Binary Choice Analysis

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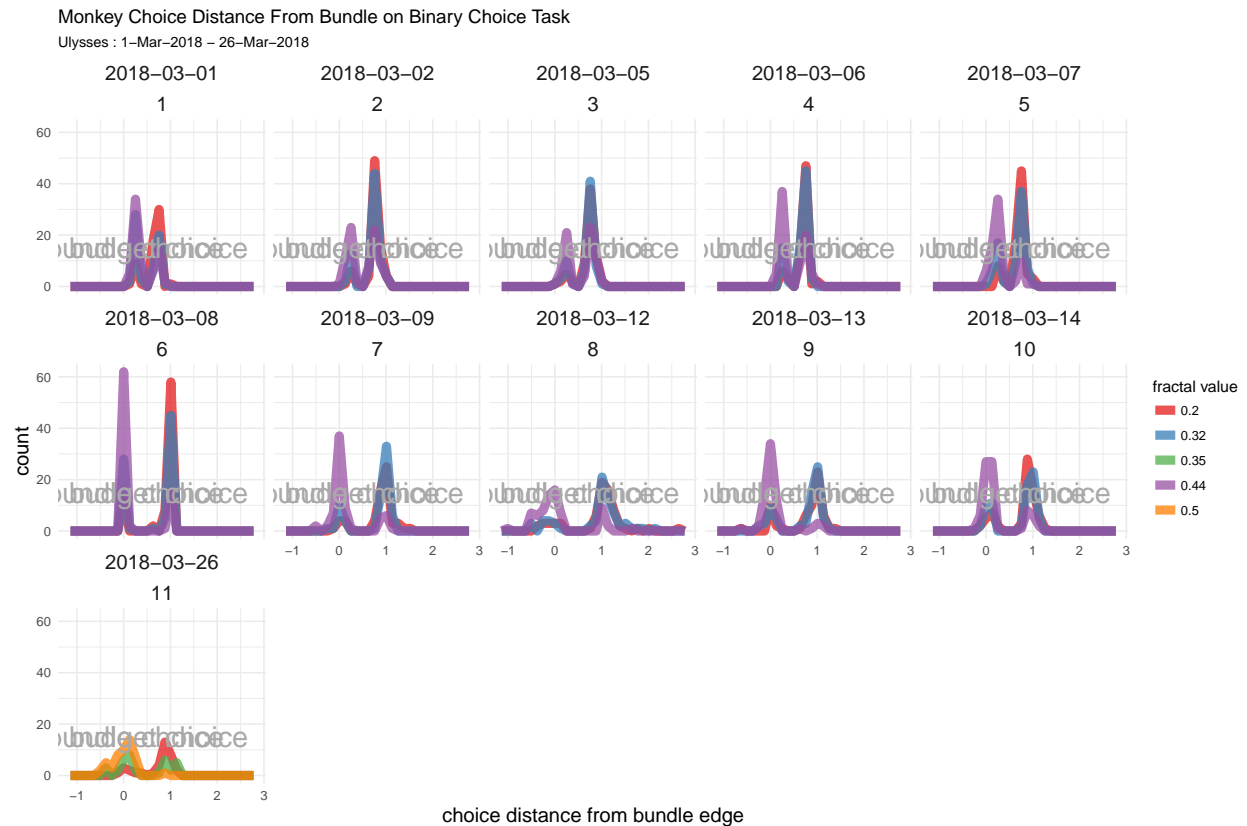
22 February 2018

```
monkey <- "Ulysses"
today <- "26-Mar-2018"
look_back <- "1-Mar-2018"

start_trial <- 0
stop_trial <- "all"

merge_days <- TRUE
```

