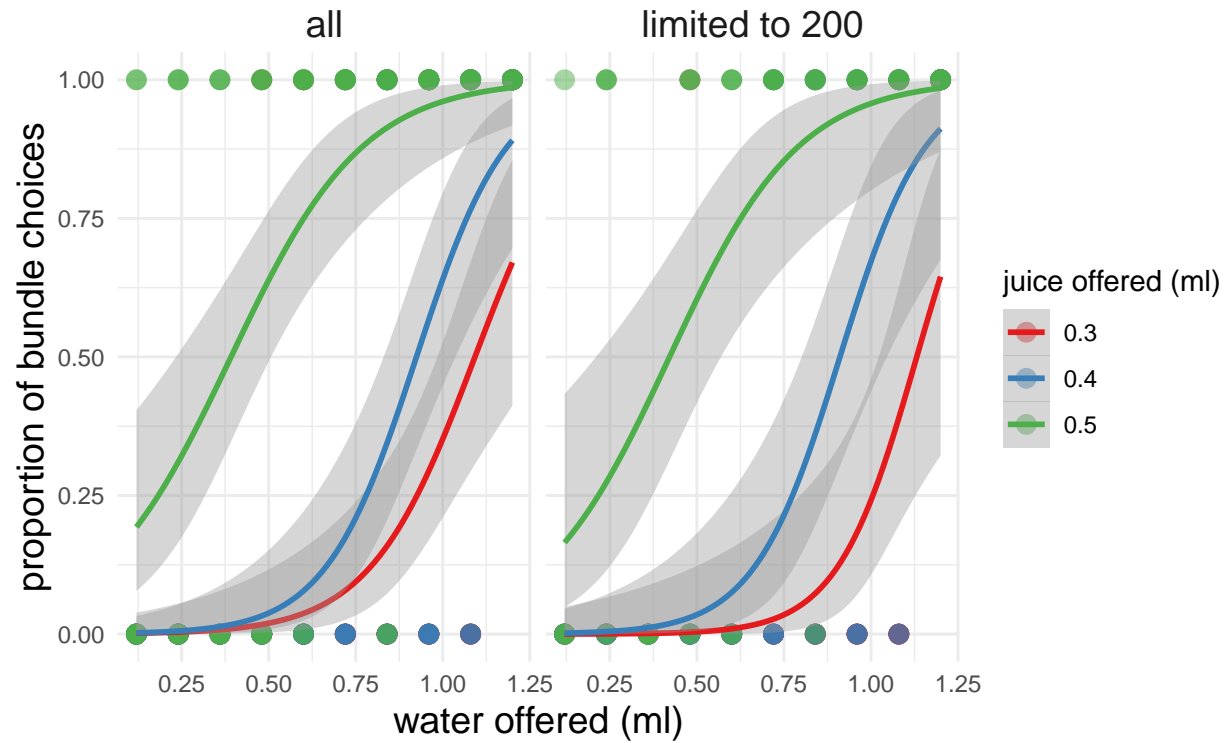
## Monkey Bundle Choice Binoimial Curves

Ulysses : 18-Apr-2018 – 20-Apr-2018



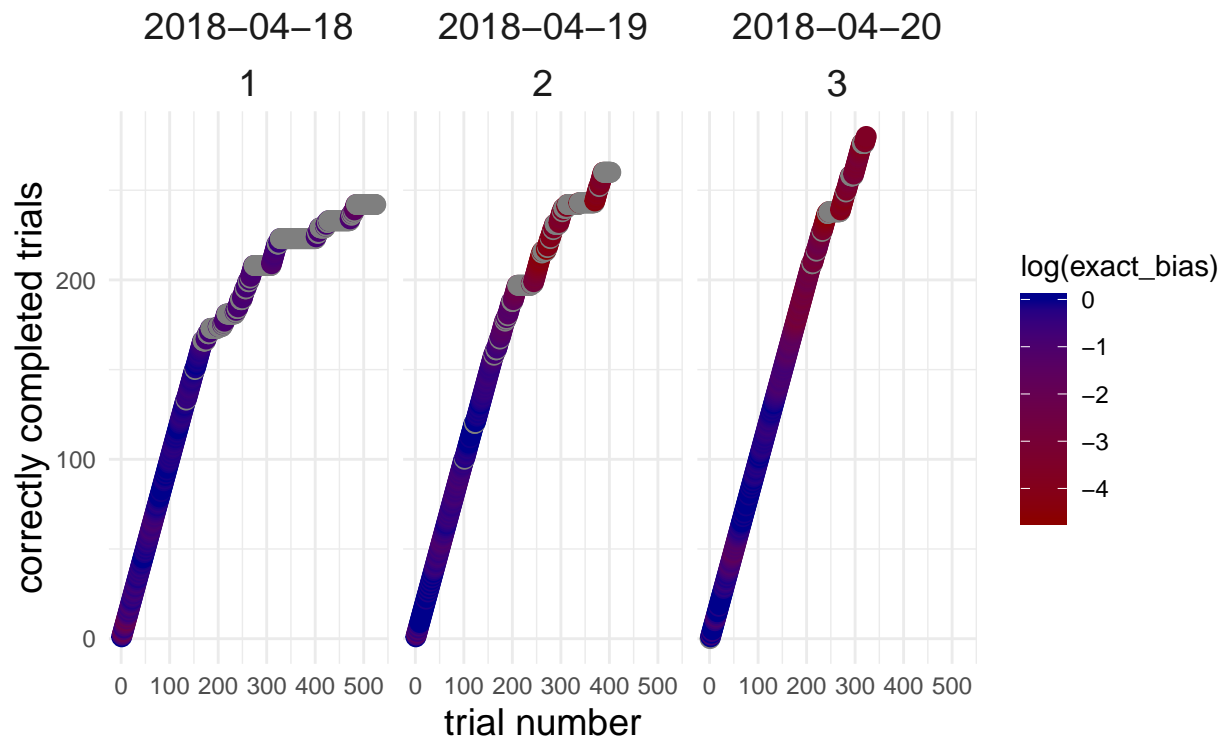
## Today's Monkey Bundle Choice Binoimial Curves

