Exploration of subsets

Sasha D. Hafner

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```
table(ds1$country, ds1$incorp)
```

```
##
##      none
##   CH   45
##   DK   87
##   FR   11
##   IE   49
##   NL  218
##   UK  109
```

```
dim(ds1)
```

```
## [1] 519 161
```

Main calibration set:

```
table(ds2$country, ds2$app.mthd)
```

```
##
##      bsth bc ts os
##   CH   12 27  5  1
##   DK   53  9  0 17
##   FR    2  4  1  0
##   IE   18  8 23  0
##   NL    3 69 22 66
##   UK   63  0 46  0
```

```
dim(ds2)
```

```
## [1] 449 161
```

```
dim(d2)
```

```
## [1] 5514  204
```

For closed slot:

```
table(ds2cs$country, ds2cs$app.mthd)
```

```
##
##      cs
##   DK  4
##   NL  4
```

```
table(ds2cs$country, ds2cs$meas.tech2)
```

```
##
```

```
##      micro met cps
##   DK         0   4
##   NL         4   0
```

```
dim(ds2cs)
```

```
## [1]   8 161
```

```
dim(d2cs)
```

```
## [1]  56 201
```

For pH effects:

```
table(ds5$country, ds5$app.mthd)
```

```
##
##      bsth  bc
##   DK  146   0
##   NL    0  16
```

```
dim(ds5)
```

```
## [1] 162 161
```

For incorporation effects:

```
table(ds4$country, ds4$app.mthd:ds4$incorp)
```

```
##
##      bsth:none bsth:shallow bsth:deep bc:none bc:shallow bc:deep
##   DK         4            8         0       0          0       0
##   FR         2            2         0       4          4       0
##   NL         0            0         0      16         25       3
```

```
dim(ds4)
```

```
## [1]  68 161
```

For all calibration data.

```
table(dscal$meas.tech2)
```

```
##
## micro met        wt   chamber       cps
##       482         8         8       102
```

```
table(dscal$country, dscal$meas.tech2)
```

```
##
##      micro met  wt chamber cps
##   CA         0   0       0   0
##   CH        45   0       0   0
##   DE         0   0       0   0
##   DK       103   0       8 102
##   FR         7   0       0   0
##   IE        49   0       0   0
##   IT         0   0       0   0
##   NL       169   8       0   0
##   NO         0   0       0   0
##   SE         0   0       0   0
##   UK       109   0       0   0
```

```
##   US          0   0       0   0
```

```
table(dscal$inst, dscal$meas.tech2)
```

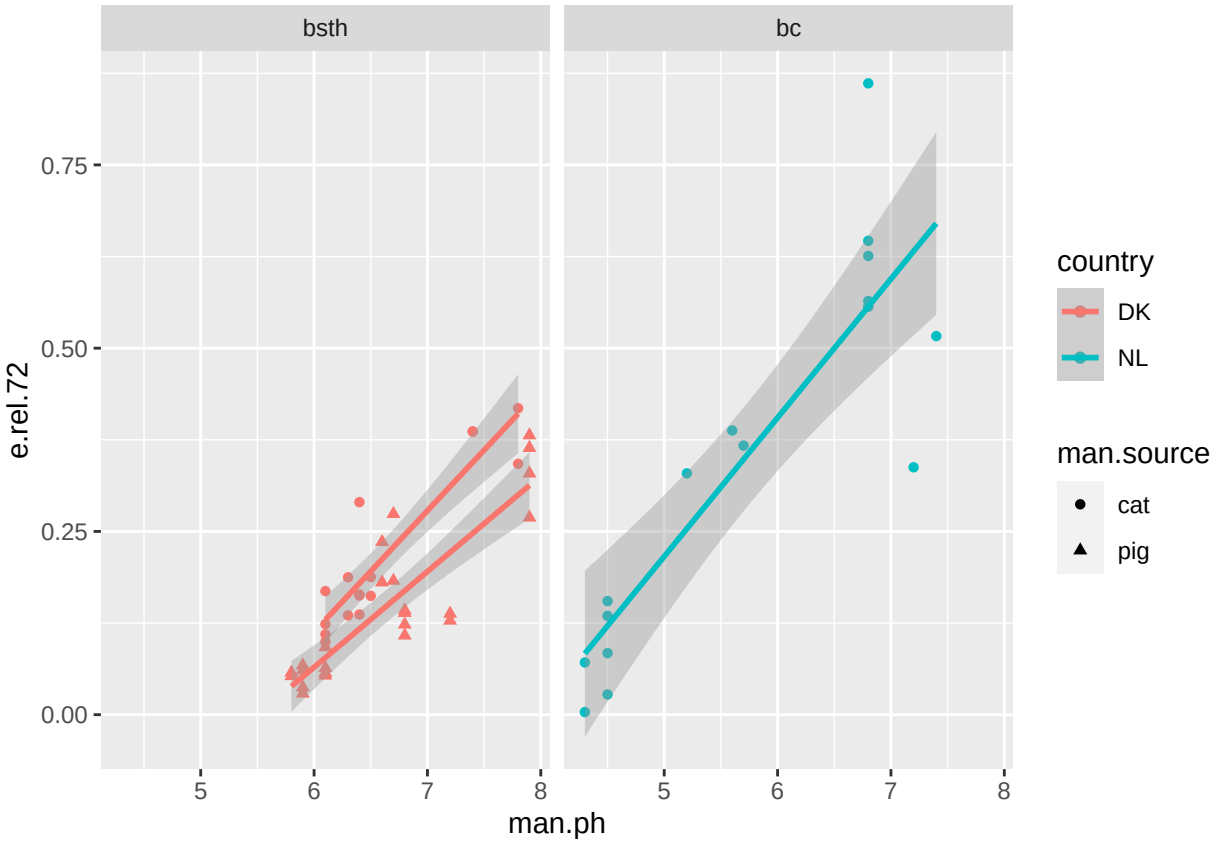
```
##
##       micro met  wt chamber cps
##   104        28   0       0   0
##   106        86   0       0   0
##   202       109   0       0   0
##   204        17   0       0   0
##   205        58   0       0   0
##   207        45   0       0   0
##   208         7   0       0   0
##   210         8   8       0   0
##   211         0   0       8 102
##   212        49   0       0   0
##   214        75   0       0   0
```

