TP 2 estimation des effectifs en populations fermées

On charge le package `RMark` qui appelle le logiciel Mark depuis `R`. On charge aussi le package `secr` qui permet d'implémenter le test de `closure`.

```
library(RMark)
library(secr)
```

Exercice 1 : souris sylvestre

Lecture et formatage des données

On commence par lire les données qui se trouvent dans le répertoire dat/

```
mouse <- convert.inp("dat/deer-mouse-nogroup.inp",
                     group.df = NULL,
                     covariates = NULL)
```

On regarde les 10 premières lignes du fichier.

```
head(mouse)
```

```
##       ch freq
## 1 111111    1
## 2 100111    1
## 3 110011    1
## 4 110111    1
## 5 111111    1
## 6 110111    1
```

Les 10 dernières lignes.

```
tail(mouse)
```

```
##        ch freq
## 33 000010    1
## 34 000010    1
## 35 000010    1
## 36 000001    1
## 37 000001    1
## 38 000001    1
```

On fait les tests de fermeture. Pour cela, il nous faut d'abord convertir les données au format requis pour utiliser le package secr qui fait ces tests. Le formatage consiste à mettre un espace entre les colonnes de capture.

```
mouse_secr <- unRMarkInput(mouse)
```

On peut utiliser la fonction summary de R pour obtenir un résumé des données.

```
summary(mouse_secr)
```

```
## Object class       capthist
##
## Counts by occasion
##             1  2  3  4  5  6 Total
## n          15 20 16 19 25 25   120
## u          15  8  6  3  3  3    38
## f           9  6  7  6  6  4    38
## M(t+1)     15 23 29 32 35 38    38
## losses      0  0  0  0  0  0     0
## detections 15 20 16 19 25 25   120
```

Test de l'hypothèse de fermeture

On fait enfin les tests. Par défaut, seul le test d'Otis est fait. En rajoutant l'option "SB = TRUE", on fait aussi le test de Stanley et Burnham.

```
closure.test(mouse_secr, SB = TRUE)
```

```
## $Otis
##  statistic         p
##  0.7649179 0.7778398
##
## $Xc
##  statistic df         p
##     11.668  7 0.1120193
##
## $NRvsJS
##  statistic df          p
##    9.31129  3 0.02542603
##
## $NMvsJS
##   statistic df         p
##  0.04895105  1 0.8248987
##
## $MtvsNR
##  statistic df        p
##   2.356705  4 0.670465
##
## $MtvsNM
##  statistic df          p
##   11.61904  6 0.07102745
##
## $compNRvsJS
##   Occasion  Chisquare df           p
## 1        2 7.44579710  1 0.006358475
```

```
## 2        3 0.04505929  1 0.831895047
## 3        4 1.82043344  1 0.177261692
## 4        5         NA NA          NA
##
## $compNMvsJS
##   Occasion  Chisquare df         p
## 1        2         NA NA        NA
## 2        3         NA NA        NA
## 3        4         NA NA        NA
## 4        5 0.04895105  1 0.8248987
```

Une première série de modèles

Pour utiliser RMark, on passe par 3 étapes : la préparation des données, la définition des modèles et l'ajustement à proprement parler.

On commence par préparer les données.

```
mouse.proc <- process.data(mouse,
                           begin.time = 1,
                           model = "FullHet")
mouse.ddl <- make.design.data(mouse.proc)
```

