Descriptives and tests of coarse grained samples Geology, GEO-112, Geography Degree, UASD

Load packages

```
library(readODS)
library(sp)
library(tidyverse)
```

```
## Loading tidyverse: ggplot2
## Loading tidyverse: tibble
## Loading tidyverse: tidyr
## Loading tidyverse: readr
## Loading tidyverse: purrr
## Loading tidyverse: dplyr
```

```
## Conflicts with tidy packages ----------------------------------------------
```

```
## filter(): dplyr, stats
## lag():    dplyr, stats
```

```
library(plotKML)
```

```
## plotKML version 0.5-6 (2016-05-02)
```

```
## URL: http://plotkml.r-forge.r-project.org/
```

Set the working directory, read the data, prepare the data

```
#Working directory
wd <- '/home/jr/Documentos/clases_UASD/sem201802/datos_campo/'
setwd(wd)

#Spatial object
fcoords <- list.files(wd, '*coord.ods')
coords <- read_ods(
  fcoords,
  col_types = c('text', 'text', 'numeric', 'numeric', 'text')
)
str(coords)
```

```
## 'data.frame':    60 obs. of  6 variables:
##  $ responsable      : chr  "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" .
##  $ nombre de muestra: chr  "M1" "M2" "M3" "M4" ...
##  $ x                : chr  "342496.286" "342569.8" "342757.28" "342503.963" ...
##  $ y                : chr  "2029593.406" "2029390.689" "2029201.855" "2030225.116" ...
##  $ datum            : chr  "ESPG:32619" "ESPG:32619" "ESPG:32619" "ESPG:32619" ...
##  $ nombre temporal  : chr  "1ra" "2da" "3ra" "4ta" ...
```

```
coords[,c(3,4)] <- sapply(coords[,c(3,4)], as.numeric)
str(coords)
```

```
## 'data.frame':    60 obs. of  6 variables:
```

```
##  $ responsable      : chr  "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" .
##  $ nombre de muestra: chr  "M1" "M2" "M3" "M4" ...
##  $ x                : num  342496 342570 342757 342504 342627 ...
##  $ y                : num  2029593 2029391 2029202 2030225 2030510 ...
##  $ datum            : chr  "ESPG:32619" "ESPG:32619" "ESPG:32619" "ESPG:32619" ...
##  $ nombre temporal  : chr  "1ra" "2da" "3ra" "4ta" ...
```

```
#Samples
fsamples <- list.files(wd, '*samples.ods')
samples <- read_ods(fsamples, range = 'A1:G1140')
```

```
## Parsed with column specification:
## cols(
##   responsable = col_character(),
##   `nombre de muestra` = col_character(),
##   `id secuencial` = col_integer(),
##   tipologia = col_character(),
##   a = col_double(),
##   b = col_integer(),
##   c = col_integer(),
##   col_character()
## )
```

```
str(samples)
```

```
## 'data.frame':    1140 obs. of  7 variables:
##  $ responsable      : chr  "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" .
##  $ nombre de muestra: chr  "M1" "M1" "M1" "M1" ...
##  $ id secuencial    : chr  "1" "2" "3" "4" ...
##  $ tipologia        : chr  "sedimentaria" "sedimentaria" "sedimentaria" "sedimentaria" ...
##  $ a                : chr  "61" "67" "118" "53" ...
##  $ b                : chr  "49" "39" "54" "40" ...
##  $ c                : chr  "35" "29" "36" "29" ...
```

```
samples[,c(5,6,7)] <- sapply(samples[,c(5,6,7)], as.numeric)
str(samples)
```

```
## 'data.frame':    1140 obs. of  7 variables:
##  $ responsable      : chr  "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" "Ernesto Santana" .
##  $ nombre de muestra: chr  "M1" "M1" "M1" "M1" ...
##  $ id secuencial    : chr  "1" "2" "3" "4" ...
##  $ tipologia        : chr  "sedimentaria" "sedimentaria" "sedimentaria" "sedimentaria" ...
##  $ a                : num  61 67 118 53 81 73 43 129 58 70 ...
##  $ b                : num  49 39 54 40 43 42 37 58 35 40 ...
##  $ c                : num  35 29 36 29 34 21 16 33 26 19 ...
```

```
# Two letters abbreviation for responsible name
samples$responsable.abbv <- gsub(
  '\\b(\\pL)\\pL{2,}|.','\\U\\1',
  iconv(samples$responsable, to='ASCII//TRANSLIT'),
  perl = TRUE)
# Responsible.sample field (e.g. ET.M1)
samples$resp.m <- paste(
  samples$responsable.abbv,
  samples$`nombre de muestra`, sep = '.')
```

