

Binary Choice Analysis

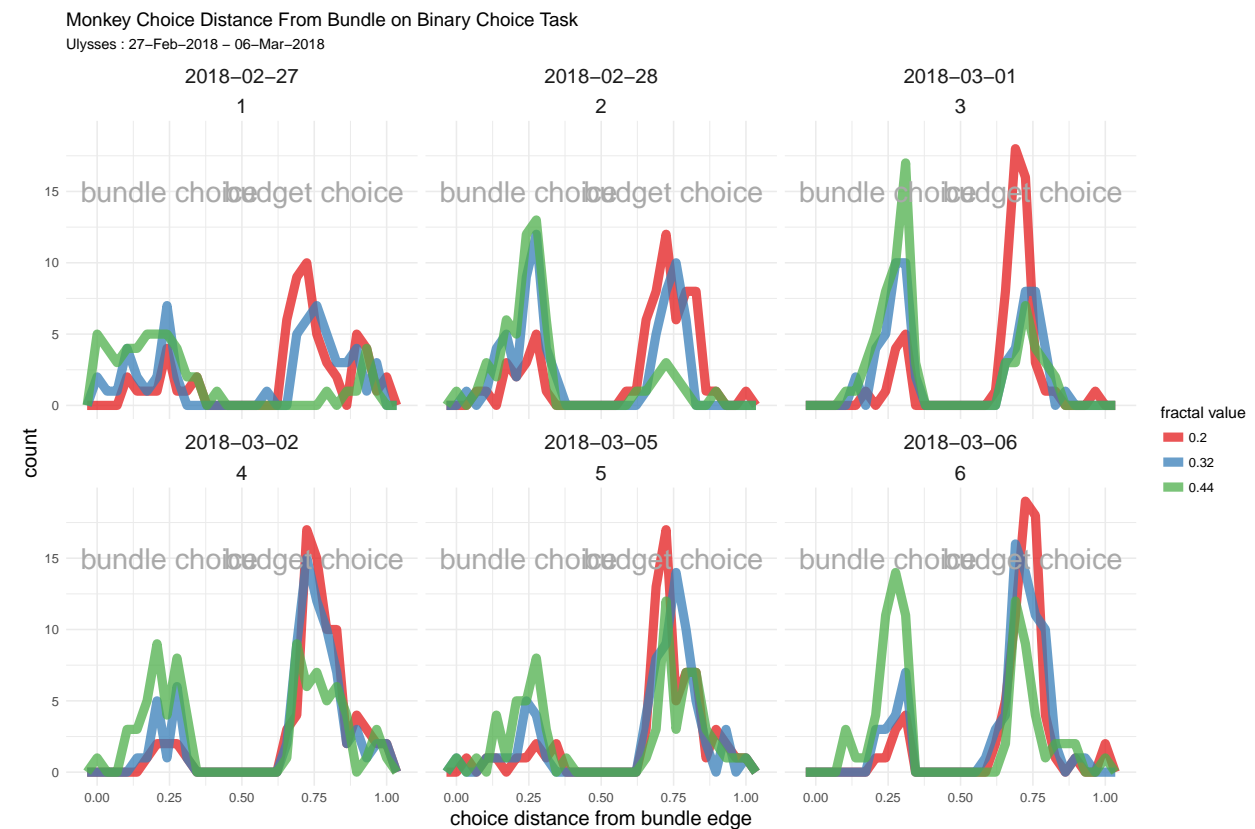
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22 February 2018

```
monkey <- "Ulysses"  
today <- "06-Mar-2018"  
look_back <- "27-Feb-2018"
```

```
start_trial <- 0  
stop_trial <- "all"
```

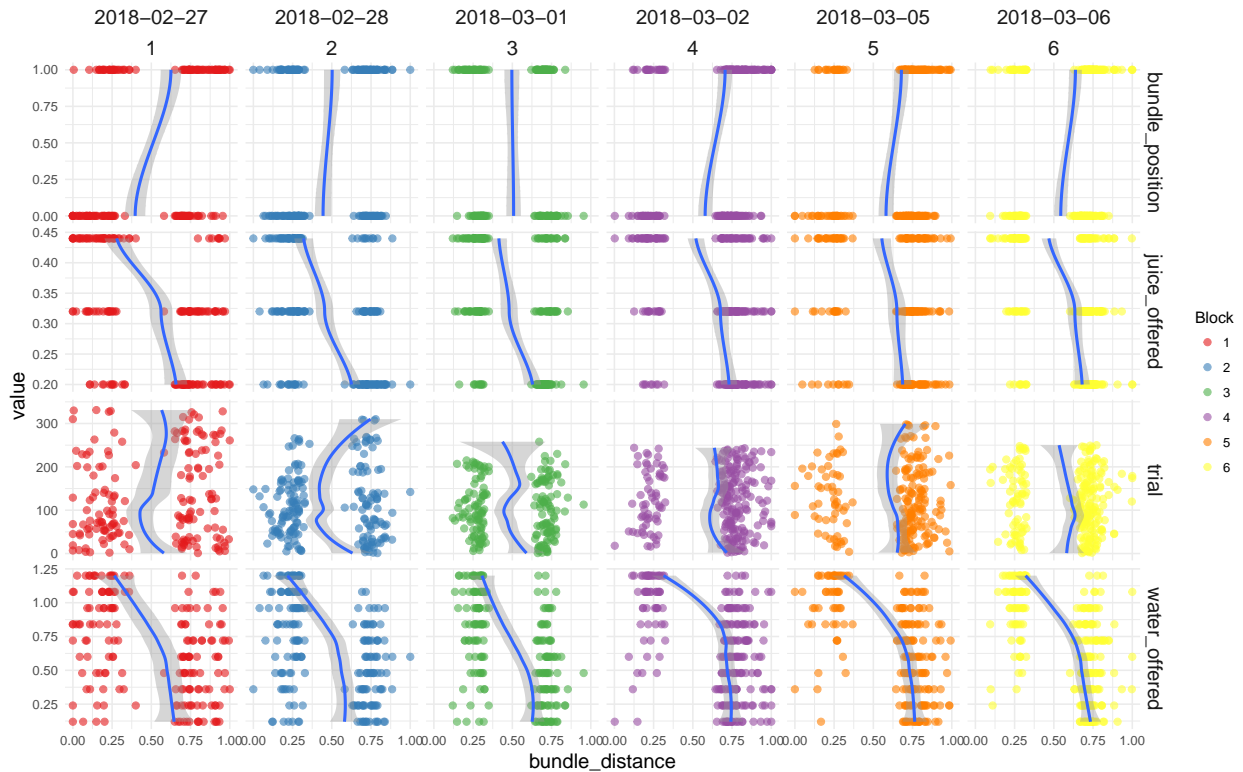
p1



p2

Monkey Choice Distance From Bundle on Binary Choice Task

Ulysses : 27-Feb-2018 - 06-Mar-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
## -2.6769  -0.5648  -0.1797   0.5069   2.8728
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)   5.111e+03  6.207e+02  8.235  < 2e-16 ***