```
dim(dscal)
```

```
## [1] 600 161
```

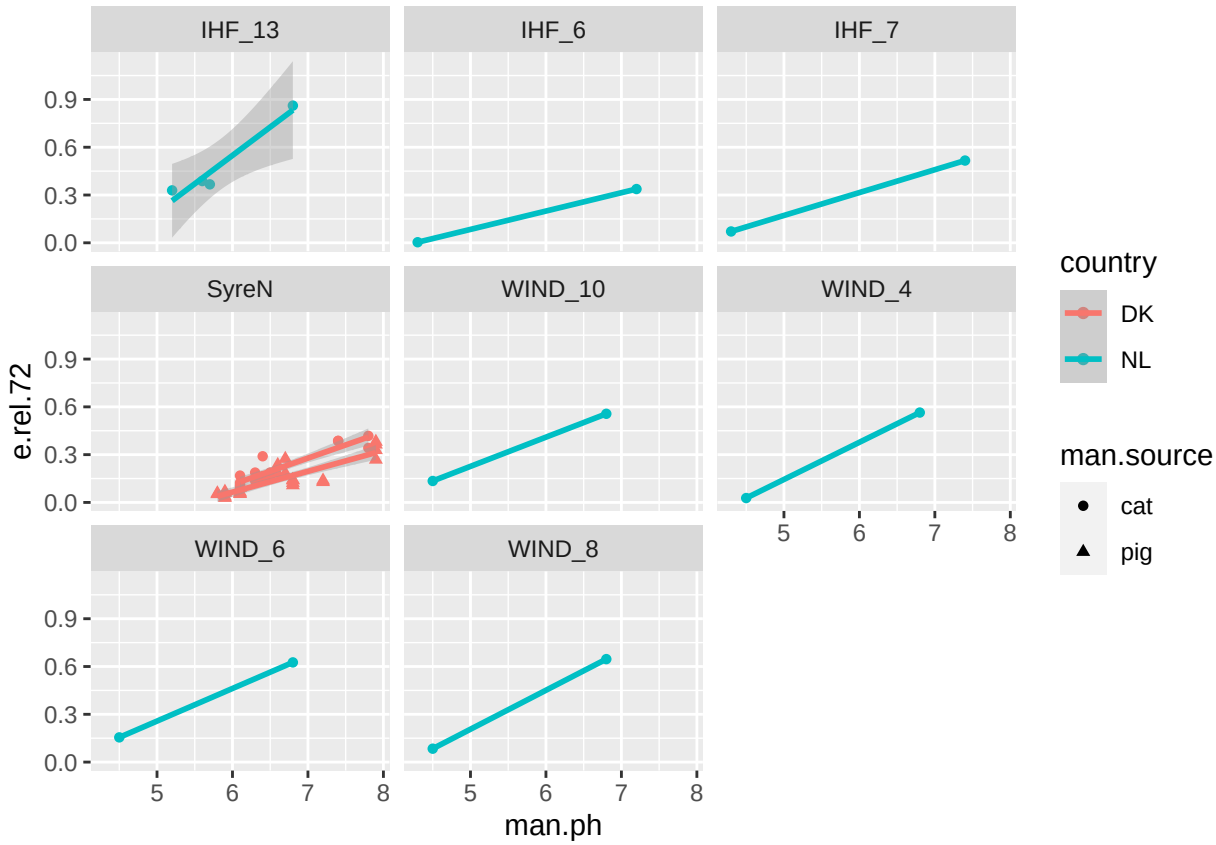
```
ggplot(ds3, aes(man.ph, e.rel.72, colour = country, shape = man.source)) +
  geom_point() +
  geom_smooth(method = lm) +
  facet_wrap(. ~ app.mthd)
```

```
## `geom_smooth()` using formula 'y ~ x'
```

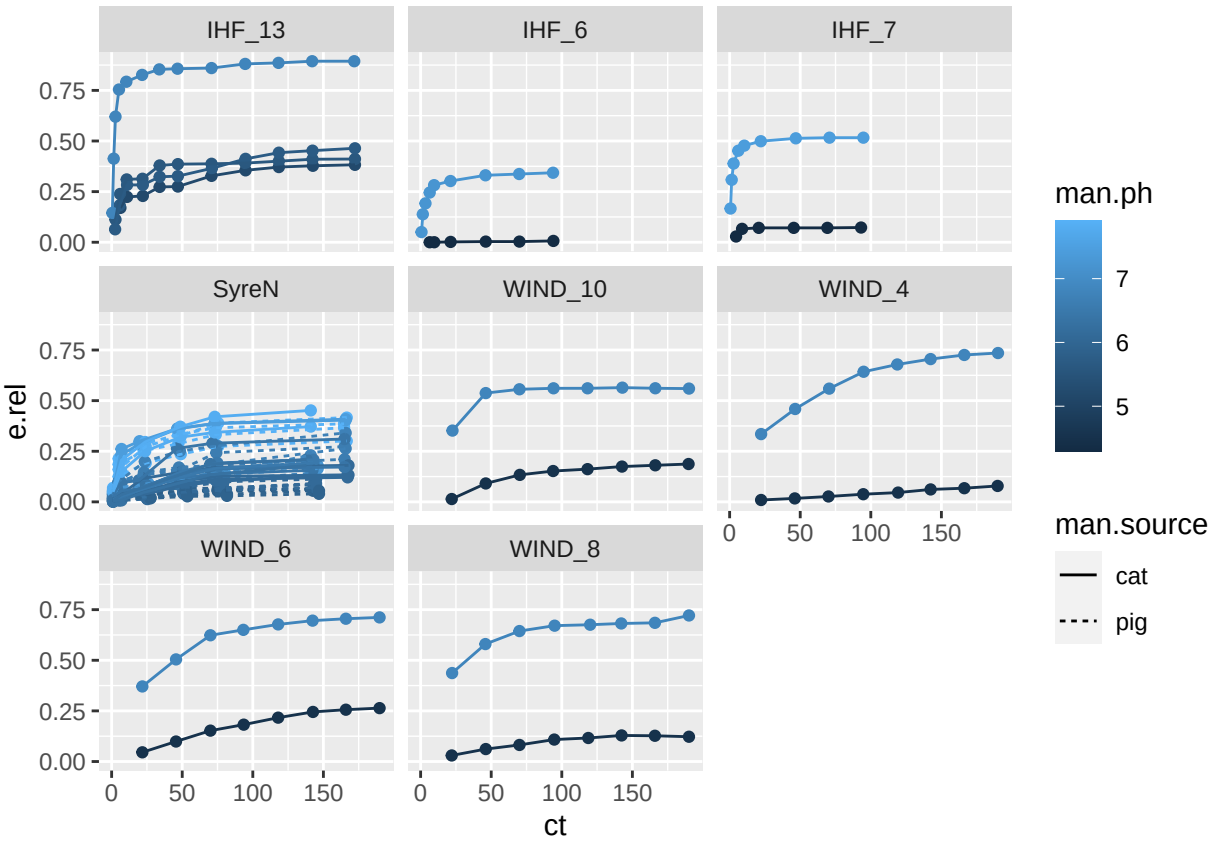


```r
ggplot(ds3, aes(man.ph, e.rel.72, colour = country, shape = man.source)) +
  geom_point() +
  geom_smooth(method = lm) +
  facet_wrap(. ~ exper)
```

```
## `geom_smooth()` using formula 'y ~ x'
## Warning in qt((1 - level)/2, df): NaNs produced
## Warning in qt((1 - level)/2, df): NaNs produced
## Warning in qt((1 - level)/2, df): NaNs produced
## Warning in qt((1 - level)/2, df): NaNs produced
## Warning in qt((1 - level)/2, df): NaNs produced
## Warning in qt((1 - level)/2, df): NaNs produced
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning -Inf
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning -Inf
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning -Inf
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning -Inf
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning -Inf
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning -Inf
```



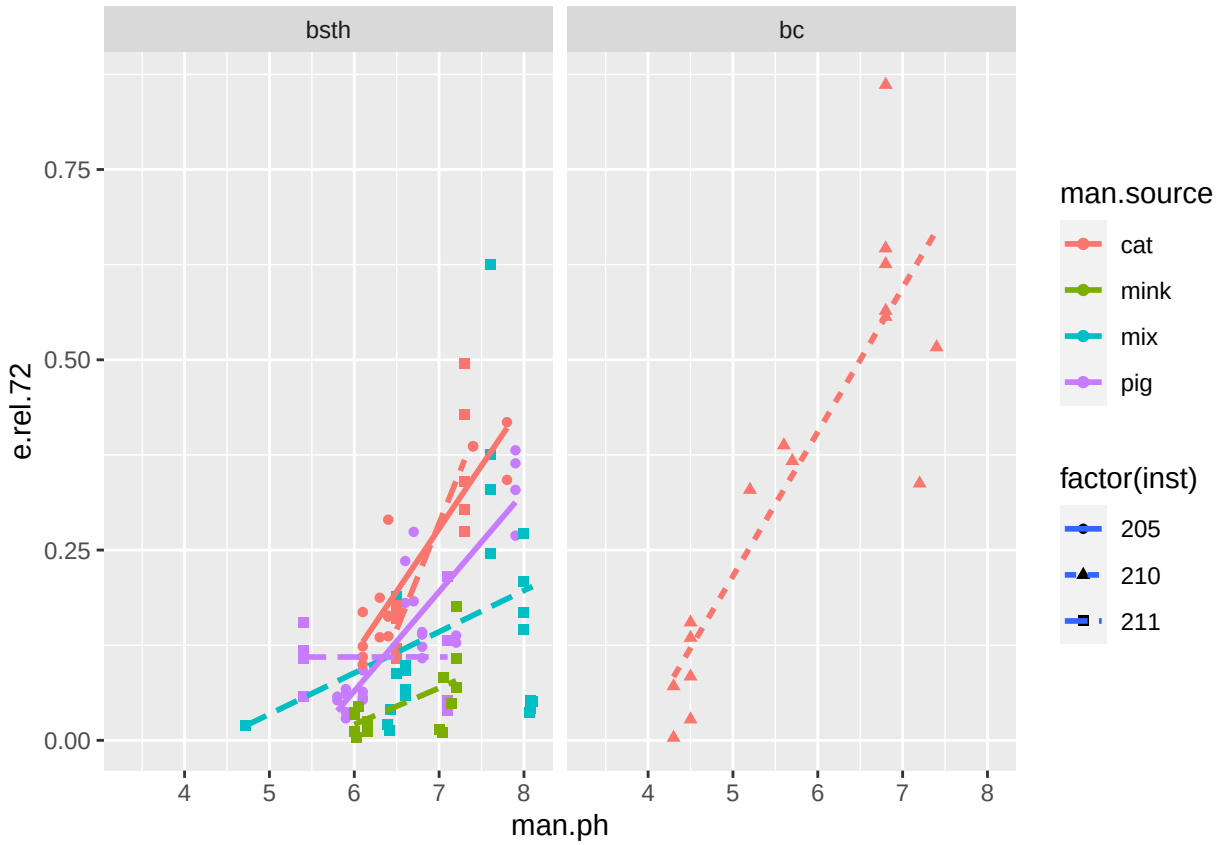