Descriptive statistics and inferences

Descriptive statistics

```
sapply(
  unique(samples$responsable),
  function(x)
    psych::describe(samples[samples$responsable==x,c(5,6,7)]),
  simplify = F
)
```

```
## $`Ernesto Santana`
##   vars   n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 210 77.70 18.58   74.5   76.17 16.31  43 151   108 0.99     1.47
## b    2 210 49.01 12.02   47.0   47.92 10.38  30  94    64 0.93     0.80
## c    3 210 30.73  9.66   30.0   30.26 10.38  11  61    50 0.45    -0.02
##     se
## a 1.28
## b 0.83
## c 0.67
##
## $`Ernesto Santana y Miqueas Ventura`
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 86.17 21.99   82.5   84.92 19.27  53 160   107 1.06     2.05
## b    2 30 62.60 16.34   63.0   62.25 14.83  29 100    71 0.23    -0.23
## c    3 30 44.57 13.33   40.5   43.96 14.08  23  73    50 0.37    -0.76
##     se
## a 4.01
## b 2.98
## c 2.43
##
## $`Edel Tejeda`
##   vars   n   mean    sd median trimmed   mad min max range skew kurtosis
## a    1 210 102.67 36.21     95  100.30 37.06  38 198   160 0.50    -0.65
## b    2 210  68.42 24.20     65   66.60 27.43  34 148   114 0.61    -0.21
## c    3 210  41.30 17.18     38   39.58 16.31  14  95    81 0.86     0.23
##     se
## a 2.50
## b 1.67
## c 1.19
##
## $`Edel Tejeda y Álvaro Taveras`
##   vars  n   mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 118.03 19.14  120.0  118.58 14.83  80 160    80 -0.20    -0.46
## b    2 30  65.07 17.94   63.5   63.92 14.83  35 112    77  0.62     0.03
## c    3 30  38.40 10.48   36.5   38.00 12.60  23  60    37  0.29    -1.28
##     se
## a 3.49
## b 3.28
## c 1.91
##
## $`Álvaro Taveras`
##   vars   n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 210 95.17 33.58     85   91.51 22.24  40 186   146 0.93     0.01
```

```
## b    2 210 62.44 21.41     58   60.05 19.27  34 135   101 0.94     0.38
## c    3 210 36.99 16.62     33   34.68 11.86  12  95    83 1.28     1.45
##     se
## a 2.32
## b 1.48
## c 1.15
##
## $`Lewis Cueto`
##   vars   n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 210 78.02 15.98     75   76.65 14.83  45 160   115 1.13     2.86
## b    2 210 52.92 11.93     50   51.79  7.41  30 110    80 1.15     2.26
## c    3 210 30.87  8.71     30   30.65  7.41  10  55    45 0.19     0.04
##     se
## a 1.10
## b 0.82
## c 0.60
##
## $`Lewis Cueto y Daniel Beltrés`
##   vars  n   mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 102.40 26.03   96.0  100.83 29.65  65 150    85 0.39    -1.13
## b    2 30  72.87 22.46   66.5   70.96 20.76  38 120    82 0.62    -0.86
## c    3 30  45.73 13.52   42.5   45.46 16.31  25  70    45 0.25    -1.40
##     se
## a 4.75
## b 4.10
## c 2.47
##
## $`Miqueas Ventura`
##   vars   n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 210 87.09 19.19     87   86.76 22.24  35 153   118 0.21    -0.13
## b    2 210 60.02 15.21     59   59.70 14.83  23 106    83 0.25    -0.05
## c    3 210 37.60 14.22     37   37.49 14.83   8  82    74 0.17    -0.45
##     se
## a 1.32
## b 1.05
## c 0.98
```

```
sapply(
  unique(samples$responsable),
  function(x)
    sapply(
      unique(samples[samples$responsable==x,'nombre de muestra']),
      function(y)
        psych::describe(
          samples[samples$responsable==x&samples$`nombre de muestra`==y,c(5,6,7)]
          ),
      simplify = F
    )
)
```

```
## $`Ernesto Santana`
## $`Ernesto Santana`$M1
##   vars  n mean    sd median trimmed   mad min max range skew kurtosis   se
## a    1 30 70.2 21.90   66.0   67.29 19.27  43 129    86 1.00     0.35 4.00
## b    2 30 45.7 12.71   41.5   43.83 11.12  32  83    51 1.18     0.75 2.32
```

```
## c    3 30 28.5 10.70   29.0   27.25 11.12  14  59    45 0.88     0.49 1.95
##
## $`Ernesto Santana`$M2
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 73.23 14.78   69.5    72.0 12.60  53 107    54 0.75    -0.42
## b    2 30 46.57  8.56   47.0    46.5  7.41  32  64    32 0.00    -0.76
## c    3 30 28.47  7.36   28.0    28.0  7.41  16  48    32 0.57    -0.11
##     se
## a 2.70
## b 1.56
## c 1.34
##
## $`Ernesto Santana`$M3
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 81.73 19.66   80.5   79.50 17.79  50 145    95 1.18     1.88
## b    2 30 51.03 10.80   47.5   50.75 10.38  30  72    42 0.26    -0.94
## c    3 30 31.40  8.95   32.5   30.96  8.15  18  49    31 0.28    -0.89
##     se
## a 3.59
## b 1.97
## c 1.63
##
## $`Ernesto Santana`$M4
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 75.57 15.68   72.5   73.88 12.60  53 121    68 0.94     0.49
## b    2 30 45.67  7.81   46.0   44.96  4.45  33  70    37 0.92     1.41
## c    3 30 28.67  8.12   29.5   28.58  9.64  12  46    34 0.10    -0.56
##     se
## a 2.86
## b 1.43
## c 1.48
##
## $`Ernesto Santana`$M5
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 85.83 21.30   81.5   82.88 17.05  52 151    99 1.32     1.78
## b    2 30 55.50 14.57   56.0   55.29 17.79  33  87    54 0.12    -1.06
## c    3 30 33.63 11.61   32.5   33.46 10.38  11  61    50 0.28    -0.30
##     se
## a 3.89
## b 2.66
## c 2.12
##
## $`Ernesto Santana`$M6
##   vars  n  mean    sd median trimmed  mad min max range skew kurtosis   se
## a    1 30 70.83 11.42   69.5   69.67 8.15  54 106    52 1.15     1.52 2.09
## b    2 30 45.73 13.77   42.0   43.00 8.90  31  94    63 1.95     3.77 2.51
## c    3 30 31.47  8.72   29.0   31.00 8.90  15  54    39 0.47    -0.12 1.59
##
## $`Ernesto Santana`$M7
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 86.53 16.63   83.0   87.21 16.31  49 115    66 -0.21    -0.77
## b    2 30 52.90 11.15   53.0   52.42 12.60  36  86    50  0.64     0.46
## c    3 30 32.97 10.79   34.5   33.17 11.12  14  54    40 -0.16    -0.97
##     se
```

```
## a 3.04
## b 2.04
## c 1.97
##
##
## $`Ernesto Santana y Miqueas Ventura`
## $`Ernesto Santana y Miqueas Ventura`$Ocoa
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 86.17 21.99   82.5   84.92 19.27  53 160   107 1.06     2.05
## b    2 30 62.60 16.34   63.0   62.25 14.83  29 100    71 0.23    -0.23
## c    3 30 44.57 13.33   40.5   43.96 14.08  23  73    50 0.37    -0.76
##     se
## a 4.01
## b 2.98
## c 2.43
##
##
## $`Edel Tejeda`
## $`Edel Tejeda`$M1
##   vars  n   mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 121.43 36.81    128  122.25 35.58  38 198   160 -0.24    -0.08
## b    2 30  83.07 25.63     78   81.33 19.27  38 148   110  0.57    -0.02
## c    3 30  47.93 15.58     46   47.08 14.83  23  78    55  0.35    -0.93
##     se
## a 6.72
## b 4.68
## c 2.85
##
## $`Edel Tejeda`$M2
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis  se
## a    1 30 82.13 18.07   80.0   81.46 15.57  50 120    70 0.27    -0.70 3.3
## b    2 30 54.20 15.35   54.0   52.67 16.31  34  95    61 0.89     0.71 2.8
## c    3 30 33.67 11.49   30.5   32.71  9.64  18  63    45 0.77     0.06 2.1
##
## $`Edel Tejeda`$M3
##   vars  n   mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 126.53 19.43    123  125.79 17.79  93 170    77 0.31    -0.60
## b    2 30  84.27 13.46     82   83.67 16.31  65 112    47 0.36    -0.99
## c    3 30  53.17 13.02     50   51.75 11.12  35  95    60 1.12     1.56
##     se
## a 3.55
## b 2.46
## c 2.38
##
## $`Edel Tejeda`$M4
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 96.27 14.89   96.5   96.75 20.02  68 120    52 -0.19    -1.01
## b    2 30 66.50 15.25   68.0   66.25 17.79  40  95    55  0.04    -1.07
## c    3 30 31.40 10.23   29.0   30.29 11.12  18  55    37  0.67    -0.39
##     se
## a 2.72
## b 2.78
## c 1.87
##
```

```
## $`Edel Tejeda`$M5
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 72.27 13.42   73.5   72.96 14.83  48  90    42 -0.42    -1.10
## b    2 30 49.77 10.67   48.0   48.58 11.86  37  75    38  0.81    -0.28
## c    3 30 29.83  7.91   31.0   29.62  8.90  18  48    30  0.18    -1.01
##     se
## a 2.45
## b 1.95
## c 1.44
##
## $`Edel Tejeda`$M6
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 154.2 19.14    155  153.92 23.72 120 186    66 0.06    -1.27
## b    2 30  96.6 16.64     95   96.04 13.34  60 135    75 0.26    -0.09
## c    3 30  63.5 15.05     60   62.96 14.83  40  95    55 0.26    -1.02
##     se
## a 3.49
## b 3.04
## c 2.75
##
## $`Edel Tejeda`$M7
##   vars  n  mean   sd median trimmed   mad min max range  skew kurtosis
## a    1 30 65.83 8.98   65.5   65.75  8.15  48  85    37  0.07    -0.69
## b    2 30 44.53 7.45   43.0   44.12 10.38  35  60    25  0.33    -1.16
## c    3 30 29.60 6.98   29.5   29.92  6.67  14  45    31 -0.18    -0.15
##     se
## a 1.64
## b 1.36
## c 1.27
##
##
## $`Edel Tejeda y Álvaro Taveras`
## $`Edel Tejeda y Álvaro Taveras`$Ocoa
##   vars  n   mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 118.03 19.14  120.0  118.58 14.83  80 160    80 -0.20    -0.46
## b    2 30  65.07 17.94   63.5   63.92 14.83  35 112    77  0.62     0.03
## c    3 30  38.40 10.48   36.5   38.00 12.60  23  60    37  0.29    -1.28
##     se
## a 3.49
## b 3.28
## c 1.91
##
##
## $`Álvaro Taveras`
## $`Álvaro Taveras`$M1
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 91.50 28.34   83.0   89.58 22.24  48 155   107 0.68    -0.32
## b    2 30 62.07 19.01   62.5   61.00 18.53  34 110    76 0.44    -0.47
## c    3 30 36.03 16.73   33.5   34.92 18.53  12  78    66 0.56    -0.56
##     se
## a 5.17
## b 3.47
## c 3.05
##
```

```
## $`Álvaro Taveras`$M2
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 80.83 13.42     80   80.88 14.83  57 115    58 0.13    -0.24
## b    2 30 52.13 10.24     53   51.92 12.60  36  74    38 0.09    -1.09
## c    3 30 29.60  7.28     28   28.92  4.45  18  48    30 0.84    -0.06
##     se
## a 2.45
## b 1.87
## c 1.33
##
## $`Álvaro Taveras`$M3
##   vars  n   mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 102.40 31.72   96.5  100.46 37.06  56 170   114 0.37    -0.93
## b    2 30  63.17 18.67   65.5   61.79 19.27  35 111    76 0.51    -0.24
## c    3 30  38.20 11.64   38.0   38.21 11.86  14  60    46 0.05    -0.51
##     se
## a 5.79
## b 3.41
## c 2.12
##
## $`Álvaro Taveras`$M4
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 80.60 18.58     80   80.12 14.83  40 120    80 0.11    -0.38
## b    2 30 55.93 15.07     54   54.04 13.34  36  95    59 0.93     0.03
## c    3 30 28.83  9.30     27   28.21 10.38  15  48    33 0.47    -1.12
##     se
## a 3.39
## b 2.75
## c 1.70
##
## $`Álvaro Taveras`$M5
##   vars  n   mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 103.30 39.21   88.0  100.62 28.17  50 185   135 0.62    -1.03
## b    2 30  68.73 23.80   62.0   66.92 22.24  38 120    82 0.59    -0.95
## c    3 30  43.63 21.18   37.5   41.33 18.53  18  95    77 0.91    -0.28
##     se
## a 7.16
## b 4.35
## c 3.87
##
## $`Álvaro Taveras`$M6
##   vars  n   mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 125.43 46.72  140.0  127.46 45.96  48 186   138 -0.44    -1.48
## b    2 30  78.60 30.83   86.5   78.04 37.06  35 135   100 -0.06    -1.28
## c    3 30  52.20 21.31   50.0   51.62 26.69  15  95    80  0.22    -1.18
##     se
## a 8.53
## b 5.63
## c 3.89
##
## $`Álvaro Taveras`$M7
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 82.13 19.49   82.5   82.12 18.53  48 120    72 0.08    -0.79
## b    2 30 56.43 15.55   56.0   55.21 20.76  37  95    58 0.54    -0.69
```

```
## c    3 30 30.40  8.70   29.5   29.62  8.15  18  55    37 0.82     0.32
##     se
## a 3.56
## b 2.84
## c 1.59
##
##
## $`Lewis Cueto`
## $`Lewis Cueto`$M1
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 81.33 17.37   80.0   80.00 14.83  55 130    75 0.68     0.11
## b    2 30 60.33 12.66   60.0   58.96 14.83  45  90    45 0.80    -0.22
## c    3 30 36.67  7.69   37.5   36.25 11.12  25  50    25 0.33    -1.14
##     se
## a 3.17
## b 2.31
## c 1.40
##
## $`Lewis Cueto`$M2
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 73.33 20.57   67.5   70.42 18.53  55 160   105  2.41     7.74
## b    2 30 49.00  6.21   50.0   49.17  7.41  35  60    25 -0.26    -0.66
## c    3 30 35.00  7.19   35.0   34.79  7.41  25  50    25  0.34    -1.13
##     se
## a 3.75
## b 1.13
## c 1.31
##
## $`Lewis Cueto`$M3
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 83.67 12.99     80   82.92 14.83  60 115    55 0.55    -0.37
## b    2 30 57.17 15.12     55   55.62 14.83  35 110    75 1.31     2.67
## c    3 30 32.00  9.34     30   31.04  7.41  20  55    35 0.87     0.18
##     se
## a 2.37
## b 2.76
## c 1.71
##
## $`Lewis Cueto`$M4
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 80.33 12.86     80   79.17 11.12  60 120    60  1.08     1.62
## b    2 30 52.00  9.25     50   51.04  7.41  40  75    35  0.91    -0.11
## c    3 30 27.00  8.47     25   27.71  7.41  10  40    30 -0.49    -0.61
##     se
## a 2.35
## b 1.69
## c 1.55
##
## $`Lewis Cueto`$M5
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 80.83 15.54   80.0   80.21 14.83  55 120    65 0.42    -0.56
## b    2 30 56.17 13.18   50.0   55.21  7.41  40  85    45 0.62    -0.98
## c    3 30 27.83  9.16   27.5   27.50 11.12  10  50    40 0.30    -0.25
##     se
```

```
## a 2.84
## b 2.41
## c 1.67
##
## $`Lewis Cueto`$M6
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 69.63 12.34   65.0   69.58 11.12  45  90    45 0.18    -0.87
## b    2 30 45.37  8.80   45.0   44.62  7.41  30  70    40 0.74     0.47
## c    3 30 28.07  7.89   26.5   28.00  9.64  15  45    30 0.10    -0.89
##     se
## a 2.25
## b 1.61
## c 1.44
##
## $`Lewis Cueto`$M7
##   vars  n mean    sd median trimmed  mad min max range skew kurtosis   se
## a    1 30 77.0 15.30   74.0   75.12 9.64  57 120    63 1.16     0.59 2.79
## b    2 30 50.4  9.63   52.5   50.21 8.90  34  72    38 0.02    -0.83 1.76
## c    3 30 29.5  6.51   30.0   29.21 7.41  17  43    26 0.31    -0.56 1.19
##
##
## $`Lewis Cueto y Daniel Beltrés`
## $`Lewis Cueto y Daniel Beltrés`$Ocoa
##   vars  n   mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 102.40 26.03   96.0  100.83 29.65  65 150    85 0.39    -1.13
## b    2 30  72.87 22.46   66.5   70.96 20.76  38 120    82 0.62    -0.86
## c    3 30  45.73 13.52   42.5   45.46 16.31  25  70    45 0.25    -1.40
##     se
## a 4.75
## b 4.10
## c 2.47
##
##
## $`Miqueas Ventura`
## $`Miqueas Ventura`$M1
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 88.33 19.03   88.5   88.25 20.76  55 122    67 0.00    -1.14
## b    2 30 56.43  8.87   55.5   56.29  9.64  40  73    33 0.12    -0.92
## c    3 30 37.13  9.30   37.0   36.88  7.41  18  61    43 0.27     0.26
##     se
## a 3.47
## b 1.62
## c 1.70
##
## $`Miqueas Ventura`$M2
##   vars  n  mean    sd median trimmed   mad min   max range  skew kurtosis
## a    1 30 86.95 15.55   88.0   87.67 15.57  56 111.5  55.5 -0.36    -0.83
## b    2 30 62.37  9.36   62.5   61.96  8.90  45  94.0  49.0  0.96     2.31
## c    3 30 41.53 12.35   42.0   41.00 12.60  19  82.0  63.0  0.81     1.78
##     se
## a 2.84
## b 1.71
## c 2.25
##
```

```
## $`Miqueas Ventura`$M3
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 78.23 15.97   74.5   77.08 14.08  54 113    59 0.60    -0.64
## b    2 30 55.43 11.80   51.5   54.33  8.90  37  79    42 0.75    -0.71
## c    3 30 31.07 10.95   29.5   30.08 10.38  12  57    45 0.62    -0.13
##     se
## a 2.92
## b 2.15
## c 2.00
##
## $`Miqueas Ventura`$M4
##   vars  n   mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 100.80 17.53     97   98.46 14.08  79 153    74  1.17     1.01
## b    2 30  74.47 11.03     74   73.88 10.38  50 105    55  0.51     0.44
## c    3 30  52.30  8.92     55   53.62  5.93  31  65    34 -1.17     0.54
##     se
## a 3.20
## b 2.01
## c 1.63
##
## $`Miqueas Ventura`$M5
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 84.30 22.54   83.0   83.75 17.79  35 130    95 0.12    -0.35
## b    2 30 54.30 21.29   51.0   53.29 25.20  23 106    83 0.43    -0.80
## c    3 30 30.63 19.58   25.5   28.79 18.53   8  72    64 0.65    -0.94
##     se
## a 4.12
## b 3.89
## c 3.57
##
## $`Miqueas Ventura`$M6
##   vars  n  mean    sd median trimmed   mad min max range skew kurtosis
## a    1 30 79.63 17.25   78.5   79.00 19.27  53 115    62 0.35    -1.13
## b    2 30 54.17 12.78   53.0   53.92 14.08  32  76    44 0.24    -1.08
## c    3 30 33.17  9.18   32.0   32.79  9.64  13  59    46 0.47     0.56
##     se
## a 3.15
## b 2.33
## c 1.68
##
## $`Miqueas Ventura`$M7
##   vars  n  mean    sd median trimmed   mad min max range  skew kurtosis
## a    1 30 91.40 17.90   97.0   92.12 17.79  62 117    55 -0.33    -1.44
## b    2 30 62.97 17.00   60.0   62.50 22.24  33  97    64  0.21    -0.96
## c    3 30 37.40 14.07   38.5   37.17 15.57  12  64    52  0.07    -0.95
##     se
## a 3.27
## b 3.10
## c 2.57
```

Inferences. Combinations of responsibles-samples

```
comb <- as.data.frame(
  gtools::combinations(
    length(unique(samples$resp.m)),
    r= 2,
    unique(samples$resp.m)
  )
)
head(comb)
```

```
##      V1    V2
## 1 AT.M1 AT.M2
## 2 AT.M1 AT.M3
## 3 AT.M1 AT.M4
## 4 AT.M1 AT.M5
## 5 AT.M1 AT.M6
## 6 AT.M1 AT.M7
```

Inferences. t-Tests between responsibles-samples (all against all)