p1

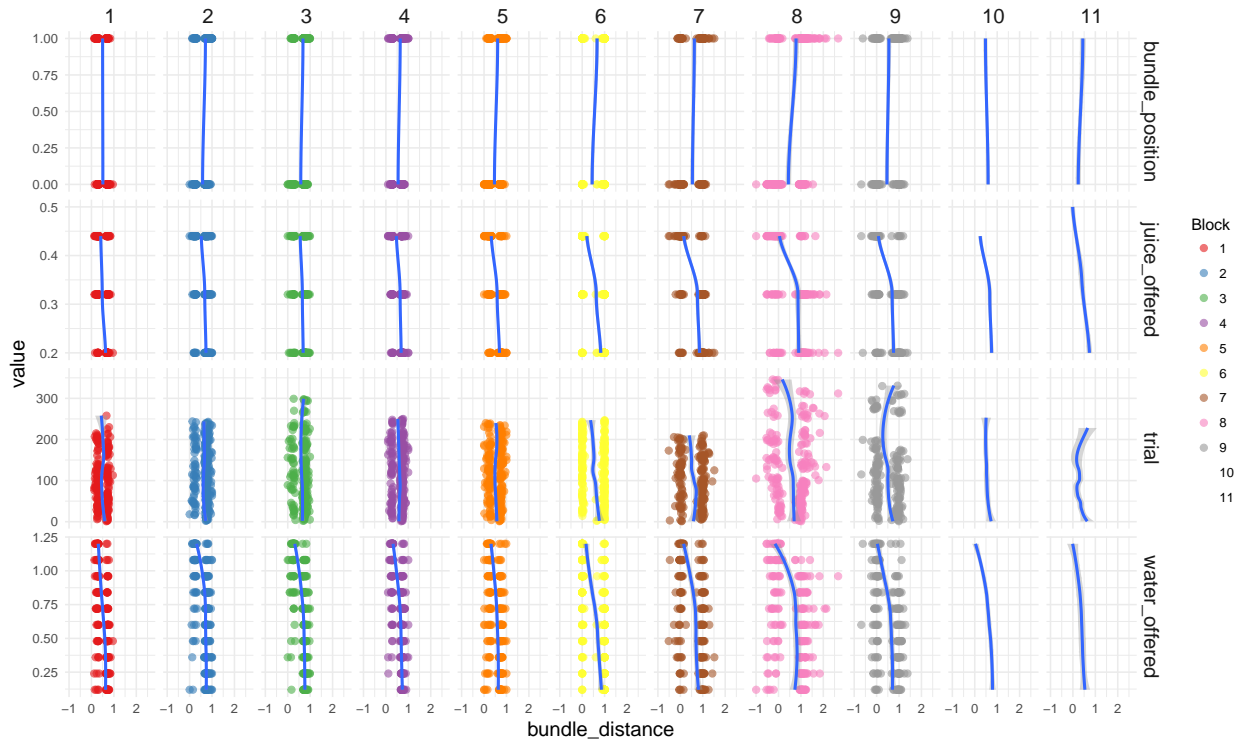Monkey Choice Distance From Bundle on Binary Choice Task
Ulysses : 1–Mar–2018 – 26–Mar–2018

choice distance from bundle edge

p2

Monkey Choice Distance From Bundle on Binary Choice Task
Ulysses : 1–Mar–2018 – 26–Mar–2018

```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
## -2.7723  -0.5273  -0.1401   0.4882   3.2252
## 
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -1.518e+03  2.021e+02  -7.514 5.73e-14 ***
## bundle_position -9.326e-01  1.277e-01  -7.303 2.82e-13 ***
## water_offered    5.450e+00  2.548e-01  21.391  < 2e-16 ***
## juice_offered    1.874e+01  8.705e-01  21.532  < 2e-16 ***
## trial            4.780e-03  8.391e-04   5.697 1.22e-08 ***
## date             8.567e-02  1.148e-02   7.465 8.32e-14 ***
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 3106.0  on 2305  degrees of freedom
## Residual deviance: 1645.4  on 2300  degrees of freedom
##   (850 observations deleted due to missingness)
## AIC: 1657.4
##
## 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(bund
## number of successes = 1272, number of trials = 2306, p-value =
## 7.831e-07
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.5310344 0.5720433
## sample estimates:
## probability of success
##               0.5516045
```

```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
## -3.13406  -0.25233   0.05239   0.31819   2.28487
##
## Coefficients: (1 not defined because of singularities)
##                            Estimate Std. Error z value Pr(>|z|)
## (Intercept)                -6.698980   1.650324  -4.059 4.92e-05 ***
## bundle_position             0.395591   0.687430   0.575 0.564977
## water_offered               6.185261   1.481074   4.176 2.96e-05 ***
## as.factor(juice_offered)0.35   3.193386   0.921399   3.466 0.000529 ***
```

```
## as.factor(juice_offered)0.5    7.686337    1.519365    5.059 4.22e-07 ***
## trial                          0.003018    0.005533    0.546 0.585395
## 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: 157.472  on 120  degrees of freedom
## Residual deviance:  60.274  on 115  degrees of freedom
##   (128 observations deleted due to missingness)
## AIC: 72.274
##
## Number of Fisher Scoring iterations: 7
```

```r
#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))])
## number of successes = 62, number of trials = 121, p-value = 0.8558
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.4198745 0.6042979
## sample estimates:
## probability of success
##               0.5123967
```

```r
p3
```

