Binary Choice Analysis

Robert Hickman

Data shown for:

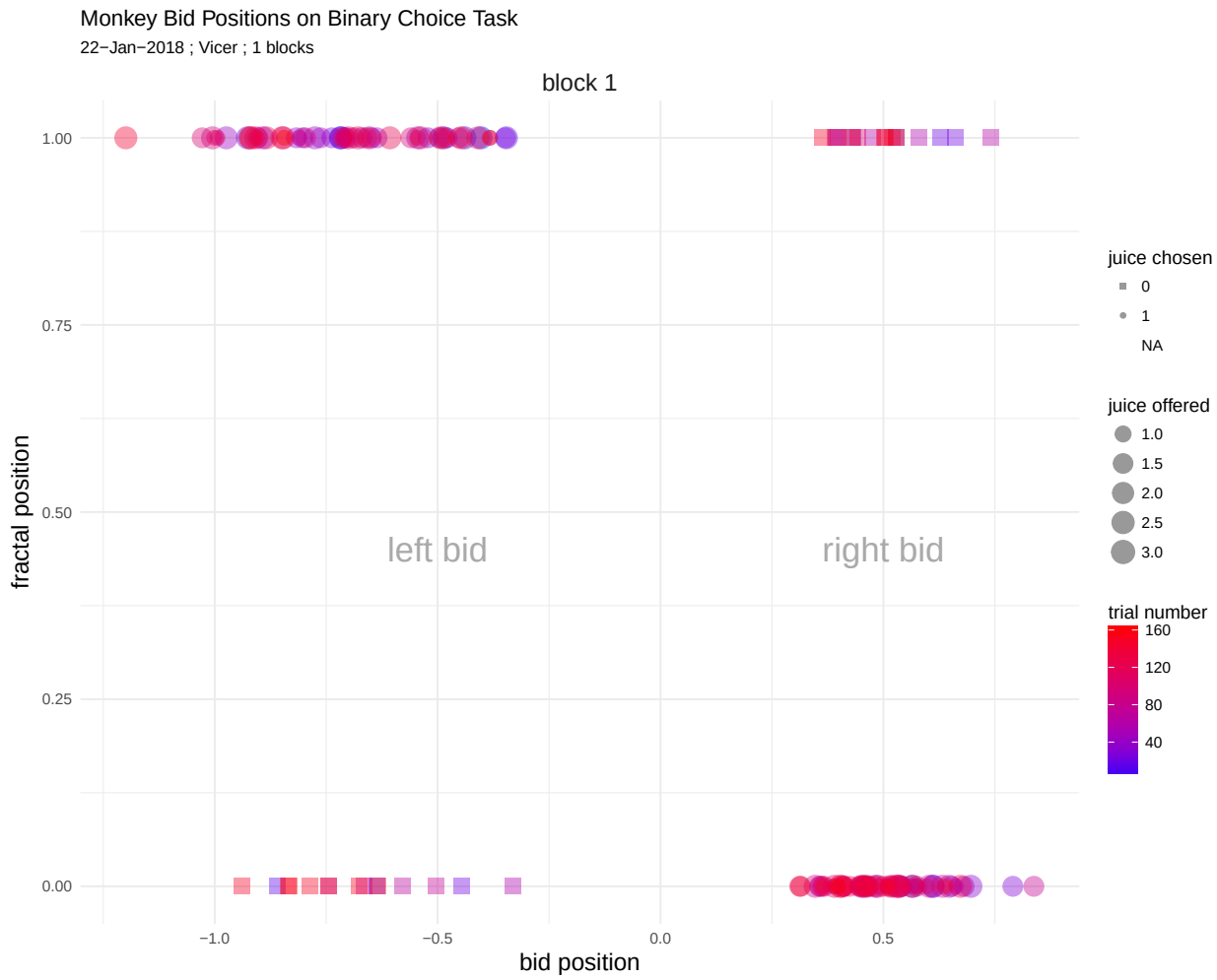
```
date
```

```
## [1] "22-Jan-2018"
```

```
monkey
```

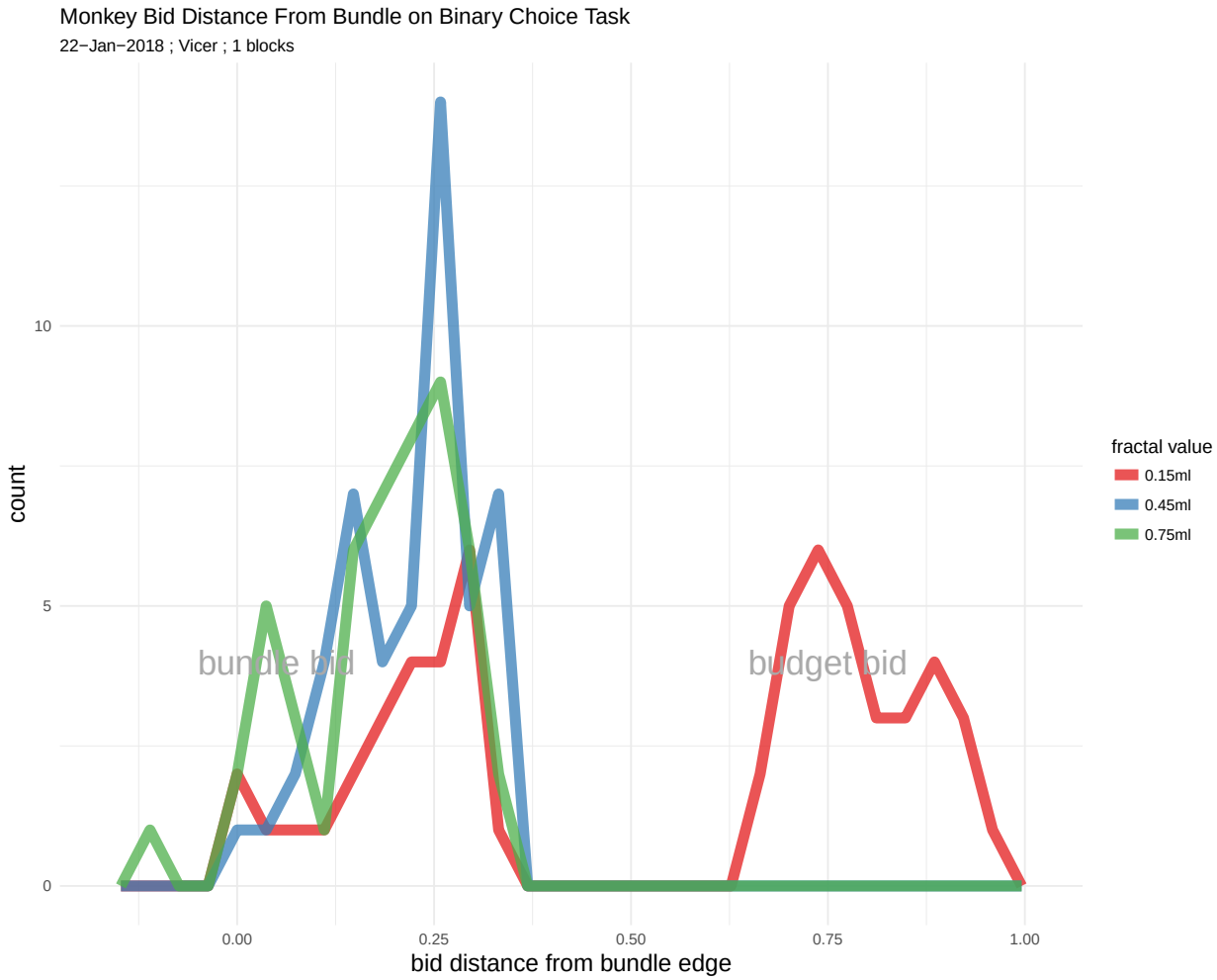
```