```
ggplot(d3, aes(ct, e.rel, colour = man.ph, lty = man.source, group = pmid)) +
  geom_point() +
  geom_line() +
  facet_wrap(. ~ exper)
```



Include SDU data.

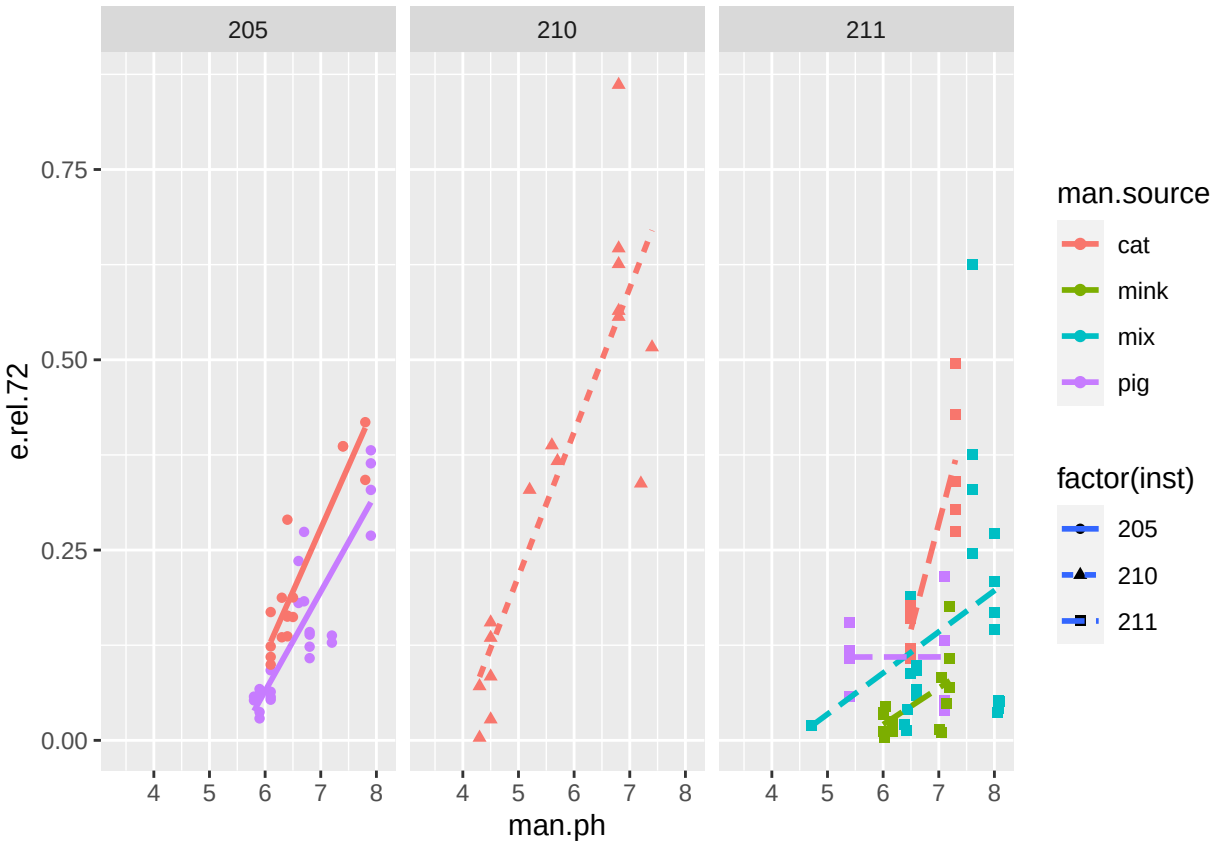
```
ggplot(ds5, aes(man.ph, e.rel.72, colour = man.source, lty = factor(inst), shape = factor(inst))) +
  geom_point() +
  geom_smooth(method = lm, se = FALSE) +
  facet_grid(. ~ app.mthd)
```

```
## `geom_smooth()` using formula 'y ~ x'
## Warning: Removed 49 rows containing non-finite values (stat_smooth).
## Warning: Removed 49 rows containing missing values (geom_point).
```




```
ggplot(ds5, aes(man.ph, e.rel.72, colour = man.source, lty = factor(inst), shape = factor(inst))) +
  geom_point() +
  geom_smooth(method = lm, se = FALSE) +
  facet_wrap(~factor(inst))
```

