Meeting 04/08/23

2023-08-03

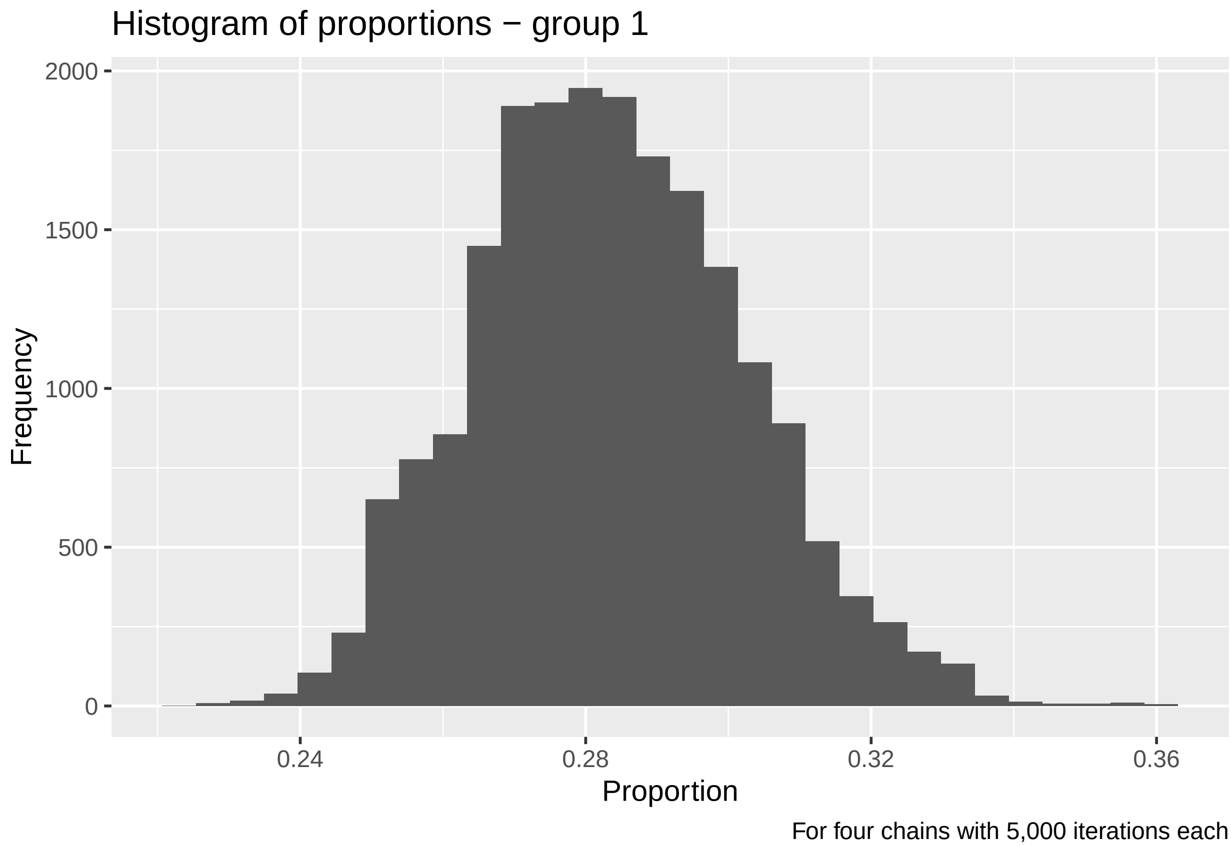
Infections by transmission type

We produce plots showing the posterior distribution of the proportion of infections from each group. The groups are:

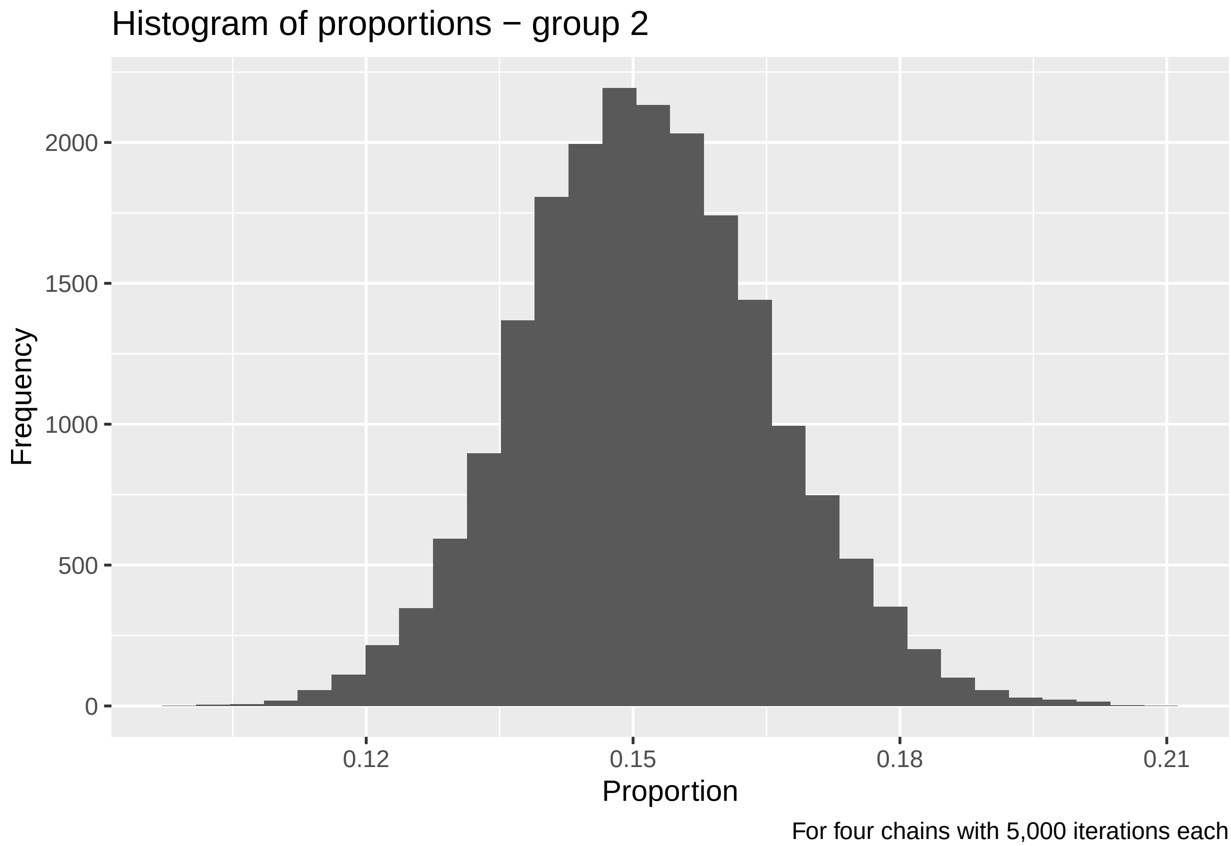
1 : Female to male, out-of-household 2 : Female to male, same household 3 : Male to female, out-of-household 4 : Male to female, same household

```
# Extract rates (eta)
eta_draws <- as_draws_matrix(fit$draws("eta"))
eta_sums <- rowSums(eta_draws)

eta_prop <- eta_draws / eta_sums

# Plot histograms of proportions
for(group in 1:4){
  p <- ggplot() + geom_histogram(aes(x = eta_prop[, group])) +
    labs(title = paste("Histogram of proportions - group", group),
         x = "Proportion", y = "Frequency",
         caption = "For four chains with 5,000 iterations each")
  print(p)
}
```