## [1] "Vicer"
```

```
#plot p1
p1
```



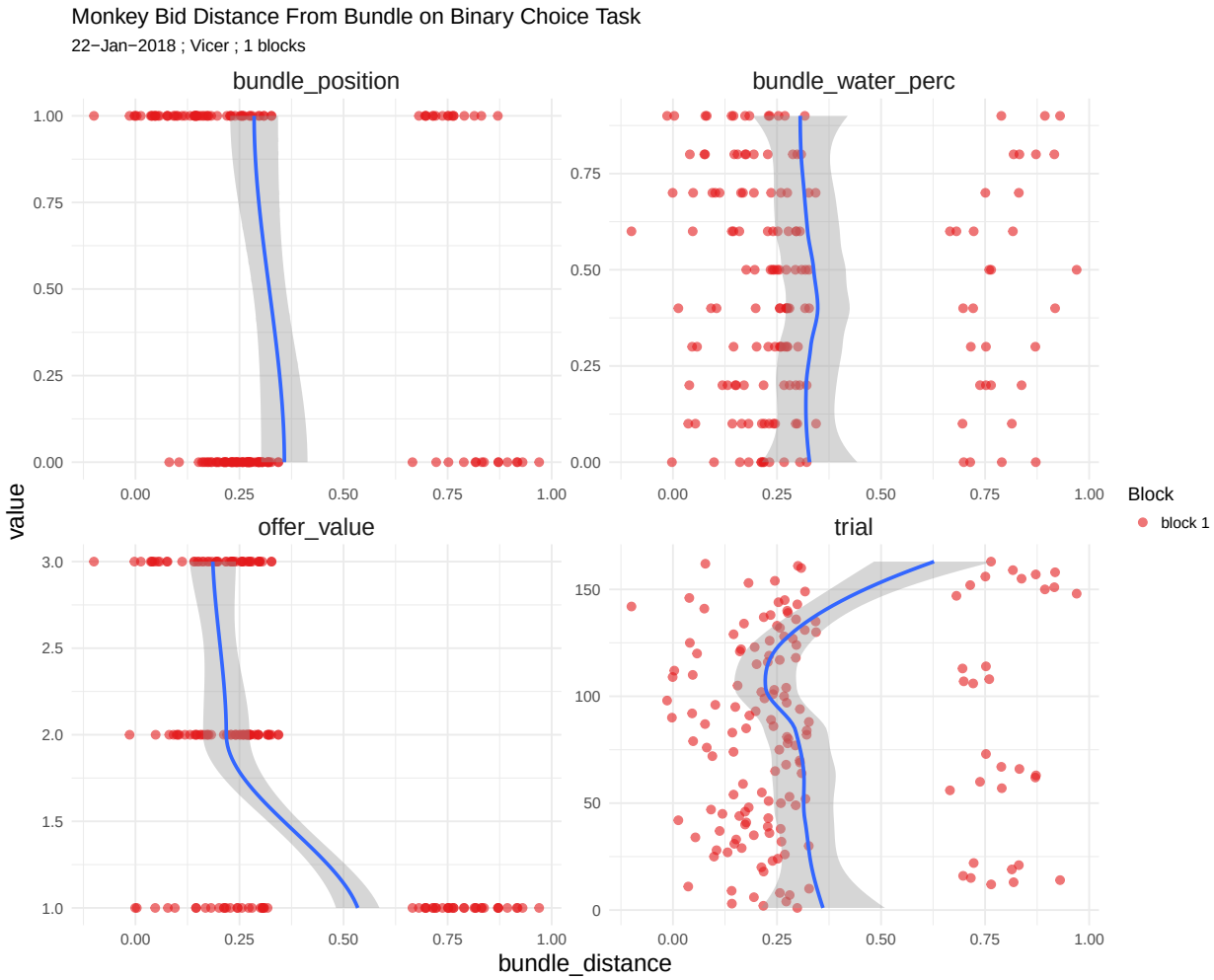
Graph of choices for each block. Circles indicate bid selecting the bundle, squares are bid selecting the budget. A fractal bid position of 1 means that the bundle is on the left hand side of the screen. Bids range from -1 (all the way to the left) to 1 (all the way to the right)

```
#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).

