

Binary Choice Analysis

Robert Hickman

Data shown for:

```
dates
```

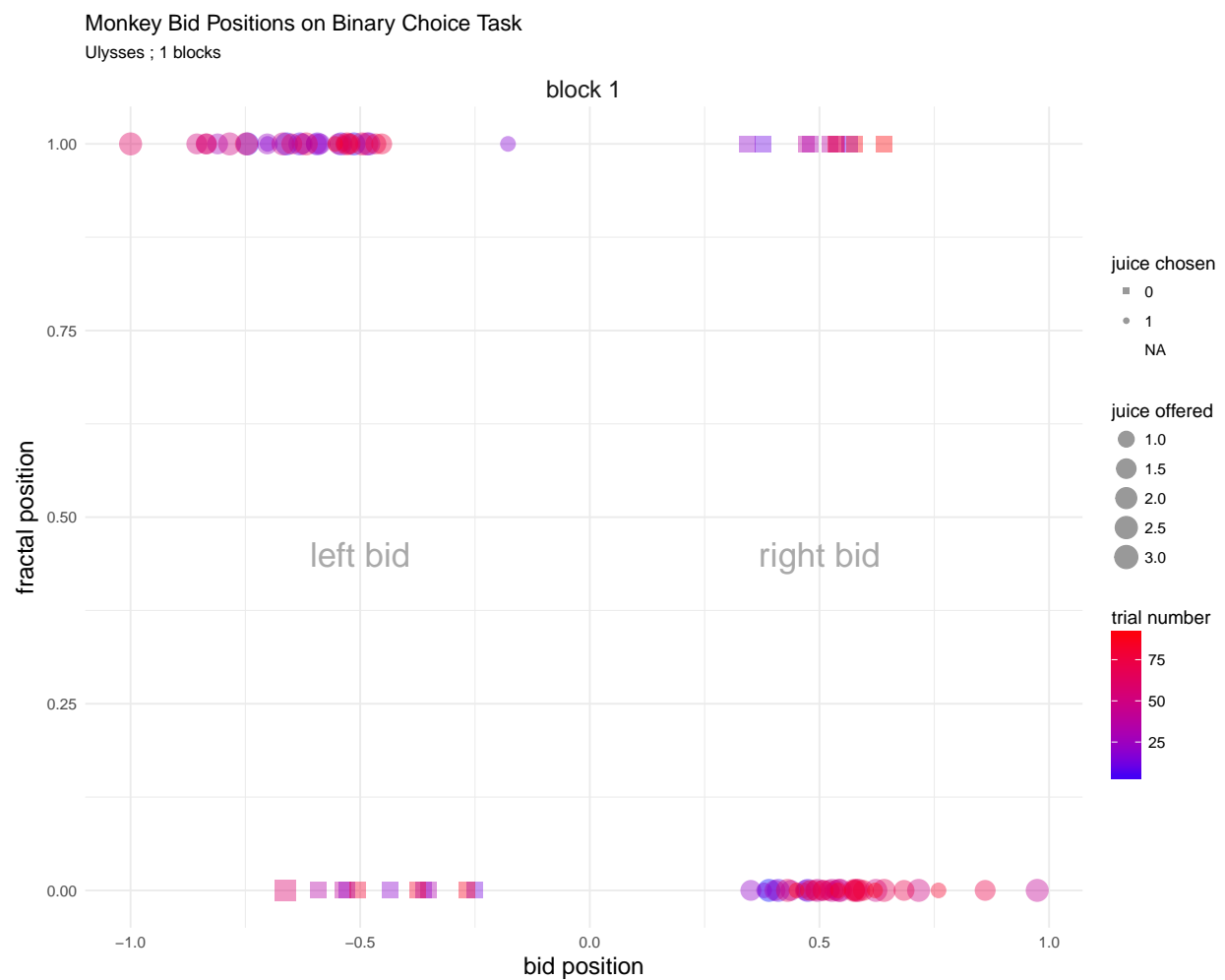
```
## [1] "07-Feb-2018"
```

```
monkey
```

```
## [1] "Ulysses"
```