```
## `geom_smooth()` using formula 'y ~ x'
## Warning: Removed 49 rows containing non-finite values (stat_smooth).
## Warning: Removed 49 rows containing missing values (geom_point).
```



Look at interval duration info.

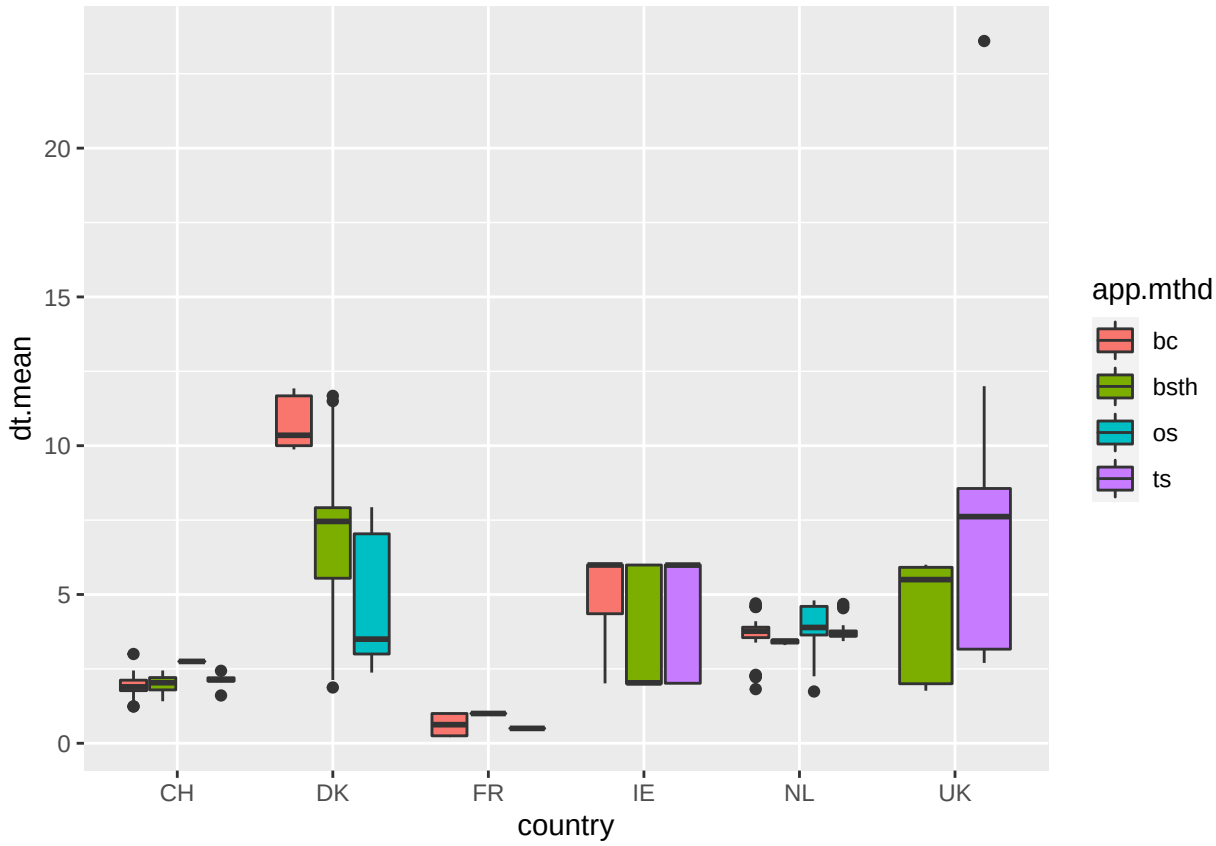
```
names(d2)
```

```
##   [1] "inst"                "eid"                 "pid"                 "pmid"
##   [5] "oid"                 "database"            "proj"                "exper"
##   [9] "exper2"              "institute"           "country"             "file"
##  [13] "row.in.file"         "pub.id"              "pub.info"            "lat"
##  [17] "long"                "topo"                "field"               "plot"
##  [21] "plot.area"           "treat"               "rep"                 "rep2"
##  [25] "interval"            "t.start"             "t.end"               "t.start.o
##  [29] "t.end.orig"          "dt"                  "dt.calc"             "dt.diff"
##  [33] "ct"                  "mt"                  "cta"                 "meas.tech
##  [37] "meas.tech2"          "meas.tech.orig"      "bg.dl"               "bg.val"
##  [41] "bg.unit"             "j.NH3"               "j.rel"               "e.int"
##  [45] "e.cum"               "e.rel"               "clay"                "silt"
##  [49] "sand"                "oc"                  "soil.type"           "soil.type
##  [53] "soil.water"          "soil.moist"          "soil.ph"             "soil.dens
##  [57] "crop.res"            "till"                "air.temp"            "air.temp.
##  [61] "soil.temp"           "soil.temp.z"         "rad"                 "wind"
##  [65] "wind.z"              "wind.2m"             "wind.loc"            "rain"
##  [69] "rain.rate"           "rain.cum"            "rh"                  "far.loc"
##  [73] "man.source"          "man.source.orig"     "man.bed"             "man.con"
##  [77] "man.trt1"            "man.trt2"            "man.stor"            "man.dm"
##  [81] "man.tkn"             "man.tan"             "acid"                "man.tic"
##  [85] "man.ua"              "man.ph"              "man.freeNH3"         "man.eq.ga
##  [89] "date.start"          "app.start"           "app.start.orig"      "app.mthd"
##  [93] "app.mthd2"           "app.mthd.orig"       "app.rate"            "tan.app"
```

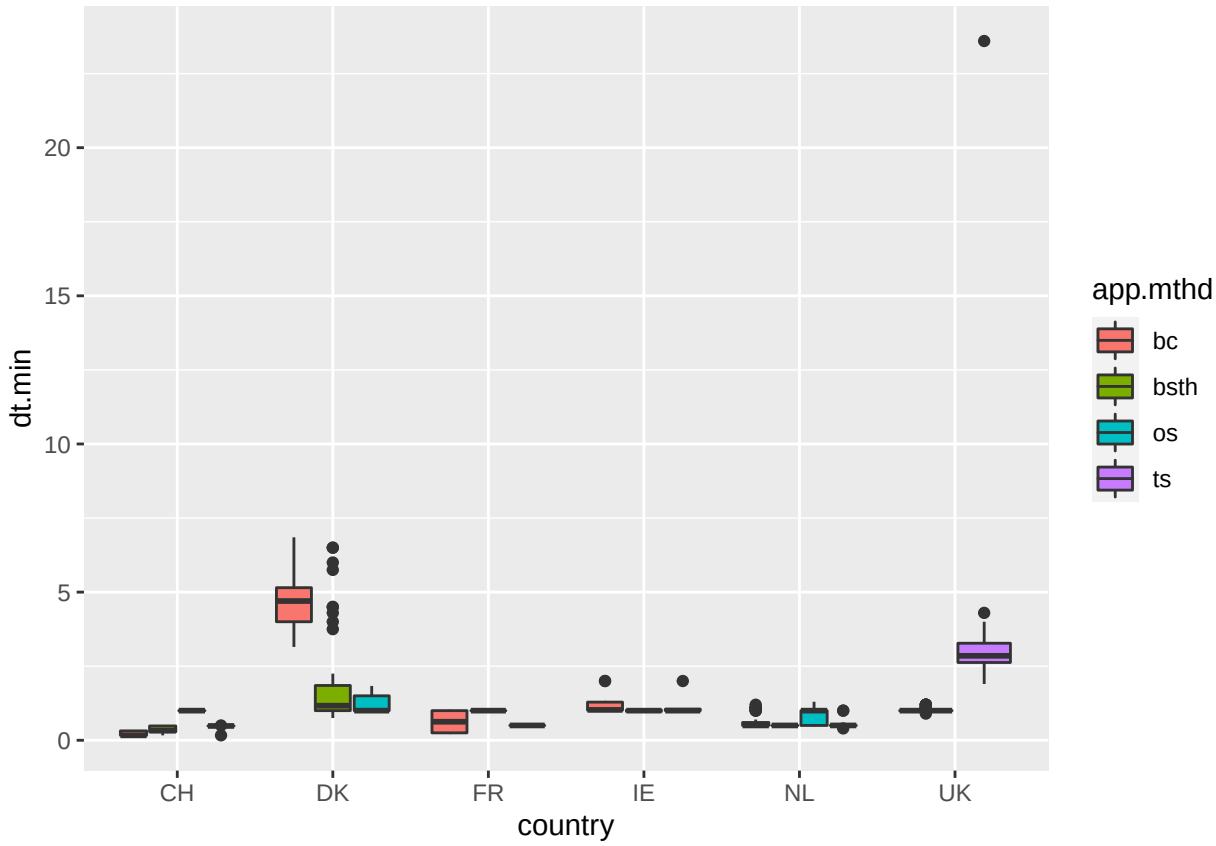
```
##  [97] "incorp"                  "incorp.orig"                "time.incorp"                "man.area"
## [101] "dist.inj"                "furrow.z"                   "furrow.w"                   "crop"
## [105] "crop.orig"               "crop.z"                     "crop.area"                  "lai"
## [109] "notes"                   "flag"                       "missingair.temp"            "missingwi
## [113] "er"                      "lwind"                      "lapp.rate"                  "lman.tan"
## [117] "man.source.cat"          "man.source.conc"            "man.source.mink"            "man.source
## [121] "man.source.none"         "man.source.other"           "man.source.pig"             "man.source
## [125] "man.source.sludge"       "app.mthd.bc"                "app.mthd.bss"               "app.mthd.
## [129] "app.mthd.cs"             "app.mthd.os"                "app.mthd.pi"                "app.mthd.
## [133] "app.mthd2.band"          "app.mthd2.bc"               "app.mthd2.cs"               "app.mthd2
## [137] "soil.type.clay"          "soil.type.clay.loam"        "soil.type.loam"             "soil.type
## [141] "soil.type.organic"       "soil.type.sand"             "soil.type.sandy loam"       "soil.type
## [145] "soil.type.sandy.loam"    "soil.type.silt loam"        "soil.type.silt.loam"        "soil.type
## [149] "soil.type.silty.clay"    "soil.type.silty.clay.loam" "soil.type2.clay"            "soil.type
## [153] "soil.type2.organic"      "soil.type2.sand"            "crop.bare soil"             "crop.cere
## [157] "crop.grass"              "crop.maize"                 "crop.other"                 "crop.stubl
## [161] "crop.any"                "incorp.deep"                "incorp.none"                "incorp.sha
## [165] "crop.app.mthd.bc"        "crop.app.mthd.bsth"         "crop.app.mthd.ts"           "grass.hght
## [169] "cereal.hght"             "bsth.grass.hght"            "bsth.cereal.hght"           "ts.grass.
## [173] "ts.cereal.hght"          "bc.grass.hght"              "bc.cereal.hght"             "app.rate.
## [177] "app.rate.cs"             "app.rate.ni"                "country.UK"                 "country.NU
## [181] "country.IT"              "country.DK"                 "country.NL"                 "country.CH
## [185] "country.SE"              "country.CA"                 "country.DE"                 "country.FI
## [189] "country.IE"              "country.US"                 "rain.cum.tot"               "exper.code
## [193] "ct.168"                  "ct.72"                      "ct.48"                      "ct.24"
## [197] "ct.0"                    "ct.max.200"                 "ct.max"                     "pmid.d2"
## [201] "weightp"                 "weightc"                    "weightca"                   "weightcas
```

