Binary Choice Analysis

Robert Hickman

Data shown for:

```
dates
```

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

```
monkey
```

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

```
precise_dates
```

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

```
#plot p1
p1
```

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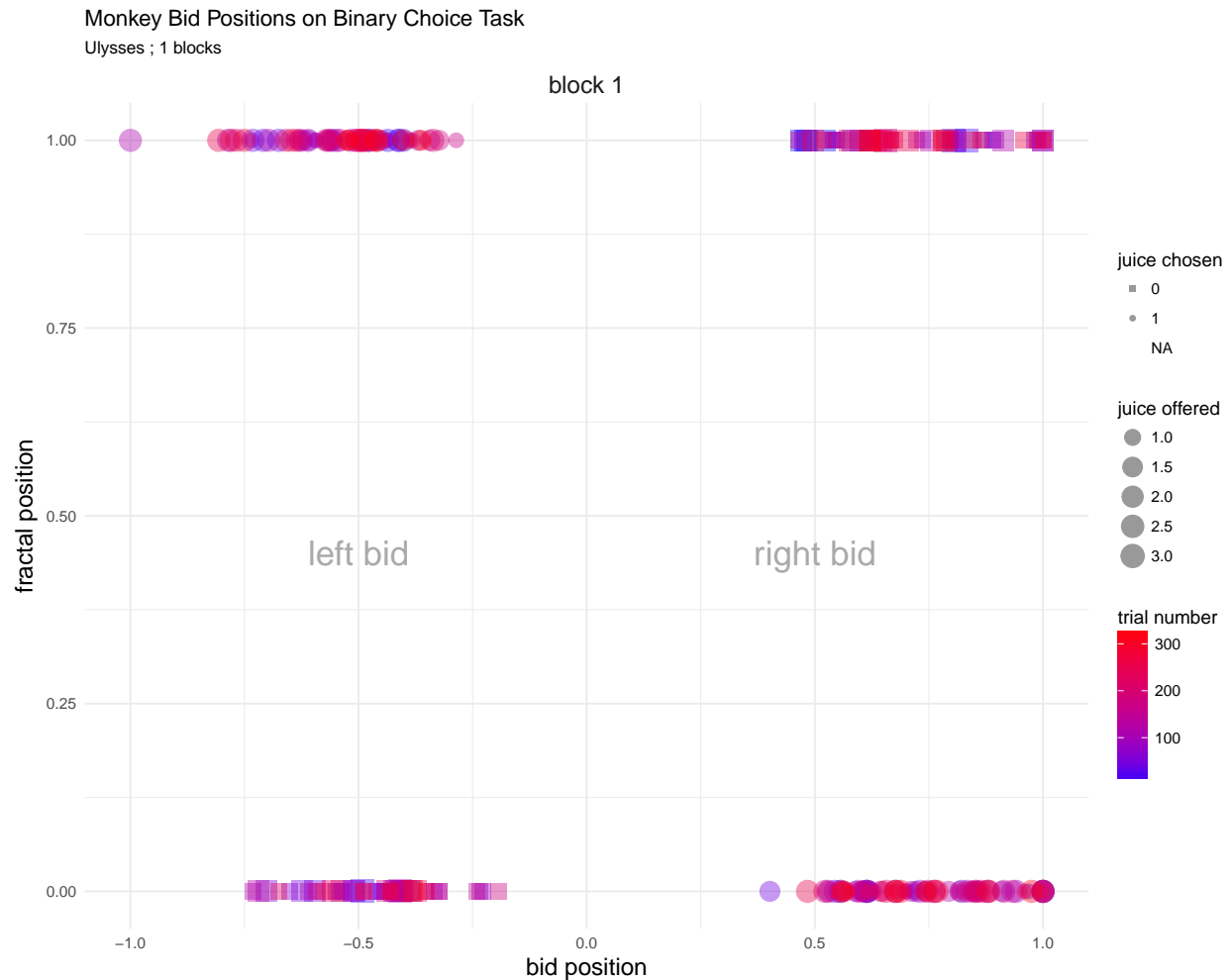
Graph of choices for each block. Circles indicate bid selecting the bundle, squares are bid selecting the budget. A fractal bid position of 1 means that the bundle is on the