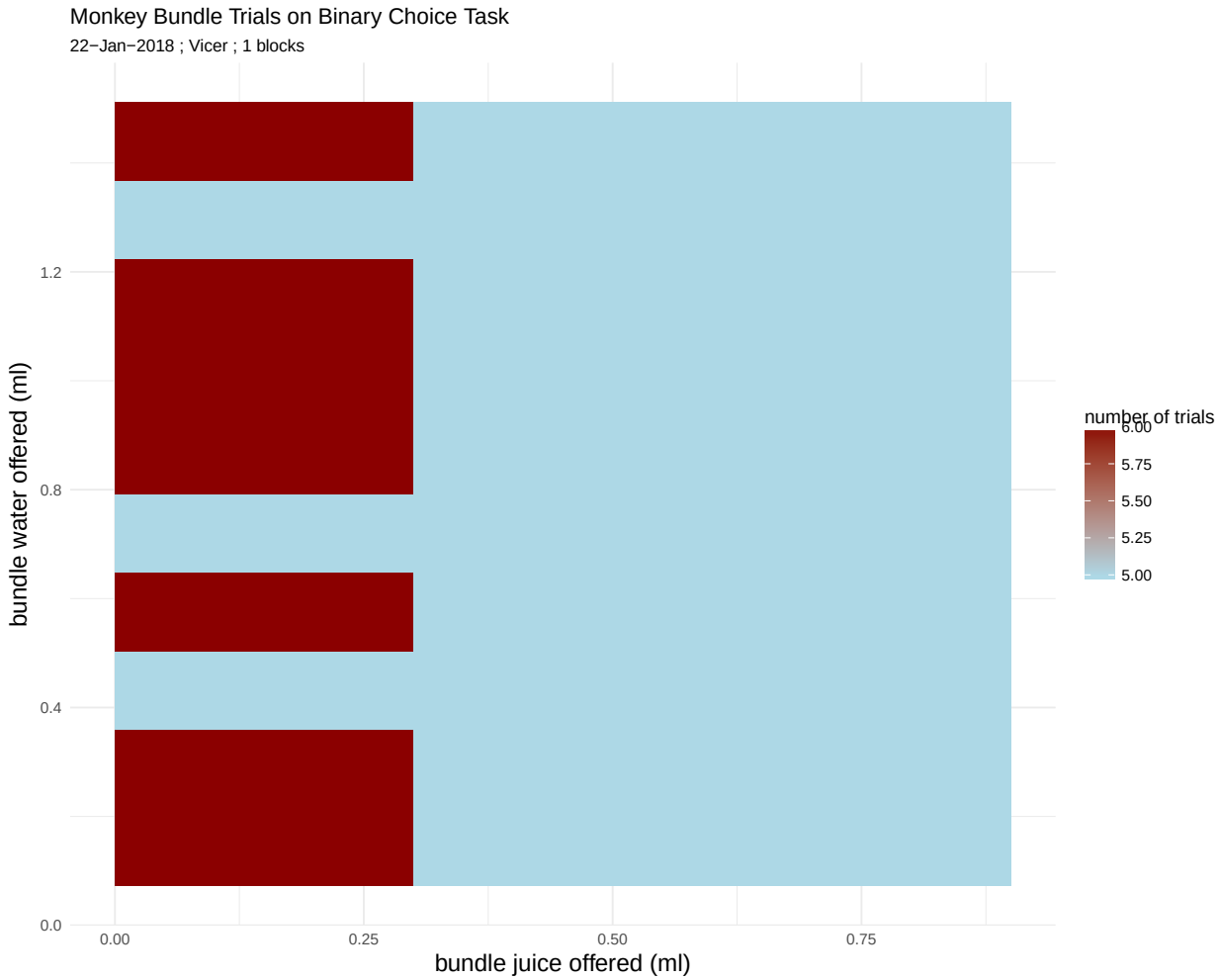
Fit lines use LOESS method.