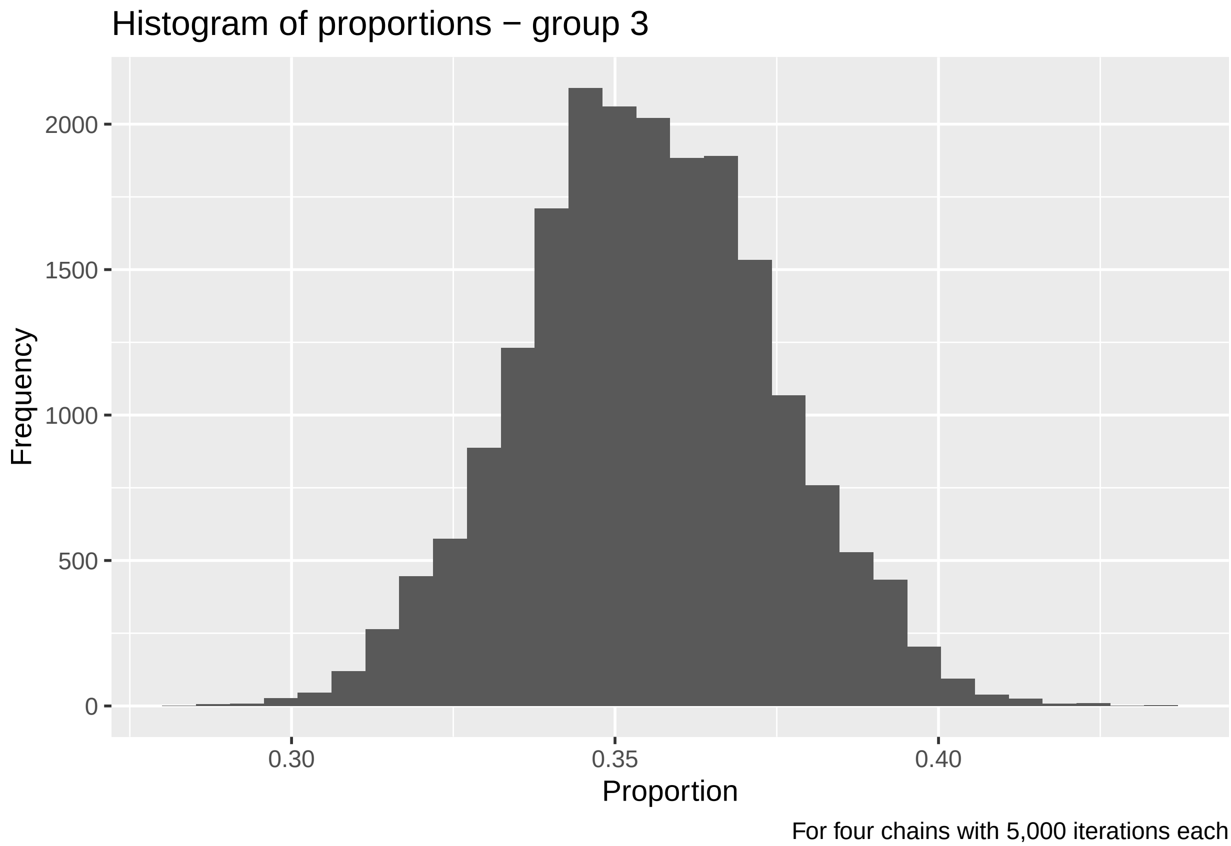
```
## Don't know how to automatically pick scale for object of type
## <draws_matrix/draws/matrix>. Defaulting to continuous.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



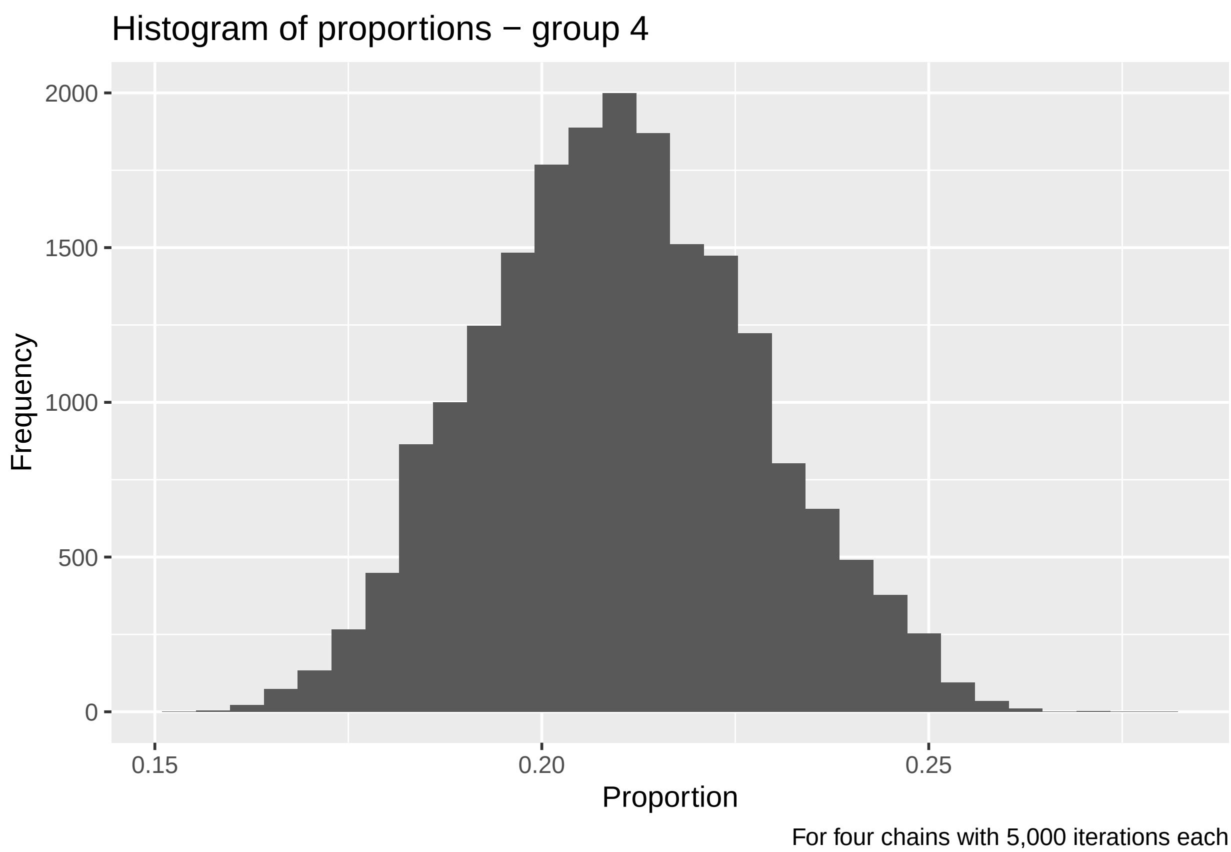

```
## Don't know how to automatically pick scale for object of type
## <draws_matrix/draws/matrix>. Defaulting to continuous.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




```
## Don’t know how to automatically pick scale for object of type
## <draws_matrix/draws/matrix>. Defaulting to continuous.
## ‘stat_bin()‘ using ‘bins = 30‘. Pick better value with ‘binwidth‘.
```




```
## Don't know how to automatically pick scale for object of type
## <draws_matrix/draws/matrix>. Defaulting to continuous.
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




```r
# Print out summary statistics
summary(eta_prop)
```

```
## # A tibble: 4 x 10
##   variable  mean median     sd    mad    q5   q95  rhat ess_bulk ess_tail
##   <chr>    <num>  <num>  <num>  <num> <num> <num> <num>    <num>    <num>
## 1 eta[1]   0.284  0.283 0.0187 0.0189 0.254 0.315  1.03     84.0     417.
## 2 eta[2]   0.151  0.151 0.0139 0.0139 0.129 0.175  1.00   1829.     6972.
## 3 eta[3]   0.355  0.354 0.0194 0.0194 0.323 0.388  1.00    889.      440.
## 4 eta[4]   0.210  0.210 0.0177 0.0182 0.182 0.241  1.05     54.1     104.
```

We can see that the plurality of infections are M -> F and out-of-household. In fact, a majority of cases are indeed out-of-household, though there seems to be a considerable amount of within household transmission too.

As of right now, some of the parameters have a concerning Rhat value (but this should hopefully change with ordered model, fingers crossed!)