The smaller the p-value the better the result

```
rownames(comb) <- paste(comb[,1], comb[,2], sep = ' - ')
ttests <- t(
  sapply(
    rownames(comb),
    function(x)
      sapply(c('a','b','c'),
             function(y)
               t.test(
                 samples[samples$resp.m==comb[x,1], y],
                 samples[samples$resp.m==comb[x,2], y]
                 )$p.value,
             simplify = T,
             USE.NAMES = T
             )
    )
)
ttests
```

```
##                                a            b            c
## AT.M1 - AT.M2         6.956812e-02 1.539072e-02 6.063435e-02
## AT.M1 - AT.M3         1.658831e-01 8.218839e-01 5.629049e-01
## AT.M1 - AT.M4         8.422789e-02 1.716850e-01 4.515563e-02
## AT.M1 - AT.M5         1.872813e-01 2.357019e-01 1.287329e-01
## AT.M1 - AT.M6         1.362682e-03 1.584989e-02 1.871616e-03
## AT.M1 - AT.M7         1.419696e-01 2.142177e-01 1.090175e-01
## AT.M1 - ES.M1         1.939336e-03 2.661626e-04 4.298995e-02
## AT.M1 - ES.M2         3.111574e-03 2.115225e-04 2.887858e-02
## AT.M1 - ES.M3         1.270173e-01 8.175293e-03 1.879159e-01
## AT.M1 - ES.M4         9.866995e-03 9.043867e-05 3.576624e-02
## AT.M1 - ES.M5         3.852214e-01 1.388903e-01 5.214454e-01
## AT.M1 - ES.M6         6.684806e-04 3.622566e-04 1.918919e-01
```

```
## AT.M1 - ES.M7         4.119268e-01 2.729643e-02 4.029271e-01
## AT.M1 - ESMV.Ocoa     4.189911e-01 9.076420e-01 3.315383e-02
## AT.M1 - ETAT.Ocoa     9.141742e-05 5.320443e-01 5.145868e-01
## AT.M1 - ET.M1         8.566143e-04 6.867034e-04 6.041608e-03
## AT.M1 - ET.M2         1.333456e-01 8.325271e-02 5.258603e-01
## AT.M1 - ET.M3         8.968160e-07 3.138405e-06 4.625861e-05
## AT.M1 - ET.M4         4.192355e-01 3.233909e-01 2.018151e-01
## AT.M1 - ET.M5         1.687427e-03 3.396494e-03 7.372511e-02
## AT.M1 - ET.M6         1.144427e-13 4.905063e-10 1.033974e-08
## AT.M1 - ET.M7         3.682923e-05 3.381016e-05 5.922673e-02
## AT.M1 - LCDB.Ocoa     1.262527e-01 4.913956e-02 1.660795e-02
## AT.M1 - LC.M1         1.003790e-01 6.793564e-01 8.515289e-01
## AT.M1 - LC.M2         6.363767e-03 1.030809e-03 7.576170e-01
## AT.M1 - LC.M3         1.763280e-01 2.739864e-01 2.549992e-01
## AT.M1 - LC.M4         5.629147e-02 1.253817e-02 1.155873e-02
## AT.M1 - LC.M5         7.737869e-02 1.682831e-01 2.298045e-02
## AT.M1 - LC.M6         3.912293e-04 8.380932e-05 2.315066e-02
## AT.M1 - LC.M7         1.758852e-02 4.492740e-03 5.354968e-02
## AT.M1 - MV.M1         6.136130e-01 1.488830e-01 7.543989e-01
## AT.M1 - MV.M2         4.448125e-01 9.385406e-01 1.532841e-01
## AT.M1 - MV.M3         3.044404e-02 1.108216e-01 1.798175e-01
## AT.M1 - MV.M4         1.328872e-01 3.366361e-03 2.561818e-05
## AT.M1 - MV.M5         2.808829e-01 1.415284e-01 2.555788e-01
## AT.M1 - MV.M6         5.593916e-02 6.460617e-02 4.149744e-01
## AT.M1 - MV.M7         9.870307e-01 8.473952e-01 7.332846e-01
## AT.M2 - AT.M3         1.440713e-03 6.786684e-03 1.230526e-03
## AT.M2 - AT.M4         9.557419e-01 2.587437e-01 7.234847e-01
## AT.M2 - AT.M5         5.302494e-03 1.141733e-03 1.527313e-03
## AT.M2 - AT.M6         1.617992e-05 7.908112e-05 3.364699e-06
## AT.M2 - AT.M7         7.647494e-01 2.118124e-01 7.007012e-01
## AT.M2 - ES.M1         2.791067e-02 3.520094e-02 6.435045e-01
## AT.M2 - ES.M2         4.150649e-02 2.615322e-02 5.510094e-01
## AT.M2 - ES.M3         8.367422e-01 6.870755e-01 3.963641e-01
## AT.M2 - ES.M4         1.677342e-01 8.066780e-03 6.409652e-01
## AT.M2 - ES.M5         2.820124e-01 3.051855e-01 1.132792e-01
## AT.M2 - ES.M6         2.945830e-03 4.603033e-02 3.719688e-01
## AT.M2 - ES.M7         1.496083e-01 7.824790e-01 1.626250e-01
## AT.M2 - ESMV.Ocoa     2.624605e-01 4.583131e-03 2.431810e-06
## AT.M2 - ETAT.Ocoa     9.662285e-12 1.286894e-03 4.114719e-04
## AT.M2 - ET.M1         1.792867e-06 3.669777e-07 7.290328e-07
## AT.M2 - ET.M2         7.529997e-01 5.422490e-01 1.078020e-01
## AT.M2 - ET.M3         1.493438e-14 1.602497e-14 3.598664e-11
## AT.M2 - ET.M4         8.916621e-05 8.212495e-05 4.356959e-01
## AT.M2 - ET.M5         1.638033e-02 3.843768e-01 9.057525e-01
## AT.M2 - ET.M6         4.285961e-23 1.088169e-16 4.628603e-14
## AT.M2 - ET.M7         5.347567e-06 1.804571e-03 1.000000e+00
## AT.M2 - LCDB.Ocoa     2.184479e-04 4.078789e-05 7.410906e-07
## AT.M2 - LC.M1         9.011626e-01 7.846984e-03 5.559416e-04
## AT.M2 - LC.M2         1.006463e-01 1.584620e-01 5.395154e-03
## AT.M2 - LC.M3         4.095479e-01 1.373963e-01 2.717362e-01
## AT.M2 - LC.M4         8.833870e-01 9.579744e-01 2.073465e-01
## AT.M2 - LC.M5         1.000000e+00 1.910651e-01 4.117482e-01
## AT.M2 - LC.M6         1.368130e-03 8.088931e-03 4.371570e-01
## AT.M2 - LC.M7         3.066388e-01 5.022114e-01 9.554601e-01
```

```
## AT.M2 - MV.M1         8.359040e-02 8.755000e-02 9.473297e-04
## AT.M2 - MV.M2         1.084574e-01 1.600502e-04 3.655635e-05
## AT.M2 - MV.M3         4.976468e-01 2.520861e-01 5.439458e-01
## AT.M2 - MV.M4         7.466295e-06 3.886454e-11 2.737696e-15
## AT.M2 - MV.M5         4.727662e-01 6.180352e-01 7.878947e-01
## AT.M2 - MV.M6         7.647327e-01 4.994131e-01 1.009647e-01
## AT.M2 - MV.M7         1.243382e-02 4.408459e-03 9.895082e-03
## AT.M3 - AT.M4         2.153203e-03 1.043689e-01 1.099845e-03
## AT.M3 - AT.M5         9.224856e-01 3.179039e-01 2.245108e-01
## AT.M3 - AT.M6         2.987871e-02 2.320399e-02 2.840744e-03
## AT.M3 - AT.M7         4.491106e-03 1.346926e-01 4.826409e-03
## AT.M3 - ES.M1         3.026434e-05 9.499869e-05 1.385649e-03
## AT.M3 - ES.M2         4.486932e-05 7.015258e-05 3.200493e-04
## AT.M3 - ES.M3         3.882346e-03 3.458498e-03 1.407742e-02
## AT.M3 - ES.M4         1.553425e-04 2.886450e-05 5.563243e-04
## AT.M3 - ES.M5         2.137978e-02 8.173899e-02 1.334789e-01
## AT.M3 - ES.M6         9.882010e-06 1.344741e-04 1.415978e-02
## AT.M3 - ES.M7         1.942882e-02 1.284514e-02 7.610664e-02
## AT.M3 - ESMV.Ocoa     2.530614e-02 9.008969e-01 5.359690e-02
## AT.M3 - ETAT.Ocoa     2.520143e-02 6.892358e-01 9.444837e-01
## AT.M3 - ET.M1         3.621949e-02 1.151121e-03 8.296894e-03
## AT.M3 - ET.M2         3.889493e-03 4.689193e-02 1.343091e-01
## AT.M3 - ET.M3         8.644464e-04 6.232374e-06 1.713177e-05
## AT.M3 - ET.M4         3.433643e-01 4.520599e-01 1.947909e-02
## AT.M3 - ET.M5         2.403830e-05 1.346917e-03 2.003451e-03
## AT.M3 - ET.M6         7.610630e-10 9.047566e-10 1.343212e-09
## AT.M3 - ET.M7         7.196660e-07 1.042979e-05 1.113872e-03
## AT.M3 - LCDB.Ocoa     1.000000e+00 7.420045e-02 2.434038e-02
## AT.M3 - LC.M1         2.589650e-03 4.945679e-01 5.498544e-01
## AT.M3 - LC.M2         1.064911e-04 3.632793e-04 2.062151e-01
## AT.M3 - LC.M3         4.804782e-03 1.768967e-01 2.674285e-02
## AT.M3 - LC.M4         1.097352e-03 5.356118e-03 8.344727e-05
## AT.M3 - LC.M5         1.741467e-03 9.935489e-02 3.267875e-04
## AT.M3 - LC.M6         5.815318e-06 2.680955e-05 2.425198e-04
## AT.M3 - LC.M7         2.944165e-04 1.786798e-03 8.462522e-04
## AT.M3 - MV.M1         4.268711e-02 8.169891e-02 6.963970e-01
## AT.M3 - MV.M2         2.112535e-02 8.348035e-01 2.863677e-01
## AT.M3 - MV.M3         5.633023e-04 6.095255e-02 1.755001e-02
## AT.M3 - MV.M4         8.100262e-01 6.395403e-03 2.432938e-06
## AT.M3 - MV.M5         1.382489e-02 9.173196e-02 7.511895e-02
## AT.M3 - MV.M6         1.220739e-03 3.398617e-02 6.819345e-02
## AT.M3 - MV.M7         1.049639e-01 9.655456e-01 8.111806e-01
## AT.M4 - AT.M5         6.508727e-03 1.627252e-02 1.147213e-03
## AT.M4 - AT.M6         1.908715e-05 7.891702e-04 2.409571e-06
## AT.M4 - AT.M7         7.562624e-01 8.998232e-01 5.031260e-01
## AT.M4 - ES.M1         5.219929e-02 6.217724e-03 8.979934e-01
## AT.M4 - ES.M2         9.481711e-02 4.860120e-03 8.661614e-01
## AT.M4 - ES.M3         8.192769e-01 1.537226e-01 2.805921e-01
## AT.M4 - ES.M4         2.616293e-01 1.866844e-03 9.413203e-01
## AT.M4 - ES.M5         3.147827e-01 9.102442e-01 8.262842e-02
## AT.M4 - ES.M6         1.783558e-02 8.251719e-03 2.626932e-01
## AT.M4 - ES.M7         1.976034e-01 3.795215e-01 1.175674e-01
## AT.M4 - ESMV.Ocoa     2.940355e-01 1.059858e-01 2.388089e-06
## AT.M4 - ETAT.Ocoa     2.071408e-10 3.714927e-02 4.292485e-04
```

```
## AT.M4 - ET.M1         2.518700e-06 8.507900e-06 5.967684e-07
## AT.M4 - ET.M2         7.470767e-01 6.605983e-01 7.870907e-02
## AT.M4 - ET.M3         3.474906e-13 2.292665e-10 3.611408e-11
## AT.M4 - ET.M4         6.725668e-04 9.102547e-03 3.134152e-01
## AT.M4 - ET.M5         5.159467e-02 7.313013e-02 6.554042e-01
## AT.M4 - ET.M6         9.120451e-22 4.652242e-14 2.163425e-14
## AT.M4 - ET.M7         3.224128e-04 5.925377e-04 7.194264e-01
## AT.M4 - LCDB.Ocoa     4.652922e-04 1.210424e-03 7.250184e-07
## AT.M4 - LC.M1         8.750551e-01 2.259274e-01 7.771377e-04
## AT.M4 - LC.M2         1.564074e-01 2.518893e-02 5.782041e-03
## AT.M4 - LC.M3         4.621058e-01 7.528780e-01 1.933823e-01
## AT.M4 - LC.M4         9.487092e-01 2.290860e-01 4.279651e-01
## AT.M4 - LC.M5         9.581066e-01 9.493251e-01 6.763576e-01
## AT.M4 - LC.M6         9.580754e-03 1.773382e-03 7.319063e-01
## AT.M4 - LC.M7         4.161187e-01 9.654938e-02 7.490178e-01
## AT.M4 - MV.M1         1.166749e-01 8.762471e-01 1.029707e-03
## AT.M4 - MV.M2         1.566746e-01 5.270117e-02 3.666368e-05
## AT.M4 - MV.M3         5.987986e-01 8.867563e-01 3.981296e-01
## AT.M4 - MV.M4         5.964208e-05 1.403628e-06 3.464639e-14
## AT.M4 - MV.M5         4.906812e-01 7.329897e-01 6.515474e-01
## AT.M4 - MV.M6         8.352836e-01 6.263467e-01 7.444430e-02
## AT.M4 - MV.M7         2.551317e-02 9.541976e-02 7.573052e-03
## AT.M5 - AT.M6         5.170466e-02 1.709024e-01 1.238069e-01
## AT.M5 - AT.M7         1.131819e-02 2.171780e-02 3.020446e-03
## AT.M5 - ES.M1         2.053817e-04 2.759183e-05 1.120488e-03
## AT.M5 - ES.M2         3.566512e-04 2.703817e-05 7.078301e-04
## AT.M5 - ES.M3         1.006362e-02 6.244651e-04 5.874623e-03
## AT.M5 - ES.M4         9.124722e-04 1.388764e-05 8.840540e-04
## AT.M5 - ES.M5         3.748511e-02 1.242778e-02 2.818201e-02
## AT.M5 - ES.M6         1.164842e-04 3.473314e-05 5.982157e-03
## AT.M5 - ES.M7         3.725068e-02 2.004962e-03 1.806696e-02
## AT.M5 - ESMV.Ocoa     4.244140e-02 2.499956e-01 8.389714e-01
## AT.M5 - ETAT.Ocoa     7.139697e-02 5.033213e-01 2.318458e-01
## AT.M5 - ET.M1         6.989381e-02 2.865688e-02 3.744189e-01
## AT.M5 - ET.M2         1.042277e-02 7.056051e-03 2.835625e-02
## AT.M5 - ET.M3         5.760121e-03 3.202186e-03 4.096443e-02
## AT.M5 - ET.M4         3.642506e-01 6.671073e-01 6.774897e-03
## AT.M5 - ET.M5         2.261267e-04 2.783773e-04 1.906343e-03
## AT.M5 - ET.M6         1.081130e-07 2.814360e-06 1.081175e-04
## AT.M5 - ET.M7         1.472096e-05 6.370904e-06 1.484567e-03
## AT.M5 - LCDB.Ocoa     9.169858e-01 4.917933e-01 6.490938e-01
## AT.M5 - LC.M1         7.715271e-03 9.489483e-02 9.887987e-02
## AT.M5 - LC.M2         5.850212e-04 1.089968e-04 4.156945e-02
## AT.M5 - LC.M3         1.340470e-02 2.919448e-02 8.850747e-03
## AT.M5 - LC.M4         4.345575e-03 9.439827e-04 2.868360e-04
## AT.M5 - LC.M5         5.897738e-03 1.495017e-02 5.662413e-04
## AT.M5 - LC.M6         7.601099e-05 1.249527e-05 5.675957e-04
## AT.M5 - LC.M7         1.508489e-03 3.648849e-04 1.329097e-03
## AT.M5 - MV.M1         6.691881e-02 1.171290e-02 1.316643e-01
## AT.M5 - MV.M2         4.032048e-02 1.807818e-01 6.411175e-01
## AT.M5 - MV.M3         2.449898e-03 8.895362e-03 6.037858e-03
## AT.M5 - MV.M4         7.514906e-01 2.381520e-01 4.554658e-02
## AT.M5 - MV.M5         2.593286e-02 1.627294e-02 1.653641e-02
## AT.M5 - MV.M6         4.322333e-03 5.011520e-03 1.734211e-02
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## AT.M5 - MV.M7         1.382075e-01 2.851273e-01 1.853159e-01
## AT.M6 - AT.M7         3.395595e-05 1.048325e-03 7.202582e-06
## AT.M6 - ES.M1         6.677437e-07 3.579404e-06 2.383220e-06
## AT.M6 - ES.M2         1.305607e-06 4.242698e-06 1.456028e-06
## AT.M6 - ES.M3         2.998779e-05 4.729589e-05 1.575999e-05
## AT.M6 - ES.M4         2.975345e-06 2.610774e-06 1.823007e-06
## AT.M6 - ES.M5         1.318864e-04 6.097316e-04 1.290067e-04
## AT.M6 - ES.M6         5.443706e-07 4.057213e-06 1.604064e-05
## AT.M6 - ES.M7         1.244469e-04 1.243287e-04 6.817697e-05
## AT.M6 - ESMV.Ocoa     1.547273e-04 1.575247e-02 1.026860e-01
## AT.M6 - ETAT.Ocoa     4.270015e-01 4.322495e-02 2.739201e-03
## AT.M6 - ET.M1         7.140154e-01 5.441762e-01 3.800675e-01
## AT.M6 - ET.M2         3.109558e-05 3.564241e-04 1.290324e-04
## AT.M6 - ET.M3         9.058252e-01 3.617661e-01 8.330161e-01
## AT.M6 - ET.M4         2.505099e-03 6.071354e-02 1.938290e-05
## AT.M6 - ET.M5         9.084180e-07 2.460241e-05 4.271545e-06
## AT.M6 - ET.M6         3.411893e-03 7.251305e-03 2.139710e-02
## AT.M6 - ET.M7         1.058717e-07 1.457919e-06 3.278172e-06
## AT.M6 - LCDB.Ocoa     2.267433e-02 4.139812e-01 1.667765e-01
## AT.M6 - LC.M1         2.281791e-05 4.687024e-03 6.051905e-04
## AT.M6 - LC.M2         1.798316e-06 1.334485e-05 1.767399e-04
## AT.M6 - LC.M3         4.107247e-05 1.405460e-03 2.610508e-05
## AT.M6 - LC.M4         1.342825e-05 6.926582e-05 5.404051e-07
## AT.M6 - LC.M5         1.760590e-05 7.303025e-04 1.107122e-06
## AT.M6 - LC.M6         3.700813e-07 2.325751e-06 1.134118e-06
## AT.M6 - LC.M7         4.765828e-06 3.163404e-05 2.934099e-06
## AT.M6 - MV.M1         2.565217e-04 6.015053e-04 1.012860e-03
## AT.M6 - MV.M2         1.353807e-04 9.213369e-03 2.188851e-02
## AT.M6 - MV.M3         7.449535e-06 4.556480e-04 1.734235e-05
## AT.M6 - MV.M4         1.028642e-02 4.936690e-01 9.812072e-01
## AT.M6 - MV.M5         8.737795e-05 8.254391e-04 1.393608e-04
## AT.M6 - MV.M6         1.275037e-05 2.683079e-04 6.014817e-05
## AT.M6 - MV.M7         6.415257e-04 1.902956e-02 2.563500e-03
## AT.M7 - ES.M1         2.975114e-02 4.945871e-03 4.537137e-01
## AT.M7 - ES.M2         5.135473e-02 3.887876e-03 3.567654e-01
## AT.M7 - ES.M3         9.371938e-01 1.243637e-01 6.624376e-01
## AT.M7 - ES.M4         1.561943e-01 1.519009e-03 4.283202e-01
## AT.M7 - ES.M5         4.855913e-01 8.112607e-01 2.274634e-01
## AT.M7 - ES.M6         8.681943e-03 6.569136e-03 6.371618e-01
## AT.M7 - ES.M7         3.508981e-01 3.165037e-01 3.148954e-01
## AT.M7 - ESMV.Ocoa     4.552830e-01 1.398224e-01 1.145896e-05
## AT.M7 - ETAT.Ocoa     1.371086e-09 5.124700e-02 2.156851e-03
## AT.M7 - ET.M1         5.509965e-06 1.282548e-05 2.494715e-06
## AT.M7 - ET.M2         1.000000e+00 5.777310e-01 2.197289e-01
## AT.M7 - ET.M3         2.478822e-12 6.689657e-10 1.759841e-10
## AT.M7 - ET.M4         2.615395e-03 1.410943e-02 6.848727e-01
## AT.M7 - ET.M5         2.656494e-02 5.838659e-02 7.927495e-01
## AT.M7 - ET.M6         7.143491e-21 1.162974e-13 9.317771e-14
## AT.M7 - ET.M7         1.599192e-04 4.944333e-04 6.959608e-01
## AT.M7 - LCDB.Ocoa     1.225694e-03 1.782747e-03 3.481055e-06
## AT.M7 - LC.M1         8.673094e-01 2.913746e-01 4.531398e-03
## AT.M7 - LC.M2         9.433614e-02 1.988873e-02 2.963058e-02
## AT.M7 - LC.M3         7.214869e-01 8.537650e-01 4.951184e-01
## AT.M7 - LC.M4         6.747259e-01 1.860310e-01 1.305273e-01
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## AT.M7 - LC.M5         7.762527e-01 9.431301e-01 2.704507e-01
