

# Binary Choice Analysis

*Robert Hickman*

Data shown for:

date

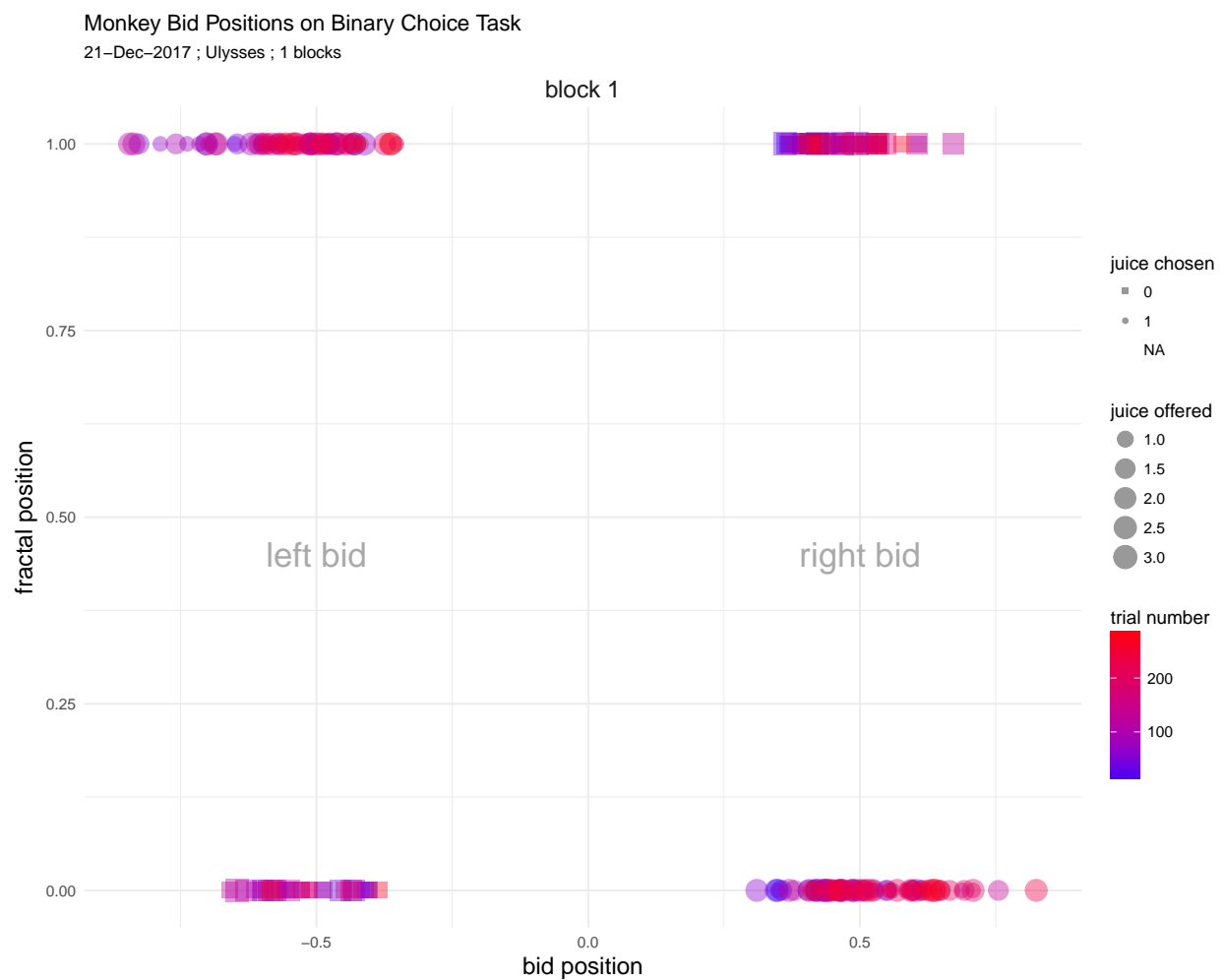
## [1] "21-Dec-2017"