left hand side of the screen. Bids range from -1 (all the way to the left) to 1 (all the way to the right)

```
#plot p2
p2 +facet_wrap(~block)
```

Monkey Bid Distance From Bundle on Binary Choice Task

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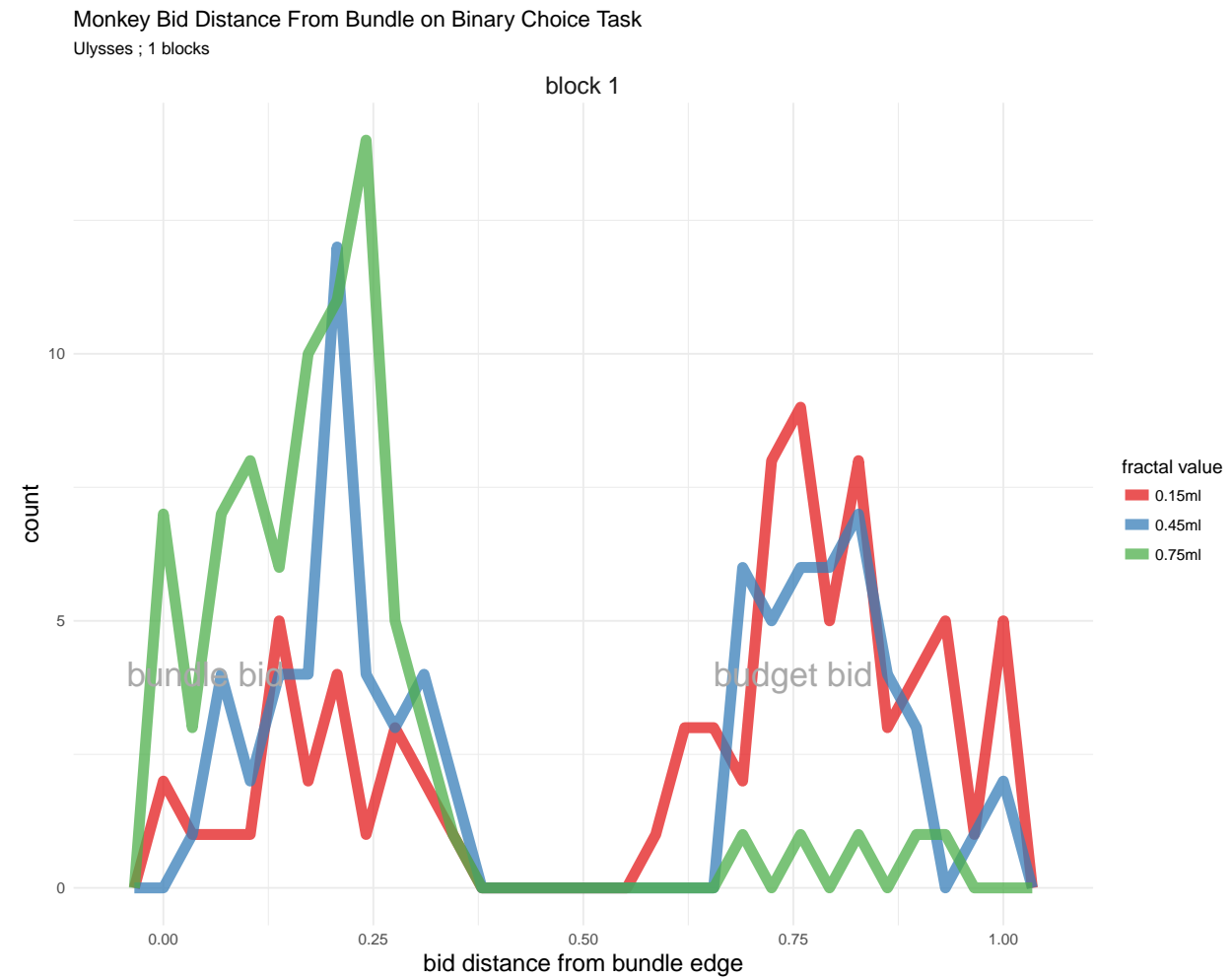
Graph showing all choices and how far away they are from the edge of the screen on the bundle side. 0 indicates full movement to the bundle side of the screen and 1 represent full movement away. Count is over all blocks for all values of the fractal (in ml of juice).