## AT.M7 - LC.M6         4.631973e-03 1.438040e-03 2.811165e-01
## AT.M7 - LC.M7         2.615089e-01 7.709567e-02 6.519303e-01
## AT.M7 - MV.M1         2.175987e-01 1.000000e+00 5.327179e-03
## AT.M7 - MV.M2         2.947074e-01 7.975065e-02 1.781927e-04
## AT.M7 - MV.M3         4.002770e-01 7.800998e-01 7.950093e-01
## AT.M7 - MV.M4         2.547685e-04 3.612195e-06 1.249670e-13
## AT.M7 - MV.M5         6.919662e-01 6.594070e-01 9.527240e-01
## AT.M7 - MV.M6         6.008633e-01 5.399805e-01 2.356714e-01
## AT.M7 - MV.M7         6.012695e-02 1.258936e-01 2.471111e-02
## ES.M1 - ES.M2         5.322974e-01 7.579974e-01 9.888399e-01
## ES.M1 - ES.M3         3.607608e-02 8.525708e-02 2.597338e-01
## ES.M1 - ES.M4         2.801923e-01 9.902837e-01 9.460766e-01
## ES.M1 - ES.M5         6.880763e-03 7.421494e-03 8.020246e-02
## ES.M1 - ES.M6         8.889640e-01 9.922603e-01 2.442726e-01
## ES.M1 - ES.M7         1.968073e-03 2.322103e-02 1.128851e-01
## ES.M1 - ESMV.Ocoa     6.602650e-03 3.971930e-05 3.587215e-06
## ES.M1 - ETAT.Ocoa     1.511802e-12 1.258863e-05 6.210537e-04
## ES.M1 - ET.M1         3.839402e-08 8.282413e-09 7.572419e-07
## ES.M1 - ET.M2         2.509263e-02 2.306022e-02 7.669095e-02
## ES.M1 - ET.M3         5.103328e-15 1.969823e-16 7.385675e-11
## ES.M1 - ET.M4         1.809685e-06 4.005073e-07 2.877130e-01
## ES.M1 - ET.M5         6.614225e-01 1.848925e-01 5.854424e-01
## ES.M1 - ET.M6         1.660393e-22 9.951989e-19 2.575896e-14
## ES.M1 - ET.M7         3.186409e-01 6.665025e-01 6.393203e-01
## ES.M1 - LCDB.Ocoa     3.038813e-06 6.533931e-07 1.109876e-06
## ES.M1 - LC.M1         3.342585e-02 3.710412e-05 1.316931e-03
## ES.M1 - LC.M2         5.700817e-01 2.083842e-01 7.998204e-03
## ES.M1 - LC.M3         5.708836e-03 2.400911e-03 1.824951e-01
## ES.M1 - LC.M4         3.391131e-02 3.253667e-02 5.496464e-01
## ES.M1 - LC.M5         3.468304e-02 2.724695e-03 7.964271e-01
## ES.M1 - LC.M6         9.022826e-01 9.064373e-01 8.590078e-01
## ES.M1 - LC.M7         1.692705e-01 1.123038e-01 6.639130e-01
## ES.M1 - MV.M1         1.154261e-03 3.901494e-04 1.504456e-03
## ES.M1 - MV.M2         1.239206e-03 3.919631e-07 5.359828e-05
## ES.M1 - MV.M3         1.104839e-01 3.219451e-03 3.623654e-01
## ES.M1 - MV.M4         1.734654e-07 4.046246e-13 4.652269e-13
## ES.M1 - MV.M5         1.701728e-02 6.353616e-02 6.030325e-01
## ES.M1 - MV.M6         6.919433e-02 1.268120e-02 7.511564e-02
## ES.M1 - MV.M7         1.333129e-04 4.284513e-05 7.910696e-03
## ES.M2 - ES.M3         6.370940e-02 8.134076e-02 1.711307e-01
## ES.M2 - ES.M4         5.554486e-01 6.720501e-01 9.207394e-01
## ES.M2 - ES.M5         1.032489e-02 5.725389e-03 4.482790e-02
## ES.M2 - ES.M6         4.845246e-01 7.795376e-01 1.555505e-01
## ES.M2 - ES.M7         1.797225e-03 1.677093e-02 6.485771e-02
## ES.M2 - ESMV.Ocoa     1.006319e-02 2.141941e-05 6.274625e-07
## ES.M2 - ETAT.Ocoa     3.662811e-14 7.956502e-06 8.969501e-05
## ES.M2 - ET.M1         7.122407e-08 1.103344e-08 2.275123e-07
## ES.M2 - ET.M2         4.136383e-02 2.159856e-02 4.201758e-02
## ES.M2 - ET.M3         8.041389e-17 1.888357e-17 9.335272e-12
## ES.M2 - ET.M4         1.299134e-07 1.295933e-07 2.078907e-01
## ES.M2 - ET.M5         7.917700e-01 2.054366e-01 4.912196e-01
## ES.M2 - ET.M6         5.530563e-25 2.188704e-18 1.596489e-14
## ES.M2 - ET.M7         2.328377e-02 3.306916e-01 5.430122e-01
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## ES.M2 - LCDB.Ocoa     2.816710e-06 6.235836e-07 1.931849e-07
## ES.M2 - LC.M1         5.668496e-02 9.000821e-06 8.777910e-05
## ES.M2 - LC.M2         9.828270e-01 2.132402e-01 9.675803e-04
## ES.M2 - LC.M3         5.232086e-03 1.669132e-03 1.093843e-01
## ES.M2 - LC.M4         5.196671e-02 2.159970e-02 4.769760e-01
## ES.M2 - LC.M5         5.712979e-02 1.563746e-03 7.689750e-01
## ES.M2 - LC.M6         3.101210e-01 5.944175e-01 8.398356e-01
## ES.M2 - LC.M7         3.361648e-01 1.087709e-01 5.669447e-01
## ES.M2 - MV.M1         1.146884e-03 4.973371e-05 1.888787e-04
## ES.M2 - MV.M2         8.973696e-04 5.995213e-09 8.928556e-06
## ES.M2 - MV.M3         2.132528e-01 1.578088e-03 2.855844e-01
## ES.M2 - MV.M4         1.621866e-08 2.169927e-15 4.724230e-16
## ES.M2 - MV.M5         2.895237e-02 7.264092e-02 5.738419e-01
## ES.M2 - MV.M6         1.282832e-01 9.269650e-03 3.288939e-02
## ES.M2 - MV.M7         7.227732e-05 2.543320e-05 3.548823e-03
## ES.M3 - ES.M4         1.846937e-01 3.173667e-02 2.204774e-01
## ES.M3 - ES.M5         4.416097e-01 1.829392e-01 4.076040e-01
## ES.M3 - ES.M6         1.164441e-02 1.028504e-01 9.767945e-01
## ES.M3 - ES.M7         3.114935e-01 5.126640e-01 5.429730e-01
## ES.M3 - ESMV.Ocoa     4.137439e-01 2.158730e-03 4.096024e-05
## ES.M3 - ETAT.Ocoa     1.133210e-09 6.112802e-04 7.338133e-03
## ES.M3 - ET.M1         4.718675e-06 1.938456e-07 7.615467e-06
## ES.M3 - ET.M2         9.348892e-01 3.595494e-01 3.976304e-01
## ES.M3 - ET.M3         2.107855e-12 7.354156e-15 7.186635e-10
## ES.M3 - ET.M4         2.122109e-03 3.423102e-05 1.000000e+00
## ES.M3 - ET.M5         3.398197e-02 6.493470e-01 4.754303e-01
## ES.M3 - ET.M6         6.775478e-21 4.522793e-17 2.636669e-13
## ES.M3 - ET.M7         2.386407e-04 9.033466e-03 3.888731e-01
## ES.M3 - LCDB.Ocoa     1.029030e-03 2.061672e-05 1.261109e-05
## ES.M3 - LC.M1         9.337221e-01 3.365036e-03 1.765618e-02
## ES.M3 - LC.M2         1.112617e-01 3.759685e-01 9.150560e-02
## ES.M3 - LC.M3         6.550645e-01 7.638652e-02 8.003671e-01
## ES.M3 - LC.M4         7.454448e-01 7.109577e-01 5.532406e-02
## ES.M3 - LC.M5         8.447631e-01 1.044443e-01 1.326364e-01
## ES.M3 - LC.M6         6.289903e-03 2.990756e-02 1.315197e-01
## ES.M3 - LC.M7         3.025494e-01 8.113966e-01 3.513671e-01
## ES.M3 - MV.M1         1.915886e-01 3.875233e-02 1.807777e-02
## ES.M3 - MV.M2         2.592221e-01 5.820574e-05 6.213157e-04
## ES.M3 - MV.M3         4.522825e-01 1.372765e-01 8.977526e-01
## ES.M3 - MV.M4         2.059536e-04 1.820296e-11 1.055133e-12
## ES.M3 - MV.M5         6.401027e-01 4.575640e-01 8.462974e-01
## ES.M3 - MV.M6         6.616893e-01 3.094796e-01 4.533896e-01
## ES.M3 - MV.M7         5.118918e-02 2.113599e-03 5.434067e-02
## ES.M4 - ES.M5         3.815700e-02 2.148626e-03 6.031796e-02
## ES.M4 - ES.M6         1.871596e-01 9.816963e-01 2.033526e-01
## ES.M4 - ES.M7         1.097808e-02 5.295446e-03 8.688508e-02
## ES.M4 - ESMV.Ocoa     3.622217e-02 7.361503e-06 1.095893e-06
## ES.M4 - ETAT.Ocoa     4.229445e-13 3.061812e-06 1.798932e-04
## ES.M4 - ET.M1         2.083908e-07 6.501078e-09 3.400911e-07
## ES.M4 - ET.M2         1.383467e-01 9.501928e-03 5.696171e-02
## ES.M4 - ET.M3         7.740718e-16 8.380288e-18 1.529684e-11
## ES.M4 - ET.M4         2.337903e-06 3.922982e-08 2.565834e-01
## ES.M4 - ET.M5         3.848994e-01 9.522018e-02 5.751432e-01
## ES.M4 - ET.M6         3.182965e-24 1.838515e-18 1.711336e-14
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## ES.M4 - ET.M7         4.977242e-03 5.674211e-01 6.349417e-01
## ES.M4 - LCDB.Ocoa     1.423427e-05 3.096899e-07 3.332724e-07
## ES.M4 - LC.M1         1.823893e-01 1.997495e-06 2.395018e-04
## ES.M4 - LC.M2         6.381504e-01 7.265582e-02 2.258625e-03
## ES.M4 - LC.M3         3.360774e-02 6.015691e-04 1.457023e-01
## ES.M4 - LC.M4         2.033253e-01 5.822622e-03 4.397397e-01
## ES.M4 - LC.M5         1.965410e-01 4.752042e-04 7.106656e-01
## ES.M4 - LC.M6         1.091303e-01 8.893818e-01 7.726851e-01
## ES.M4 - LC.M7         7.214279e-01 4.110605e-02 6.627339e-01
## ES.M4 - MV.M1         6.355683e-03 5.967172e-06 4.074384e-04
## ES.M4 - MV.M2         6.510913e-03 4.932121e-10 1.637249e-05
## ES.M4 - MV.M3         5.166535e-01 4.143508e-04 3.392980e-01
## ES.M4 - MV.M4         2.256835e-07 3.555060e-16 2.369413e-15
## ES.M4 - MV.M5         8.745669e-02 4.402777e-02 6.141524e-01
## ES.M4 - MV.M6         3.433123e-01 3.162173e-03 4.901323e-02
## ES.M4 - MV.M7         5.820844e-04 9.231692e-06 5.031496e-03
## ES.M5 - ES.M6         1.436274e-03 9.868488e-03 4.173675e-01
## ES.M5 - ES.M7         8.876802e-01 4.409212e-01 8.185948e-01
## ES.M5 - ESMV.Ocoa     9.526488e-01 8.100889e-02 1.281849e-03
## ES.M5 - ETAT.Ocoa     7.737742e-08 2.727801e-02 1.005111e-01
## ES.M5 - ET.M1         3.433569e-05 5.855013e-06 1.767114e-04
## ES.M5 - ET.M2         4.711353e-01 7.376872e-01 9.911181e-01
## ES.M5 - ET.M3         1.812286e-10 7.945228e-11 8.576609e-08
## ES.M5 - ET.M4         3.238198e-02 5.939339e-03 4.323739e-01
## ES.M5 - ET.M5         4.841964e-03 8.779484e-02 1.445163e-01
## ES.M5 - ET.M6         7.469868e-19 1.962366e-14 9.689168e-12
## ES.M5 - ET.M7         2.843002e-05 6.605414e-04 1.094911e-01
## ES.M5 - LCDB.Ocoa     9.206279e-03 8.432285e-04 4.589626e-04
## ES.M5 - LC.M1         3.736538e-01 1.755110e-01 2.384269e-01
## ES.M5 - LC.M2         2.433123e-02 3.026925e-02 5.860685e-01
## ES.M5 - LC.M3         6.364897e-01 6.653789e-01 5.506367e-01
## ES.M5 - LC.M4         2.319592e-01 2.719564e-01 1.445997e-02
## ES.M5 - LC.M5         3.036650e-01 8.531719e-01 3.610334e-02
## ES.M5 - LC.M6         7.591152e-04 2.050931e-03 3.449372e-02
## ES.M5 - LC.M7         7.069298e-02 1.159703e-01 9.573525e-02
## ES.M5 - MV.M1         6.334756e-01 7.656657e-01 2.027625e-01
## ES.M5 - MV.M2         8.174968e-01 3.464902e-02 1.333280e-02
## ES.M5 - MV.M3         1.237739e-01 9.845273e-01 3.819850e-01
## ES.M5 - MV.M4         4.357805e-03 5.405489e-07 4.209999e-09
## ES.M5 - MV.M5         7.874999e-01 7.998821e-01 4.738505e-01
## ES.M5 - MV.M6         2.205094e-01 7.077201e-01 8.634841e-01
## ES.M5 - MV.M7         2.778266e-01 7.300079e-02 2.627445e-01
## ES.M6 - ES.M7         8.624528e-05 3.084822e-02 5.562160e-01
## ES.M6 - ESMV.Ocoa     1.496472e-03 6.341235e-05 4.014216e-05
## ES.M6 - ETAT.Ocoa     1.958821e-15 1.935167e-05 7.297518e-03
## ES.M6 - ET.M1         2.345797e-08 9.881546e-09 7.580378e-06
## ES.M6 - ET.M2         5.646894e-03 2.836185e-02 4.071876e-01
## ES.M6 - ET.M3         8.147098e-18 9.440037e-16 6.827426e-10
## ES.M6 - ET.M4         8.211479e-10 8.057253e-07 9.784254e-01
## ES.M6 - ET.M5         6.576293e-01 2.101452e-01 4.505494e-01
## ES.M6 - ET.M6         3.580828e-25 2.061913e-18 2.712837e-13
## ES.M6 - ET.M7         6.470459e-02 6.766988e-01 3.641496e-01
## ES.M6 - LCDB.Ocoa     3.687163e-07 8.740540e-07 1.232432e-05
## ES.M6 - LC.M1         7.905642e-03 7.267789e-05 1.744160e-02
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## ES.M6 - LC.M2         5.634010e-01 2.432487e-01 9.250553e-02
## ES.M6 - LC.M3         1.496394e-04 3.345987e-03 8.200247e-01
## ES.M6 - LC.M4         3.717164e-03 4.364158e-02 4.886932e-02
## ES.M6 - LC.M5         6.375576e-03 3.995421e-03 1.211708e-01
## ES.M6 - LC.M6         6.972827e-01 9.026920e-01 1.189098e-01
## ES.M6 - LC.M7         8.257716e-02 1.343587e-01 3.268744e-01
## ES.M6 - MV.M1         7.940924e-05 7.861691e-04 1.803898e-02
## ES.M6 - MV.M2         2.885833e-05 1.355145e-06 6.129351e-04
## ES.M6 - MV.M3         4.394201e-02 4.877976e-03 8.762300e-01
## ES.M6 - MV.M4         2.931738e-10 2.683329e-12 7.643830e-13
## ES.M6 - MV.M5         5.568984e-03 7.015916e-02 8.324295e-01
## ES.M6 - MV.M6         2.384036e-02 1.699077e-02 4.650919e-01
## ES.M6 - MV.M7         2.667470e-06 6.623079e-05 5.534794e-02
## ES.M7 - ESMV.Ocoa     9.421922e-01 9.742692e-03 4.882182e-04
## ES.M7 - ETAT.Ocoa     6.783318e-09 2.758737e-03 5.268475e-02
## ES.M7 - ET.M1         2.719070e-05 6.529161e-07 6.997785e-05
## ES.M7 - ET.M2         3.304894e-01 7.088668e-01 8.086608e-01
## ES.M7 - ET.M3         8.297375e-12 8.472793e-14 1.962842e-08
## ES.M7 - ET.M4         2.024070e-02 2.374240e-04 5.660667e-01
## ES.M7 - ET.M5         5.674459e-04 2.706848e-01 2.051496e-01
## ES.M7 - ET.M6         6.377415e-21 2.355458e-16 2.798976e-12
## ES.M7 - ET.M7         3.217071e-07 1.257387e-03 1.576194e-01
## ES.M7 - LCDB.Ocoa     7.010235e-03 8.057616e-05 1.648674e-04
## ES.M7 - LC.M1         2.409879e-01 1.902274e-02 1.322409e-01
## ES.M7 - LC.M2         8.381401e-03 1.010925e-01 3.945063e-01
## ES.M7 - LC.M3         4.599880e-01 2.190421e-01 7.120295e-01
## ES.M7 - LC.M4         1.119443e-01 7.348899e-01 2.069065e-02
## ES.M7 - LC.M5         1.754191e-01 3.043147e-01 5.186610e-02
## ES.M7 - LC.M6         4.085988e-05 5.276061e-03 4.978720e-02
## ES.M7 - LC.M7         2.443484e-02 3.566498e-01 1.385243e-01
## ES.M7 - MV.M1         6.978793e-01 1.798578e-01 1.146794e-01
## ES.M7 - MV.M2         9.204950e-01 7.564461e-04 5.889494e-03
## ES.M7 - MV.M3         5.339802e-02 3.961482e-01 5.011704e-01
## ES.M7 - MV.M4         2.015286e-03 3.736735e-10 4.037416e-10
## ES.M7 - MV.M5         6.640614e-01 7.511576e-01 5.703306e-01
## ES.M7 - MV.M6         1.200793e-01 6.840814e-01 9.386323e-01
## ES.M7 - MV.M7         2.797986e-01 9.138477e-03 1.764068e-01
## ESMV.Ocoa - ETAT.Ocoa 1.518309e-07 5.799223e-01 5.136232e-02
## ESMV.Ocoa - ET.M1     4.337769e-05 5.649350e-04 3.723052e-01
## ESMV.Ocoa - ET.M2     4.409288e-01 4.469089e-02 1.265489e-03
## ESMV.Ocoa - ET.M3     4.029711e-10 6.653100e-07 1.422340e-02
## ESMV.Ocoa - ET.M4     4.229378e-02 3.433216e-01 7.317054e-05
## ESMV.Ocoa - ET.M5     4.828686e-03 7.281706e-04 4.130014e-06
## ESMV.Ocoa - ET.M6     2.272488e-18 6.547922e-11 3.240050e-06
## ESMV.Ocoa - ET.M7     3.421203e-05 2.225208e-06 2.192077e-06
## ESMV.Ocoa - LCDB.Ocoa 1.158515e-02 4.795559e-02 7.376045e-01
## ESMV.Ocoa - LC.M1     3.488941e-01 5.506301e-01 7.198110e-03
## ESMV.Ocoa - LC.M2     2.306364e-02 1.335888e-04 1.201880e-03
## ESMV.Ocoa - LC.M3     5.944093e-01 1.866796e-01 9.533088e-05
## ESMV.Ocoa - LC.M4     2.159889e-01 3.382102e-03 1.665649e-07
## ESMV.Ocoa - LC.M5     2.829669e-01 9.888317e-02 6.638817e-07
## ESMV.Ocoa - LC.M6     8.013916e-04 7.095379e-06 4.748647e-07
## ESMV.Ocoa - LC.M7     6.655517e-02 9.646405e-04 1.671352e-06
## ESMV.Ocoa - MV.M1     6.847461e-01 7.602965e-02 1.541584e-02
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## ESMV.Ocoa - MV.M2     8.740457e-01 9.461907e-01 3.642889e-01