On définit les modèles que l'on souhaite ajuster grâce à une fonction R qui fait 3 choses : spéficication des effets, création d'une liste des modèles à ajuster et préparation pour envoi à Mark. Par défaut, Mark considère un effet comportement et distingue une probabilité de capture c et une autre de recapture p. On utilise "share = TRUE" pour fusionner ces deux paramètres en une seule probabilité de capture.

```
run.mouse <- function() {

## On specifie les effets

  # M0 : p constant dans le temps
  p.dot <- list(formula =  ~ 1, share = TRUE)
  # Mb : p (recapture) different de c (premiere capture) et constants dans le temps
  p.dot.behav <- list(formula =  ~ 1)
  # Mt : p varie selon la session (dans le temps)
  p.time <- list(formula =  ~ time, share = TRUE)
  # Mh : p est heterogene entre individu
  p.h <- list(formula = ~ mixture, share = TRUE)
  # Mtb
  p.time.behav <- list(formula =  ~ time)
  # Mbh
  p.h.behav <- list(formula =  ~ mixture)
  # Mth
  p.h.time <- list(formula = ~ time + mixture, share = TRUE)
  # Mtbh
  p.h.time.behav <- list(formula =  ~ mixture + time)

## On construit la liste des modeles
  mouse.model.list <- create.model.list("FullHet")

## On prépare le tout pour envoi a Mark
```

```
  mouse.results <- mark.wrapper(mouse.model.list,
                                data = mouse.proc,
                                ddl = mouse.ddl)

## On retourne les resultats
  return(mouse.results)
}
```