Ulysses : 20-Apr-2018



## Monkey Trial Progression and Bias

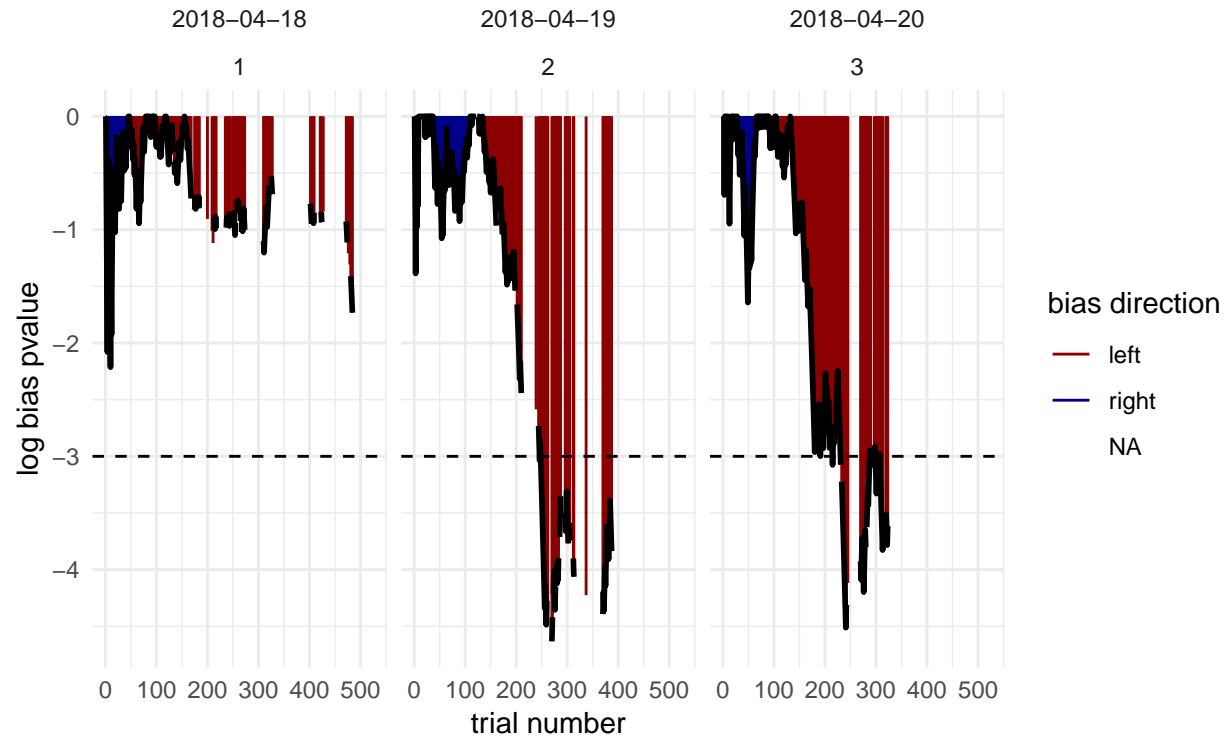
Ulysses : 18-Apr-2018 – 20-Apr-2018



p8

## Monkey Trial Progression and Bias

Ulysses : 18-Apr-2018 – 20-Apr-2018



p9

# Pooled Monkey Bundle Choice Binoimial Curves

Ulysses : 20-Apr-2018