## ESMV.Ocoa - MV.M3     1.158042e-01 5.681620e-02 7.233589e-05
## ESMV.Ocoa - MV.M4     6.128114e-03 1.789811e-03 1.095542e-02
## ESMV.Ocoa - MV.M5     7.465904e-01 9.600081e-02 2.213374e-03
## ESMV.Ocoa - MV.M6     2.057462e-01 3.014524e-02 3.192921e-04
## ESMV.Ocoa - MV.M7     3.164458e-01 9.324275e-01 4.741002e-02
## ETAT.Ocoa - ET.M1     6.557761e-01 2.700268e-03 7.599093e-03
## ETAT.Ocoa - ET.M2     4.857567e-10 1.454302e-02 1.009413e-01
## ETAT.Ocoa - ET.M3     9.319026e-02 1.925540e-05 1.084368e-05
## ETAT.Ocoa - ET.M4     8.449683e-06 7.400930e-01 1.126927e-02
## ETAT.Ocoa - ET.M5     8.927735e-15 2.118102e-04 7.528107e-04
## ETAT.Ocoa - ET.M6     8.552238e-10 2.412361e-09 8.192762e-10
## ETAT.Ocoa - ET.M7     9.753618e-17 1.043169e-06 3.588424e-04
## ETAT.Ocoa - LCDB.Ocoa 1.056330e-02 1.428692e-01 2.251403e-02
## ETAT.Ocoa - LC.M1     1.534911e-10 2.430867e-01 4.685412e-01
## ETAT.Ocoa - LC.M2     4.112389e-12 4.597692e-05 1.490688e-01
## ETAT.Ocoa - LC.M3     8.860970e-11 7.045657e-02 1.544119e-02
## ETAT.Ocoa - LC.M4     5.069751e-12 9.533102e-04 2.219097e-05
## ETAT.Ocoa - LC.M5     2.986607e-11 3.293601e-02 1.095999e-04
## ETAT.Ocoa - LC.M6     8.713365e-16 2.851549e-06 6.900642e-05
## ETAT.Ocoa - LC.M7     1.070180e-12 2.805799e-04 2.527828e-04
## ETAT.Ocoa - MV.M1     1.232252e-07 2.281294e-02 6.224307e-01
## ETAT.Ocoa - MV.M2     5.149238e-09 4.687915e-01 2.938675e-01
## ETAT.Ocoa - MV.M3     4.554718e-12 1.750348e-02 1.037583e-02
## ETAT.Ocoa - MV.M4     5.910342e-04 1.820871e-02 8.463520e-07
## ETAT.Ocoa - MV.M5     5.798742e-08 3.857313e-02 6.186325e-02
## ETAT.Ocoa - MV.M6     3.519451e-11 9.075683e-03 4.423764e-02
## ETAT.Ocoa - MV.M7     7.080224e-07 6.434238e-01 7.560791e-01
## ET.M1 - ET.M2         4.667830e-06 3.044487e-06 1.744786e-04
## ET.M1 - ET.M3         5.056683e-01 8.214753e-01 1.636158e-01
## ET.M1 - ET.M4         1.300642e-03 3.827747e-03 1.206513e-05
## ET.M1 - ET.M5         4.442228e-08 8.651661e-08 1.089840e-06
## ET.M1 - ET.M6         8.708647e-05 1.896231e-02 2.245208e-04
## ET.M1 - ET.M7         3.214369e-09 3.388891e-09 6.839481e-07
## ET.M1 - LCDB.Ocoa     2.473077e-02 1.066323e-01 5.614252e-01
## ET.M1 - LC.M1         3.051238e-06 8.260610e-05 9.562907e-04
## ET.M1 - LC.M2         1.282132e-07 4.706977e-08 1.761680e-04
## ET.M1 - LC.M3         5.958556e-06 1.843609e-05 1.600698e-05
## ET.M1 - LC.M4         1.400151e-06 3.126436e-07 6.505382e-08
## ET.M1 - LC.M5         2.075646e-06 6.885255e-06 1.977845e-07
## ET.M1 - LC.M6         1.428737e-08 5.390179e-09 1.700193e-07
## ET.M1 - LC.M7         3.801402e-07 1.188213e-07 5.641229e-07
## ET.M1 - MV.M1         7.484115e-05 4.768083e-06 2.068618e-03
## ET.M1 - MV.M2         2.953634e-05 1.870502e-04 8.342162e-02
## ET.M1 - MV.M3         6.869237e-07 3.509651e-06 1.158201e-05
## ET.M1 - MV.M4         8.306308e-03 9.930842e-02 1.893582e-01
## ET.M1 - MV.M5         2.129268e-05 1.563242e-05 3.780745e-04
## ET.M1 - MV.M6         1.426821e-06 1.828540e-06 4.886000e-05
## ET.M1 - MV.M7         2.376951e-04 7.732364e-04 7.991532e-03
## ET.M2 - ET.M3         7.440871e-13 5.304411e-11 8.088138e-08
## ET.M2 - ET.M4         1.658875e-03 2.868868e-03 4.228844e-01
## ET.M2 - ET.M5         1.986201e-02 1.996305e-01 1.383250e-01
## ET.M2 - ET.M6         1.387143e-21 1.289494e-14 9.223644e-12
## ET.M2 - ET.M7         6.619139e-05 3.417072e-03 1.040510e-01
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## ET.M2 - LCDB.Ocoa     9.572658e-04 4.383350e-04 4.512499e-04
## ET.M2 - LC.M1         8.618288e-01 9.682707e-02 2.401822e-01
## ET.M2 - LC.M2         8.368556e-02 9.345136e-02 5.924425e-01
## ET.M2 - LC.M3         7.074611e-01 4.538105e-01 5.400206e-01
## ET.M2 - LC.M4         6.585295e-01 5.044743e-01 1.338420e-02
## ET.M2 - LC.M5         7.662361e-01 5.963979e-01 3.396517e-02
## ET.M2 - LC.M6         2.895422e-03 8.812785e-03 3.226278e-02
## ET.M2 - LC.M7         2.400602e-01 2.562613e-01 9.064507e-02
## ET.M2 - MV.M1         2.008254e-01 4.935289e-01 2.041978e-01
## ET.M2 - MV.M2         2.731774e-01 1.634345e-02 1.328274e-02
## ET.M2 - MV.M3         3.794971e-01 7.284266e-01 3.732779e-01
## ET.M2 - MV.M4         1.484633e-04 2.928310e-07 3.637079e-09
## ET.M2 - MV.M5         6.828306e-01 9.834259e-01 4.678156e-01
## ET.M2 - MV.M6         5.856940e-01 9.927391e-01 8.529169e-01
## ET.M2 - MV.M7         5.072489e-02 4.043904e-02 2.649860e-01
## ET.M3 - ET.M4         9.419486e-09 1.256499e-05 1.788210e-09
## ET.M3 - ET.M5         2.407228e-17 1.601863e-15 5.903280e-11
## ET.M3 - ET.M6         7.247383e-07 2.587009e-03 6.178100e-03
## ET.M3 - ET.M7         9.658302e-19 3.232987e-18 3.366702e-11
## ET.M3 - LCDB.Ocoa     1.554520e-04 2.113586e-02 3.418409e-02
## ET.M3 - LC.M1         2.265357e-13 2.081751e-09 2.928280e-07
## ET.M3 - LC.M2         1.069629e-14 3.979393e-16 2.901693e-08
## ET.M3 - LC.M3         1.204507e-13 8.775044e-10 1.972593e-09
## ET.M3 - LC.M4         8.556706e-15 7.465890e-15 2.332710e-12
## ET.M3 - LC.M5         4.201334e-14 3.191915e-11 9.540431e-12
## ET.M3 - LC.M6         3.333659e-18 5.732426e-18 6.727679e-12
## ET.M3 - LC.M7         1.833432e-15 1.542984e-15 2.792317e-11
## ET.M3 - MV.M1         2.009228e-10 9.879833e-13 1.195321e-06
## ET.M3 - MV.M2         5.825539e-12 1.602137e-09 7.717580e-04
## ET.M3 - MV.M3         7.239859e-15 3.012475e-12 2.175918e-09
## ET.M3 - MV.M4         1.396239e-06 3.173269e-03 7.648191e-01
## ET.M3 - MV.M5         1.679471e-10 3.722951e-08 3.060625e-06
## ET.M3 - MV.M6         5.467478e-14 2.148550e-12 7.728255e-09
## ET.M3 - MV.M7         1.012855e-09 1.571591e-06 3.288258e-05
## ET.M4 - ET.M5         1.690067e-08 9.025035e-06 5.096666e-01
## ET.M4 - ET.M6         1.746004e-18 9.455830e-10 4.014068e-13
## ET.M4 - ET.M7         1.082894e-12 1.078264e-08 4.295859e-01
## ET.M4 - LCDB.Ocoa     2.683897e-01 2.047376e-01 2.323412e-05
## ET.M4 - LC.M1         7.243605e-04 9.391600e-02 2.828713e-02
## ET.M4 - LC.M2         8.053831e-06 9.748032e-07 1.208316e-01
## ET.M4 - LC.M3         9.354297e-04 2.063098e-02 8.132879e-01
## ET.M4 - LC.M4         4.279700e-05 5.089946e-05 7.488252e-02
## ET.M4 - LC.M5         2.315135e-04 6.821202e-03 1.602249e-01
## ET.M4 - LC.M6         4.371338e-10 3.848082e-08 1.632323e-01
## ET.M4 - LC.M7         6.941691e-06 1.136558e-05 3.948554e-01
## ET.M4 - MV.M1         7.767406e-02 3.058656e-03 2.685321e-02
## ET.M4 - MV.M2         2.115766e-02 2.119177e-01 1.034078e-03
## ET.M4 - MV.M3         3.088876e-05 2.699862e-03 9.034439e-01
## ET.M4 - MV.M4         2.849448e-01 2.434434e-02 1.311005e-11
## ET.M4 - MV.M5         1.889591e-02 1.366601e-02 8.500884e-01
## ET.M4 - MV.M6         1.864237e-04 1.267466e-03 4.841472e-01
## ET.M4 - MV.M7         2.572464e-01 4.003409e-01 6.427167e-02
## ET.M5 - ET.M6         2.970980e-25 1.566195e-17 5.285619e-14
## ET.M5 - ET.M7         3.374490e-02 3.211557e-02 9.039999e-01
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## ET.M5 - LCDB.Ocoa     1.198779e-06 8.204823e-06 1.250737e-06
## ET.M5 - LC.M1         2.765753e-02 9.279701e-04 1.255781e-03
## ET.M5 - LC.M2         8.129255e-01 7.353190e-01 1.045590e-02
## ET.M5 - LC.M3         1.457769e-03 3.303986e-02 3.363744e-01
## ET.M5 - LC.M4         2.077369e-02 3.899349e-01 1.857500e-01
## ET.M5 - LC.M5         2.605364e-02 4.334091e-02 3.692541e-01
## ET.M5 - LC.M6         4.320608e-01 8.688767e-02 3.900150e-01
## ET.M5 - LC.M7         2.078806e-01 8.101704e-01 8.591994e-01
## ET.M5 - MV.M1         4.059889e-04 1.094880e-02 1.805104e-03
## ET.M5 - MV.M2         2.444897e-04 9.465535e-06 6.375973e-05
## ET.M5 - MV.M3         1.227954e-01 5.589899e-02 6.191059e-01
## ET.M5 - MV.M4         2.971438e-09 2.693373e-12 1.112595e-14
## ET.M5 - MV.M5         1.545767e-02 3.029046e-01 8.366912e-01
## ET.M5 - MV.M6         7.022908e-02 1.533828e-01 1.373496e-01
## ET.M5 - MV.M7         1.953932e-05 7.381535e-04 1.355582e-02
## ET.M6 - ET.M7         4.823085e-25 1.103329e-18 4.945940e-14
## ET.M6 - LCDB.Ocoa     6.161421e-12 2.209926e-05 1.128133e-05
## ET.M6 - LC.M1         4.100365e-22 3.971650e-13 4.814363e-11
## ET.M6 - LC.M2         1.407178e-22 5.468935e-17 8.551127e-12
## ET.M6 - LC.M3         2.469013e-22 1.488255e-13 5.346554e-13
## ET.M6 - LC.M4         3.373117e-23 1.072702e-16 3.463330e-15
## ET.M6 - LC.M5         7.527097e-23 1.170931e-14 7.913413e-15
## ET.M6 - LC.M6         1.047797e-25 8.124104e-19 9.976505e-15
## ET.M6 - LC.M7         6.252827e-24 2.774315e-17 5.165406e-14
## ET.M6 - MV.M1         2.321970e-19 4.325346e-15 1.182687e-10
## ET.M6 - MV.M2         3.969332e-21 7.809324e-13 7.753626e-08
## ET.M6 - MV.M3         1.917211e-23 2.732659e-15 4.173300e-13
## ET.M6 - MV.M4         3.411195e-16 1.653158e-07 1.005787e-03
## ET.M6 - MV.M5         1.497571e-18 1.048522e-11 1.333436e-09
## ET.M6 - MV.M6         1.247551e-22 1.482253e-15 1.702428e-12
## ET.M6 - MV.M7         5.606907e-19 1.656358e-10 3.764670e-09
## ET.M7 - LCDB.Ocoa     1.482262e-08 1.369515e-07 6.707371e-07
## ET.M7 - LC.M1         8.298607e-05 3.944982e-07 4.463111e-04
## ET.M7 - LC.M2         7.469379e-02 1.457293e-02 4.565205e-03
## ET.M7 - LC.M3         1.015001e-07 1.814937e-04 2.646208e-01
## ET.M7 - LC.M4         5.549633e-06 1.101015e-03 1.997684e-01
## ET.M7 - LC.M5         3.522660e-05 1.181737e-04 4.045425e-01
## ET.M7 - LC.M6         1.783571e-01 6.937374e-01 4.286728e-01
## ET.M7 - LC.M7         1.205726e-03 1.084347e-02 9.544433e-01
## ET.M7 - MV.M1         6.751753e-07 6.032567e-07 8.124443e-04
## ET.M7 - MV.M2         6.090502e-08 4.560323e-11 3.253363e-05
## ET.M7 - MV.M3         5.660103e-04 8.706341e-05 5.390511e-01
## ET.M7 - MV.M4         1.882887e-12 6.856515e-17 1.843187e-15
## ET.M7 - MV.M5         1.707789e-04 2.316699e-02 7.869153e-01
## ET.M7 - MV.M6         3.405422e-04 8.519617e-04 9.595455e-02
## ET.M7 - MV.M7         1.368055e-08 2.946701e-06 9.401411e-03
## LCDB.Ocoa - LC.M1     5.529005e-04 1.065293e-02 2.540205e-03
## LCDB.Ocoa - LC.M2     1.257144e-05 2.921136e-06 3.890590e-04
## LCDB.Ocoa - LC.M3     1.019720e-03 2.537321e-03 2.990266e-05
## LCDB.Ocoa - LC.M4     1.505572e-04 3.218359e-05 5.128843e-08
## LCDB.Ocoa - LC.M5     3.055444e-04 9.922371e-04 2.018719e-07
## LCDB.Ocoa - LC.M6     1.952222e-07 2.710021e-07 1.456140e-07
## LCDB.Ocoa - LC.M7     3.131916e-05 1.096794e-05 5.161898e-07
## LCDB.Ocoa - MV.M1     2.044468e-02 6.297584e-04 5.924766e-03
```

```
## LCDB.Ocoa - MV.M2     7.548470e-03 2.318140e-02 2.139834e-01
## LCDB.Ocoa - MV.M3     7.406221e-05 4.924249e-04 2.335611e-05
## LCDB.Ocoa - MV.M4     7.811529e-01 7.278612e-01 3.087745e-02
## LCDB.Ocoa - MV.M5     5.607564e-03 1.726621e-03 1.039550e-03
## LCDB.Ocoa - MV.M6     2.117542e-04 2.551225e-04 1.025564e-04
## LCDB.Ocoa - MV.M7     6.207674e-02 5.946838e-02 2.275964e-02
## LC.M1 - LC.M2         1.091390e-01 7.169065e-05 3.896543e-01
## LC.M1 - LC.M3         5.581847e-01 3.829203e-01 3.914352e-02
## LC.M1 - LC.M4         8.008908e-01 5.246897e-03 2.154801e-05
## LC.M1 - LC.M5         9.068662e-01 2.166597e-01 1.614385e-04
## LC.M1 - LC.M6         4.035211e-03 2.273578e-06 7.245940e-05
## LC.M1 - LC.M7         3.094889e-01 1.196202e-03 2.628986e-04
## LC.M1 - MV.M1         1.421706e-01 1.728753e-01 8.330423e-01
## LC.M1 - MV.M2         1.922099e-01 4.823227e-01 7.305659e-02
## LC.M1 - MV.M3         4.746567e-01 1.263401e-01 2.599639e-02
## LC.M1 - MV.M4         6.160728e-05 2.314218e-05 1.151664e-09
## LC.M1 - MV.M5         5.703182e-01 1.884909e-01 1.244993e-01
## LC.M1 - MV.M6         7.050073e-01 6.549937e-02 1.150155e-01
## LC.M1 - MV.M7         3.102738e-02 4.991127e-01 8.033150e-01
## LC.M2 - LC.M3         2.417452e-02 9.366745e-03 1.690145e-01
## LC.M2 - LC.M4         1.204439e-01 1.464458e-01 2.237199e-04
## LC.M2 - LC.M5         1.168727e-01 1.014505e-02 1.380627e-03
## LC.M2 - LC.M6         4.023645e-01 7.035460e-02 7.596208e-04
## LC.M2 - LC.M7         4.368166e-01 5.066667e-01 2.952097e-03
## LC.M2 - MV.M1         4.821847e-03 4.332143e-04 3.246149e-01
## LC.M2 - MV.M2         5.499669e-03 3.294687e-08 1.582667e-02
## LC.M2 - MV.M3         3.072359e-01 1.135059e-02 1.063627e-01
## LC.M2 - MV.M4         7.404171e-07 1.843015e-14 2.957899e-11
## LC.M2 - MV.M5         5.383132e-02 1.993047e-01 2.588741e-01
## LC.M2 - MV.M6         2.038383e-01 5.304521e-02 3.928440e-01
## LC.M2 - MV.M7         6.100020e-04 1.511881e-04 4.099187e-01
## LC.M3 - LC.M4         3.221257e-01 1.169847e-01 3.398920e-02
## LC.M3 - LC.M5         4.468382e-01 7.857966e-01 8.640348e-02
## LC.M3 - LC.M6         6.887468e-05 5.791980e-04 8.350204e-02
## LC.M3 - LC.M7         7.421687e-02 4.403431e-02 2.345851e-01
## LC.M3 - MV.M1         2.725194e-01 8.198041e-01 3.714187e-02
## LC.M3 - MV.M2         3.786616e-01 1.157976e-01 1.382920e-03
## LC.M3 - MV.M3         1.539577e-01 6.226097e-01 7.237826e-01
## LC.M3 - MV.M4         7.254825e-05 5.327824e-06 5.970131e-12
## LC.M3 - MV.M5         8.945111e-01 5.502422e-01 7.317464e-01
## LC.M3 - MV.M6         3.108403e-01 4.102078e-01 6.273793e-01
## LC.M3 - MV.M7         6.094037e-02 1.680708e-01 8.589695e-02
## LC.M4 - LC.M5         8.924972e-01 1.622215e-01 7.158246e-01
## LC.M4 - LC.M6         1.717097e-03 6.108503e-03 6.156823e-01
## LC.M4 - LC.M7         3.649271e-01 5.142487e-01 2.053503e-01
## LC.M4 - MV.M1         6.207553e-02 6.308019e-02 4.542705e-05
## LC.M4 - MV.M2         7.791922e-02 6.271149e-05 2.323003e-06
## LC.M4 - MV.M3         5.771070e-01 2.149407e-01 1.133988e-01
## LC.M4 - MV.M4         3.786499e-06 9.331191e-12 3.215898e-16
## LC.M4 - MV.M5         4.068082e-01 5.903095e-01 3.564769e-01
## LC.M4 - MV.M6         8.592221e-01 4.553266e-01 8.970806e-03
## LC.M4 - MV.M7         8.155711e-03 3.305946e-03 1.118062e-03
## LC.M5 - LC.M6         3.120931e-03 4.794501e-04 9.161976e-01
## LC.M5 - LC.M7         3.396984e-01 5.829844e-02 4.203690e-01
```

```
## LC.M5 - MV.M1         1.001408e-01 9.270904e-01 2.507000e-04
## LC.M5 - MV.M2         1.329947e-01 4.043740e-02 9.934157e-06
## LC.M5 - MV.M3         5.253140e-01 8.211334e-01 2.199979e-01
## LC.M5 - MV.M4         1.877774e-05 2.793939e-07 5.324660e-15
## LC.M5 - MV.M5         4.911019e-01 6.847755e-01 4.819763e-01
## LC.M5 - MV.M6         7.781023e-01 5.530410e-01 2.807388e-02
## LC.M5 - MV.M7         1.777183e-02 8.897500e-02 2.991282e-03
## LC.M6 - LC.M7         4.482772e-02 3.894165e-02 4.460898e-01
## LC.M6 - MV.M1         3.891787e-05 9.583084e-06 1.467404e-04
## LC.M6 - MV.M2         1.353521e-05 1.137646e-09 6.810742e-06
## LC.M6 - MV.M3         2.331297e-02 4.395410e-04 2.288974e-01
## LC.M6 - MV.M4         1.436656e-10 5.508047e-16 5.842746e-16
## LC.M6 - MV.M5         3.101214e-03 4.009979e-02 5.093732e-01
## LC.M6 - MV.M6         1.261759e-02 3.086203e-03 2.466789e-02
## LC.M6 - MV.M7         1.276379e-06 8.774217e-06 2.725162e-03
## LC.M7 - MV.M1         1.384298e-02 1.439596e-02 5.498073e-04
## LC.M7 - MV.M2         1.535116e-02 8.653305e-06 2.407439e-05
## LC.M7 - MV.M3         7.611462e-01 7.565850e-02 5.039028e-01
## LC.M7 - MV.M4         6.381530e-07 1.540983e-12 9.364343e-16
## LC.M7 - MV.M5         1.483384e-01 3.660118e-01 7.652571e-01
## LC.M7 - MV.M6         5.340684e-01 2.029748e-01 8.008790e-02
## LC.M7 - MV.M7         1.447679e-03 9.793675e-04 7.934787e-03
## MV.M1 - MV.M2         7.590104e-01 1.449322e-02 1.248225e-01
## MV.M1 - MV.M3         2.998694e-02 7.120049e-01 2.438892e-02
## MV.M1 - MV.M4         1.067034e-02 3.929048e-09 2.480605e-08
## MV.M1 - MV.M5         4.570480e-01 6.152333e-01 1.079953e-01
## MV.M1 - MV.M6         6.866560e-02 4.285989e-01 1.017035e-01
## MV.M1 - MV.M7         5.228572e-01 6.872742e-02 9.313139e-01
## MV.M2 - MV.M3         3.643413e-02 1.457939e-02 9.860168e-04
## MV.M2 - MV.M4         2.009204e-03 2.585246e-05 2.996044e-04
## MV.M2 - MV.M5         5.983765e-01 6.467269e-02 1.295012e-02
## MV.M2 - MV.M6         8.978154e-02 6.469559e-03 4.342324e-03
## MV.M2 - MV.M7         3.084028e-01 8.662740e-01 2.314217e-01
## MV.M3 - MV.M4         2.634801e-06 2.432732e-08 3.298541e-11
## MV.M3 - MV.M5         2.344653e-01 7.998236e-01 9.161950e-01
## MV.M3 - MV.M6         7.454309e-01 6.914943e-01 4.241854e-01
## MV.M3 - MV.M7         3.926284e-03 5.142909e-02 5.679854e-02
## MV.M4 - MV.M5         2.533239e-03 3.547967e-05 2.169528e-06
## MV.M4 - MV.M6         1.561590e-05 1.582630e-08 2.963273e-11
## MV.M4 - MV.M7         4.439799e-02 3.108587e-03 1.085044e-05
## MV.M5 - MV.M6         3.717738e-01 9.766600e-01 5.245612e-01
## MV.M5 - MV.M7         1.822196e-01 8.697689e-02 1.301456e-01
## MV.M6 - MV.M7         1.203745e-02 2.749519e-02 1.735409e-01
```