```r
# Check proportion of HH vs OOH
eta_HH_prop <- rowSums(eta_prop[, c(2,4)])
summary(eta_HH_prop)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.2925  0.3473  0.3610  0.3615  0.3751  0.4383
```

```r
print(quantile(eta_HH_prop, c(0.025, 0.975))) # 90% CI
```

```
##      2.5%     97.5%
## 0.3220805 0.4028591
```

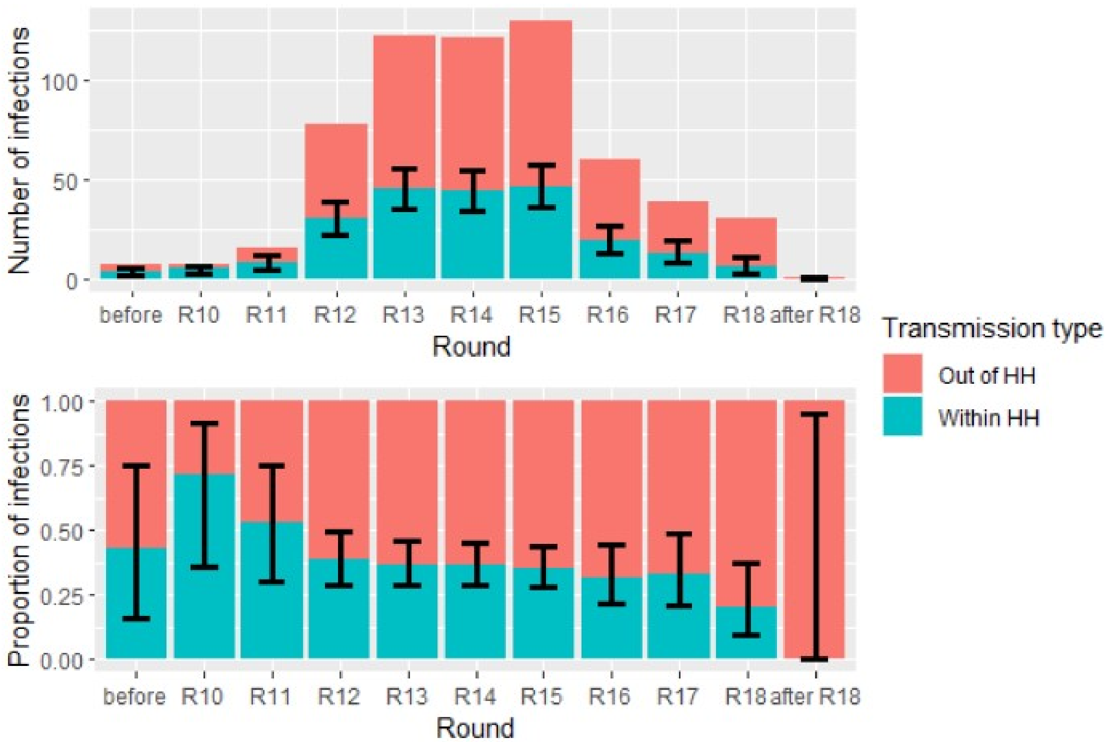


Figure 1: Caption

Resulting densities

We now plot the underlying distributions for each transmission type for one sample from the posterior distribution.

(What is the best way to aggregate the samples? Perhaps generate densities for every 50 iterations and take the mean at each grid point for plotting? May be computationally expensive to take mean of all)

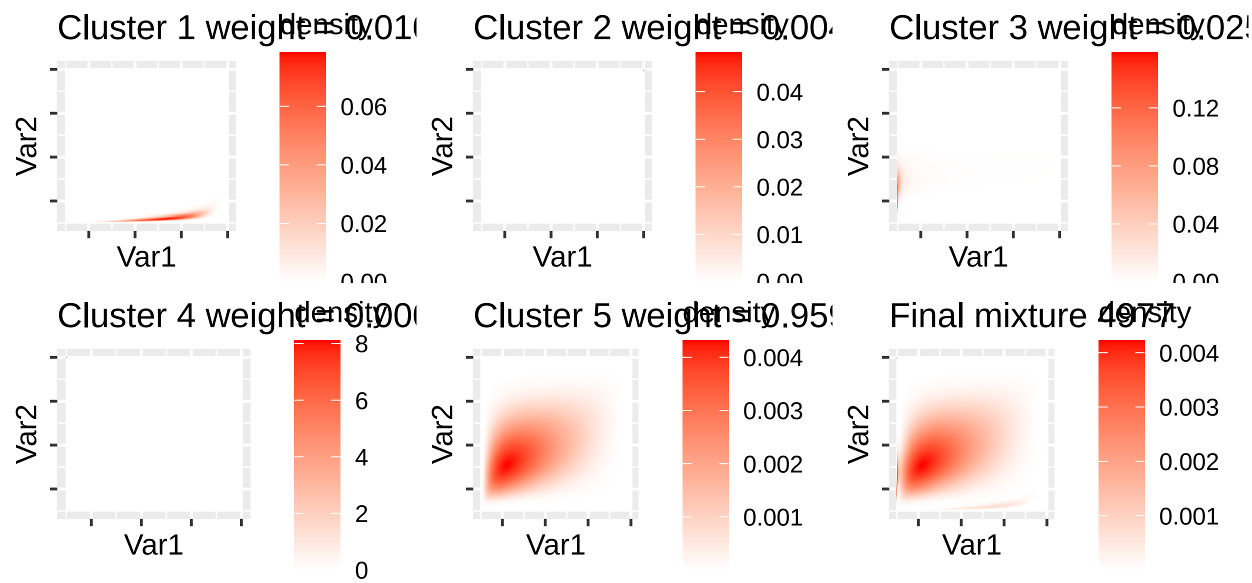
```r
source(here::here("helper-functions", "plot_normal.R"))
```

```
## Warning: package 'ggpubr' was built under R version 4.2.3
```

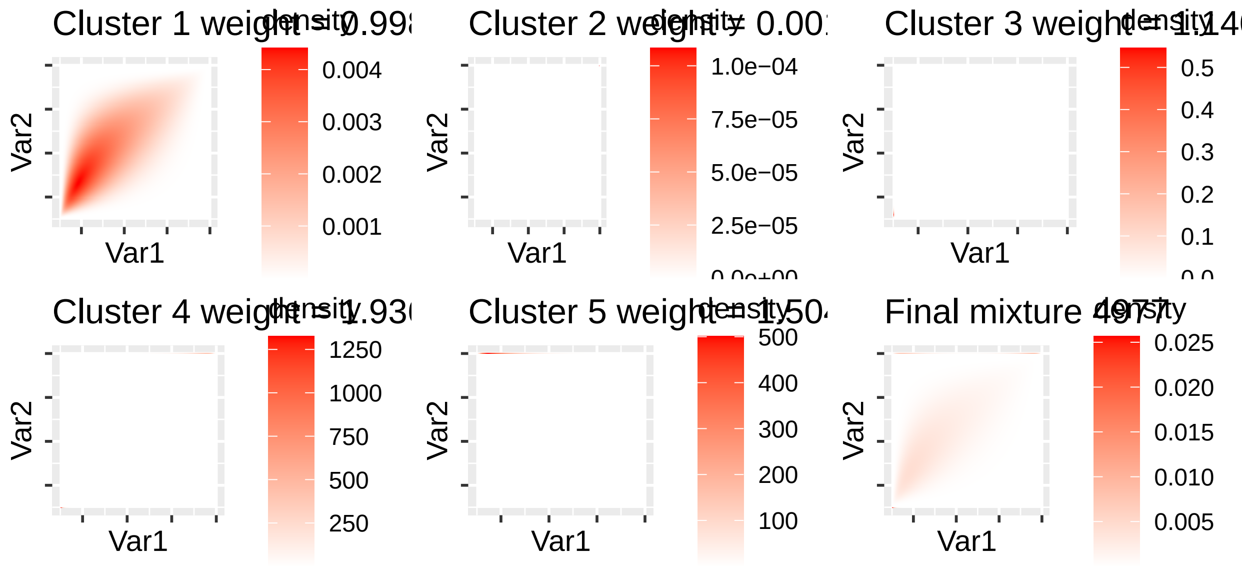
```r
set.seed(635261)