```
d2i <- as.data.frame(summarise(group_by(d2, inst, country, man.source, app.mthd, pmid), dt.mx = max(dt[c
                               dt.mean = mean(dt[ct <= 24]), dt.med = median(dt[ct <= 24])))
```

```
ggplot(d2i, aes(country, dt.mean, fill = app.mthd)) +
  geom_boxplot()
```



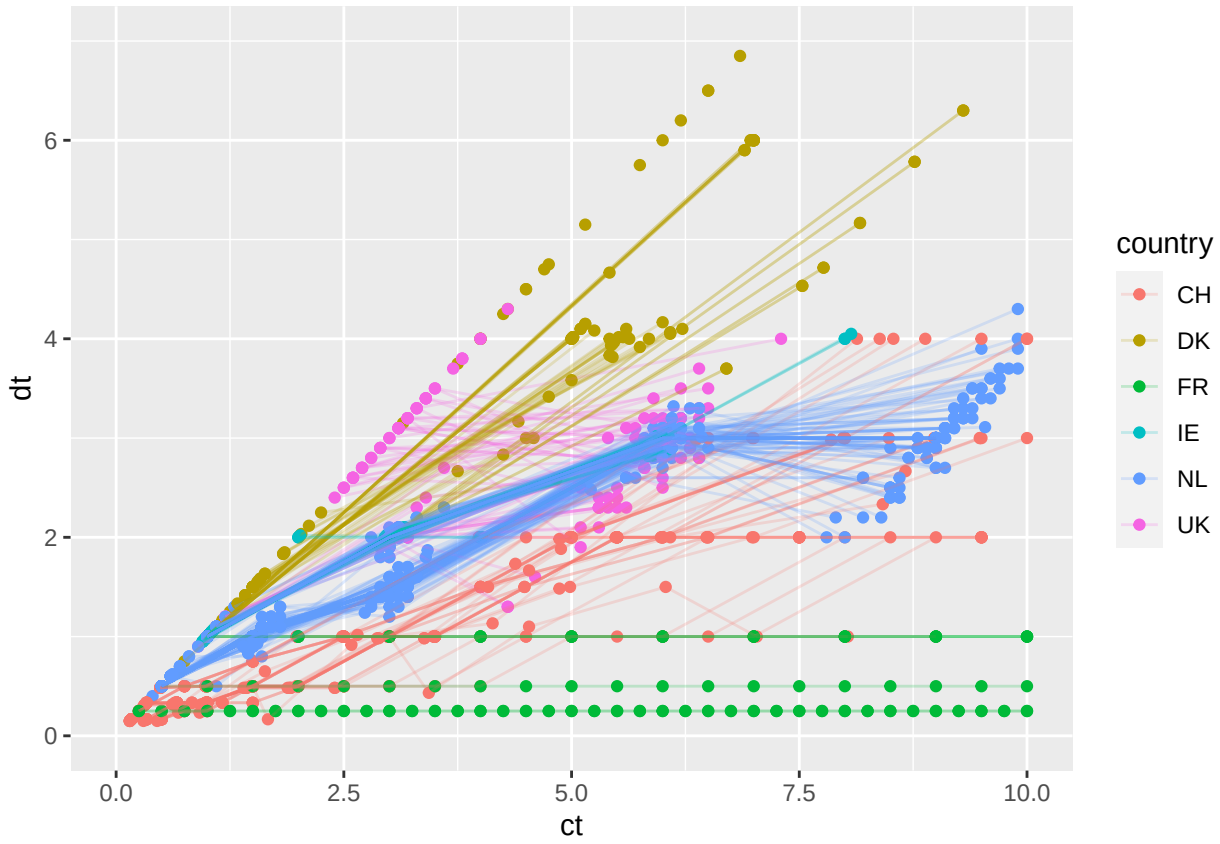

```
ggplot(d2i, aes(country, dt.min, fill = app.mthd)) +
  geom_boxplot()
```




```
ggplot(d2, aes(ct, dt, colour = country, group = pmid)) +
  xlim(0, 10) +
  ylim(0, 7) +
  geom_point() +
  geom_line(alpha = 0.2)
```

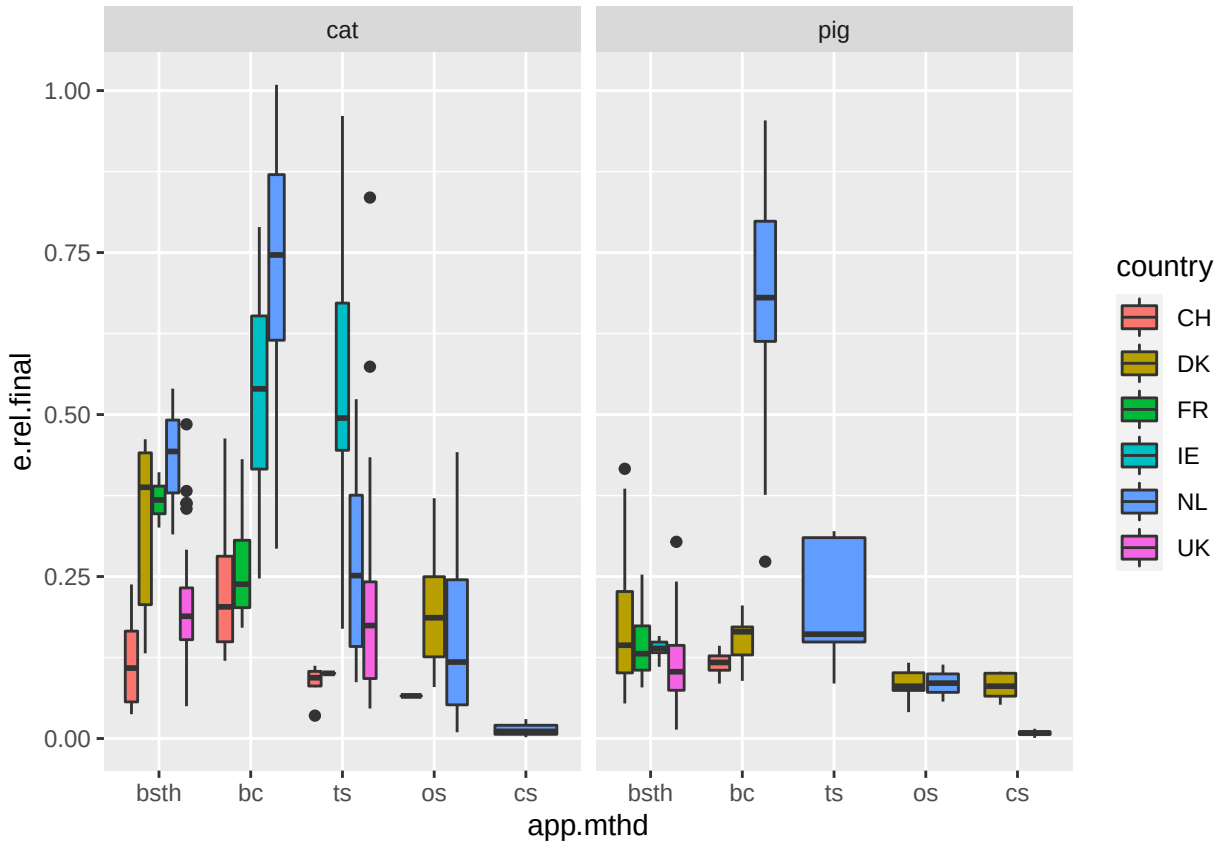
```
## Warning: Removed 3733 rows containing missing values (geom_point).
```