Inferences. Number and relative frequencies of statistically significant differences between samples by responsibles (all against all)

- The higher the TRUE relative frequencies the better the result

```
respnames <- unique(
  samples$responsable.abbv)[
    nchar(unique(samples$responsable.abbv))==2
    ]#This excludes Ocoa samples
ttests.nrlf <- map(
```

```
  respnames,
  ~ttests %>%
    as.data.frame() %>%
    rownames_to_column('m1 - m2') %>%
    mutate_if(is.numeric, funs(.<=0.05)) %>%
    filter(grepl(.x, `m1 - m2`)) %>%
    filter(!grepl('Ocoa', `m1 - m2`)) %>%
    gather(variable, value, -`m1 - m2`) %>%
    dplyr::select(variable, value) %>%
    group_by(variable, value) %>%
    dplyr::summarise(freq=n()) %>%
    dplyr::add_tally(freq) %>%
    mutate(proportion=round(freq/n*100,2))
) %>% set_names(respnames)
ttests.nrlf
```

```
## $ES
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    97   217       44.7
## 2 a        TRUE    120   217       55.3
## 3 b        FALSE    78   217       35.9
## 4 b        TRUE    139   217       64.1
## 5 c        FALSE   134   217       61.8
## 6 c        TRUE     83   217       38.2
##
## $ET
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    44   217       20.3
## 2 a        TRUE    173   217       79.7
## 3 b        FALSE    51   217       23.5
## 4 b        TRUE    166   217       76.5
## 5 c        FALSE    92   217       42.4
## 6 c        TRUE    125   217       57.6
##
## $AT
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    88   217       40.6
## 2 a        TRUE    129   217       59.4
## 3 b        FALSE    88   217       40.6
## 4 b        TRUE    129   217       59.4
## 5 c        FALSE   102   217       47
## 6 c        TRUE    115   217       53
##
## $LC
## # A tibble: 6 x 5
```

```
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE   108   217       49.8
## 2 a        TRUE    109   217       50.2
## 3 b        FALSE    96   217       44.2
## 4 b        TRUE    121   217       55.8
## 5 c        FALSE   111   217       51.2
## 6 c        TRUE    106   217       48.8
##
## $MV
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE   101   217       46.5
## 2 a        TRUE    116   217       53.5
## 3 b        FALSE    93   217       42.9
## 4 b        TRUE    124   217       57.1
## 5 c        FALSE   101   217       46.5
## 6 c        TRUE    116   217       53.5
```