monkey

## [1] "Ulysses"

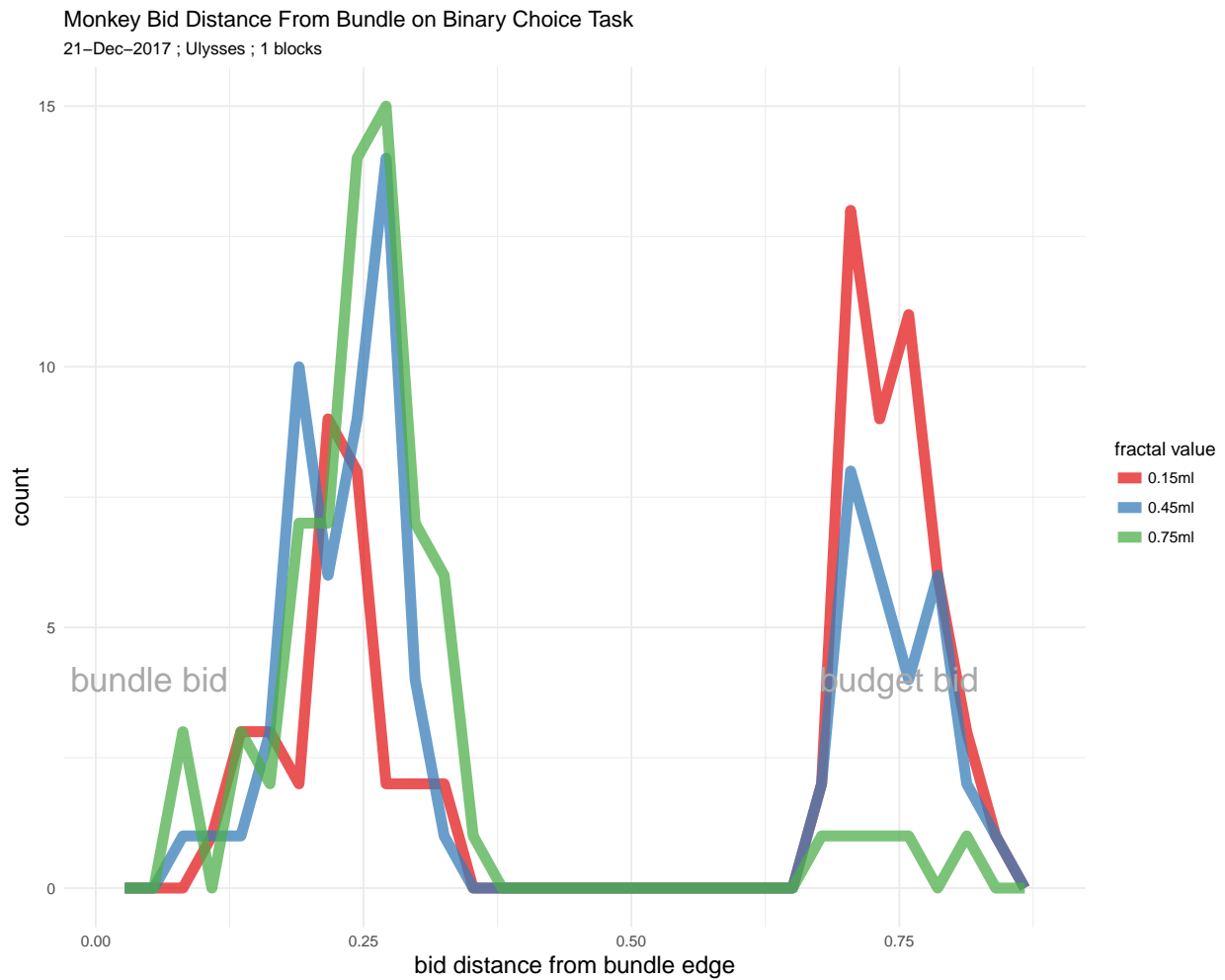
*#plot p1*

p1



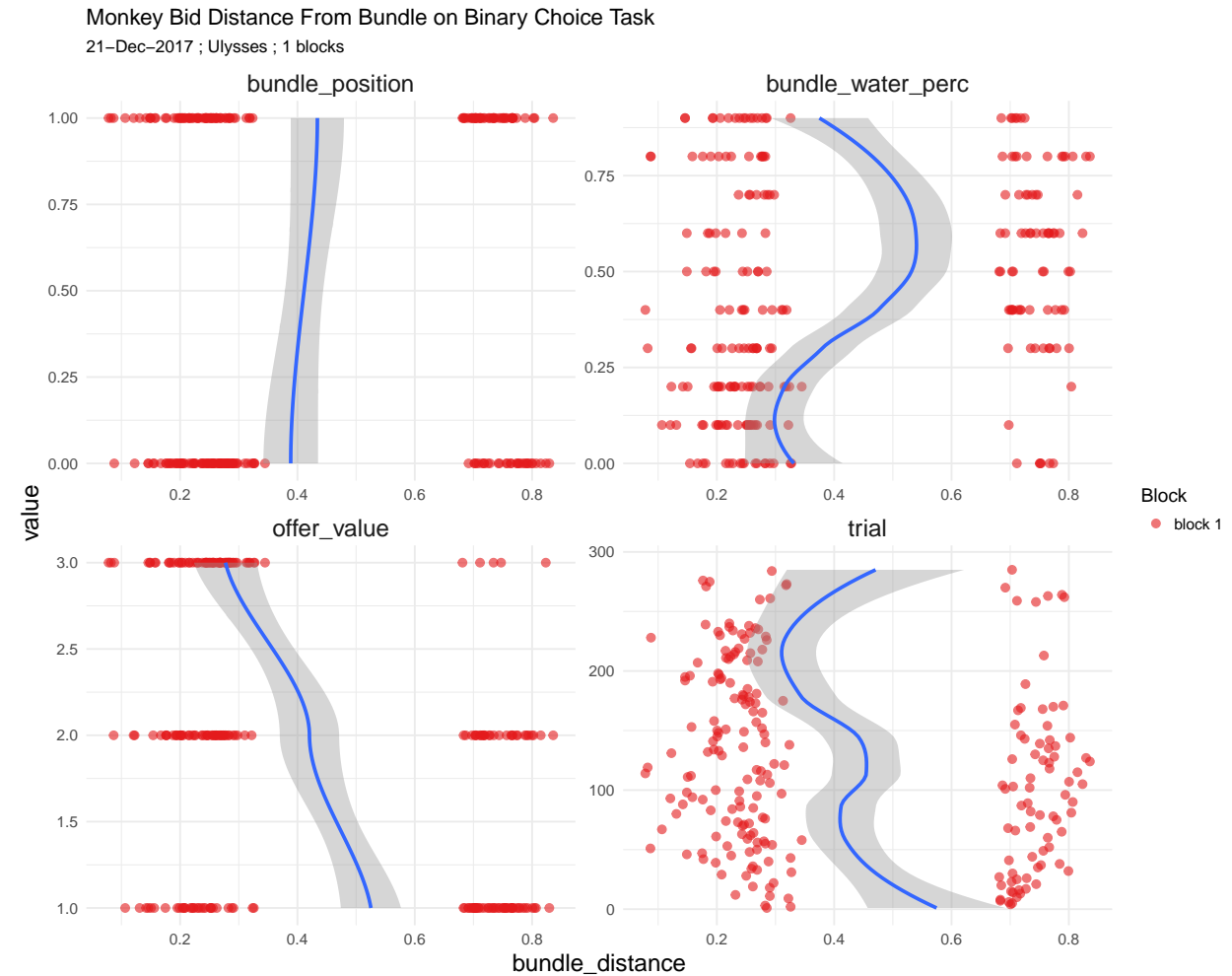
Graph of choices for each block. Circles indicate bid selecting the bundle, squares are bid selecting the budget. A fractal bid position of 1 means that the bundle is on the left hand side of the screen. Bids range from -1 (all the way to the left) to 1 (all the way to the right)

#plot p2  
p2



Graph showing all choices and how far away they are from the edge of the screen on the bundle side. 0 indicates full movement to the bundle side of the screen and 1 represent full movement away. Count is over all blocks for all values of the fractal (in ml of juice).

```
#plot p3
p3
```



Graphs of various factors against the distance from the bundle side of the screen the monkey bids.

A bundle position of 1 indicates that the bundle is on the left hand side of the screen. A bundle water percentage of 1 indicates that the bundle contains no water [CHECK THIS- PRETTY SURE ITS CORRECT], whereas zero means it contains the full 1.2ml. Offer values of 1, 2, and 3 represent 0.15ml, 0.45ml, and 0.75mls of apple and mango juice (150ml in 950ml of water).