```
## Warning: Removed 3733 row(s) containing missing values (geom_path).
```

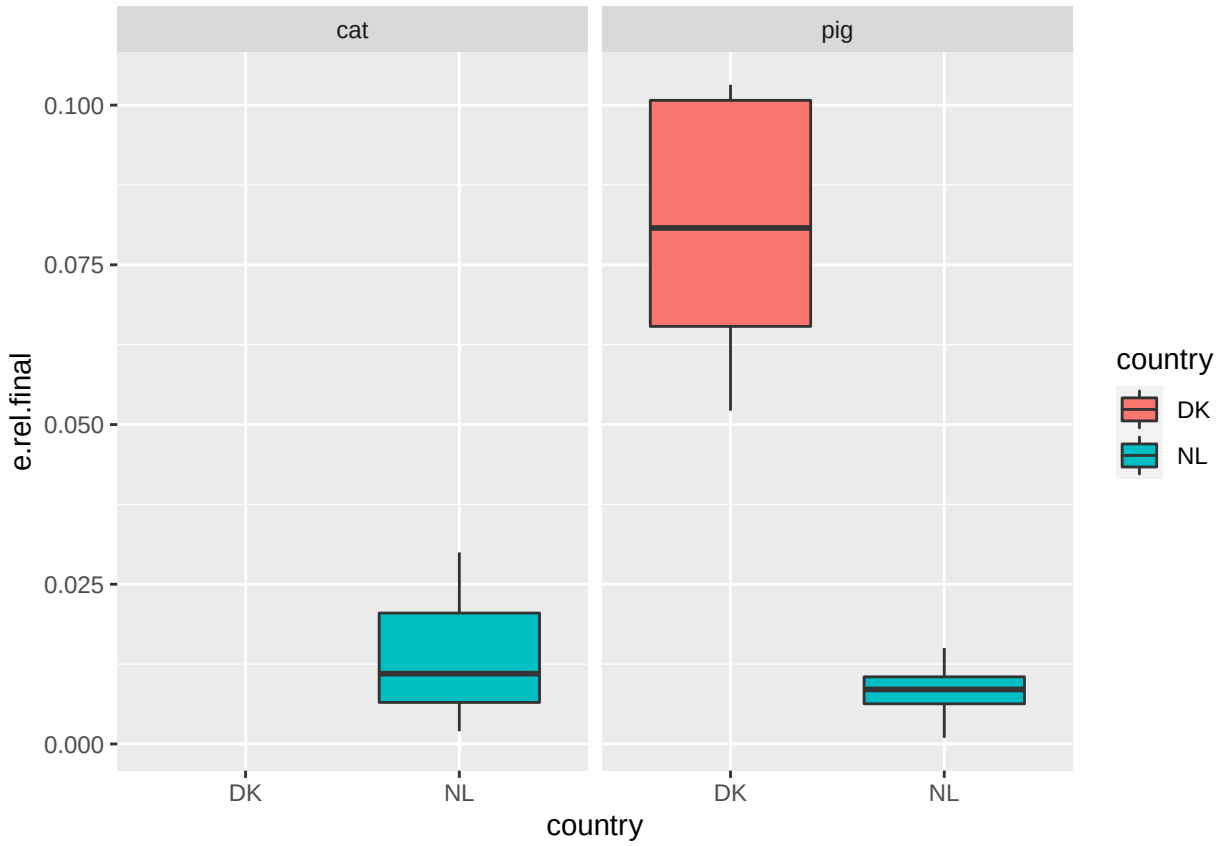


Application methods–closed slot

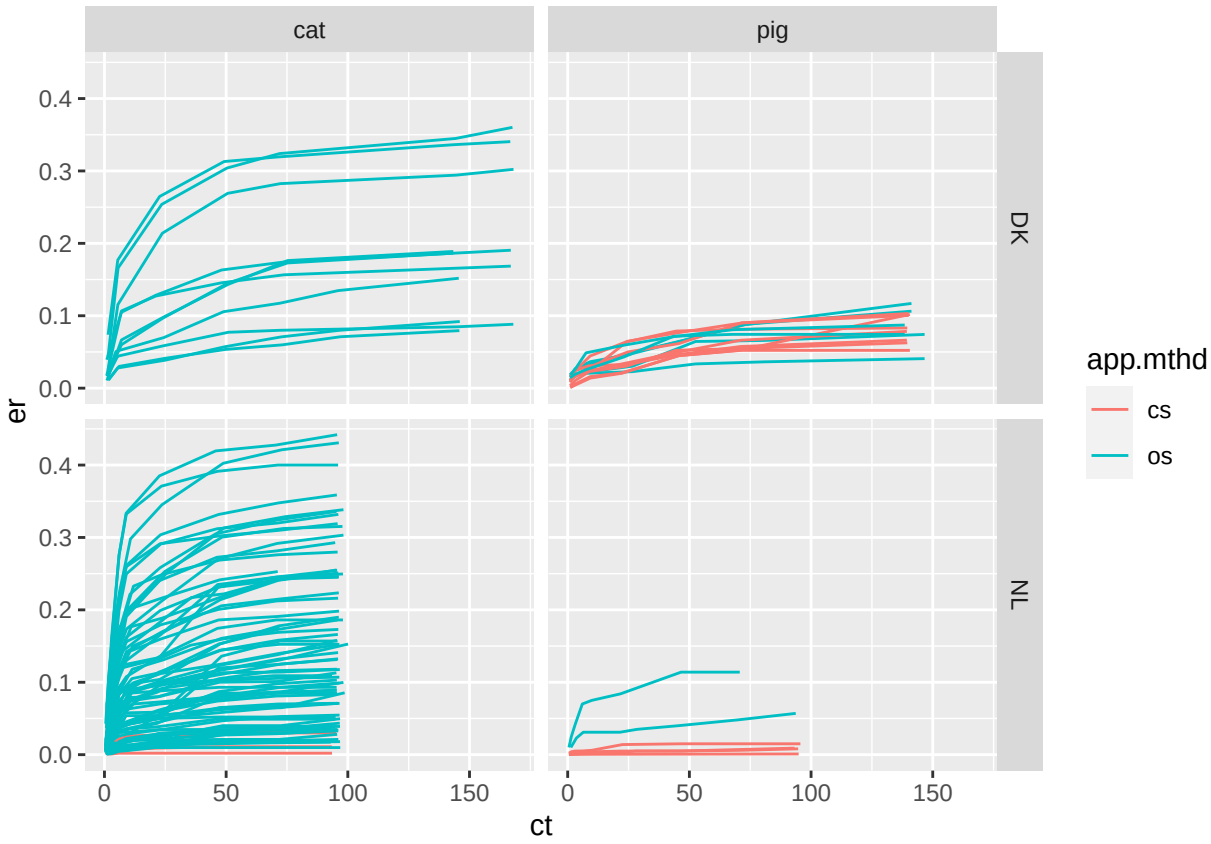
```
ggplot(ds1, aes(app.mthd, e.rel.final, fill = country)) +
  geom_boxplot() +
  facet_wrap(~ man.source)
```



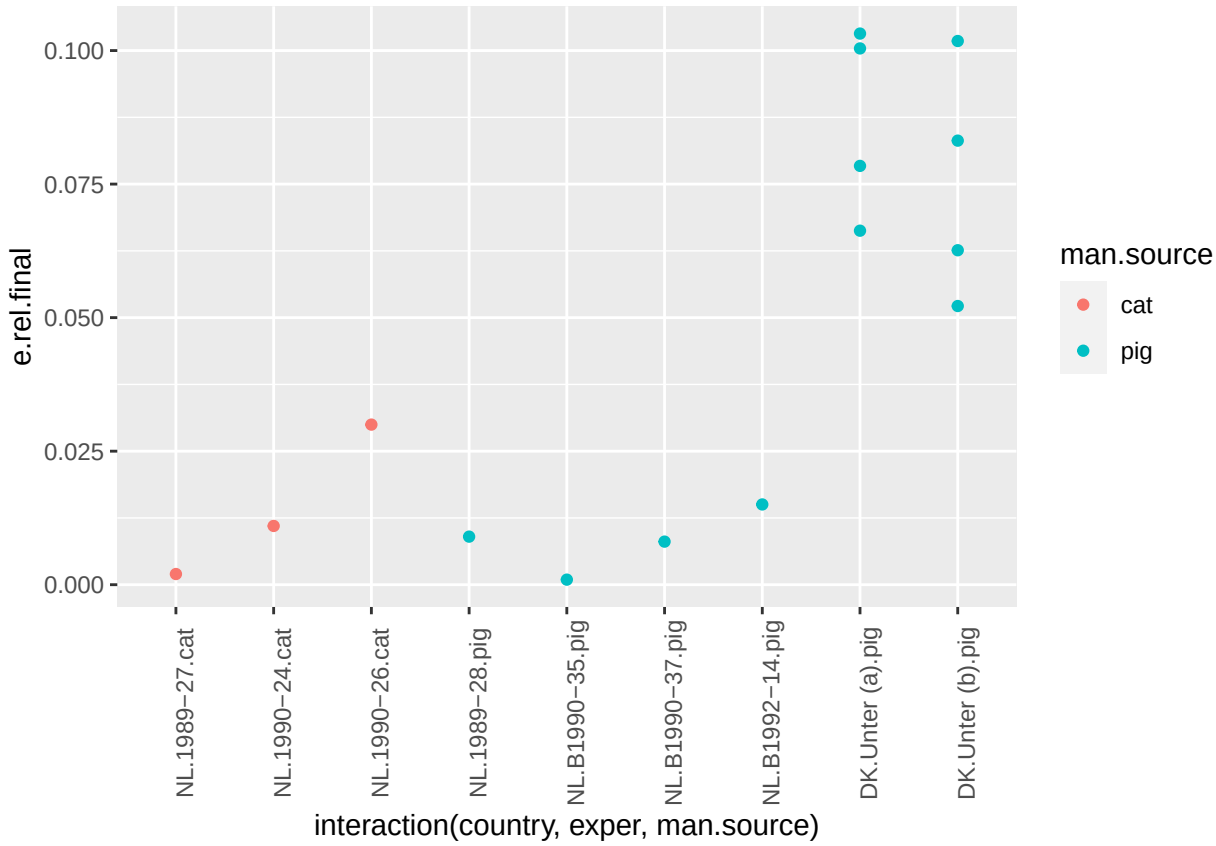