# Randomly choose draw and chain number
draw_no <- sample(5000, 1)
chain_no <- sample(4, 1)
```

```r
# Plot densities for all groups
for (group in 1:4){
  cat("Plotting", group, "\n") # progress bar!
  plot_normal(fit, chain_no, draw_no, group, "not_in_use")
}
```

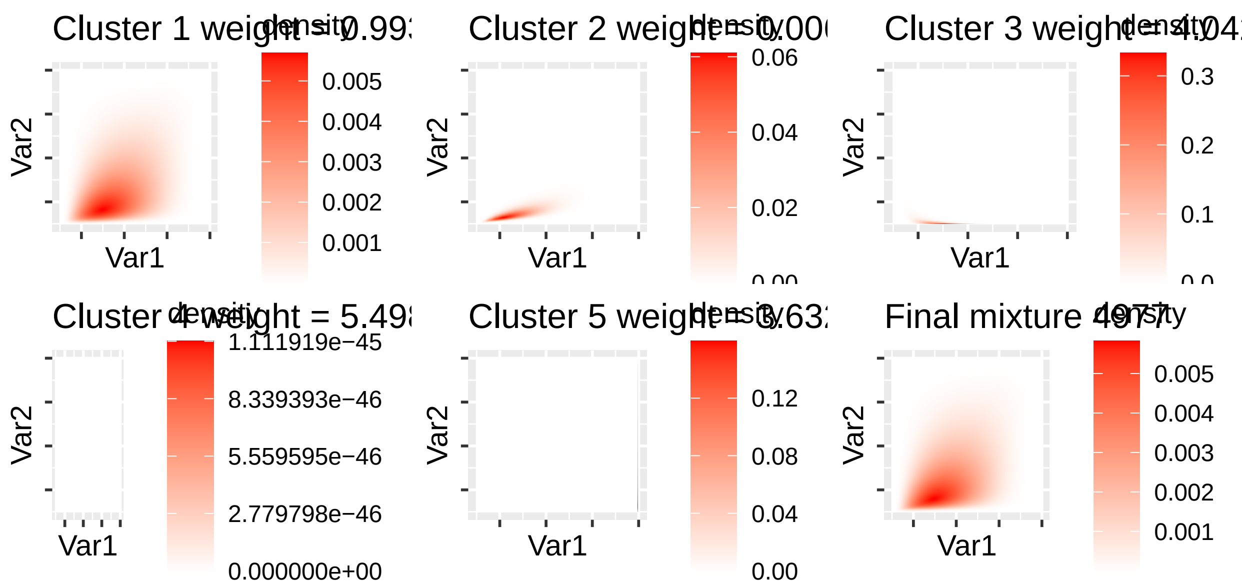
```
## Plotting 1
```




```
## Plotting 2
```

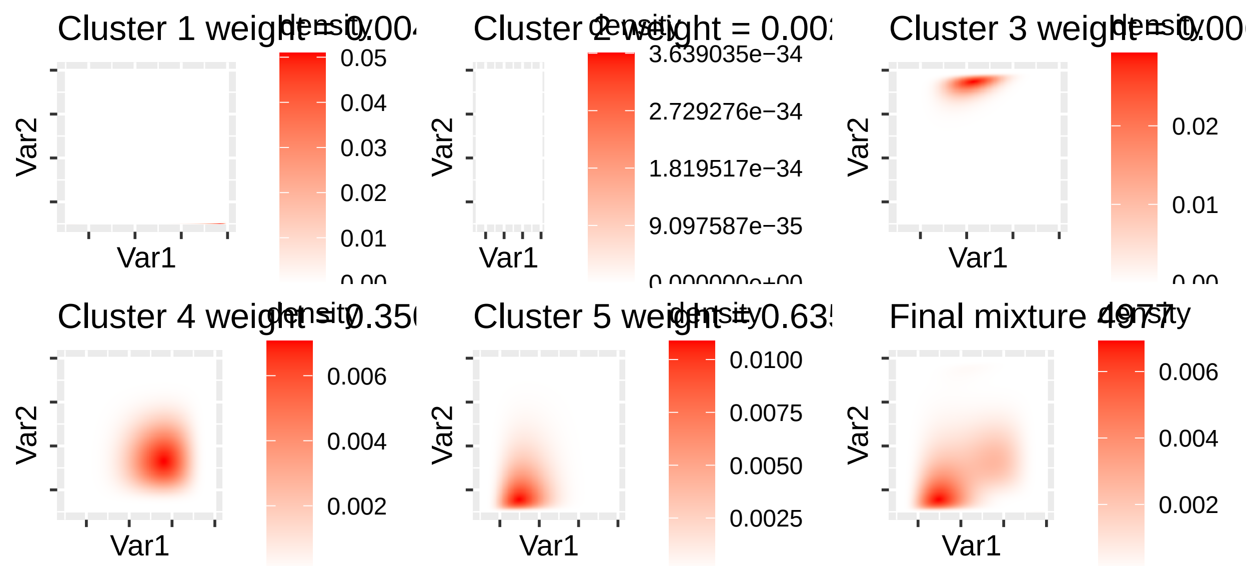

Var1
Var2
density
0.004
0.003
0.002
0.001
1.0e−04
7.5e−05
5.0e−05
2.5e−05
0.5
0.4
0.3
0.2
0.1
1250
1000
750
500
250
500
400
300
200
100
0.025
0.020
0.015
0.010
0.005

```
## Plotting 3
```



Cluster 1 weight = 0.99
density
0.005
0.004
0.003
0.002
0.001
Var1
Var2
Cluster 2 weight = 0.00
density
0.06
0.04
0.02
Var1
Var2
Cluster 3 weight = 4.04
density
0.3
0.2
0.1
Var1
Var2
Cluster 4 weight = 5.49
density
1.111919e−45
8.339393e−46
5.559595e−46
2.779798e−46
0.000000e+00
Var1
Var2
Cluster 5 weight = 3.63
density
0.12
0.08
0.04
0.00
Var1
Var2
Final mixture 4977
density
0.005
0.004
0.003
0.002
0.001
Var1
Var2


```
## Plotting 4
```



Compare to the results from the kde analysis:

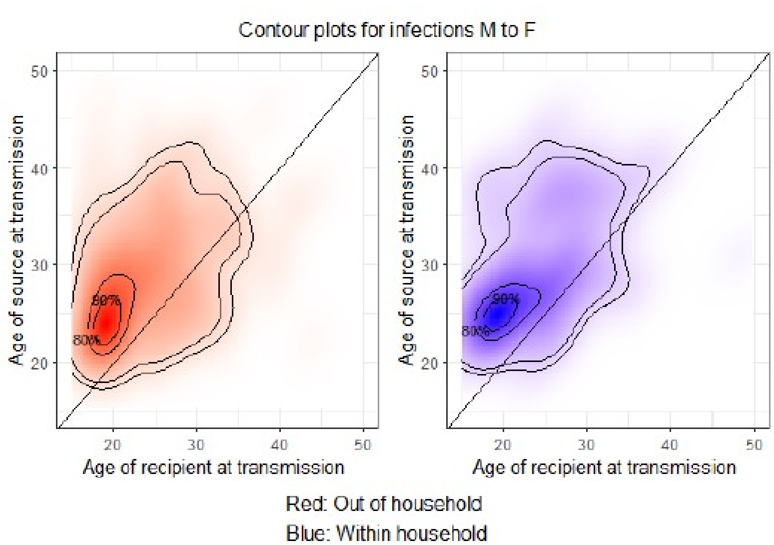


Figure 6: Contour plots for sources' and recipients' ages for infections male to female

Figure 2: Caption

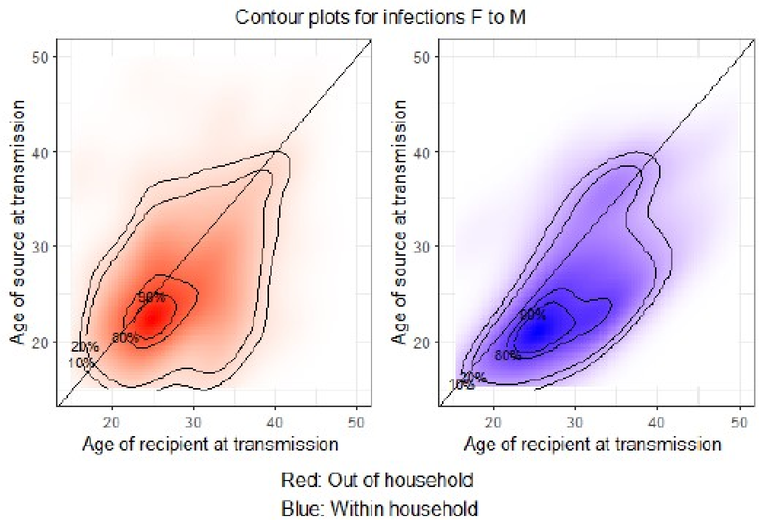


Figure 7: Contour plots for sources' and recipients' ages for infections female to male

Figure 3: Caption

Diagnosis on ordered model