```
#plot p3
p3
```

Monkey Bid Distance From Bundle on Binary Choice Task
Ulysses ; 1 blocks
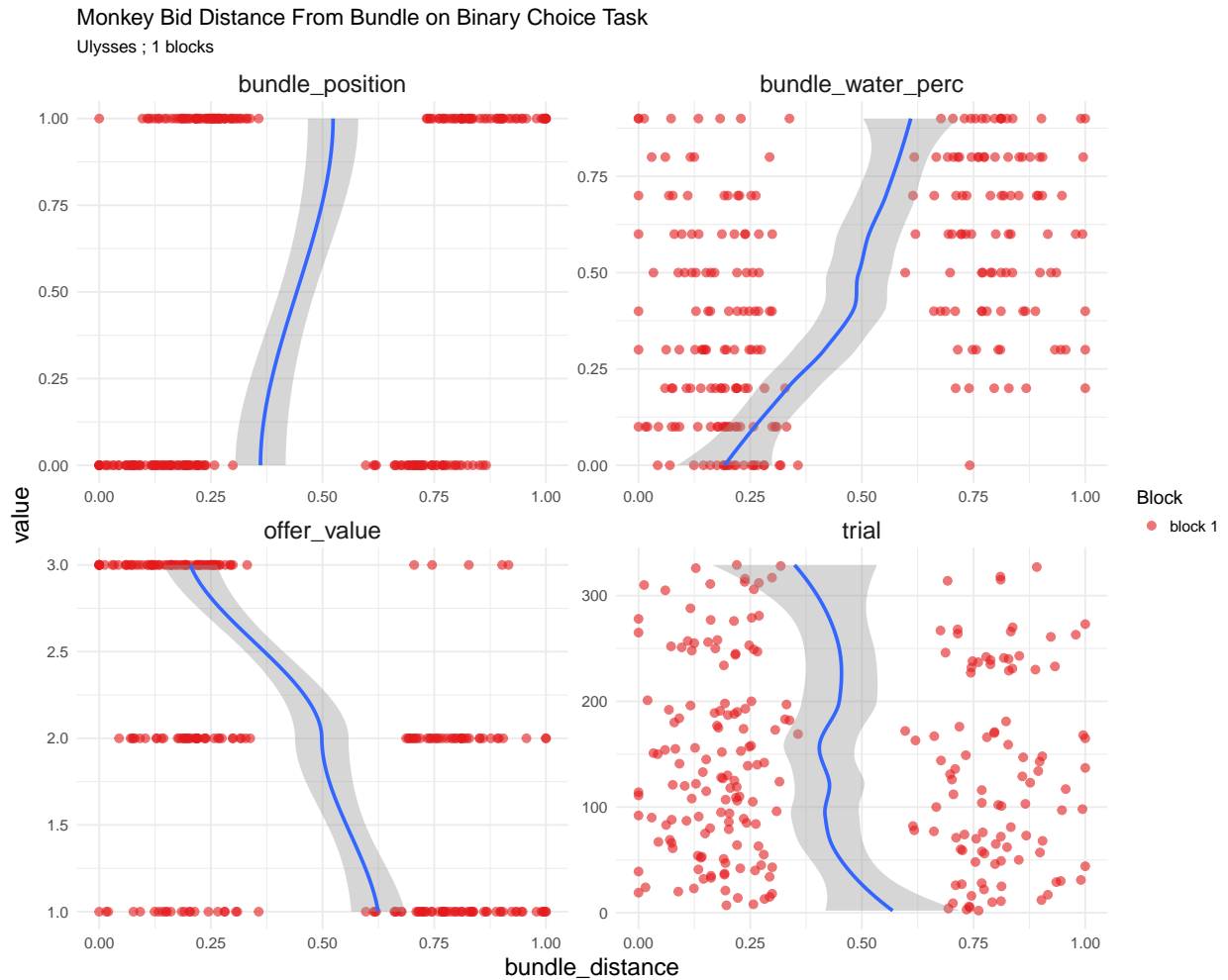
Graphs of various factors against the distance from the bundle side of the screen the monkey bids.