## bundle_position -1.100e+00  1.714e-01 -6.421 1.36e-10 ***
## water_offered   5.389e+00  3.342e-01 16.123  < 2e-16 ***
## juice_offered   1.518e+01  1.075e+00 14.113  < 2e-16 ***
## trial          -3.388e-04  1.068e-03 -0.317   0.751
## date           -2.911e-01  3.529e-02 -8.247  < 2e-16 ***
## ---
```

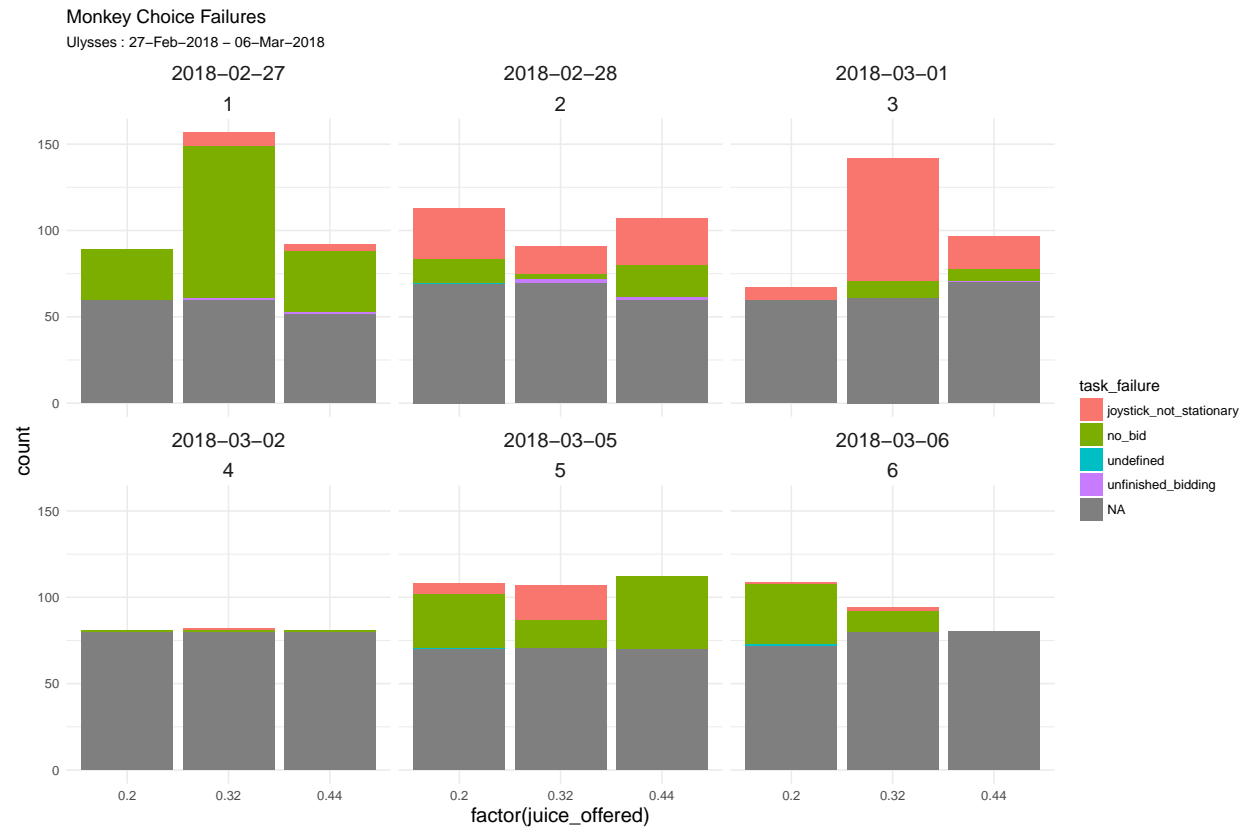
```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 1641.17  on 1244  degrees of freedom
## Residual deviance:  927.74  on 1239  degrees of freedom
##    (564 observations deleted due to missingness)
## AIC: 939.74
##
## Number of Fisher Scoring iterations: 6

#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 + 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 = dplyr::filter(task_data,