Fit lines use LOESS method.

```

#generate a model of likelihood to bid for the fractal dependent on it's position,
#value and associated water
model <- glm(data = task_data,
             fractal_bid ~ bundle_position + bundle_water_perc + offer_value + trial,
             family = "binomial")

#summarise the parameters
summary(model)

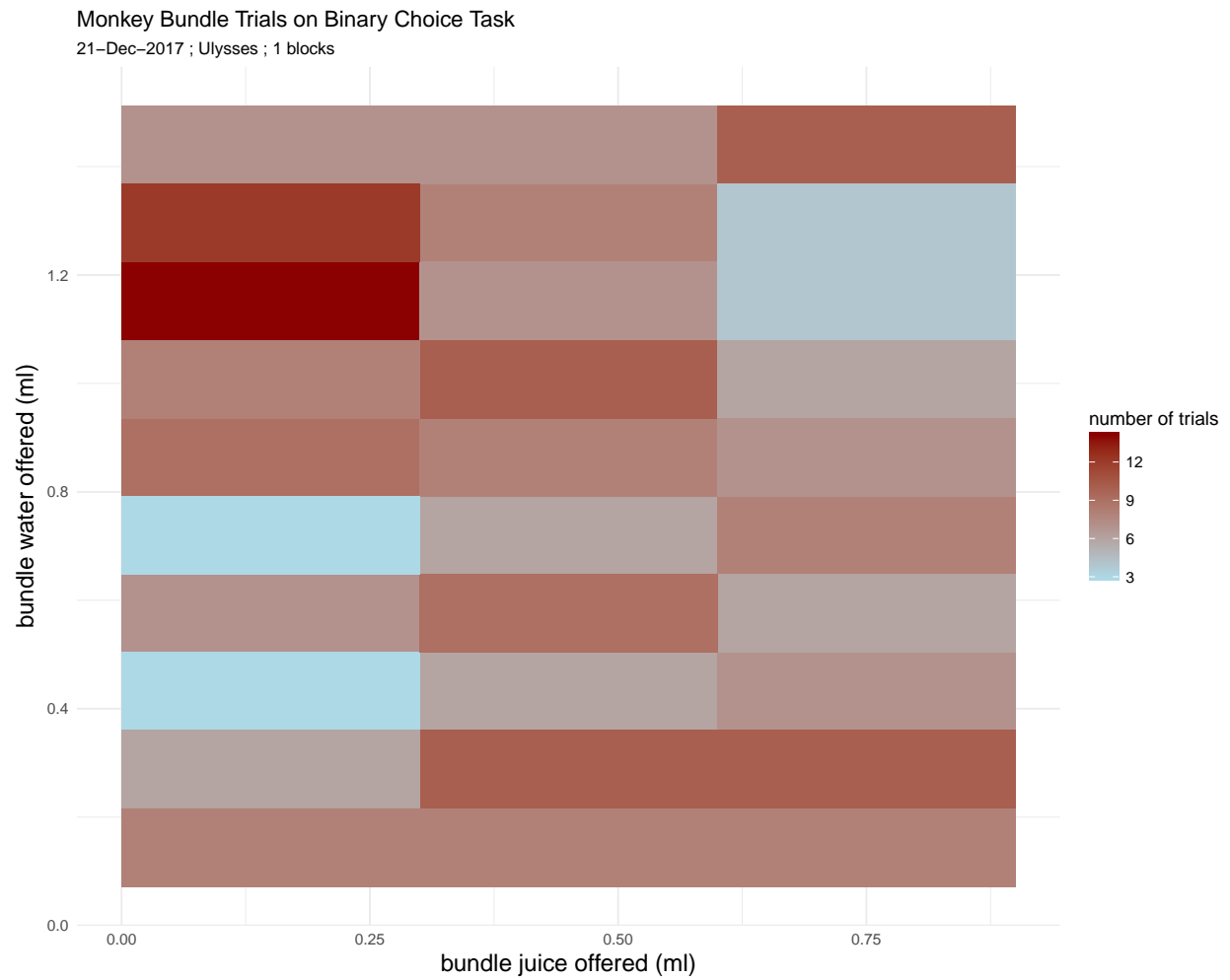
```

```

##
## Call:
## glm(formula = fractal_bid ~ bundle_position + bundle_water_perc +
##      offer_value + trial, family = "binomial", data = task_data)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.3282  -0.7109   0.2831   0.6959   1.7927
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)   -1.357044   0.564316  -2.405  0.01618 *
