Lab 1: Meta-analyses

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Part 1: In class demo

Load libraries

```r
library(tidyverse)
```

```
## -- Attaching packages ----------------------------------------------------------------------------

## v ggplot2 3.3.0     v purrr   0.3.3
## v tibble  3.0.0     v dplyr   0.8.5
## v tidyr   1.0.2     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.5.0

## Warning: package 'ggplot2' was built under R version 3.6.3

## Warning: package 'tibble' was built under R version 3.6.3

## Warning: package 'tidyr' was built under R version 3.6.3

## Warning: package 'dplyr' was built under R version 3.6.3

## Warning: package 'forcats' was built under R version 3.6.3

## -- Conflicts ----------------------------------------------------------------------------------------
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```r
#install.packages("meta")
library(meta)
```

```
## Warning: package 'meta' was built under R version 3.6.3

## Loading 'meta' package (version 4.11-0).
## Type 'help(meta)' for a brief overview.
```

Read in data

```r
studies <- read_csv(file="studies.csv")
```

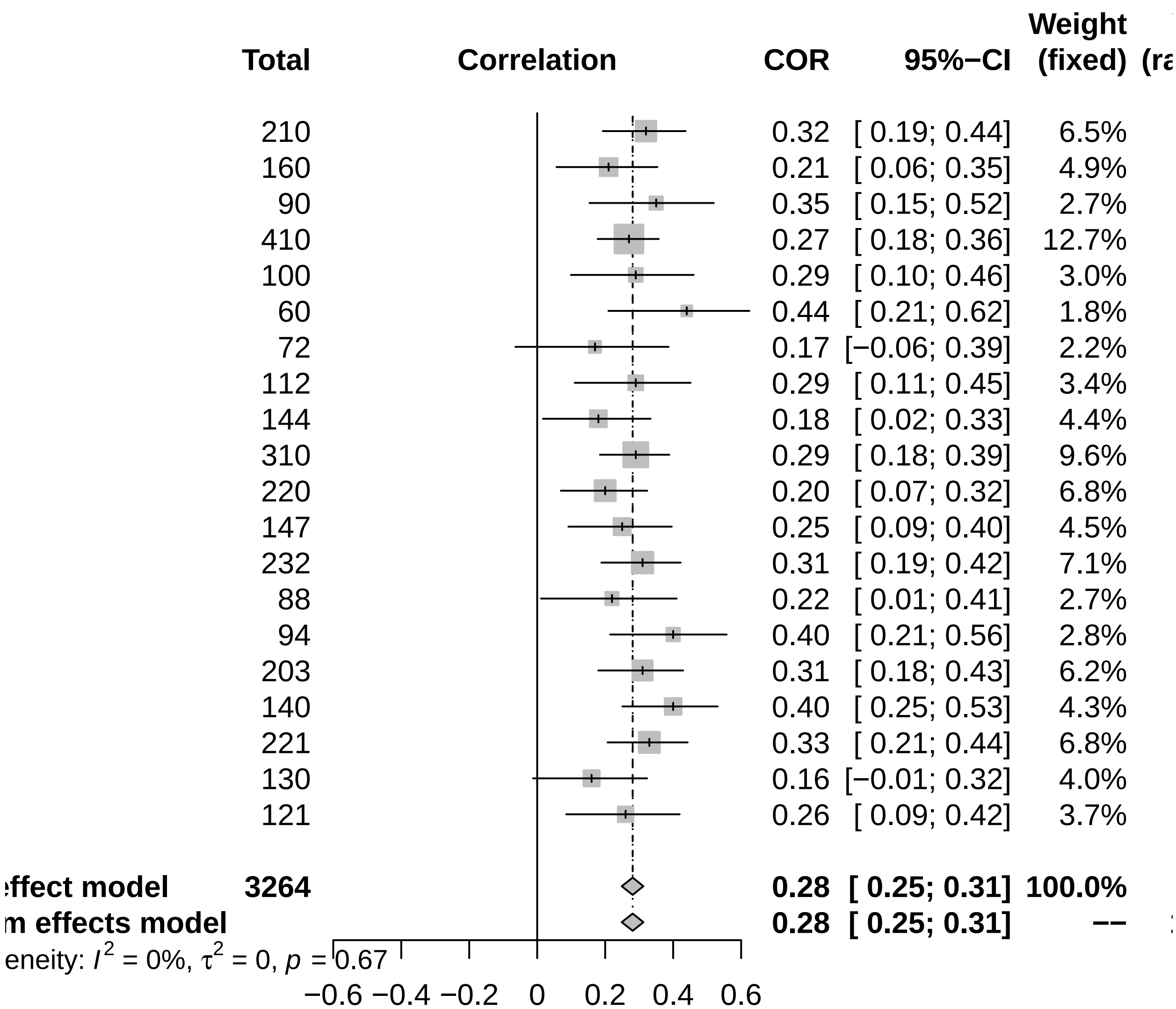
```
## Parsed with column specification:
## cols(
##   r = col_double(),
##   n = col_double(),
##   Study = col_character()
## )
```