On fait tourner tous les modèles d'un coup.

```
mouse.results <- run.mouse()
```

```
##
## Output summary for FullHet model
## Name : pi(~1)p(~1)c()f0(~1)
##
## Npar :  3  (unadjusted=1)
## -2lnL:  109.5069
## AICc :  115.614  (unadjusted=111.52455)
##
## Beta
##                    estimate          se           lcl          ucl
## pi:(Intercept)  -0.0447893  474.519830  -930.1036700  930.0140900
## p:(Intercept)    0.1053406    0.132637    -0.1546279    0.3653092
## f0:(Intercept) -14.6539160 2644.200200 -5197.2865000 5167.9786000
##
##
## Real Parameter pi
##
##
## mixture:1 0.4888046
##
##
## Real Parameter p
##
##                    1         2         3         4         5         6
## mixture:1 0.5263108 0.5263108 0.5263108 0.5263108 0.5263108 0.5263108
## mixture:2 0.5263108 0.5263108 0.5263108 0.5263108 0.5263108 0.5263108
##
##
## Real Parameter c
##
##                    2         3         4         5         6
## mixture:1 0.5263108 0.5263108 0.5263108 0.5263108 0.5263108
## mixture:2 0.5263108 0.5263108 0.5263108 0.5263108 0.5263108
##
##
## Real Parameter f0
##
##             1
##  4.323994e-07
##
## Output summary for FullHet model
```

```
## Name : pi(~1)p(~1)c(~1)f0(~1)
##
## Npar :  4
## -2lnL:  97.98748
## AICc :  106.1668
##
## Beta
##                      estimate        se           lcl           ucl
## pi:(Intercept) -7.668276e-06 0.0000000 -7.668276e-06 -7.668276e-06
## p:(Intercept)  -6.525621e-01 0.3230650 -1.285770e+00 -1.935470e-02
## c:(Intercept)   4.554755e-01 0.1772735  1.080194e-01  8.029316e-01
## f0:(Intercept)  1.040117e+00 1.0904393 -1.097144e+00  3.177378e+00
##
##
## Real Parameter pi
##
##
## mixture:1 0.4999981
##
##
## Real Parameter p
##
##                    1         2         3         4         5         6
## mixture:1 0.3424124 0.3424124 0.3424124 0.3424124 0.3424124 0.3424124
## mixture:2 0.3424124 0.3424124 0.3424124 0.3424124 0.3424124 0.3424124
##
##
## Real Parameter c
##
##                    2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
##
##         1
##  2.829547
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture)c()f0(~1)
##
## Npar :  4  (unadjusted=1)
## -2lnL:  1
## AICc :  NA  (unadjusted=Not a Number                )
##
## Beta
##                estimate se lcl ucl
## pi:(Intercept)      Inf  0 Inf Inf
## p:(Intercept)       Inf  0 Inf Inf
## p:mixture2          Inf  0 Inf Inf
## f0:(Intercept)      Inf  0 Inf Inf
##
##
```

```
## Real Parameter pi
##
##
## mixture:1 5.562685e-309
##
##
## Real Parameter p
##
##                        1             2             3             4             5
## mixture:1 5.562685e-309 5.562685e-309 5.562685e-309 5.562685e-309 5.562685e-309
## mixture:2 5.562685e-309 5.562685e-309 5.562685e-309 5.562685e-309 5.562685e-309
##                        6
## mixture:1 5.562685e-309
## mixture:2 5.562685e-309
##
##
## Real Parameter c
##
##                        2             3             4             5             6
## mixture:1 5.562685e-309 5.562685e-309 5.562685e-309 5.562685e-309 5.562685e-309
## mixture:2 5.562685e-309 5.562685e-309 5.562685e-309 5.562685e-309 5.562685e-309
##
##
## Real Parameter f0
##
##   1
##  NA
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture)c(~1)f0(~1)
##
## Npar :  5  (unadjusted=4)
## -2lnL:  97.98748
## AICc :  108.2577  (unadjusted=106.16685)
##
## Beta
##                       estimate          se          lcl         ucl
## pi:(Intercept) -9.345500e-03 371.2696900 -727.6979500 727.6792600
## p:(Intercept)  -6.525628e-01   1.4669431   -3.5277714   2.2226457
## p:mixture2      2.418911e-06   2.8485424   -5.5831409   5.5831457
## c:(Intercept)   4.554757e-01   0.1772735    0.1080196   0.8029317
## f0:(Intercept)  1.040116e+00   1.0904376   -1.0971419   3.1773735
##
##
## Real Parameter pi
##
##
## mixture:1 0.4976636
##
##
## Real Parameter p
##
##                   1         2         3         4         5         6
## mixture:1 0.3424122 0.3424122 0.3424122 0.3424122 0.3424122 0.3424122
```

```
## mixture:2 0.3424128 0.3424128 0.3424128 0.3424128 0.3424128 0.3424128
##
##
## Real Parameter c
##
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