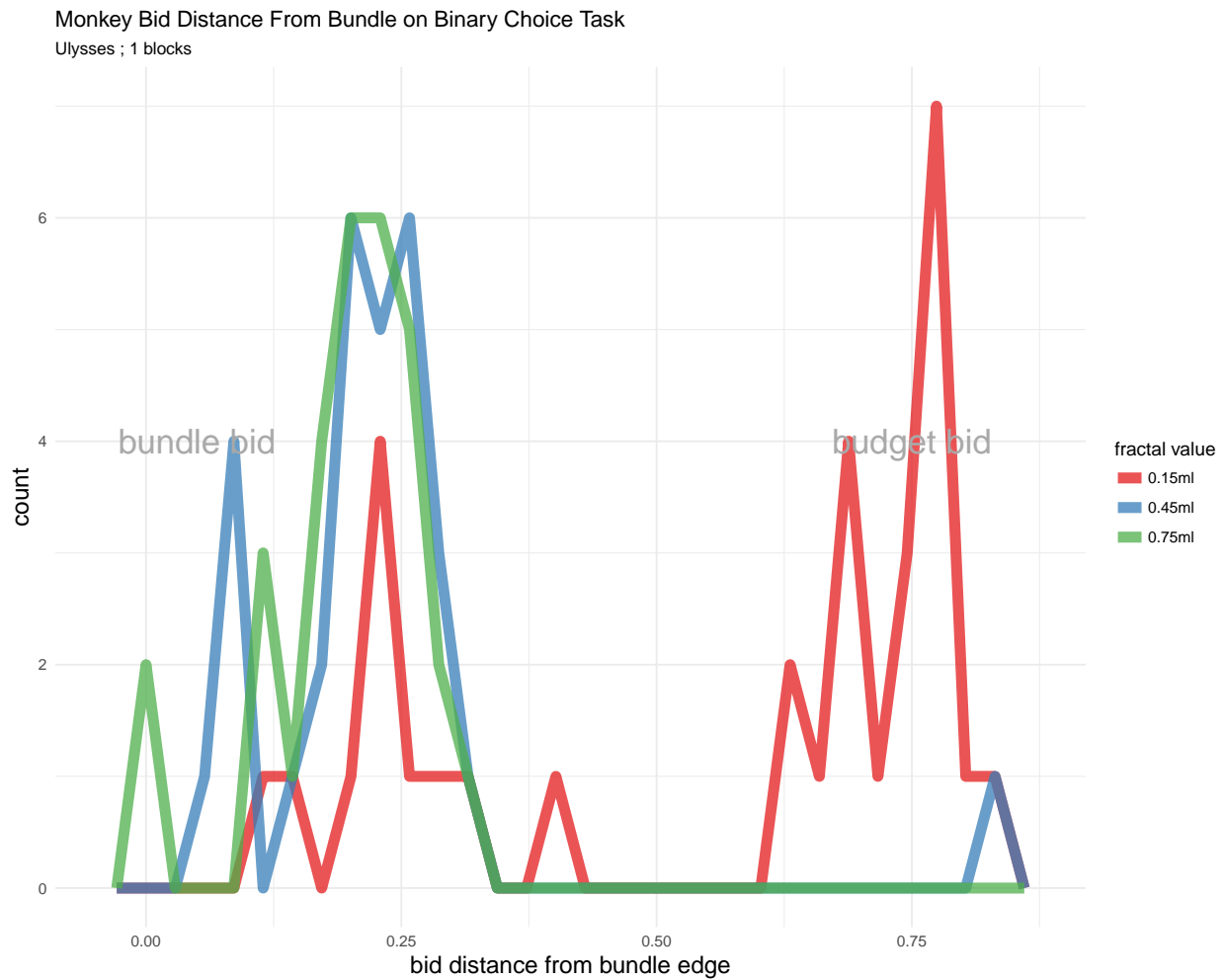
```
#plot p1
```

```
p1
```



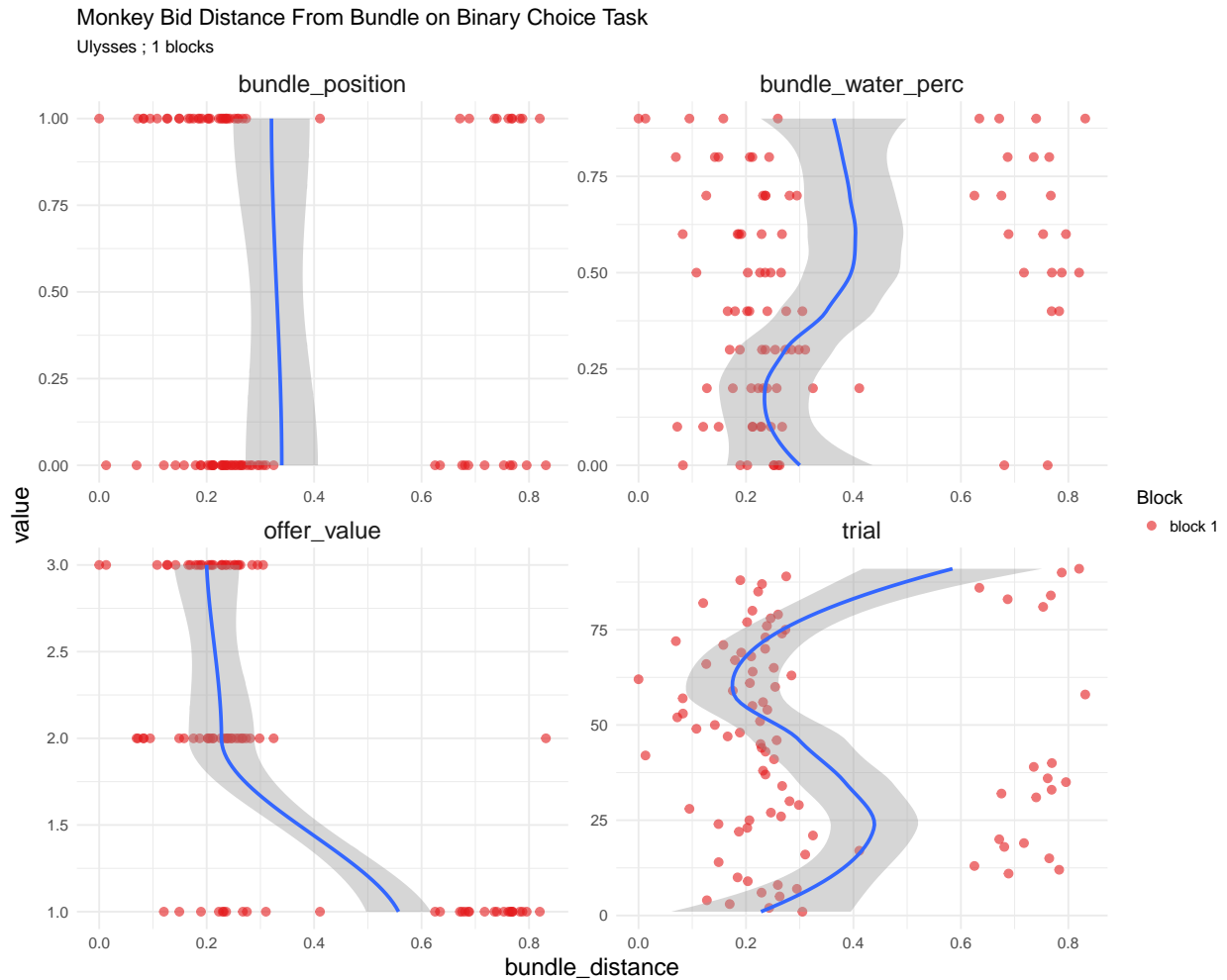
Graph of choices for each block. Circles indicate bid selecting the bundle, squares are bid selecting the budget. A fractal bid position of 1 means that the bundle is on the left hand side of the screen. Bids range from -1 (all the way to the left) to 1 (all the way to the right)

#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)