Monkey Choice Failures
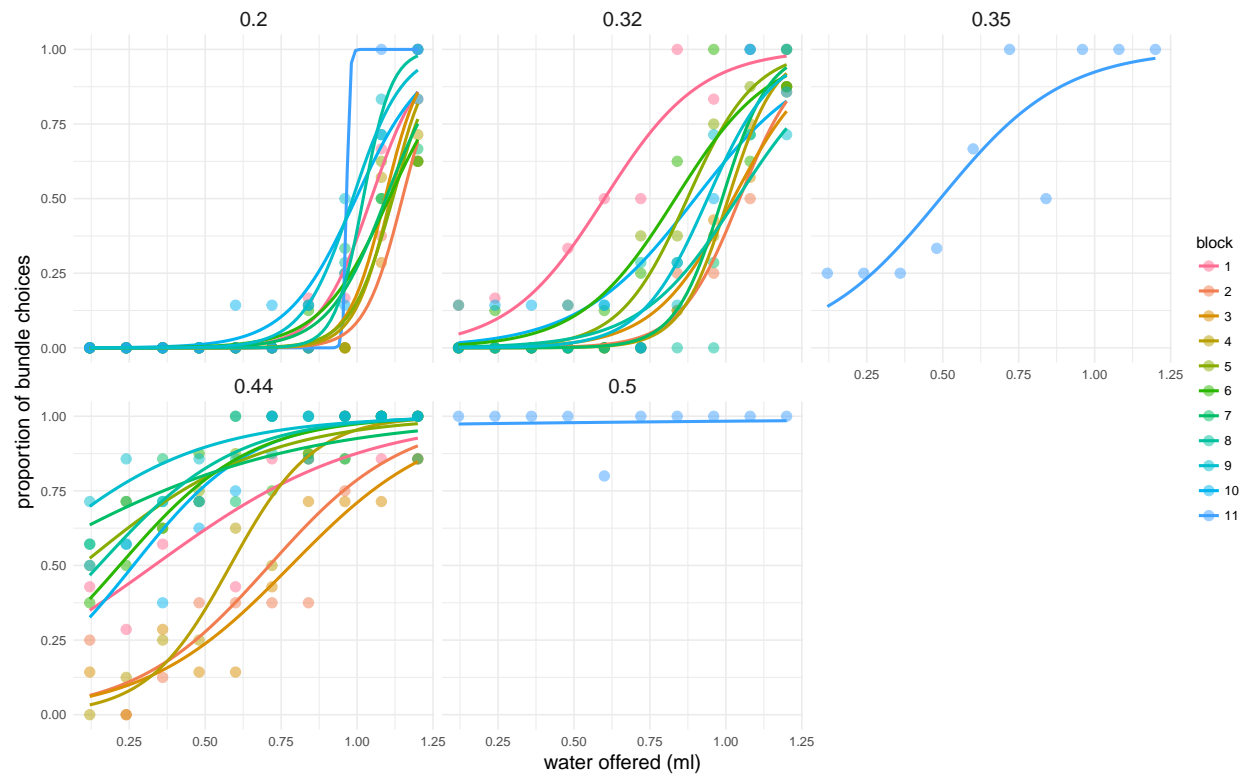
Ulysses : 1–Mar–2018 – 26–Mar–2018

factor(juice_offered)

p4

Monkey Bundle Choice Binoimial Curves

Ulysses : 1–Mar–2018 – 26–Mar–2018

proportion of bundle choices

water offered (ml)