##
##         1
##  2.829544
##
## Output summary for FullHet model
## Name : pi(~1)p(~time + mixture)c()f0(~1)
##
## Npar :  9
## -2lnL:  80.75912
## AICc :  99.58481
##
## Beta
##                   estimate        se        lcl       ucl
## pi:(Intercept) -0.3007804 0.5739910 -1.4258027  0.824242
## p:(Intercept)   0.6308280 0.5695648 -0.4855190  1.747175
## p:time2         0.6813491 0.5269156 -0.3514056  1.714104
## p:time3         0.1400698 0.5295156 -0.8977808  1.177920
## p:time4         0.5482071 0.5267872 -0.4842958  1.580710
## p:time5         1.3410905 0.5353025  0.2918975  2.390283
## p:time6         1.3410905 0.5353026  0.2918975  2.390284
## p:mixture2     -2.2472083 0.3887933 -3.0092433 -1.485173
## f0:(Intercept)  0.8024597 1.2065512 -1.5623808  3.167300
##
##
## Real Parameter pi
##
##
## mixture:1 0.4253667
##
##
## Real Parameter p
##
##                   1         2         3         4         5         6
## mixture:1 0.6526772 0.7878772 0.6837151 0.7647743 0.8778170 0.8778170
## mixture:2 0.1657047 0.2819051 0.1859853 0.2557506 0.4316089 0.4316089
##
##
## Real Parameter c
##
##                   2         3         4         5         6
## mixture:1 0.7878772 0.6837151 0.7647743 0.8778170 0.8778170
## mixture:2 0.2819051 0.1859853 0.2557506 0.4316089 0.4316089
##
```

```
##
## Real Parameter f0
##
##         1
##  2.231022
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture + time)c(~1)f0(~1)
##
## Npar :  10  (unadjusted=6)
## -2lnL:  93.72121
## AICc :  114.735  (unadjusted=106.1013)
##
## Beta
##                    estimate           se           lcl           ucl
## pi:(Intercept)    0.3286746 6.224744e+02 -1.219721e+03  1220.3786000
## p:(Intercept)    -0.7950974 2.297504e+02 -4.511060e+02   449.5157600
## p:mixture2        0.8389172 0.000000e+00  8.389172e-01     0.8389172
## p:time2          -0.1386398 0.000000e+00 -1.386398e-01    -0.1386398
## p:time3           0.1519365 0.000000e+00  1.519365e-01     0.1519365
## p:time4          -0.0848359 0.000000e+00 -8.483590e-02    -0.0848359
## p:time5           0.6682998 0.000000e+00  6.682998e-01     0.6682998
## p:time6          18.4066000 3.670346e+03 -7.175471e+03  7212.2847000
## c:(Intercept)     0.4554756 1.772735e-01  1.080195e-01     0.8029316
## f0:(Intercept) -22.7029580 1.682750e+04 -3.300460e+04 32959.1900000
##
##
## Real Parameter pi
##
##
## mixture:1 0.5814368
##
##
## Real Parameter p
##
##                    1         2         3         4         5 6
## mixture:1 0.3110752 0.2821671 0.3445324 0.2931916 0.4683430 1
## mixture:2 0.5109532 0.4763128 0.5487834 0.4897474 0.6708693 1
##
##
## Real Parameter c
##
##                    2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
##
##             1
##  1.381117e-10
##
## Output summary for FullHet model
## Name : pi(~1)p(~time)c()f0(~1)
```

```
##
## Npar :  8  (unadjusted=6)
## -2lnL:  99.67496
## AICc :  116.3325  (unadjusted=112.05505)
##
## Beta
##                      estimate           se           lcl          ucl
## pi:(Intercept)  7.549656e-05 2508.4672000 -4.916596e+03 4.916596e+03
## p:(Intercept)  -4.274439e-01    0.3318810 -1.077931e+00 2.230428e-01
## p:time2         5.328044e-01    0.4644358 -3.774899e-01 1.443099e+00
## p:time3         1.089901e-01    0.4670113 -8.063520e-01 1.024332e+00
## p:time4         4.274438e-01    0.4641209 -4.822330e-01 1.337121e+00
## p:time5         1.081370e+00    0.4765166  1.473975e-01 2.015343e+00
## p:time6         1.081371e+00    0.4765167  1.473982e-01 2.015344e+00
## f0:(Intercept) -1.788015e+01 6504.9378000 -1.276756e+04 1.273180e+04
##
##
## Real Parameter pi
##
##
## mixture:1 0.5000189
##
##
## Real Parameter p
##
##                   1         2         3   4         5         6
## mixture:1 0.3947369 0.5263158 0.4210526 0.5 0.6578947 0.6578948
## mixture:2 0.3947369 0.5263158 0.4210526 0.5 0.6578947 0.6578948
##
##
## Real Parameter c
##
##                   2         3   4         5         6
## mixture:1 0.5263158 0.4210526 0.5 0.6578947 0.6578948
## mixture:2 0.5263158 0.4210526 0.5 0.6578947 0.6578948
##
##
## Real Parameter f0
##
##             1
##  1.716914e-08
##
## Output summary for FullHet model
## Name : pi(~1)p(~time)c(~1)f0(~1)
##
## Npar :  9  (unadjusted=6)
## -2lnL:  93.72121
## AICc :  112.5469  (unadjusted=106.1013)
##
## Beta
##                      estimate           se           lcl          ucl
## pi:(Intercept)  5.922538e-05  275.3355500  -539.6576300  539.6577500
## p:(Intercept)  -4.274441e-01    0.3318809    -1.0779305    0.2230424
## p:time2        -2.011647e-01    0.5493738    -1.2779374    0.8756081
```

```
## p:time3         2.197930e-02    0.6228343    -1.1987760    1.2427346
## p:time4        -2.657027e-01    0.7811174    -1.7966927    1.2652874
## p:time5         4.274442e-01    0.8813689    -1.3000388    2.1549272
## p:time6         1.836064e+01 4326.2342000 -8461.0585000 8497.7798000
## c:(Intercept)   4.554755e-01    0.1772735     0.1080195    0.8029316
## f0:(Intercept) -2.189720e+01    0.0000000   -21.8972000  -21.8972000
##
##
## Real Parameter pi
##
##
## mixture:1 0.5000148
##
##
## Real Parameter p
##
##                   1         2         3         4   5 6
## mixture:1 0.3947368 0.3478261 0.4000001 0.3333334 0.5 1
## mixture:2 0.3947368 0.3478261 0.4000001 0.3333334 0.5 1
##
##
## Real Parameter c
##
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
##
##             1
##  3.091483e-10
```