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
## -2.56508  -0.39901   0.07749   0.44109   2.44801
##
## Coefficients:
##                    Estimate Std. Error z value Pr(>|z|)
## (Intercept)       -1.602041   0.636219  -2.518   0.0118 *
## bundle_position   -0.844273   0.414688  -2.036   0.0418 *
## bundle_water_perc -7.559530   1.104194  -6.846 7.58e-12 ***
## offer_value        2.840509   0.392227   7.242 4.42e-13 ***
## trial              0.003427   0.002290   1.496   0.1345
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 327.29  on 239  degrees of freedom
## Residual deviance: 154.90  on 235  degrees of freedom
##   (89 observations deleted due to missingness)
## AIC: 164.9
##
## Number of Fisher Scoring iterations: 6
```
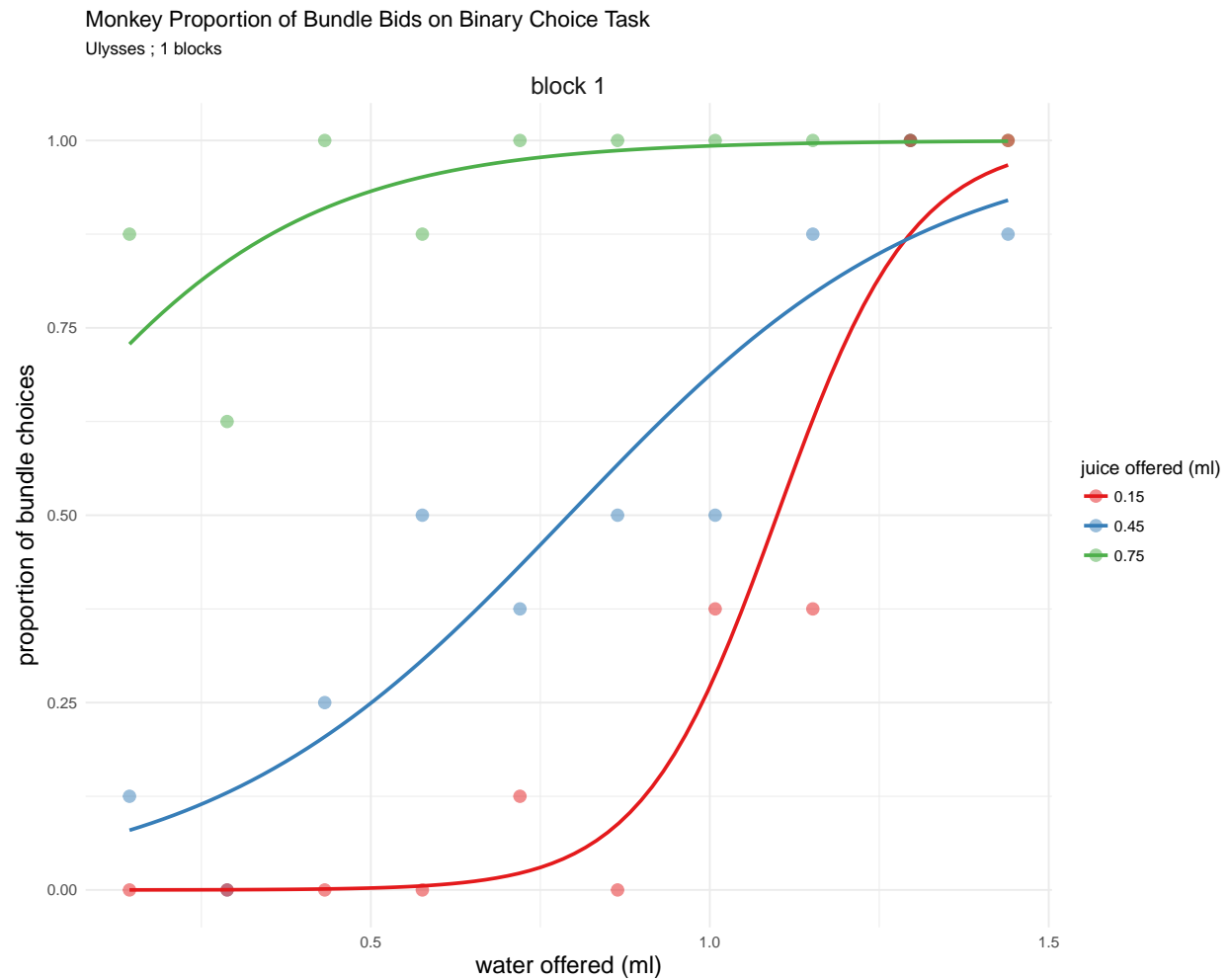
```
#plot p4
```
p4

Monkey Bundle Trials on Binary Choice Task
Ulysses ; 1 blocks
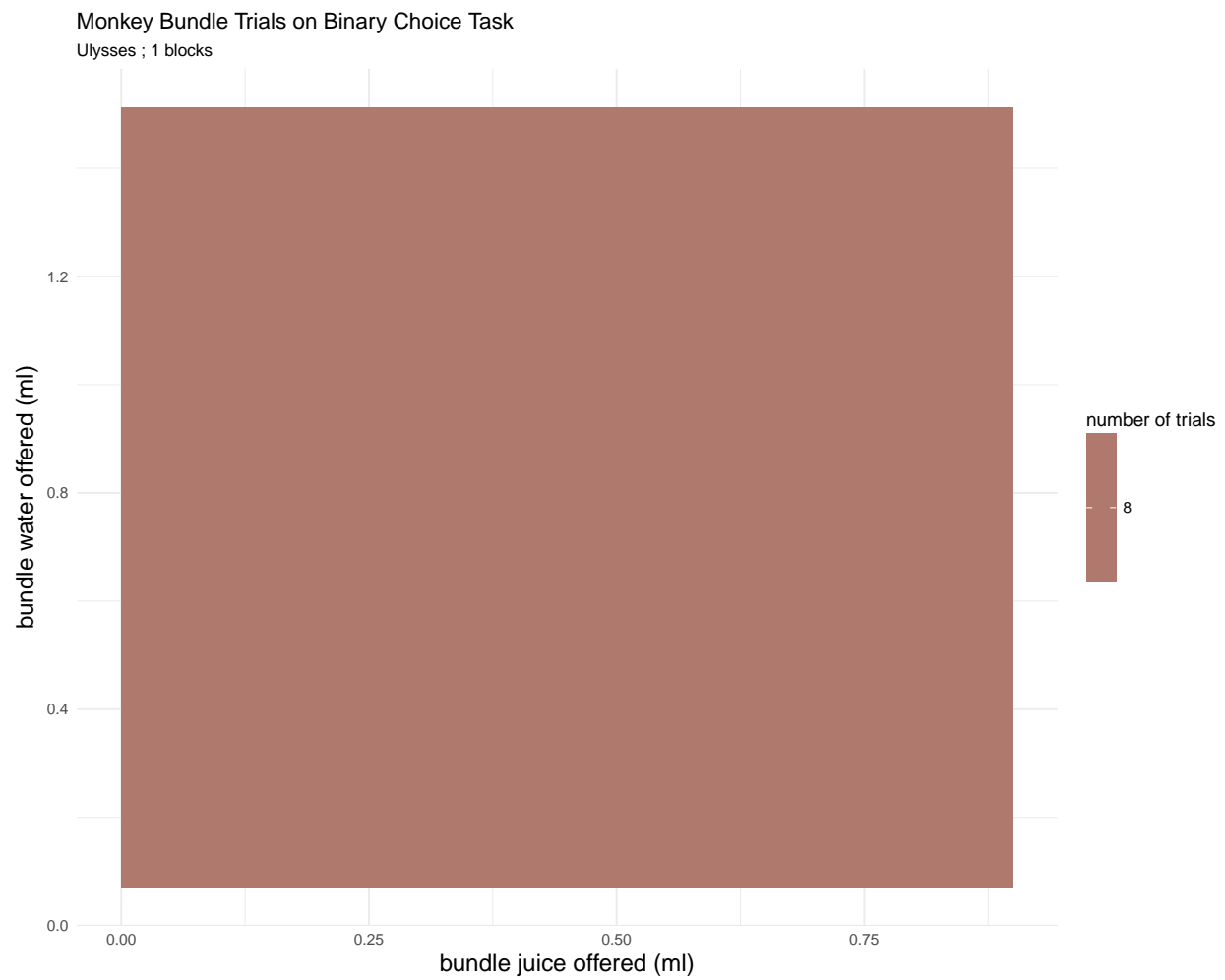
Graph showing the number of trials the monkey carried out for each bundle combination. Does not include failed trials.