juice offered (ml)
- 0.2
- 0.32
- 0.35
- 0.44
- 0.5

p5

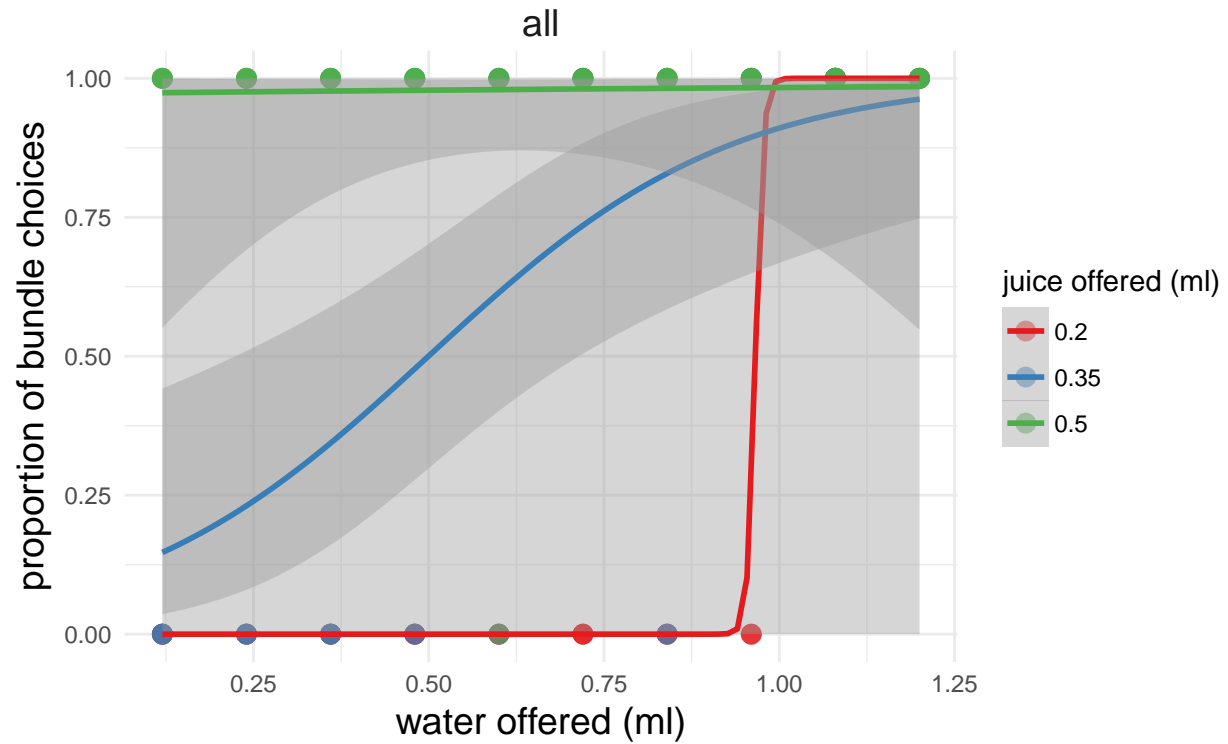## Monkey Bundle Choice Binoimial Curves

Ulysses : 1–Mar–2018 – 26–Mar–2018

p6

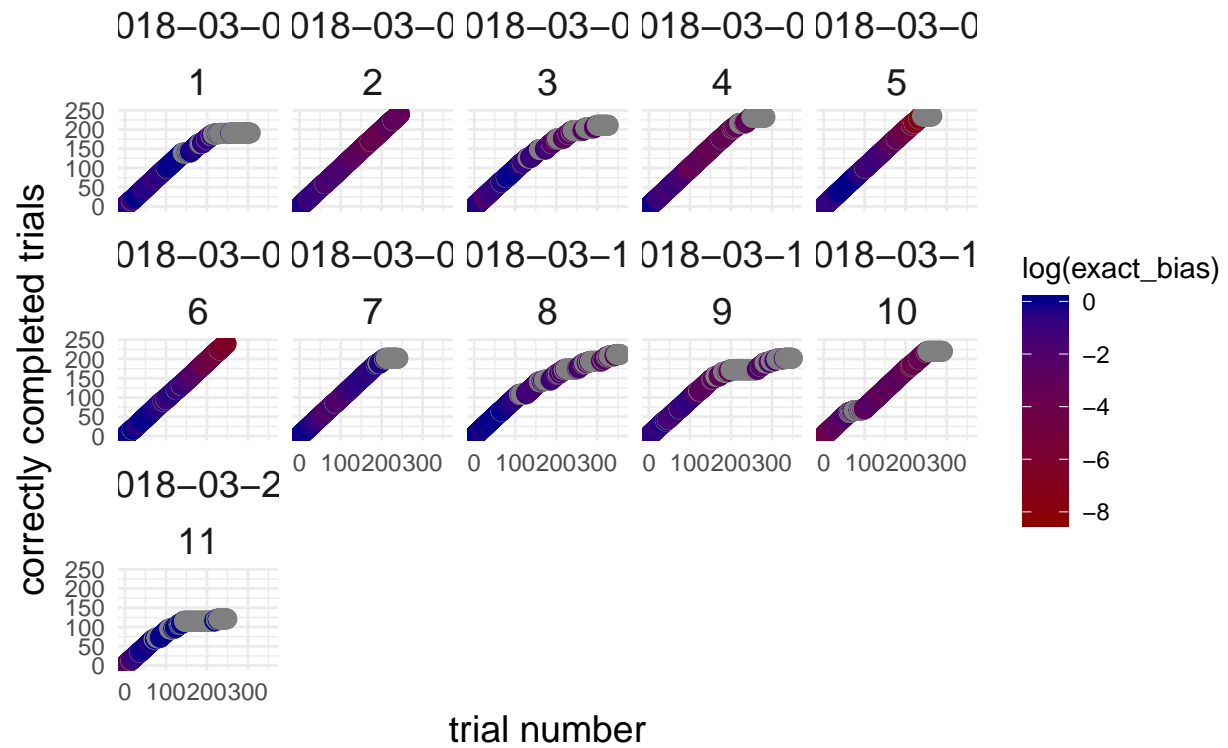# Today's Monkey Bundle Choice Binoimial Curves

Ulysses : 26−Mar−2018

all

p7

Monkey Trial Progression and Bias

Ulysses : 1–Mar–2018 – 26–Mar–2018

Monkey Trial Progression and Bias

Ulysses : 1–Mar–2018 – 26–Mar–2018