On examine les résultats.

```
mouse.results
```

```
##                                 model npar      AICc DeltaAICc weight Deviance
## 1               pi(~1)p(~1)c()f0(~1)    3 115.61399        NA     NA 85.44111
## 2             pi(~1)p(~1)c(~1)f0(~1)    4 106.16685        NA     NA 73.92174
## 3          pi(~1)p(~mixture)c()f0(~1)    4        NA        NA     NA  2.00000
## 4        pi(~1)p(~mixture)c(~1)f0(~1)    5 108.25775        NA     NA 73.92174
## 5   pi(~1)p(~time + mixture)c()f0(~1)    9  99.58481        NA     NA 56.69338
## 6 pi(~1)p(~mixture + time)c(~1)f0(~1)   10 114.73503        NA     NA 69.65547
## 7             pi(~1)p(~time)c()f0(~1)    8 116.33249        NA     NA 75.60922
## 8           pi(~1)p(~time)c(~1)f0(~1)    9 112.54690        NA     NA 69.65547
```

Le nom des modèles n'est pas limpide. On fait le lien entre la première colonne qui donne le numéro du modèle, et la liste des modèles qu'on a définie au-dessus.

```
names(mouse.results)
```

```
## [1] "p.dot"          "p.dot.behav"    "p.h"            "p.h.behav"
```

```
## [5] "p.h.time"       "p.h.time.behav" "p.time"         "p.time.behav"
## [9] "model.table"
```

Par exemple, si l'on veut afficher les résultats du modèle M_0, il s'agit du modèle 1 "p.dot". On peut afficher la probabilité de détection avec l'intervalle de confiance associé.

```
mouse.results$p.dot$results$real
```

```
##                  estimate          se           lcl       ucl fixed note
## pi g1 m1    4.888046e-01 118.5704800 5.319033e-309 1.0000000
## p g1 t1 m1  5.263108e-01   0.0330674  4.614199e-01 0.5903250
## f0 g1 a0 t1 4.323994e-07   0.0011434  1.805605e-10 0.0010355
```

On obtient aussi une estimation de l'effectif.

```
mouse.results$p.dot$results$derived
```

```
## $`N Population Size`
##   estimate lcl      ucl
## 1       38  38 38.00104
```

Le meilleur modèle selon l'AIC est le modèle numéroté 4 qui correspond à "p.h.behav". On affiche les résults pour ce modèle.

```
mouse.results$p.h.behav$results$real
```

```
##              estimate         se           lcl        ucl fixed note
## pi g1 m1    0.4976636 92.8153960 5.510941e-309  1.0000000
## p g1 t1 m1  0.3424122  0.3303059  2.853230e-02  0.9022648
## p g1 t1 m2  0.3424128  0.3273832  2.924610e-02  0.8999982
## c g1 t2 m1  0.6119403  0.0420970  5.269787e-01  0.6906013
## f0 g1 a0 t1 2.8295445  3.0854417  4.991967e-01 16.0384110
```

```
mouse.results$p.h.behav$results$derived
```

```
## $`N Population Size`
##   estimate     lcl      ucl
## 1 40.82954 38.4992 54.03841
```

Analyses séparées, mâles vs. femelles

Ici on sépare mâles et femelles et on reproduit l'analyse ci-dessus.On commence par lire les données. On spécifie le groupe, ici les mâles d'abord, puis les femelles.

```
mouse <- convert.inp("dat/deer-mouse-sex2G-MF.inp",
                     group.df = data.frame(sex = c("M","F")),
                     covariates = NULL)
```