Inferences. Number and relative frequencies of statistically significant differences pairwise by responsible

- The higher the TRUE relative frequencies the better the result

```
respnamesc <- as.data.frame(gtools::combinations(length(respnames), r=2, respnames))
rownames(respnamesc) <- paste(
  respnamesc$V1,
  '-',
  respnamesc$V2,
  '=',
  respnamesc$V2,
  '-',
  respnamesc$V1
)
ttests.nrlf.p <- map(
  rownames(respnamesc),
  ~ttests %>%
    as.data.frame() %>%
    rownames_to_column('m1 - m2') %>%
    mutate_if(is.numeric, funs(.<=0.05)) %>%
    filter(
      grepl(
        paste0(
          '^',
          respnamesc[.x,1],
          '\\.M. - ',
          respnamesc[.x,2],
          '.*$|^',
          respnamesc[.x,2],
          '\\.M. - ',
          respnamesc[.x,1],
```

```
          '.*$'),
        `m1 - m2`)) %>%
    gather(variable, value, -`m1 - m2`) %>%
    dplyr::select(variable, value) %>%
    group_by(variable, value) %>%
    dplyr::summarise(freq=n()) %>%
    dplyr::add_tally(freq) %>%
    mutate(proportion=round(freq/n*100,2))
) %>% setNames(rownames(respnamesc))
ttests.nrlf.p
```

```
## $`AT - ES = ES - AT`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    22    56       39.3
## 2 a        TRUE     34    56       60.7
## 3 b        FALSE    16    56       28.6
## 4 b        TRUE     40    56       71.4
## 5 c        FALSE    30    56       53.6
## 6 c        TRUE     26    56       46.4
##
## $`AT - ET = ET - AT`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    13    56       23.2
## 2 a        TRUE     43    56       76.8
## 3 b        FALSE    17    56       30.4
## 4 b        TRUE     39    56       69.6
## 5 c        FALSE    23    56       41.1
## 6 c        TRUE     33    56       58.9
##
## $`AT - LC = LC - AT`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    25    56       44.6
## 2 a        TRUE     31    56       55.4
## 3 b        FALSE    25    56       44.6
## 4 b        TRUE     31    56       55.4
## 5 c        FALSE    24    56       42.9
## 6 c        TRUE     32    56       57.1
##
## $`AT - MV = MV - AT`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    27    49       55.1
## 2 a        TRUE     22    49       44.9
```

```
## 3 b        FALSE    31    49       63.3
## 4 b        TRUE     18    49       36.7
## 5 c        FALSE    24    49       49.0
## 6 c        TRUE     25    49       51.0
##
## $`ES - ET = ET - ES`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    10    56       17.9
## 2 a        TRUE     46    56       82.1
## 3 b        FALSE    14    56       25
## 4 b        TRUE     42    56       75
## 5 c        FALSE    29    56       51.8
## 6 c        TRUE     27    56       48.2
##
## $`ES - LC = LC - ES`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    33    56       58.9
## 2 a        TRUE     23    56       41.1
## 3 b        FALSE    26    56       46.4
## 4 b        TRUE     30    56       53.6
## 5 c        FALSE    35    56       62.5
## 6 c        TRUE     21    56       37.5
##
## $`ES - MV = MV - ES`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    25    49       51.0
## 2 a        TRUE     24    49       49.0
## 3 b        FALSE    15    49       30.6
## 4 b        TRUE     34    49       69.4
## 5 c        FALSE    25    49       51.0
## 6 c        TRUE     24    49       49.0
##
## $`ET - LC = LC - ET`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    12    56       21.4
## 2 a        TRUE     44    56       78.6
## 3 b        FALSE    14    56       25
## 4 b        TRUE     42    56       75
## 5 c        FALSE    21    56       37.5
## 6 c        TRUE     35    56       62.5
##
## $`ET - MV = MV - ET`
```

```
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    11    49       22.4
## 2 a        TRUE     38    49       77.6
## 3 b        FALSE    10    49       20.4
## 4 b        TRUE     39    49       79.6
## 5 c        FALSE    18    49       36.7
## 6 c        TRUE     31    49       63.3
##
## $`LC - MV = MV - LC`
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    27    49       55.1
## 2 a        TRUE     22    49       44.9
## 3 b        FALSE    26    49       53.1
## 4 b        TRUE     23    49       46.9
## 5 c        FALSE    23    49       46.9
## 6 c        TRUE     26    49       53.1
```

Inferences. Statistically significant differences between samples of the same person

- The higher the TRUE relative frequencies the better the result

```
ttests.nrlf.s <- map(
  respnames,
  ~ttests %>%
    as.data.frame() %>%
    rownames_to_column('m1 - m2') %>%
    mutate_if(is.numeric, funs(.<=0.05)) %>%
    filter(grepl(
      paste0(
          '^',
          .x,
          '\\.M. - ',
          .x,
          '.*$')
      , `m1 - m2`)) %>%
    gather(variable, value, -`m1 - m2`) %>%
    dplyr::select(variable, value) %>%
    group_by(variable, value) %>%
    dplyr::summarise(freq=n()) %>%
    dplyr::add_tally(freq) %>%
    mutate(proportion=round(freq/n*100,2))
) %>% set_names(respnames)
ttests.nrlf.s
```

```
## $ES
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
```

```
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    14    28       50
## 2 a        TRUE     14    28       50
## 3 b        FALSE    13    28       46.4
## 4 b        TRUE     15    28       53.6
## 5 c        FALSE    20    28       71.4
## 6 c        TRUE      8    28       28.6
##
## $ET
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE     1    21       4.76
## 2 a        TRUE     20    21      95.2
## 3 b        FALSE     2    21       9.52
## 4 b        TRUE     19    21      90.5
## 5 c        FALSE     7    21      33.3
## 6 c        TRUE     14    21      66.7
##
## $AT
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    10    21       47.6
## 2 a        TRUE     11    21       52.4
## 3 b        FALSE    11    21       52.4
## 4 b        TRUE     10    21       47.6
## 5 c        FALSE     9    21       42.9
## 6 c        TRUE     12    21       57.1
##
## $LC
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    15    21       71.4
## 2 a        TRUE      6    21       28.6
## 3 b        FALSE    10    21       47.6
## 4 b        TRUE     11    21       52.4
## 5 c        FALSE    11    21       52.4
## 6 c        TRUE     10    21       47.6
##
## $MV
## # A tibble: 6 x 5
## # Groups:   variable [3]
##   variable value  freq     n proportion
##   <chr>    <lgl> <int> <int>      <dbl>
## 1 a        FALSE    11    21       52.4
## 2 a        TRUE     10    21       47.6
## 3 b        FALSE    11    21       52.4
## 4 b        TRUE     10    21       47.6
## 5 c        FALSE    11    21       52.4
```

```
## 6 c        TRUE     10    21       47.6
```