## bundle_position  -0.939366   0.362475  -2.592  0.00955 **
## bundle_water_perc -3.776635   0.727891  -5.188 2.12e-07 ***
## offer_value      1.803499   0.279801   6.446 1.15e-10 ***
## trial           0.008132   0.002502   3.250  0.00115 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 292.52  on 225  degrees of freedom
## Residual deviance: 200.29  on 221  degrees of freedom
##      (65 observations deleted due to missingness)
## AIC: 210.29
##
## Number of Fisher Scoring iterations: 5

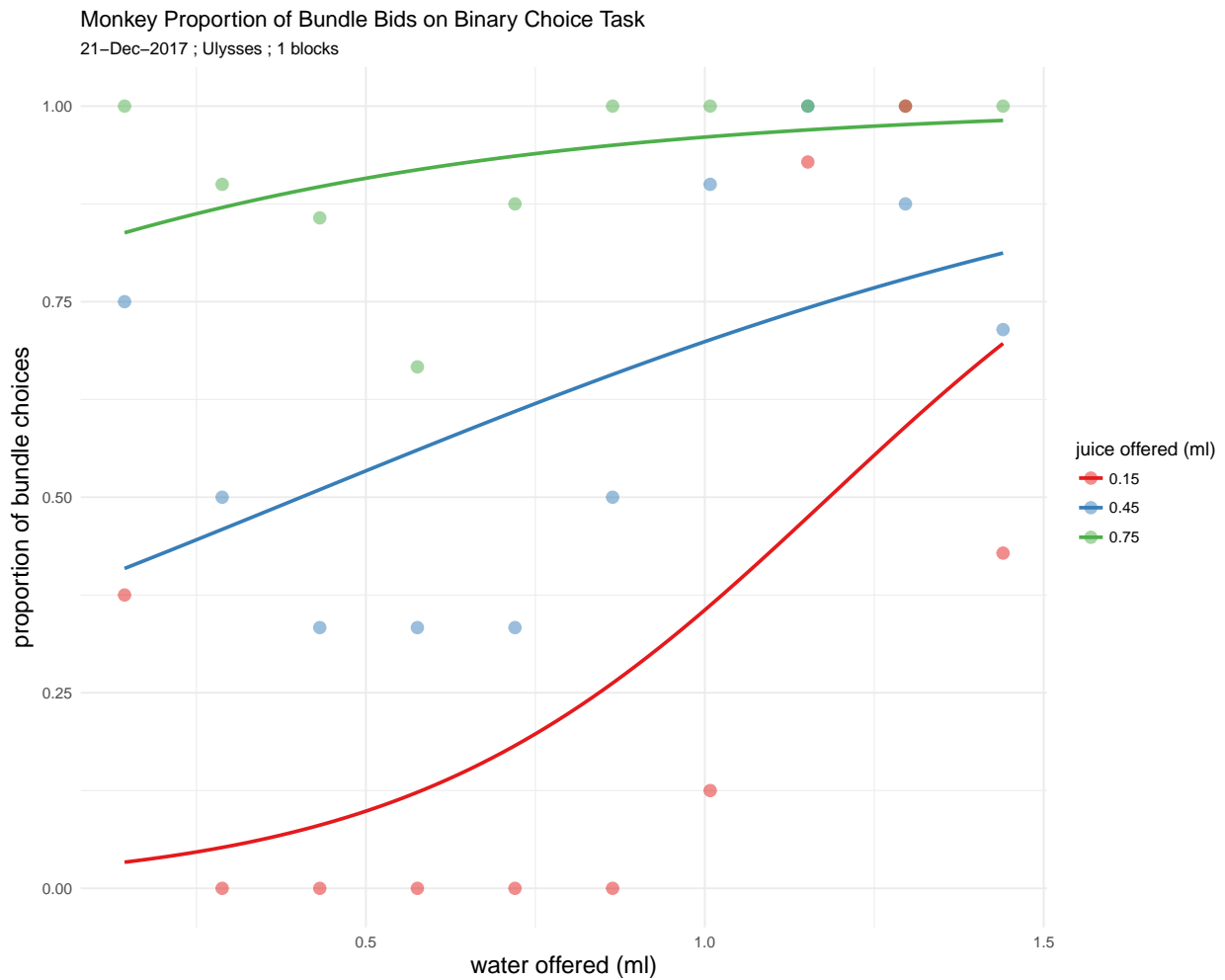
```