On inspecte les données.

```r
head(mouse)
```

```
##         ch freq sex
## 1:1 111111    1   M
## 1:3 110011    1   M
## 1:4 110111    1   M
## 1:5 111111    1   M
## 1:6 110111    1   M
## 1:7 111110    1   M
```

```r
tail(mouse)
```

```
##          ch freq sex
## 2:28 001010    1   F
## 2:29 001000    1   F
## 2:30 000100    1   F
## 2:32 000110    1   F
## 2:34 000010    1   F
## 2:38 000001    1   F
```

On sépare mâles et femelles en deux jeux de données.

```r
mouseM <- mouse[mouse$sex == "M", ]
mouseF <- mouse[mouse$sex == "F", ]
```

On formate les données pour effectuer les tests de l'hypothèse de fermeture.

```r
mouseM_secr <- unRMarkInput(mouseM) # on convertit au bon format
mouseF_secr <- unRMarkInput(mouseF) # on convertit au bon format
```

On fait les tests de fermeture, les mâles d'abord.

```r
closure.test(mouseM_secr, SB = TRUE)
```

```
## $Otis
##  statistic        p
##   1.408787 0.920551
##
## $Xc
##  statistic df          p
##   11.31081  6 0.07923259
##
## $NRvsJS
##  statistic df           p
##   9.316319  2 0.009483899
##
## $NMvsJS
##  statistic df p
##          0  0 1
##
## $MtvsNR
```

```
##  statistic df         p
##   1.994488  4 0.7367727
##
## $MtvsNM
##  statistic df          p
##   11.31081  6 0.07923259
##
## $compNRvsJS
##   Occasion Chisquare df          p
## 1        2  5.619444  1 0.01776228
## 2        3        NA NA         NA
## 3        4  3.696875  1 0.05451448
## 4        5        NA NA         NA
##
## $compNMvsJS
##   Occasion Chisquare df  p
## 1        2        NA NA NA
## 2        3        NA NA NA
## 3        4        NA NA NA
## 4        5        NA NA NA
```

Les femelles ensuite.

```
closure.test(mouseF_secr, SB = TRUE)
```

```
## $Otis
##  statistic         p
##  0.2255718 0.5892328
##
## $Xc
##  statistic df         p
##   3.362287  5 0.6443199
##
## $NRvsJS
##  statistic df         p
##    1.63254  1 0.2013521
##
## $NMvsJS
##  statistic df         p
##  0.2539683  1 0.6142947
##
## $MtvsNR
##  statistic df         p
##   1.729747  4 0.7853071
##
## $MtvsNM
##  statistic df        p
##   3.108319  4 0.539865
##
## $compNRvsJS
##   Occasion Chisquare df         p
## 1        2        NA NA        NA
## 2        3   1.63254  1 0.2013521
```

```
## 3        4        NA NA        NA
## 4        5        NA NA        NA
##
## $compNMvsJS
##   Occasion Chisquare df         p
## 1        2        NA NA        NA
## 2        3        NA NA        NA
## 3        4        NA NA        NA
## 4        5 0.2539683  1 0.6142947
```

Les modèles maintenant. Commençons par les mâles.

```
mouse.proc <- process.data(mouseM,
                           begin.time = 1,
                           model = "FullHet")
mouse.ddl <- make.design.data(mouse.proc)
```

La liste des modèles.

```
run.mouse <- function() {

  # sans l'effet sexe
  p.dot <- list(formula =  ~ 1, share = TRUE)
  p.dot.behav <- list(formula =  ~ 1)
  p.time <- list(formula =  ~ time, share = TRUE)
  p.h <- list(formula = ~ mixture, share = TRUE)
  p.time.behav <- list(formula =  ~ time)
  p.h.behav <- list(formula =  ~ mixture)
  p.h.time <- list(formula = ~ time + mixture, share = TRUE)
  p.h.time.behav <- list(formula =  ~ mixture + time)

  mouse.model.list <- create.model.list("FullHet")

  mouse.results <- mark.wrapper(mouse.model.list,
                                data = mouse.proc,
                                ddl = mouse.ddl)

  return(mouse.results)
}
```