Compare correlations across studies

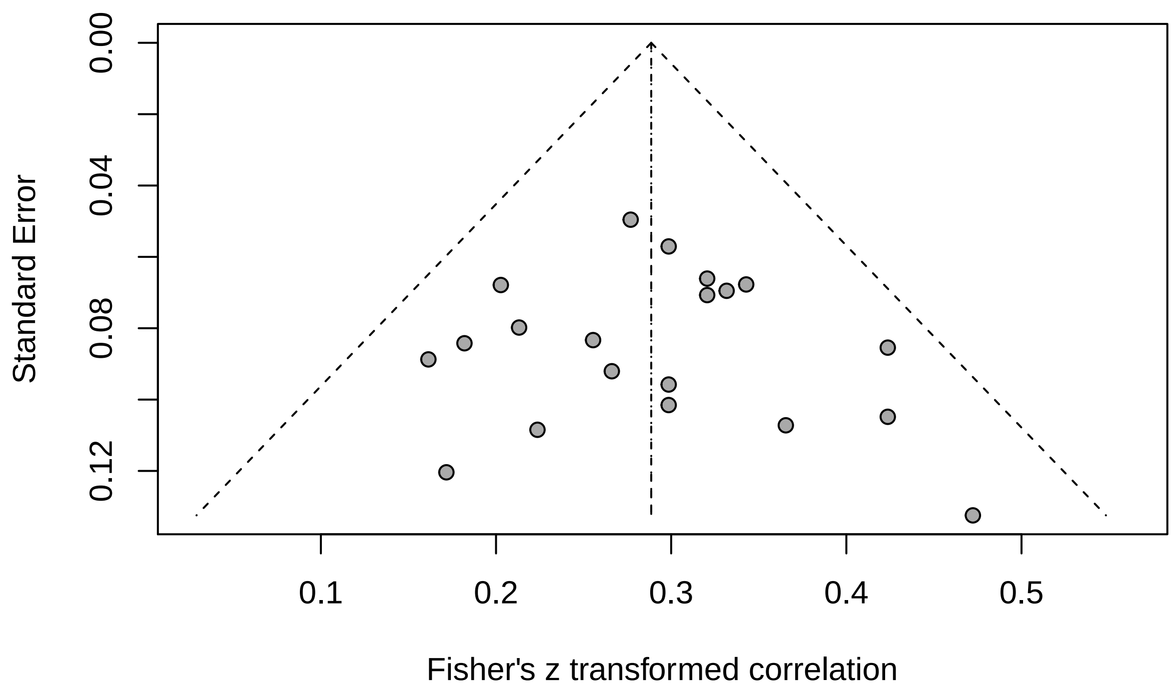
```
MA <-metacor(cor = r, n = n, studlab= Study, data=studies)
MA
```

```
##        COR            95%-CI %W(fixed) %W(random)
## S1  0.3200 [ 0.1930; 0.4365]       6.5        6.5
## S2  0.2100 [ 0.0567; 0.3536]       4.9        4.9
## S3  0.3500 [ 0.1541; 0.5194]       2.7        2.7
## S4  0.2700 [ 0.1778; 0.3575]      12.7       12.7
## S5  0.2900 [ 0.0992; 0.4602]       3.0        3.0
## S6  0.4400 [ 0.2095; 0.6242]       1.8        1.8
## S7  0.1700 [-0.0642; 0.3864]       2.2        2.2
## S8  0.2900 [ 0.1104; 0.4513]       3.4        3.4
## S9  0.1800 [ 0.0169; 0.3337]       4.4        4.4
## S10 0.2900 [ 0.1846; 0.3888]       9.6        9.6
## S11 0.2000 [ 0.0696; 0.3237]       6.8        6.8
## S12 0.2500 [ 0.0918; 0.3959]       4.5        4.5
## S13 0.3100 [ 0.1887; 0.4220]       7.1        7.1
## S14 0.2200 [ 0.0111; 0.4105]       2.7        2.7
## S15 0.4000 [ 0.2148; 0.5574]       2.8        2.8
## S16 0.3100 [ 0.1800; 0.4294]       6.2        6.2
## S17 0.4000 [ 0.2507; 0.5307]       4.3        4.3
## S18 0.3300 [ 0.2070; 0.4427]       6.8        6.8
## S19 0.1600 [-0.0125; 0.3233]       4.0        4.0
## S20 0.2600 [ 0.0855; 0.4190]       3.7        3.7
##
## Number of studies combined: k = 20
##
##                         COR            95%-CI     z  p-value
## Fixed effect model   0.2809 [0.2487; 0.3124] 16.34 < 0.0001
## Random effects model 0.2809 [0.2487; 0.3124] 16.34 < 0.0001
##
## Quantifying heterogeneity:
##  tau^2 = 0 [0.0000; 0.0064]; tau = 0 [0.0000; 0.0800];
##  I^2 = 0.0% [0.0%; 37.5%]; H = 1.00 [1.00; 1.27]
##
## Test of heterogeneity:
##      Q d.f. p-value
##  15.84   19  0.6682
##
## Details on meta-analytical method:
## - Inverse variance method
## - DerSimonian-Laird estimator for tau^2
## - Jackson method for confidence interval of tau^2 and tau
## - Fisher's z transformation of correlations
```

```
forest(MA)
```