```r
fit_ordered <- readRDS(here::here("data", "logit_pairs_draws_ordered.rds"))
print(fit_ordered, max_rows = 200)
```

```
##                  variable   mean median    sd   mad     q5    q95 rhat
##   lp__                    833.96 834.38 11.25 11.18 814.76 851.70 1.00
##   v[1,1]                    0.49   0.53  0.26  0.35   0.10   0.87 1.60
##   v[2,1]                    0.98   0.99  0.04  0.01   0.95   1.00 1.00
##   v[3,1]                    0.98   0.99  0.05  0.01   0.92   1.00 1.00
##   v[4,1]                    0.81   0.97  0.26  0.05   0.24   1.00 1.02
##   v[1,2]                    0.93   0.96  0.12  0.04   0.78   0.99 1.07
##   v[2,2]                    0.63   0.70  0.30  0.35   0.08   1.00 1.00
##   v[3,2]                    0.69   0.79  0.29  0.28   0.11   1.00 1.00
##   v[4,2]                    0.74   0.85  0.28  0.21   0.17   1.00 1.00
##   v[1,3]                    0.76   0.85  0.24  0.19   0.24   1.00 1.00
##   v[2,3]                    0.60   0.64  0.30  0.38   0.07   0.99 1.00
##   v[3,3]                    0.62   0.67  0.30  0.38   0.08   0.99 1.00
##   v[4,3]                    0.66   0.73  0.30  0.33   0.10   0.99 1.00
##   v[1,4]                    0.60   0.64  0.30  0.38   0.07   0.99 1.00
##   v[2,4]                    0.59   0.62  0.31  0.40   0.07   0.99 1.00
##   v[3,4]                    0.60   0.65  0.30  0.39   0.07   0.99 1.00
##   v[4,4]                    0.59   0.63  0.31  0.40   0.07   0.99 1.00
##   alpha[1]                  0.79   0.77  0.24  0.23   0.44   1.22 1.00
##   alpha[2]                  0.71   0.69  0.23  0.23   0.38   1.12 1.00
##   alpha[3]                  0.69   0.66  0.23  0.21   0.38   1.10 1.00
##   alpha[4]                  0.76   0.73  0.24  0.23   0.41   1.19 1.00
##   eta[1]                  175.48 174.97 13.80 13.45 153.78 198.37 1.01
```

```
## eta[2]                92.97  92.63   9.67  9.68  77.51 109.32 1.00
## eta[3]               218.11 217.64  14.91 14.79 194.43 243.29 1.00
## eta[4]               127.54 127.04  11.28 11.32 109.82 147.04 1.00
## mus_1[1,1]            -1.13  -0.95   0.53  0.18  -2.08  -0.76 1.37
## mus_1[2,1]            -0.92  -0.92   0.11  0.11  -1.11  -0.74 1.00
## mus_1[3,1]            -0.43  -0.43   0.07  0.06  -0.54  -0.33 1.00
## mus_1[4,1]            -0.46  -0.37   0.23  0.14  -0.91  -0.22 1.02
## mus_1[1,2]            -0.72  -0.75   0.21  0.12  -0.92  -0.41 1.09
## mus_1[2,2]             1.39   0.68   2.17  1.61  -0.78   5.91 1.00
## mus_1[3,2]             1.51   0.95   1.88  1.26  -0.29   5.49 1.00
## mus_1[4,2]             0.48   0.11   1.27  0.46  -0.33   2.94 1.01
## mus_1[1,3]             0.62   0.41   1.31  0.69  -0.61   2.48 1.00
## mus_1[2,3]             4.43   3.84   3.26  3.19   0.21  10.64 1.00
## mus_1[3,3]             4.45   3.77   3.22  3.07   0.52  10.67 1.00
## mus_1[4,3]             2.70   1.59   2.92  1.86   0.01   8.78 1.01
## mus_1[1,4]             4.63   3.62   3.87  3.39   0.33  12.34 1.00
## mus_1[2,4]             8.19   7.75   4.22  4.26   2.08  15.77 1.00
## mus_1[3,4]             8.20   7.75   4.22  4.33   2.14  15.84 1.00
## mus_1[4,4]             6.53   5.93   4.19  4.36   0.92  14.34 1.01
## mus_1[1,5]            11.05  10.34   6.01  6.11   2.43  21.90 1.00
## mus_1[2,5]            13.91  13.33   5.85  5.64   5.33  24.59 1.00
## mus_1[3,5]            13.78  13.19   5.76  5.65   5.35  24.20 1.00
## mus_1[4,5]            12.70  12.20   5.99  6.02   4.03  23.34 1.00
## mus_2[1,1]            -0.47  -0.52   0.36  0.22  -0.83  -0.03 1.18
## mus_2[2,1]            -0.29  -0.29   0.10  0.10  -0.45  -0.13 1.00
## mus_2[3,1]            -1.15  -1.15   0.08  0.07  -1.28  -1.03 1.00
## mus_2[4,1]            -1.31  -1.23   0.28  0.15  -1.88  -1.02 1.01
## mus_2[1,2]            -0.46  -0.46   0.49  0.27  -0.88   0.05 1.16
## mus_2[2,2]            -0.06  -0.40   8.94  7.32 -15.32  15.22 1.00
## mus_2[3,2]            -0.98  -1.83   7.45  3.75 -13.00  13.31 1.00
## mus_2[4,2]            -1.33  -0.98   4.83  2.77  -7.62   5.30 1.01
## mus_2[1,3]            -2.27  -2.82   3.82  0.94  -4.83   2.99 1.01
## mus_2[2,3]            -0.14  -0.21   9.88  9.53 -16.48  16.33 1.00
## mus_2[3,3]            -0.22  -0.79   9.37  8.76 -15.58  15.31 1.00
## mus_2[4,3]            -0.30  -0.41   8.14  6.35 -14.21  13.85 1.01
## mus_2[1,4]            -0.45  -0.90   9.20  8.51 -15.67  15.24 1.00
## mus_2[2,4]             0.23   0.23   9.92  9.78 -15.91  16.88 1.00
## mus_2[3,4]             0.21   0.08  10.12  9.86 -16.46  17.21 1.00
## mus_2[4,4]             0.21   0.30   9.76  9.32 -16.01  16.44 1.00
## mus_2[1,5]            -0.06  -0.22   9.80  9.73 -16.34  15.90 1.00
## mus_2[2,5]            -0.04  -0.23   9.97 10.22 -16.01  16.39 1.00
## mus_2[3,5]             0.19   0.13   9.85  9.87 -16.06  16.39 1.00
## mus_2[4,5]             0.09  -0.05   9.91  9.98 -15.93  16.36 1.00
## Sigmas[1,1,1,1]        1.70   0.79   1.55  0.64   0.37   4.37 1.54
## Sigmas[2,1,1,1]        1.09   1.08   0.17  0.16   0.85   1.41 1.00
## Sigmas[3,1,1,1]        0.61   0.61   0.07  0.07   0.50   0.73 1.00
## Sigmas[4,1,1,1]        0.53   0.58   0.37  0.14   0.16   0.77 1.02
## Sigmas[1,2,1,1]        2.13   1.78   2.74  1.83   0.42   5.30 1.51
## Sigmas[2,2,1,1]        2.77   0.68  26.89  0.62   0.17   7.28 1.00
## Sigmas[3,2,1,1]        4.69   0.68  78.33  0.57   0.17   6.64 1.00
## Sigmas[4,2,1,1]        1.75   0.61  25.13  0.40   0.19   4.32 1.01
## Sigmas[1,3,1,1]        1.46   0.60   8.90  0.50   0.16   4.09 1.01
## Sigmas[2,3,1,1]        3.40   0.75  23.11  0.72   0.17   9.11 1.00
## Sigmas[3,3,1,1]        4.74   0.74  54.24  0.70   0.17  10.62 1.00
```