Inferences. Correlations by axis

```
# a-axis
cor.a <- map(
  rownames(respnamesc),
  ~cor.test(
    sort(samples[samples$responsable.abbv==respnamesc[.x,1],'a']),
    sort(samples[samples$responsable.abbv==respnamesc[.x,2],'a'])
  )
) %>% setNames(rownames(respnamesc))
cor.a
```

```
## $`AT - ES = ES - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 67.922, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9714592 0.9833495
## sample estimates:
##       cor
## 0.9781917
##
##
## $`AT - ET = ET - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 74.596, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9761924 0.9861247
## sample estimates:
##       cor
## 0.9818187
##
##
## $`AT - LC = LC - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 51.71, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9519994 0.9718812
## sample estimates:
##       cor
```

```
## 0.9632367
##
##
## $`AT - MV = MV - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 45.763, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9397111 0.9645903
## sample estimates:
##      cor
## 0.953757
##
##
## $`ES - ET = ET - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 73.416, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9754441 0.9856863
## sample estimates:
##       cor
## 0.9812456
##
##
## $`ES - LC = LC - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 95.859, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9854104 0.9915136
## sample estimates:
##       cor
## 0.9888706
##
##
## $`ES - MV = MV - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 66.852, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9705718 0.9828286
```

```
## sample estimates:
##       cor
## 0.9775113
##
##
## $`ET - LC = LC - ET`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 57.661, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9609388 0.9771612
## sample estimates:
##       cor
## 0.9701153
##
##
## $`ET - MV = MV - ET`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 80.311, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9793754 0.9879878
## sample estimates:
##       cor
## 0.9842554
##
##
## $`LC - MV = MV - LC`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "a"]) and sort(samples[samples$res
## t = 64.212, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9682011 0.9814360
## sample estimates:
##       cor
## 0.9756927
```

```r
# Correlation b-axis
cor.b <- map(
  rownames(respnamesc),
  ~cor.test(
    sort(samples[samples$responsable.abbv==respnamesc[.x,1],'b']),
    sort(samples[samples$responsable.abbv==respnamesc[.x,2],'b'])
  )
) %>% setNames(rownames(respnamesc))
```

```
cor.b
```

```
## $`AT - ES = ES - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 145.06, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9935621 0.9962616
## sample estimates:
##       cor
## 0.9950937
##
##
## $`AT - ET = ET - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 103.47, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9874461 0.9927008
## sample estimates:
##       cor
## 0.9904258
##
##
## $`AT - LC = LC - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 76.359, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9772480 0.9867429
## sample estimates:
##      cor
## 0.982627
##
##
## $`AT - MV = MV - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 60.461, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9643149 0.9791501
## sample estimates:
```

```
##       cor
## 0.9727093
##
##
## $`ES - ET = ET - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 114.85, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9897791 0.9940602
## sample estimates:
##       cor
## 0.9922072
##
##
## $`ES - LC = LC - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 89.589, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9833413 0.9903058
## sample estimates:
##      cor
## 0.987289
##
##
## $`ES - MV = MV - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 71.409, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9740899 0.9848926
## sample estimates:
##       cor
## 0.9802081
##
##
## $`ET - LC = LC - ET`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 63.898, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
```

```
##  0.9679002 0.9812591
## sample estimates:
##       cor
## 0.9754618
##
##
## $`ET - MV = MV - ET`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 82.988, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9806526 0.9887348
## sample estimates:
##       cor
## 0.9852327
##
##
## $`LC - MV = MV - LC`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "b"]) and sort(samples[samples$res
## t = 55.565, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9580935 0.9754828
## sample estimates:
##       cor
## 0.9679276
```

```
# Correlation c-axis
cor.c <- map(
  rownames(respnamesc),
  ~cor.test(
    sort(samples[samples$responsable.abbv==respnamesc[.x,1],'c']),
    sort(samples[samples$responsable.abbv==respnamesc[.x,2],'c'])
  )
) %>% setNames(rownames(respnamesc))
cor.c
```

```
## $`AT - ES = ES - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 58.047, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9614310 0.9774514
## sample estimates:
##       cor
## 0.9704937
```

```
##
##
## $`AT - ET = ET - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 94.999, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9851502 0.9913618
## sample estimates:
##       cor
## 0.9886717
##
##
## $`AT - LC = LC - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 42.412, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9306613 0.9591965
## sample estimates:
##       cor
## 0.9467577
##
##
## $`AT - MV = MV - AT`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 43.13, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9327604 0.9604495
## sample estimates:
##       cor
## 0.9483826
##
##
## $`ES - ET = ET - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 85.886, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9819070 0.9894679
## sample estimates:
```

```
##       cor
## 0.9861922
##
##
## $`ES - LC = LC - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 70.578, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9734968 0.9845449
## sample estimates:
##       cor
## 0.9797536
##
##
## $`ES - MV = MV - ES`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 110.15, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9889014 0.9935489
## sample estimates:
##       cor
## 0.9915371
##
##
## $`ET - LC = LC - ET`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 57.467, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9606871 0.9770128
## sample estimates:
##       cor
## 0.9699219
##
##
## $`ET - MV = MV - ET`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 64.126, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
```

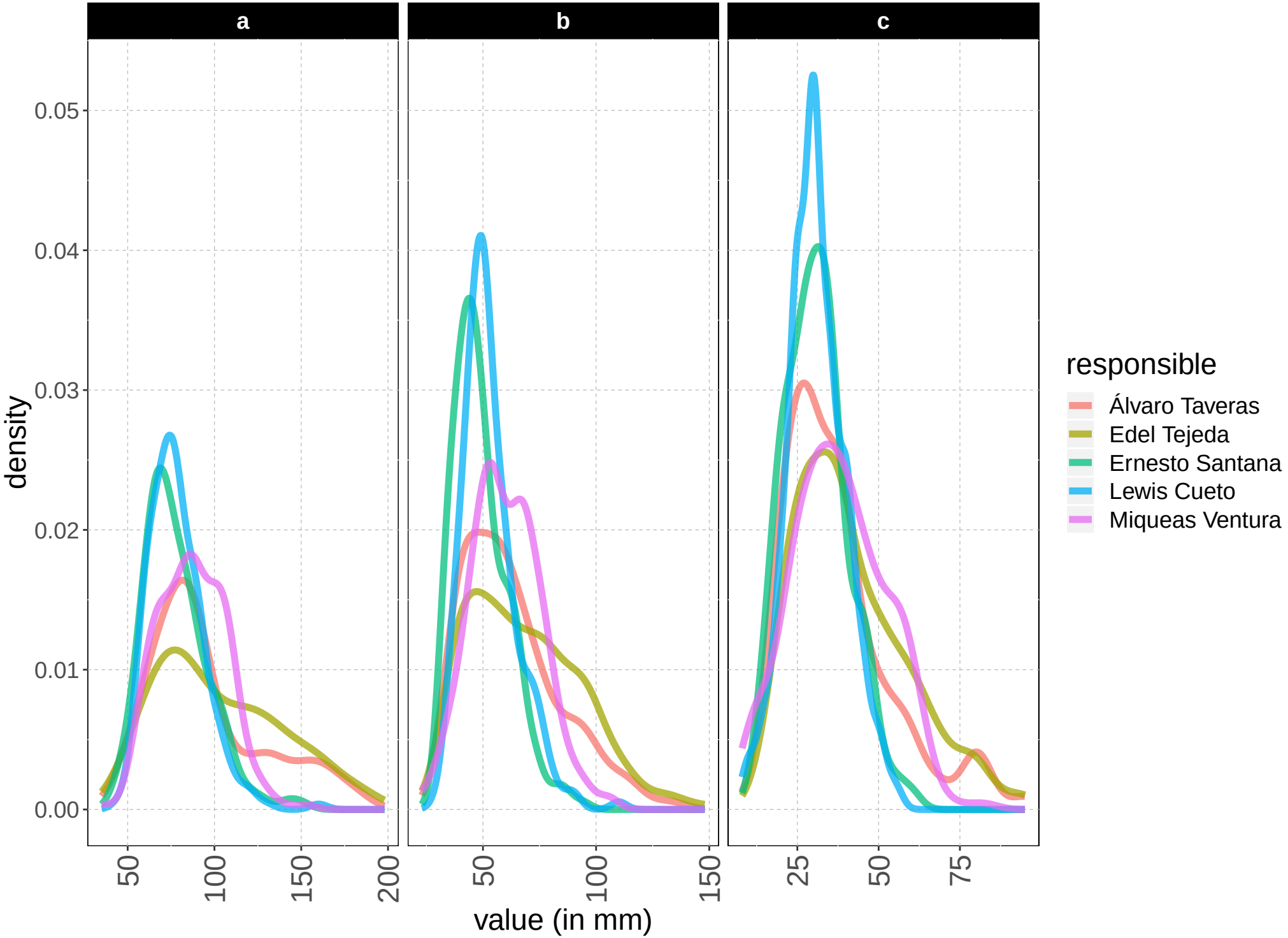
```
##  0.9681189 0.9813877
## sample estimates:
##       cor
## 0.9756296
##
##
## $`LC - MV = MV - LC`
##
##  Pearson's product-moment correlation
##
## data:  sort(samples[samples$responsable.abbv == respnamesc[.x, 1], "c"]) and sort(samples[samples$res
## t = 74.83, df = 208, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9763365 0.9862091
## sample estimates:
##       cor
## 0.9819291
```

Plots

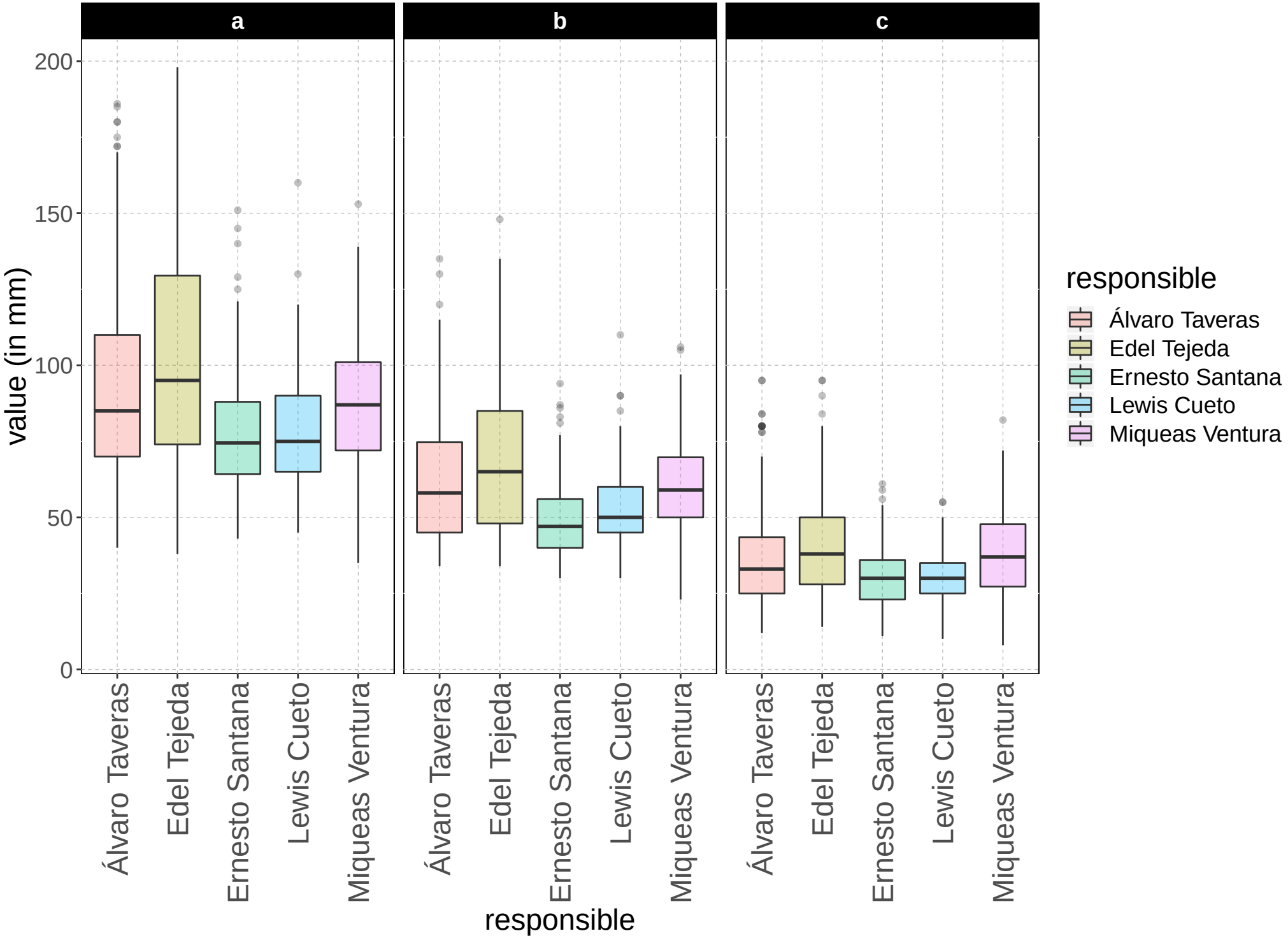
```
# Density plots
respon.dens <- samples %>%
  filter(!grepl('Ocoa', `nombre de muestra`)) %>%
  select(responsible=responsable, a, b, c) %>%
  gather(axis, `value (in mm)`, -responsible) %>%
  ggplot(aes(x=`value (in mm)`, colour = responsible)) +
  geom_line(alpha = 0.75, stat = 'density', size = 2, fill = 'gray95') +
  facet_grid(~axis, scales = 'free_x') +
  theme(
    text = element_text(size = 18),
    axis.text.x=element_text(size = 18, angle = 90, hjust = 1, vjust = 0.5),
    panel.background = element_rect(fill = 'white', colour = 'black'),
    panel.grid.major = element_line(colour = "grey", linetype = "dashed", size = 0.25),
    strip.background = element_rect(colour = "black", fill = "black"),
    strip.text.x = element_text(colour = "white", face = "bold")
  )
```

```
## Warning: Ignoring unknown parameters: fill
```

```
respon.dens
```


a
b
c
density
0.05
0.04
0.03
0.02
0.01
0.00
50
100
150
200
50
100
150
25
50
75
value (in mm)
responsible
Álvaro Taveras
Edel Tejeda
Ernesto Santana
Lewis Cueto
Miqueas Ventura

```r
# Box-plots
respon.bp <- samples %>%
  filter(!grepl('Ocoa', `nombre de muestra`)) %>%
  select(responsible=responsable, a, b, c) %>%
  gather(axis, `value (in mm)`, -responsible) %>%
  ggplot(aes(x=responsible, y=`value (in mm)`, fill = responsible)) +
  geom_boxplot(alpha = 0.3) +
  facet_grid(~axis, scales = 'free_x') +
  theme(
    text = element_text(size = 18),
    axis.text.x=element_text(size = 18, angle = 90, hjust = 1, vjust = 0.5),
    panel.background = element_rect(fill = 'white', colour = 'black'),
    panel.grid.major = element_line(colour = "grey", linetype = "dashed", size = 0.25),
    strip.background = element_rect(colour = "black", fill = "black"),
    strip.text.x = element_text(colour = "white", face = "bold")
  )
respon.bp
```


a
b
c
200
150
100
50
0
value (in mm)
Álvaro Taveras
Edel Tejeda
Ernesto Santana
Lewis Cueto
Miqueas Ventura
responsible
responsible
Álvaro Taveras
Edel Tejeda
Ernesto Santana
Lewis Cueto
Miqueas Ventura

Maps

```
# coords.sp <- coords
# coordinates(coords.sp) <- ~x+y
# proj4string(coords.sp) <- CRS("+init=epsg:32619")
# plotKML(coords.sp, 'kml')
# spTransform(coords.sp, CRS("+init=epsg:4326"))
```