Total
Correlation
COR
95%−CI
Weight
(fixed)
(ra
210 0.32 [0.19; 0.44] 6.5%
160 0.21 [0.06; 0.35] 4.9%
90 0.35 [0.15; 0.52] 2.7%
410 0.27 [0.18; 0.36] 12.7%
100 0.29 [0.10; 0.46] 3.0%
60 0.44 [0.21; 0.62] 1.8%
72 0.17 [−0.06; 0.39] 2.2%
112 0.29 [0.11; 0.45] 3.4%
144 0.18 [0.02; 0.33] 4.4%
310 0.29 [0.18; 0.39] 9.6%
220 0.20 [0.07; 0.32] 6.8%
147 0.25 [0.09; 0.40] 4.5%
232 0.31 [0.19; 0.42] 7.1%
88 0.22 [0.01; 0.41] 2.7%
94 0.40 [0.21; 0.56] 2.8%
203 0.31 [0.18; 0.43] 6.2%
140 0.40 [0.25; 0.53] 4.3%
221 0.33 [0.21; 0.44] 6.8%
130 0.16 [−0.01; 0.32] 4.0%
121 0.26 [0.09; 0.42] 3.7%
effect model 3264 0.28 [0.25; 0.31] 100.0%
m effects model 0.28 [0.25; 0.31] −−
eneity: I^2 = 0%, τ^2 = 0, p = 0.67
−0.6 −0.4 −0.2 0 0.2 0.4 0.6

```r
funnel(MA)
```



Part 2: Try it yourself

Load libraries

```
library(tidyverse)
#install.packages("meta")
library(meta)
```

Read in data

```
studies <- read_csv(file="studies2.csv")
```

```
## Parsed with column specification:
## cols(
##   r = col_double(),
##   n = col_double(),
##   Study = col_character()
## )
```