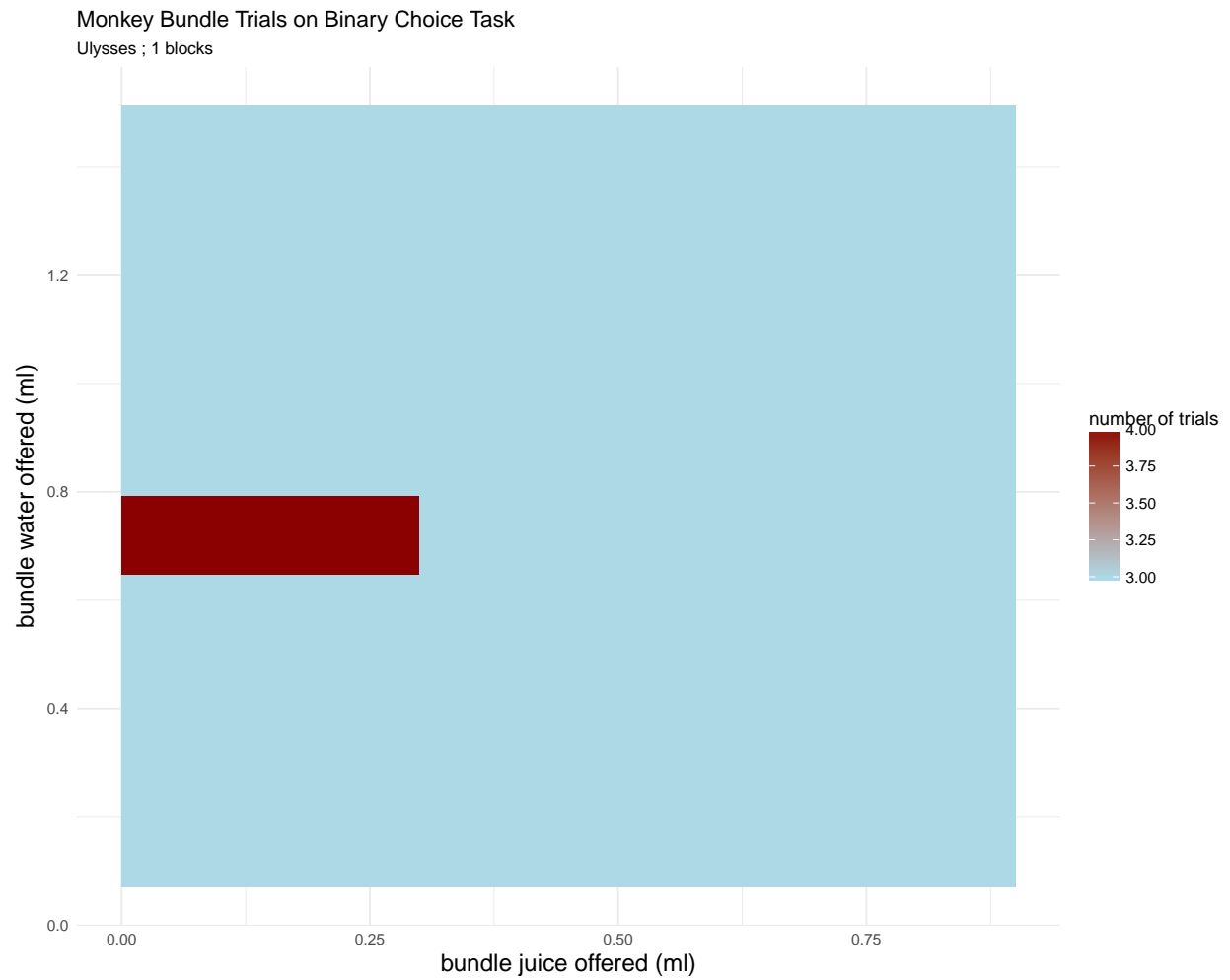
```

```

##
## 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
## -2.24165   0.00042   0.01148   0.12224   1.32019
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)   -4.73383    1.99550  -2.372 0.017680 *
## bundle_position -0.41928    0.99533  -0.421 0.673576
## bundle_water_perc -9.06741    3.01137  -3.011 0.002603 **
## offer_value     6.82598    1.90457   3.584 0.000338 ***
## trial          0.01866    0.01796   1.039 0.298825
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 98.317  on 90  degrees of freedom
## Residual deviance: 27.559  on 86  degrees of freedom
##      (1 observation deleted due to missingness)
## AIC: 37.559
##
## Number of Fisher Scoring iterations: 8