```
ggplot(subset(ds1, app.mthd == 'cs'), aes(country, e.rel.final, fill = country)) +
  geom_boxplot() +
  facet_wrap(~ man.source)
```




```
ggplot(subset(d1, app.mthd %in% c('os', 'cs') & country != 'CH'), aes(ct, er, colour = app.mthd, group =
  geom_line() +
  facet_grid(country ~ man.source)
```




```
ggplot(xx <- subset(ds1, app.mthd == 'cs'), aes(interaction(country, exper, man.source), e.rel.final, co
  geom_point() +
  theme(axis.text.x = element_text(angle = 90))
```




```
  #geom_jitter(height = 0)
unique(xx$notes)
```

```
## [1] NA  Incorporation (incorp/incorp.orig) not entered and was assumed to be none.
## [2]
## 15 Levels:   Modeled flux Air temperature and RH are copied from next plot, row 691  ... NA  Incorpo
```

```
unique(xx[, c('country', 'file')])
```

```
##      country                          file
## 479       NL                    ALFAM1.xlsx
## 1236      DK                ALFAM2_AU_v5.xlsx
## 1758      NL ALFAM2_data_NL_arable01_v3.xlsx
```

```
ggplot(xx <- subset(ds2, app.mthd == 'cs'), aes(interaction(country, exper, man.source), e.rel.final, c
  geom_point() +
  theme(axis.text.x = element_text(angle = 90))
```

```
  #geom_jitter(height = 0)
unique(xx$notes)
```

```
## factor(0)
## 13 Levels:   Modeled flux ... NA  Incorporation (incorp/incorp.orig) not entered and was assumed to
```

```
unique(xx[, c('country', 'file')])
```

```
## [1] country file
## <0 rows> (or 0-length row.names)
```

```
table(ds1$exper, ds1$app.mthd)
```

```
##
##                            bsth bc ts os cs
##   1                           1  7 10  0  0
##   10                          1  0  0  0  0
##   11                          0  1  0  0  0
##   12                          1  0  0  0  0
##   13                          0  1  0  0  0
##   14                          1  0  0  0  0
##   15                          0  1  0  0  0
##   16                          1  0  0  0  0
##   17                          0  1  0  0  0
##   18                          1  0  0  0  0
##   1989-13                     0  1  0  1  0
##   1989-15                     0  1  0  0  0
##   1989-27                     0  0  0  1  1
##   1989-28                     0  1  0  1  1
```