```
## Sigmas[4,3,1,1]            4.42   0.69   68.89  0.64   0.16   9.08 1.00
## Sigmas[1,4,1,1]            3.02   0.66   27.20  0.61   0.16   8.19 1.00
## Sigmas[2,4,1,1]            5.59   0.71   63.62  0.67   0.16  11.74 1.00
## Sigmas[3,4,1,1]            3.45   0.76   27.20  0.72   0.17   8.93 1.00
## Sigmas[4,4,1,1]            3.45   0.72   37.14  0.67   0.17   9.53 1.00
## Sigmas[1,5,1,1]            3.67   0.75   24.52  0.70   0.16  10.12 1.00
## Sigmas[2,5,1,1]            3.29   0.71   15.87  0.66   0.17  10.03 1.00
## Sigmas[3,5,1,1]            3.11   0.72   34.70  0.66   0.17   7.53 1.00
## Sigmas[4,5,1,1]           55.24   0.70 3959.89  0.64   0.17  10.54 1.00
## Sigmas[1,1,2,1]            0.31   0.28    0.45  0.13  -0.03   0.79 1.17
## Sigmas[2,1,2,1]            0.57   0.56    0.12  0.11   0.40   0.79 1.00
## Sigmas[3,1,2,1]            0.25   0.25    0.06  0.06   0.15   0.35 1.00
## Sigmas[4,1,2,1]            0.29   0.30    0.15  0.11   0.06   0.49 1.01
## Sigmas[1,2,2,1]            0.27   0.31    0.87  0.14  -0.15   0.79 1.17
## Sigmas[2,2,2,1]            0.30   0.00    9.41  0.46  -2.08   2.37 1.00
## Sigmas[3,2,2,1]           -0.64   0.02   32.15  0.44  -2.06   1.92 1.00
## Sigmas[4,2,2,1]            0.25   0.13    7.28  0.37  -1.28   2.41 1.00
## Sigmas[1,3,2,1]           -0.16  -0.07    2.85  0.40  -1.67   1.21 1.00
## Sigmas[2,3,2,1]           -0.32   0.00   10.25  0.49  -3.61   2.88 1.01
## Sigmas[3,3,2,1]           -0.56   0.00   18.48  0.49  -3.08   2.78 1.00
## Sigmas[4,3,2,1]            0.62   0.02   18.75  0.46  -2.75   2.86 1.00
## Sigmas[1,4,2,1]           -0.21  -0.01   13.32  0.44  -2.53   2.35 1.00
## Sigmas[2,4,2,1]            1.43   0.00   39.25  0.48  -3.41   3.17 1.00
## Sigmas[3,4,2,1]            0.06   0.00    8.78  0.47  -2.69   2.72 1.00
## Sigmas[4,4,2,1]           -0.12   0.00    6.26  0.46  -2.67   2.48 1.00
## Sigmas[1,5,2,1]           -0.14  -0.02   12.52  0.47  -3.07   2.73 1.00
## Sigmas[2,5,2,1]            0.19   0.01    7.43  0.45  -2.50   3.45 1.00
## Sigmas[3,5,2,1]            0.28   0.01   10.05  0.45  -2.18   2.57 1.00
## Sigmas[4,5,2,1]          -17.07   0.00  677.87  0.48  -2.73   3.04 1.00
## Sigmas[1,1,1,2]            0.31   0.28    0.45  0.13  -0.03   0.79 1.17
## Sigmas[2,1,1,2]            0.57   0.56    0.12  0.11   0.40   0.79 1.00
## Sigmas[3,1,1,2]            0.25   0.25    0.06  0.06   0.15   0.35 1.00
## Sigmas[4,1,1,2]            0.29   0.30    0.15  0.11   0.06   0.49 1.01
## Sigmas[1,2,1,2]            0.27   0.31    0.87  0.14  -0.15   0.79 1.17
## Sigmas[2,2,1,2]            0.30   0.00    9.41  0.46  -2.08   2.37 1.00
## Sigmas[3,2,1,2]           -0.64   0.02   32.15  0.44  -2.06   1.92 1.00
## Sigmas[4,2,1,2]            0.25   0.13    7.28  0.37  -1.28   2.41 1.00
## Sigmas[1,3,1,2]           -0.16  -0.07    2.85  0.40  -1.67   1.21 1.00
## Sigmas[2,3,1,2]           -0.32   0.00   10.25  0.49  -3.61   2.88 1.01
## Sigmas[3,3,1,2]           -0.56   0.00   18.48  0.49  -3.08   2.78 1.00
## Sigmas[4,3,1,2]            0.62   0.02   18.75  0.46  -2.75   2.86 1.00
## Sigmas[1,4,1,2]           -0.21  -0.01   13.32  0.44  -2.53   2.35 1.00
## Sigmas[2,4,1,2]            1.43   0.00   39.25  0.48  -3.41   3.17 1.00
## Sigmas[3,4,1,2]            0.06   0.00    8.78  0.47  -2.69   2.72 1.00
## Sigmas[4,4,1,2]           -0.12   0.00    6.26  0.46  -2.67   2.48 1.00
## Sigmas[1,5,1,2]           -0.14  -0.02   12.52  0.47  -3.07   2.73 1.00
## Sigmas[2,5,1,2]            0.19   0.01    7.43  0.45  -2.50   3.45 1.00
## Sigmas[3,5,1,2]            0.28   0.01   10.05  0.45  -2.18   2.57 1.00
## Sigmas[4,5,1,2]          -17.07   0.00  677.87  0.48  -2.73   3.04 1.00
## Sigmas[1,1,2,2]            0.66   0.60    0.58  0.14   0.37   0.97 1.09
## Sigmas[2,1,2,2]            0.80   0.79    0.12  0.12   0.62   1.02 1.00
## Sigmas[3,1,2,2]            1.03   1.03    0.11  0.10   0.86   1.22 1.00
## Sigmas[4,1,2,2]            1.20   1.07    0.75  0.25   0.69   2.06 1.01
## Sigmas[1,2,2,2]            0.68   0.62    0.41  0.15   0.40   1.12 1.09
```

```
## Sigmas[2,2,2,2]           2.77   0.72   20.28  0.66   0.17   7.10 1.00
## Sigmas[3,2,2,2]           4.32   0.77   33.85  0.70   0.17   7.40 1.00
## Sigmas[4,2,2,2]           3.57   0.86   15.97  0.80   0.20  11.98 1.00
## Sigmas[1,3,2,2]           1.40   0.68    3.26  0.57   0.17   4.32 1.00
## Sigmas[2,3,2,2]           5.37   0.75   33.53  0.71   0.17  11.97 1.01
## Sigmas[3,3,2,2]           3.58   0.73   16.69  0.69   0.17  10.45 1.00
## Sigmas[4,3,2,2]           3.58   0.75   19.88  0.72   0.17  10.10 1.00
## Sigmas[1,4,2,2]           2.41   0.70   11.88  0.63   0.17   8.06 1.00
## Sigmas[2,4,2,2]           5.23   0.72   51.65  0.66   0.17  12.73 1.00
## Sigmas[3,4,2,2]           2.75   0.70   11.75  0.64   0.16   8.68 1.00
## Sigmas[4,4,2,2]           2.33   0.70    7.72  0.64   0.17   8.11 1.00
## Sigmas[1,5,2,2]           3.40   0.71   20.33  0.68   0.16   9.19 1.00
## Sigmas[2,5,2,2]           2.61   0.71    9.39  0.66   0.17   8.95 1.00
## Sigmas[3,5,2,2]           2.40   0.69   10.17  0.64   0.17   7.71 1.00
## Sigmas[4,5,2,2]          28.58   0.73  406.26  0.68   0.17  11.40 1.00
## weights[1,1]              0.49   0.53    0.26  0.35   0.10   0.87 1.60
## weights[2,1]              0.98   0.99    0.04  0.01   0.95   1.00 1.00
## weights[3,1]              0.98   0.99    0.05  0.01   0.92   1.00 1.00
## weights[4,1]              0.81   0.97    0.26  0.05   0.24   1.00 1.02
## weights[1,2]              0.48   0.44    0.26  0.34   0.09   0.86 1.56
## weights[2,2]              0.01   0.00    0.04  0.00   0.00   0.04 1.00
## weights[3,2]              0.02   0.00    0.05  0.00   0.00   0.08 1.00
## weights[4,2]              0.16   0.02    0.24  0.03   0.00   0.71 1.02
## weights[1,3]              0.03   0.01    0.06  0.01   0.00   0.06 1.01
## weights[2,3]              0.00   0.00    0.01  0.00   0.00   0.01 1.00
## weights[3,3]              0.00   0.00    0.01  0.00   0.00   0.01 1.00
## weights[4,3]              0.02   0.00    0.07  0.00   0.00   0.15 1.02
## weights[1,4]              0.00   0.00    0.01  0.00   0.00   0.01 1.01
## weights[2,4]              0.00   0.00    0.00  0.00   0.00   0.00 1.00
## weights[3,4]              0.00   0.00    0.00  0.00   0.00   0.00 1.00
## weights[4,4]              0.00   0.00    0.01  0.00   0.00   0.01 1.00
## weights[1,5]              0.00   0.00    0.00  0.00   0.00   0.01 1.00
## weights[2,5]              0.00   0.00    0.00  0.00   0.00   0.00 1.00
## weights[3,5]              0.00   0.00    0.00  0.00   0.00   0.00 1.00
## weights[4,5]              0.00   0.00    0.00  0.00   0.00   0.01 1.01
## cumprod_one_minus_v[1,1]  0.51   0.47    0.26  0.35   0.13   0.90 1.60
## cumprod_one_minus_v[2,1]  0.02   0.01    0.04  0.01   0.00   0.05 1.00
## cumprod_one_minus_v[3,1]  0.02   0.01    0.05  0.01   0.00   0.08 1.00
## cumprod_one_minus_v[4,1]  0.19   0.03    0.26  0.05   0.00   0.76 1.02
## cumprod_one_minus_v[1,2]  0.03   0.02    0.06  0.01   0.00   0.07 1.01
## cumprod_one_minus_v[2,2]  0.00   0.00    0.01  0.00   0.00   0.02 1.00
## cumprod_one_minus_v[3,2]  0.00   0.00    0.01  0.00   0.00   0.01 1.00
## cumprod_one_minus_v[4,2]  0.03   0.00    0.07  0.01   0.00   0.17 1.02
## cumprod_one_minus_v[1,3]  0.01   0.00    0.01  0.00   0.00   0.02 1.01
## cumprod_one_minus_v[2,3]  0.00   0.00    0.00  0.00   0.00   0.01 1.00
## cumprod_one_minus_v[3,3]  0.00   0.00    0.00  0.00   0.00   0.00 1.00
## cumprod_one_minus_v[4,3]  0.00   0.00    0.01  0.00   0.00   0.01 1.01
## cumprod_one_minus_v[1,4]  0.00   0.00    0.00  0.00   0.00   0.01 1.00
## cumprod_one_minus_v[2,4]  0.00   0.00    0.00  0.00   0.00   0.00 1.00
## cumprod_one_minus_v[3,4]  0.00   0.00    0.00  0.00   0.00   0.00 1.00
## cumprod_one_minus_v[4,4]  0.00   0.00    0.00  0.00   0.00   0.01 1.01
## ess_bulk ess_tail
##      937     3162
##        6       80
```