#plot p4  
p4



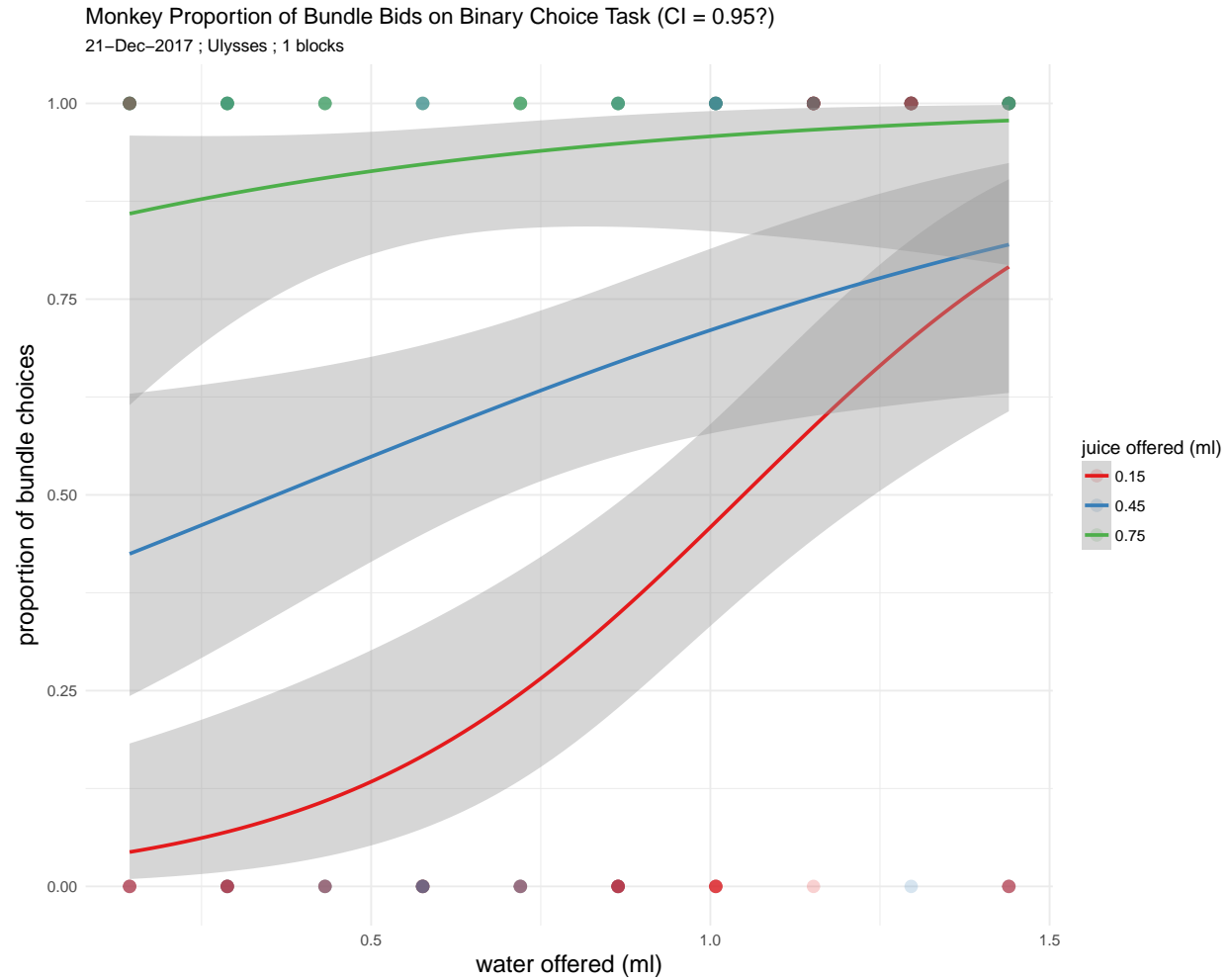
Graph showing the number of trials the monkey carried out for each bundle combination. Does not include failed trials.

#plot p5  
p5



Graph showing the proportion of bids for the bundle that a monkey makes, separated by the values of the juice offered in the bundles. Fits using a binomial glm model.

p6



Same graph as above but with 95% confidence intervals. Uses the default method of calculating this for the tidyverse libraries in R which I'm not convinced are the best way. Looking into calculating and plotting it myself.