##      block_no == max(block_no)))
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.04710  -0.31333  -0.06311   0.16525   2.90132
##
## Coefficients: (1 not defined because of singularities)
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)   -16.064051    2.376021  -6.761 1.37e-11 ***
## bundle_position -1.725178    0.534221  -3.229 0.00124 **
## water_offered    9.612820    1.436255   6.693 2.19e-11 ***
## juice_offered   23.298627    3.924487   5.937 2.91e-09 ***
## trial           0.005185    0.003565   1.454 0.14585
## 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: 285.77  on 231  degrees of freedom
## Residual deviance: 109.20  on 227  degrees of freedom
##    (51 observations deleted due to missingness)
## AIC: 119.2
##
## Number of Fisher Scoring iterations: 7
```

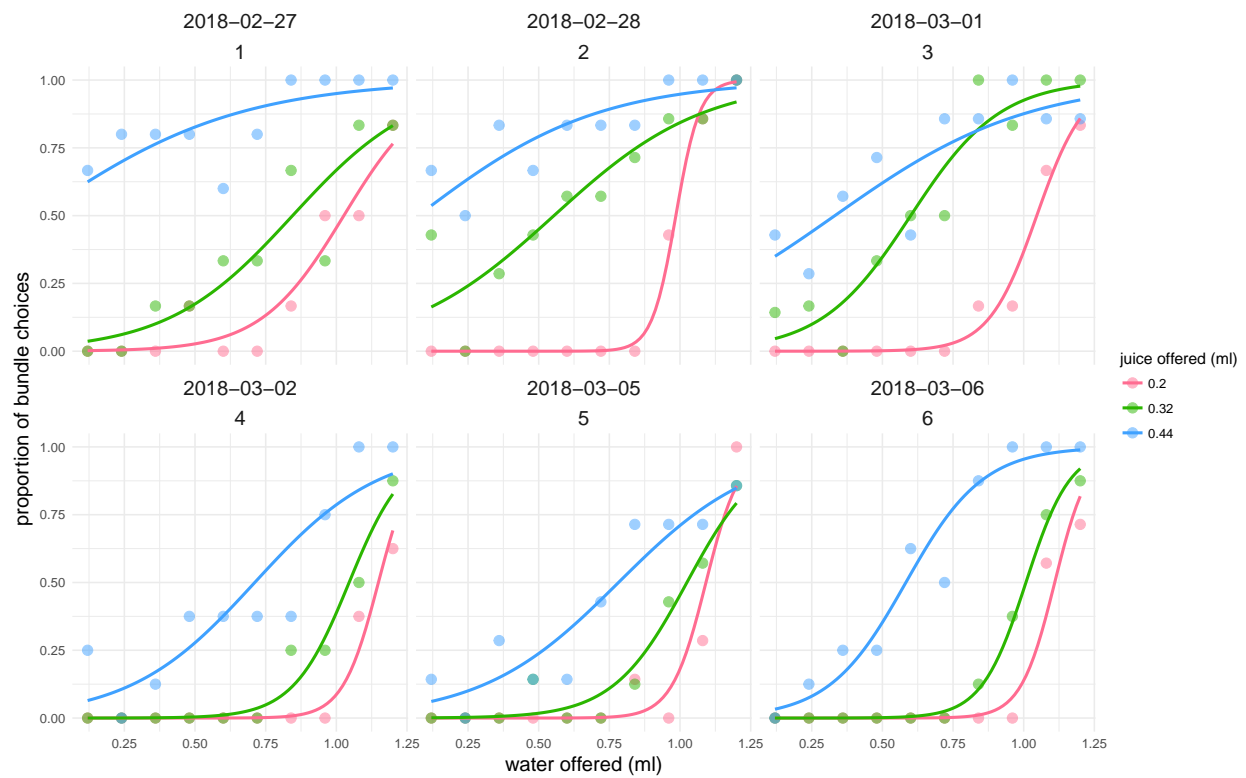
p3



p4

Monkey Bundle Choice Binoimial Curves

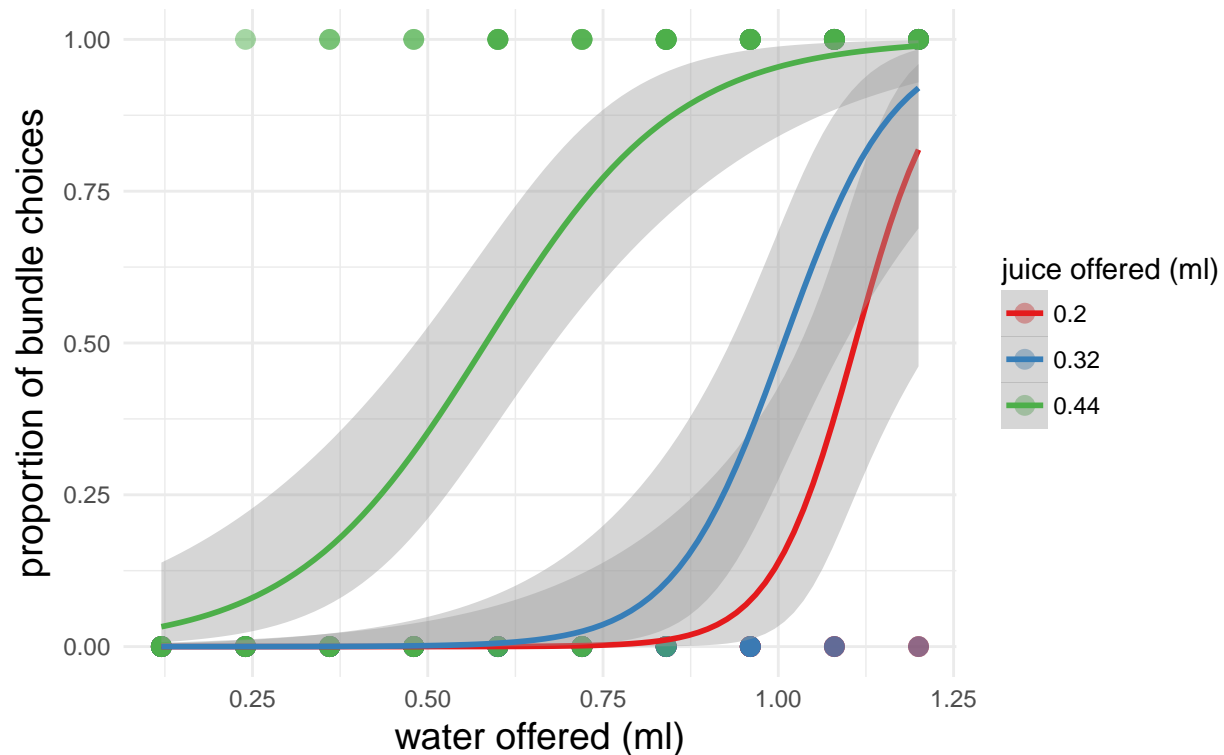
Ulysses : 27-Feb-2018 – 06-Mar-2018



p5

Today's Monkey Bundle Choice Binoimial Curves

Ulysses : 06-Mar-2018



```
p6 <- task_data %>%
  .[order(block_no, trial)] %>%
  .[,correct := cumsum(is.na(task_failure)), by = block_no] %>%
  .[bundle_position == fractal_choice, left_bid := 1] %>%
  .[bundle_position != fractal_choice, left_bid := -1] %>%
  .[!is.na(left_bid), leftward_bias := cumsum(left_bid) / trial, by = block_no] %>%
  #.[, res := rollapplyr(progression, 1:N, mean), by = block_no]
  ggplot(., aes(x = trial, y = correct)) +
  geom_point(size = 3, aes(colour = leftward_bias)) +
  scale_colour_gradient2(low = "darkred", high = "darkblue", midpoint = 0, mid = "purple") +
  xlab("trial number") +
  ylab("correctly completed trials") +
  ggtitle("Monkey Trial Progression and Bias",
    subtitle = paste(monkey, ":", look_back, "-", today)) +
  theme_minimal() +
  theme(strip.text.x = element_text(size = 14)) +
  theme(axis.title.x = element_text(size = 14)) +
  theme(axis.title.y = element_text(size = 14)) +
  facet_wrap(~date + block_no)
```

p6

Monkey Trial Progression and Bias

Ulysses : 27-Feb-2018 – 06-Mar-2018