```
##        2903      2743
##        1914      1253
##         184       304
##          37       558
##        2838      1246
##        3349      4995
##         520      2103
##        1392       709
##        8633      6215
##        3888      3738
##        1275      1984
##        3638      1656
##        2773      2797
##        5567      3564
##        3094      6065
##        2821      1150
##        2730      1765
##        1889      1129
##        2288      2691
##         966       644
##        2648      1976
##        4462      4979
##        3980      8681
##           8        84
##        3140      1942
##        1929      1449
##         221       491
##          26       102
##        5159      4215
##        3702      4776
##         926      2252
##        1385      1019
##        7644      7793
##        2063      2794
##         853      1412
##        1613      1569
##       10093      7812
##        2848      3287
##        1312      1319
##        4149      2761
##        9027      5494
##        7496     10269
##        4589      5722
##          15        82
##        2704      1818
##        2732      1811
##         274       438
##          17       109
##        4499      8334
##        4278      4676
##        2164      3464
##        2548      1560
##        5656      4932
##        4014      4378
```

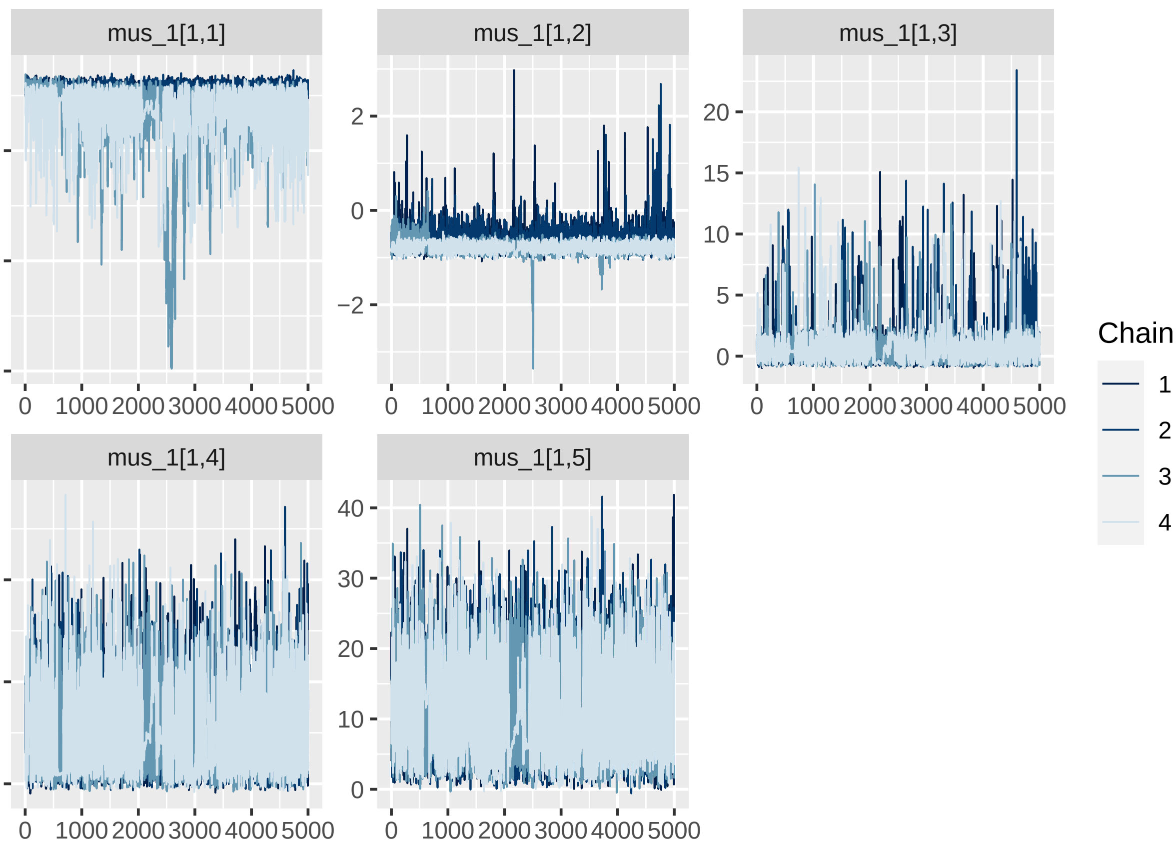
```
##        4903       6763
##        4223       2838
##        4106       1004
##        5157       3601
##        4611       5657
##        5385       7703
##        4099       4902
##        5460       9152
##        3960       5844
##           7         92
##        2620       1894
##        1925       1363
##         244        466
##           7        143
##        5015       5989
##        1877       1439
##        1891       2648
##        1508       1698
##        2077       4515
##        2850       1626
##        2015       2684
##        2792       4678
##        1230        608
##        3774       3541
##        2199       3662
##        3165       2706
##        1875       1210
##        3802       4245
##        1542        756
##         970         94
##        2956       1511
##        2053       2013
##         343        299
##         474        118
##        3696       3247
##        2226       2166
##        2570       2433
##        2334       2549
##         712        270
##        2171       1576
##        2696       1988
##        4425       2413
##        2919       1928
##        3184       3343
##        3082       2967
##        1924       1703
##        2355        824
##        3288       3120
##        2142       1463
##         970         94
##        2956       1511
##        2053       2013
##         343        299
##         474        118
```