```r
#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)
```

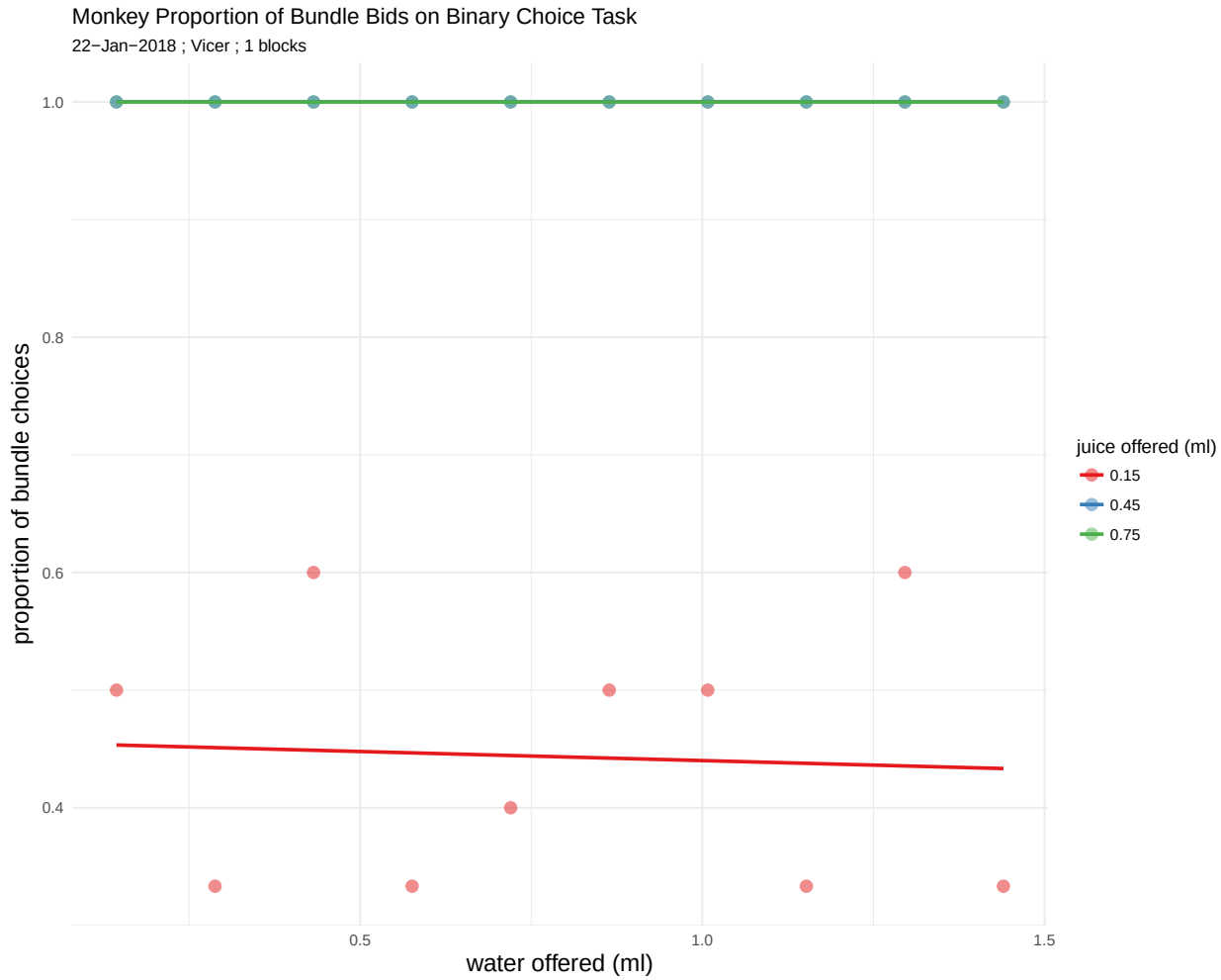
```
##
## Call:
## glm(formula = fractal_bid ~ bundle_position + bundle_water_perc +
##     offer_value + trial, family = "binomial", data = task_data)
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -1.23625   0.00000   0.00000   0.00007   1.42041
##
## Coefficients:
##                      Estimate Std. Error z value Pr(>|z|)
## (Intercept)       -2.057e+01  2.003e+03  -0.010    0.992
## bundle_position   -5.361e-01  5.418e-01  -0.989    0.322
## bundle_water_perc  1.600e-01  9.332e-01   0.171    0.864