```
##   1990-12                  0  1  2  1  0
##   1990-17                  0  1  0  1  0
##   1990-18                  1  1  0  0  0
##   1990-20                  0  1  2  1  0
##   1990-22                  0  1  0  1  0
##   1990-23                  0  1  2  1  0
##   1990-24                  0  3  2  1  1
##   1990-25                  0  1  0  0  0
##   1990-26                  0  1  0  1  1
##   1990-27                  1  1  0  0  0
##   1990-29                  0  1  0  0  0
##   1990-30                  0  1  0  0  0
##   1990-31                  0  1  0  0  0
##   1990-35                  0  1  0  0  0
##   1990-36                  0  1  0  1  0
##   1991-15                  0  2  2  0  0
##   1991-16                  0  2  2  0  0
##   1991-24                  1  1  1  0  0
##   1991-30                  0  1  0  0  0
##   1991-36                  0  1  0  0  0
##   1992-11                  0  1  0  0  0
##   1992-12                  0  1  0  0  0
##   1992-16                  0  1  0  3  0
##   1992-17                  0  1  2  0  0
##   1992-21                  0  1  0  0  0
##   1992-25                  0  0  0  4  0
##   1992-26                  0  1  4  0  0
##   1992-27                  0  1  2  2  0
##   1992-28                  0  1  0  0  0
##   1992-35                  0  1  0  0  0
##   1992-38                  0  1  0  2  0
##   1993-10                  0  2  0  0  0
##   1993-11                  0  2  4  0  0
##   1993-12                  0  2  0  0  0
##   1993-18                  0  0  0  4  0
##   1993-21                  0  0  0  6  0
##   1993-22                  0  0  4  0  0
##   2                        2  0  4  0  0
##   3                        2  1  8  0  0
##   4                        3  2  1  0  0
##   5                       20  1  0  0  0
##   6                        3  0  0  0  0
##   7                        0  1  0  0  0
##   8                        1  0  0  0  0
##   9                        0  1  0  0  0
##   A1                       2  1  0  0  0
##   A2                       1  1  1  0  0
##   A3                       1  1  1  0  0
##   A4                       1  1  1  1  0
##   A5                       1  1  1  0  0
##   A6                       1  1  1  0  0
##   B1990-15                 0  1  0  0  0
##   B1990-35                 0  1  0  0  1
##   B1990-37                 0  1  0  0  1
```

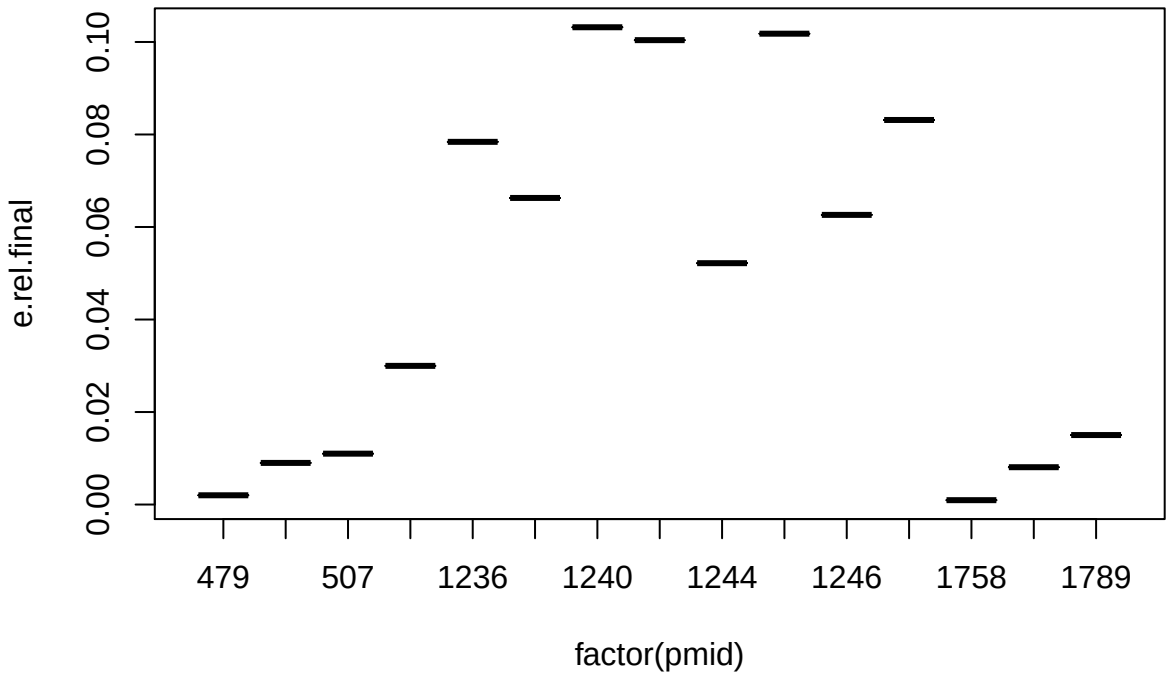
```
##   B1990-38                    0  2  0  0  0
##   B1990-39                    0  2  0  0  0
##   B1991-13                    0  1  0  0  0
##   B1991-14                    0  1  0  0  0
##   B1991-18                    0  1  0  0  0
##   B1991-36                    0  1  0  0  0
##   B1991-37                    0  1  0  0  0
##   B1991-38                    0  1  0  0  0
##   B1992-10                    0  1  0  0  0
##   B1992-14                    0  1  0  0  1
##   B1992-19                    0  1  0  0  0
##   B1992-20                    0  1  0  0  0
##   B1992-24                    0  1  0  0  0
##   B1992-37                    0  1  0  0  0
##   B1992-38                    0  1  0  0  0
##   B1993-15                    0  2  0  0  0
##   B1998-39                    0  1  0  0  0
##   B1998-40                    0  1  0  0  0
##   Cracking Clays 40 Acres    36  0  0  0  0
##   Cracking Clays Faringdon   27  0  0  0  0
##   Cracking Clays Rowden       0  0 46  0  0
##   DERVAL(44)_2011             2  0  0  0  0
##   ECLAIRE-2012                0  0  1  0  0
##   F1                          0  3  0  0  0
##   F2                          0  2  0  0  0
##   F3                          2  0  0  0  0
##   G1997-24                    0  2  0  1  0
##   G1997-25                    0  1  0  1  0
##   G1997-26                    0  2  0  1  0
##   G1997-28                    0  1  0  1  0
##   G1997-29                    0  2  0  1  0
##   G1997-30                    0  1  0  1  0
##   G1997-31                    0  2  0  1  0
##   G1997-33                    0  1  0  1  0
##   G1998-28                    0  3  0  0  0
##   G1998-30                    0  4  0  0  0
##   G1998-32                    0  4  0  0  0
##   G1999-19                    0  0  0  5  0
##   G1999-20                    0  0  0  3  0
##   G1999-22                    0  0  0  2  0
##   G1999-26                    0  0  0  2  0
##   G1999-27                    0  0  0  5  0
##   G1999-30                    0  0  0  5  0
##   G1999-35                    0  0  0  2  0
##   G2                          0  3  0  0  0
##   G2000-11                    0  0  0  2  0
##   G2000-12                    0  0  0  5  0
##   G2000-19                    0  0  0  2  0
##   G2000-9                     0  0  0  2  0
##   G2002-10                    0  0  2  0  0
##   G2002-23                    0  0  2  0  0
##   G2003-10                    0  3  0  0  0
##   G2003-11                    0  4  0  0  0
##   G3                          0  3  0  0  0
```

```
##   IHF_13                    0  1  0  0  0
##   IHF_6                     0  1  0  0  0
##   IHF_7                     0  1  0  0  0
##   Juni 2000                 1  0  0  4  0
##   Juni_99                   1  0  0  3  0
##   Kent_01                   5  0  0  0  0
##   Kent_2_02                 3  0  0  0  0
##   LACHAP(44)_2011           0  2  0  0  0
##   LI_1994                   0  2  0  0  0
##   R1                        0  3  0  0  0
##   SyreN                    16  0  0  6  0
##   TREV(29)_2011             4  0  0  0  0
##   TS1                       0  3  0  0  0
##   TS2                       0  1  0  0  0
##   Unter (a)                 4  0  0  2  4
##   Unter (b)                 4  0  0  2  4
##   Z1                        0  3  0  0  0
##   Z2                        3  0  0  0  0
```

```
table(ds1$country, ds1$app.mthd)
```

```
##
##      bsth  bc  ts  os  cs
##   CH   12  27   5   1   0
##   DK   53   9   0  17   8
##   FR    6   4   1   0   0
##   IE   18   8  23   0   0
##   NL    3 100  33  75   7
##   UK   63   0  46   0   0
```

```
plot(e.rel.final ~ factor(pmid), data = subset(ds1, app.mthd == 'cs'))
```



Problem is 1183.