```
##        3696      3247
##        2226      2166
##        2570      2433
##        2334      2549
##         712       270
##        2171      1576
##        2696      1988
##        4425      2413
##        2919      1928
##        3184      3343
##        3082      2967
##        1924      1703
##        2355       824
##        3288      3120
##        2142      1463
##         827       102
##        3878      2777
##        2883      2174
##         510       235
##        1161       110
##        3292      3204
##        2329      1580
##        1452      2589
##        3257      2726
##         727       264
##        2305      1447
##        1958      1676
##        2576      2984
##        2306      1595
##        2070      2803
##        3104      2767
##        1822      1898
##        2543      2311
##        3028      2526
##        1125       646
##           6        80
##        2903      2743
##        1914      1253
##         184       304
##           6        84
##        2722      2638
##        1960      1263
##         192       264
##         943       932
##        2906      4606
##        3865      6177
##         400       228
##        1112       656
##        4060      4679
##        3782      5964
##        1751      1531
##        1340       639
##        3060      2102
##        2821      1853
```

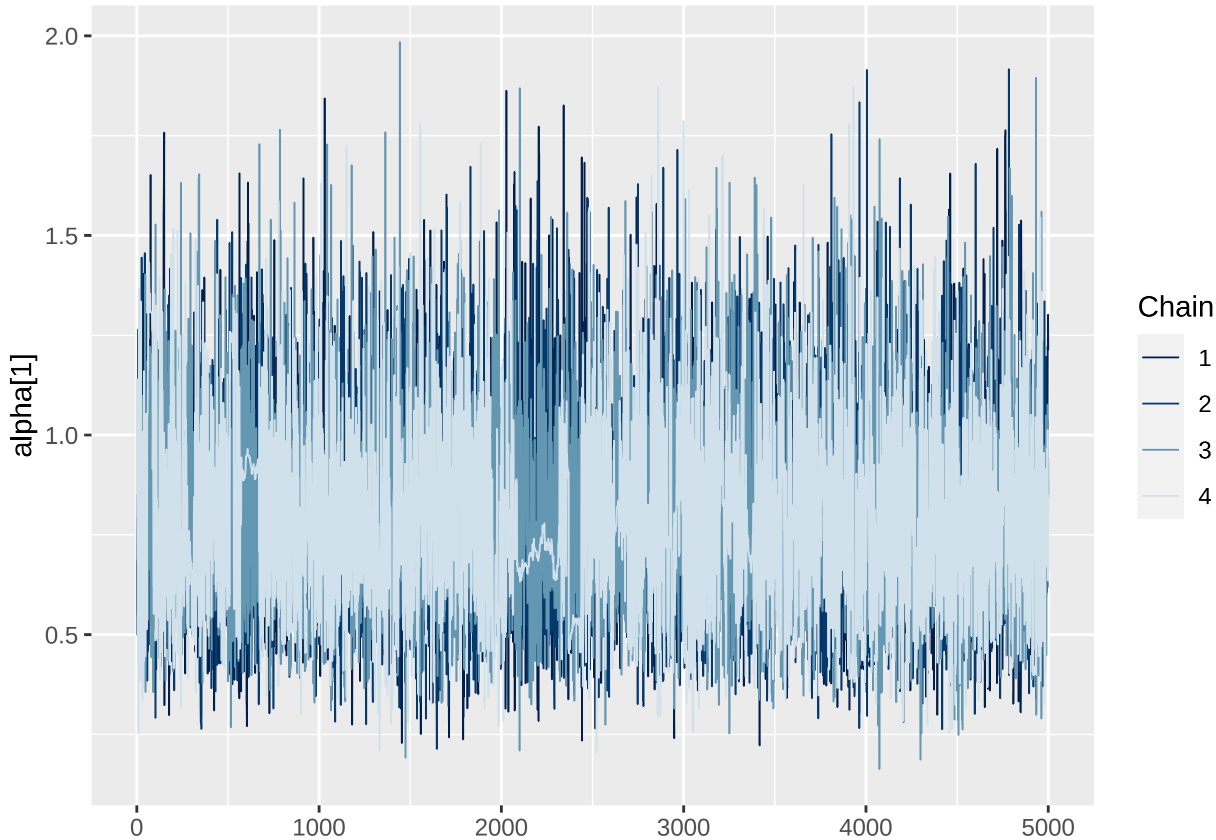
```
##      1196      2945
##         6        80
##      2897      2743
##      1914      1253
##       184       304
##       783       914
##      3194      3149
##      3368      6135
##       384       239
##      1027       636
##      3906      1814
##      3167      4252
##      1342      3562
##      1340       639
##      3060      2102
##      2821      1853
##      1196      2945
```

The first group seems to have a bit of issues with mixing, so let's plot their traces:

```r
# Plot mu_1 for group 1
mcmc_trace(fit_ordered$draws((c("mus_1[1,1]", "mus_1[1,2]", "mus_1[1,3]",
                                "mus_1[1,4]","mus_1[1,5]"))))
```

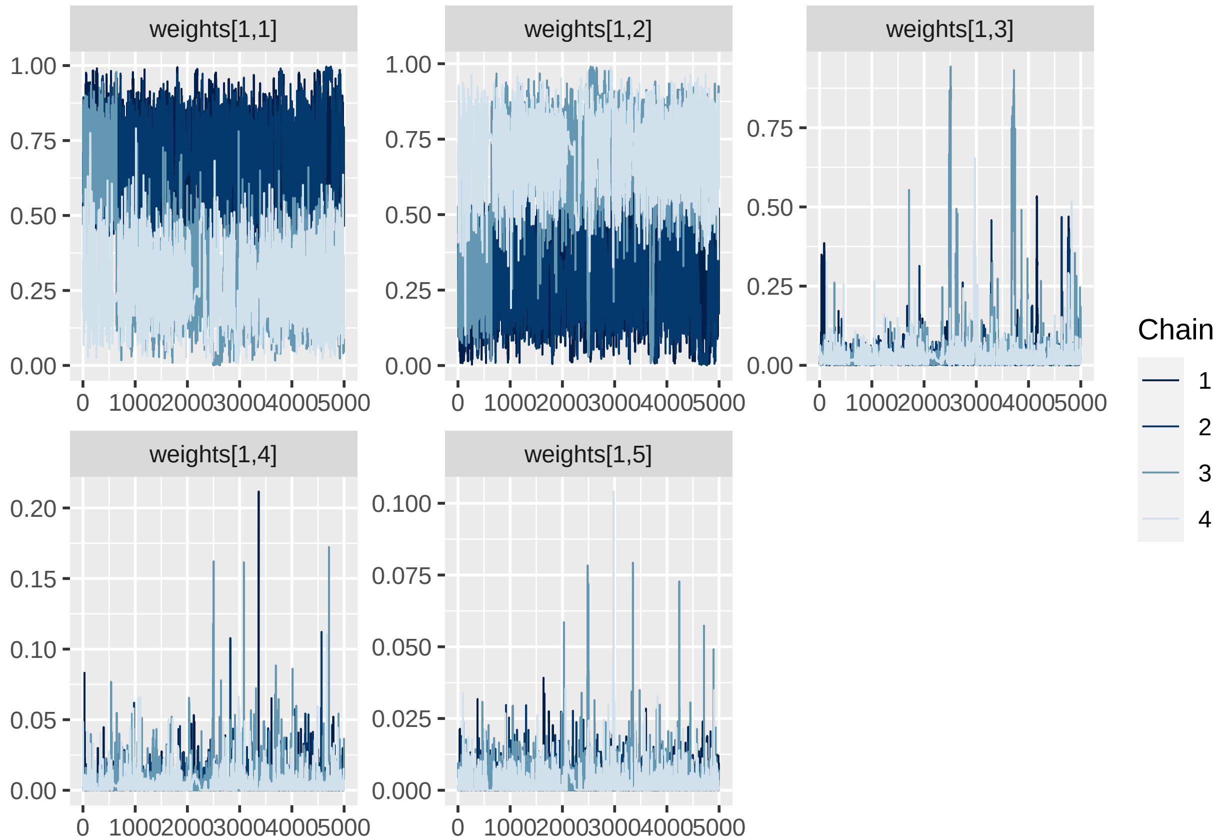


```r
# Plot alpha for group 1
mcmc_trace(fit_ordered$draws("alpha[1]"))
```



Perhaps chain 4 is the issue?

```r
# Plot weights for group 1
mcmc_trace(fit_ordered$draws((c("weights[1,1]", "weights[1,2]", "weights[1,3]",
                              "weights[1,4]","weights[1,5]"))))
```



Probably still multi-modal, two main clusters. All chains identify the last three clusters to be undesirable. No idea why chain 4 suddendly stopped working in the middle.