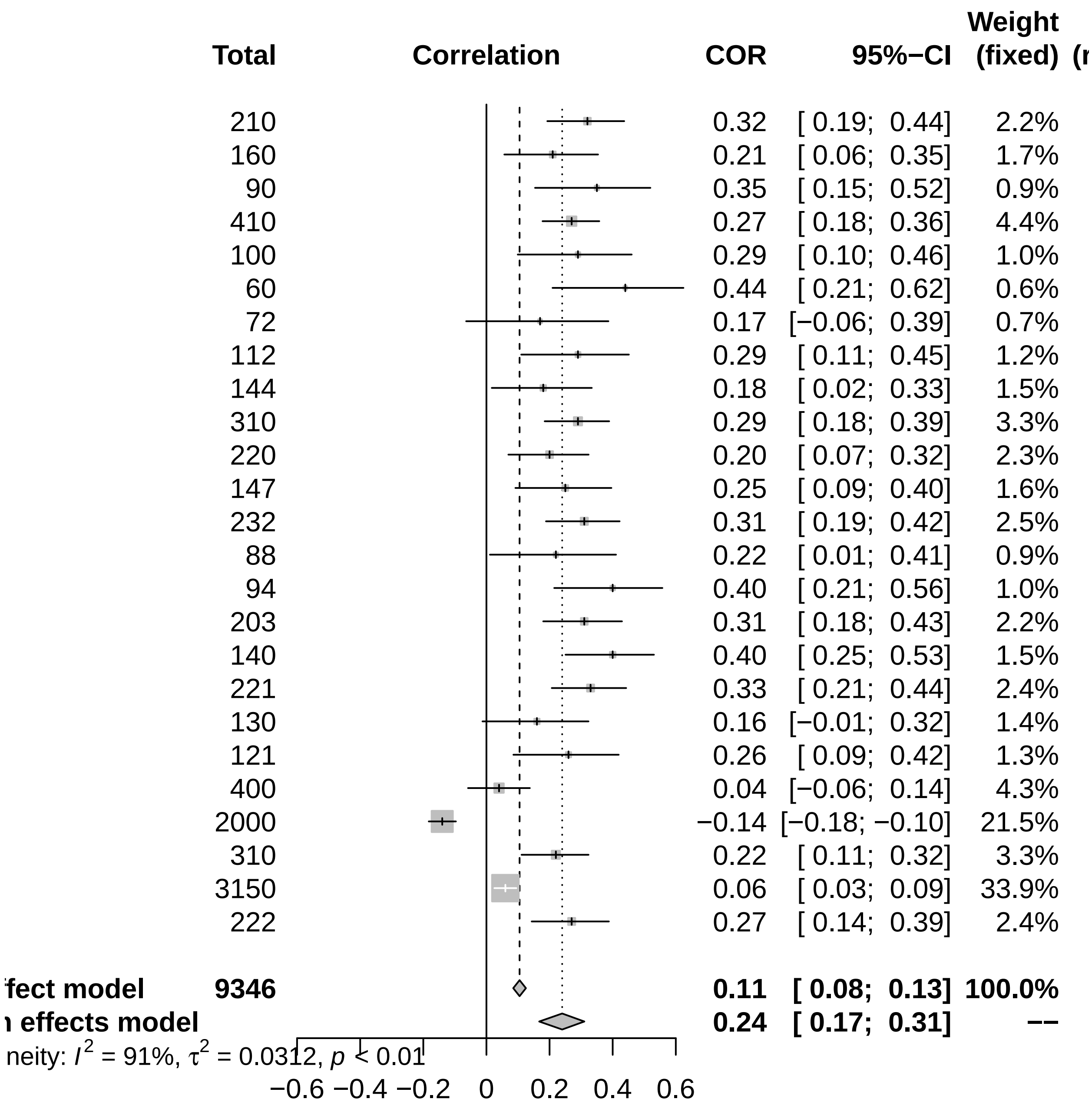
Compare correlations across studies

```r
MA <-metacor(cor = r, n = n, studlab= Study, data=studies)
MA
```

```
##         COR            95%-CI %W(fixed) %W(random)
## S1   0.3200 [ 0.1930;  0.4365]       2.2        4.2
## S2   0.2100 [ 0.0567;  0.3536]       1.7        4.0
## S3   0.3500 [ 0.1541;  0.5194]       0.9        3.5
## S4   0.2700 [ 0.1778;  0.3575]       4.4        4.5
## S5   0.2900 [ 0.0992;  0.4602]       1.0        3.6
## S6   0.4400 [ 0.2095;  0.6242]       0.6        3.1
## S7   0.1700 [-0.0642;  0.3864]       0.7        3.3
## S8   0.2900 [ 0.1104;  0.4513]       1.2        3.7
## S9   0.1800 [ 0.0169;  0.3337]       1.5        3.9
## S10  0.2900 [ 0.1846;  0.3888]       3.3        4.4
## S11  0.2000 [ 0.0696;  0.3237]       2.3        4.2
## S12  0.2500 [ 0.0918;  0.3959]       1.6        3.9
## S13  0.3100 [ 0.1887;  0.4220]       2.5        4.2
## S14  0.2200 [ 0.0111;  0.4105]       0.9        3.5
## S15  0.4000 [ 0.2148;  0.5574]       1.0        3.6
## S16  0.3100 [ 0.1800;  0.4294]       2.2        4.2
## S17  0.4000 [ 0.2507;  0.5307]       1.5        3.9
## S18  0.3300 [ 0.2070;  0.4427]       2.4        4.2
## S19  0.1600 [-0.0125;  0.3233]       1.4        3.8
## S20  0.2600 [ 0.0855;  0.4190]       1.3        3.8
## S21  0.0400 [-0.0583;  0.1375]       4.3        4.5
## S22 -0.1400 [-0.1827; -0.0968]      21.5        4.7
## S23  0.2200 [ 0.1113;  0.3235]       3.3        4.4
## S24  0.0600 [ 0.0251;  0.0947]      33.9        4.8
## S25  0.2700 [ 0.1434;  0.3879]       2.4        4.2
##
## Number of studies combined: k = 25
##
##                         COR            95%-CI     z  p-value
## Fixed effect model   0.1050 [0.0849; 0.1251] 10.15 < 0.0001
## Random effects model 0.2400 [0.1672; 0.3102]  6.31 < 0.0001
##
## Quantifying heterogeneity:
##  tau^2 = 0.0312 [0.0112; 0.0515]; tau = 0.1767 [0.1060; 0.2270];
##  I^2 = 90.9% [87.8%; 93.2%]; H = 3.31 [2.86; 3.83]
##
## Test of heterogeneity:
##       Q d.f.  p-value
##  263.44   24 < 0.0001
##
## Details on meta-analytical method:
## - Inverse variance method
## - DerSimonian-Laird estimator for tau^2
## - Jackson method for confidence interval of tau^2 and tau
## - Fisher's z transformation of correlations
```

Create a forest plot

```
forest(MA)
```



Create a funnel plot

```
funnel(MA)
```