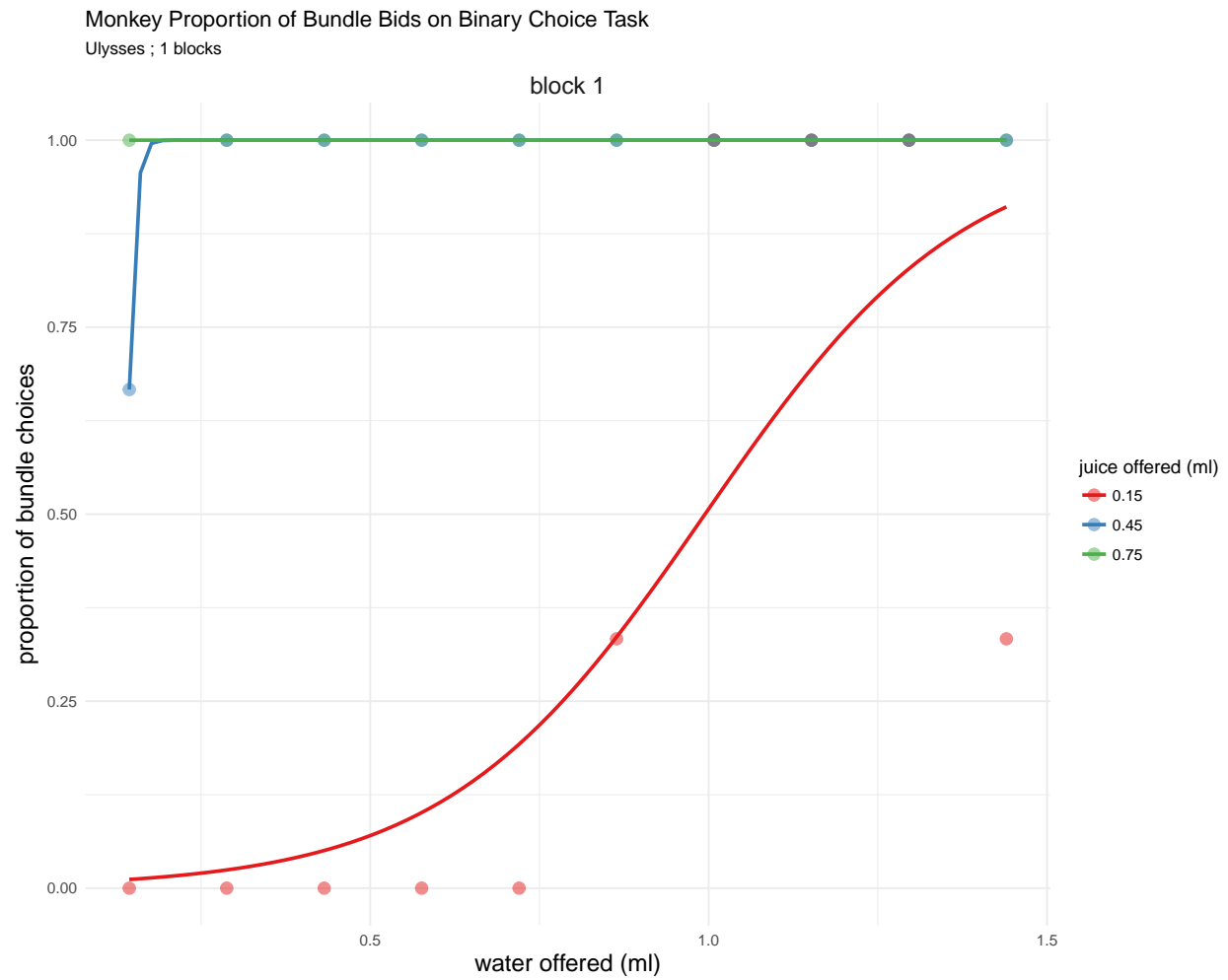
```

#plot p4
p4



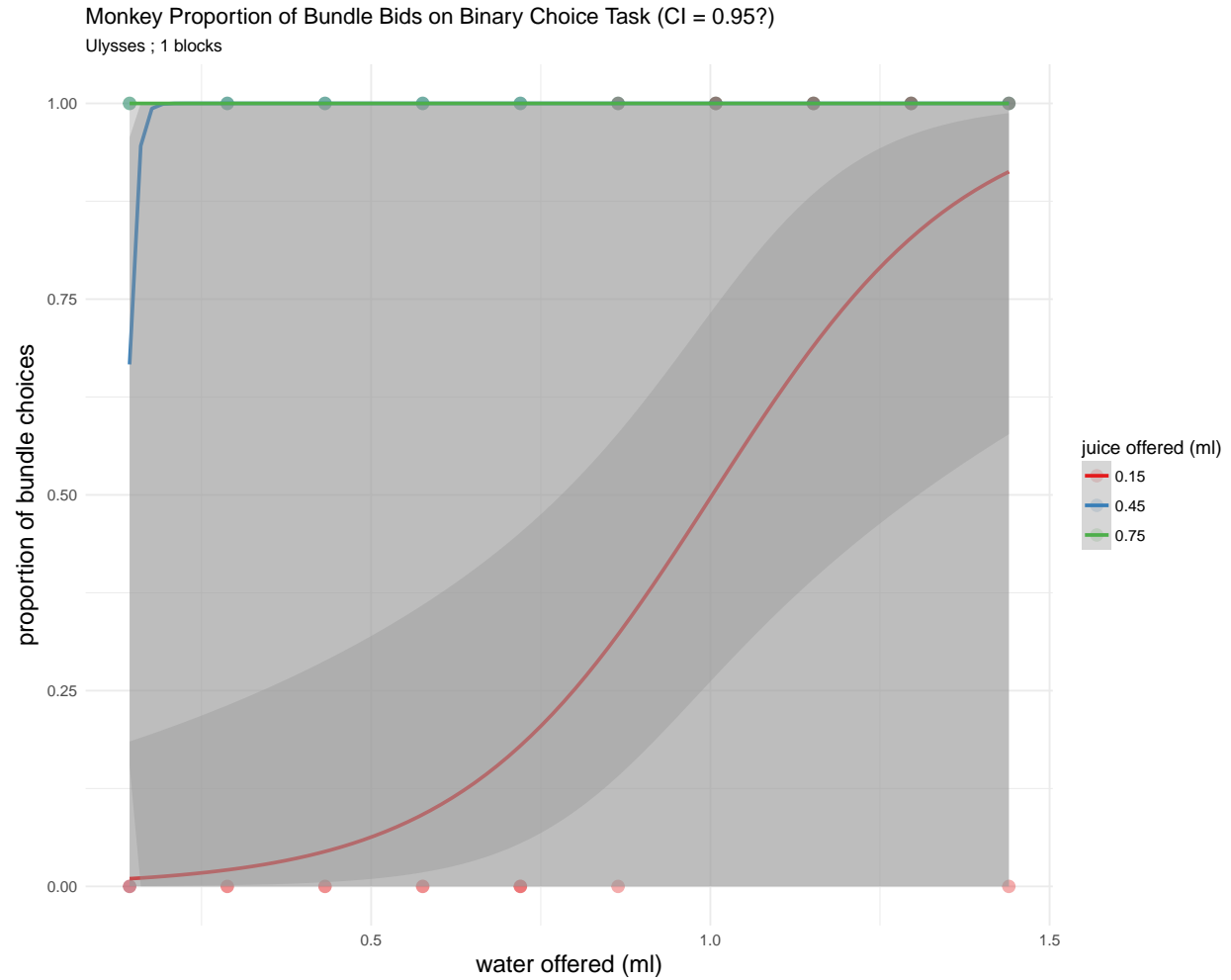
Graph showing the number of trials the monkey carried out for each bundle combination. Does not include failed trials.

#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.