p5

Monkey Proportion of Bundle Bids on Binary Choice Task

Ulysses ; 1 blocks

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

Monkey Proportion of Bundle Bids on Binary Choice Task (CI = 0.95?)

Ulysses ; 1 blocks
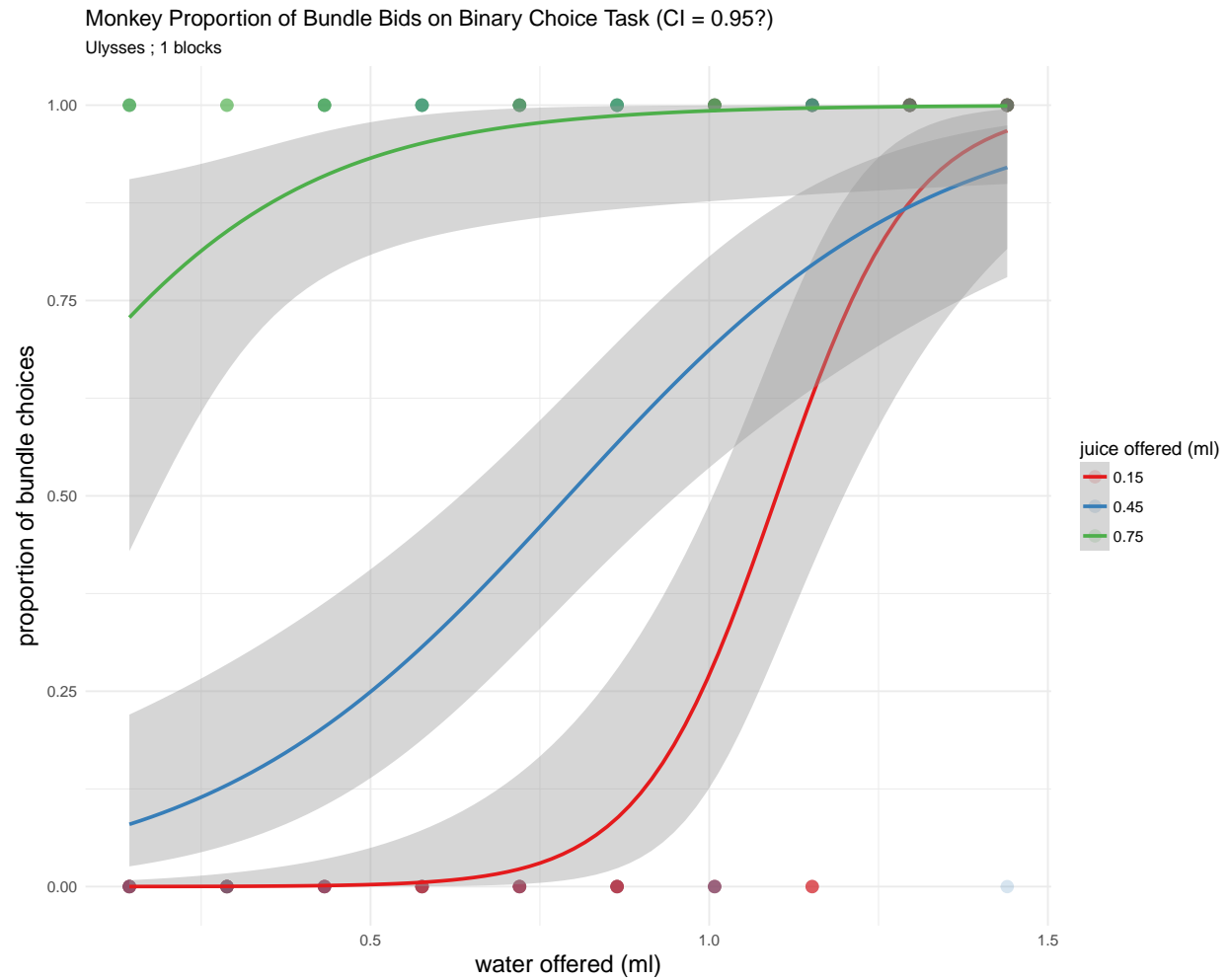
Same graph as above but with 95% confidence intervals. Uses the default method of calculating this for the tidyverse libraries in R which I'm not convinced are the best way. Looking into calculating and plotting it myself.