## offer_value        2.041e+01  2.003e+03   0.010    0.992
## trial              1.074e-03  5.349e-03   0.201    0.841
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 158.776  on 156  degrees of freedom
## Residual deviance:  77.113  on 152  degrees of freedom
##   (6 observations deleted due to missingness)
## AIC: 87.113
##
## Number of Fisher Scoring iterations: 20
```

```
#plot p4
p4
```



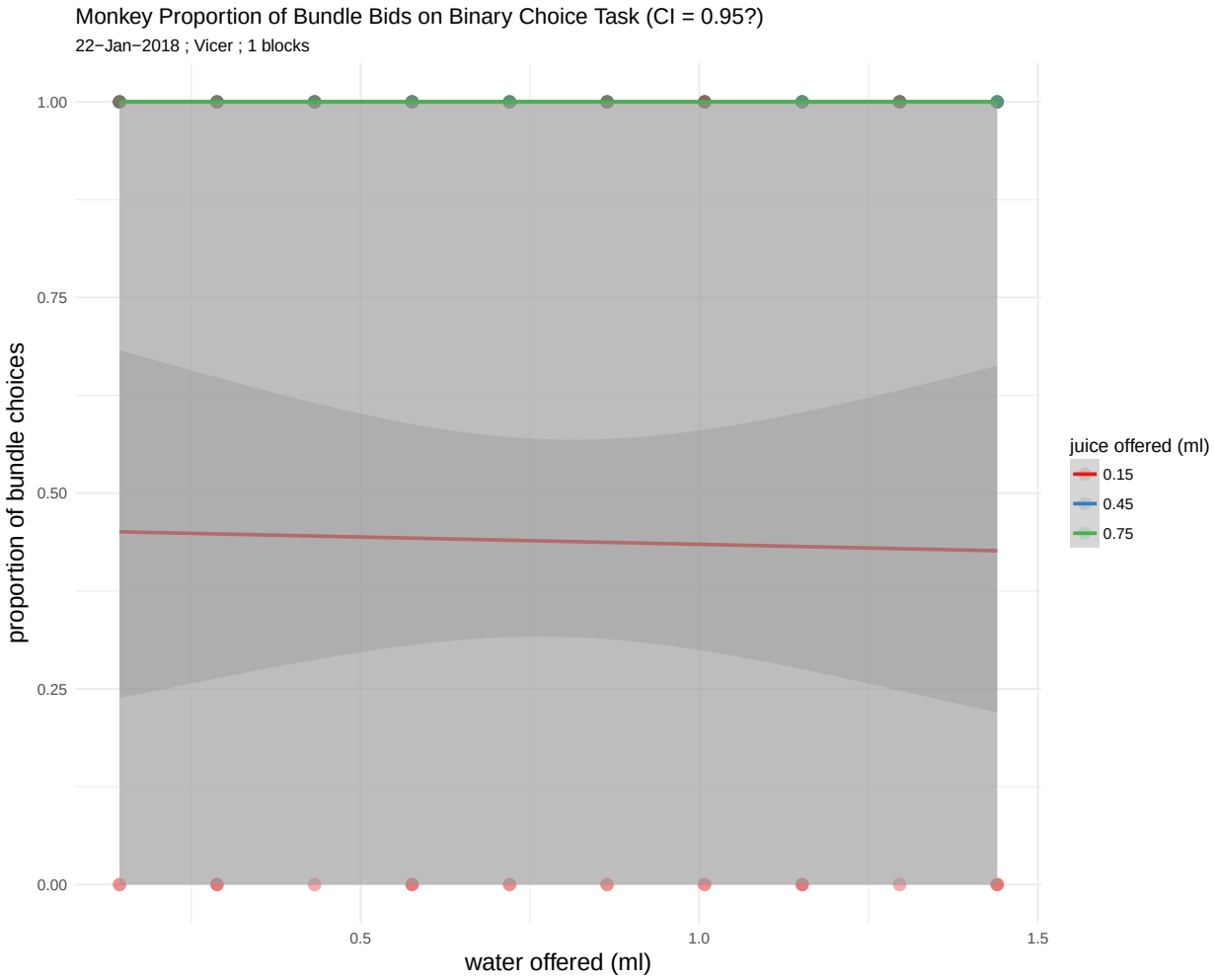
Graph showing the number of trials the monkey carried out for each bundle combination. Does not include failed trials.

```
#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.