On lance Mark.

```
mouse.results <- run.mouse()
```

```
##
## Output summary for FullHet model
## Name : pi(~1)p(~1)c()f0(~1)
##
## Npar :  3  (unadjusted=1)
## -2lnL:  75.69613
## AICc :  81.89285  (unadjusted=77.728386)
##
```

```
## Beta
##                      estimate           se           lcl          ucl
## pi:(Intercept)  1.013946e-05 6.644657e+02 -1.302353e+03 1.302353e+03
## p:(Intercept)   5.193003e-01 1.842141e-01  1.582407e-01 8.803599e-01
## f0:(Intercept) -1.976323e+01 1.110348e+04 -2.178258e+04 2.174306e+04
##
##
## Real Parameter pi
##
##
## mixture:1 0.5000025
##
##
## Real Parameter p
##
##                    1         2         3         4         5         6
## mixture:1 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841
## mixture:2 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841
##
##
## Real Parameter c
##
##                    2         3         4         5         6
## mixture:1 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841
## mixture:2 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841
##
##
## Real Parameter f0
##
##           1
##  2.6118e-09
##
## Output summary for FullHet model
## Name : pi(~1)p(~1)c(~1)f0(~1)
##
## Npar :  4  (unadjusted=2)
## -2lnL:  66.768
## AICc :  75.09858  (unadjusted=70.865562)
##
## Beta
##                      estimate        se           lcl           ucl
## pi:(Intercept)  2.722698e-05 0.0000000  2.722698e-05  2.722698e-05
## p:(Intercept)  -1.743535e-01 0.2960051 -7.545235e-01  4.058166e-01
## c:(Intercept)   9.694006e-01 0.2503915  4.786331e-01  1.460168e+00
## f0:(Intercept) -1.861396e+01 0.0000000 -1.861396e+01 -1.861396e+01
##
##
## Real Parameter pi
##
##
## mixture:1 0.5000068
##
##
## Real Parameter p
```

```
##
##                   1         2         3         4         5         6
## mixture:1 0.4565217 0.4565217 0.4565217 0.4565217 0.4565217 0.4565217
## mixture:2 0.4565217 0.4565217 0.4565217 0.4565217 0.4565217 0.4565217
##
##
## Real Parameter c
##
##               2     3     4     5     6
## mixture:1 0.725 0.725 0.725 0.725 0.725
## mixture:2 0.725 0.725 0.725 0.725 0.725
##
##
## Real Parameter f0
##
##             1
##  8.242559e-09
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture)c()f0(~1)
##
## Npar :  4
## -2lnL:  63.91043
## AICc :  72.24101
##
## Beta
##                   estimate        se        lcl        ucl
## pi:(Intercept) -0.2917234 0.8369745  -1.932193  1.3487466
## p:(Intercept)  -0.6286008 0.7041767  -2.008787  0.7515856
## p:mixture2      2.1939320 0.5210746   1.172626  3.2152382
## f0:(Intercept) -1.8195673 7.9445373 -17.390861 13.7517260
##
##
## Real Parameter pi
##
##
## mixture:1 0.427582
##
##
## Real Parameter p
##
##                   1         2         3         4         5         6
## mixture:1 0.3478279 0.3478279 0.3478279 0.3478279 0.3478279 0.3478279
## mixture:2 0.8271170 0.8271170 0.8271170 0.8271170 0.8271170 0.8271170
##
##
## Real Parameter c
##
##                   2         3         4         5         6
## mixture:1 0.3478279 0.3478279 0.3478279 0.3478279 0.3478279
## mixture:2 0.8271170 0.8271170 0.8271170 0.8271170 0.8271170
##
##
## Real Parameter f0
```

```
##
##          1
##  0.1620959
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture)c(~1)f0(~1)
##
## Npar :  5
## -2lnL:  63.42531
## AICc :  73.92531
##
## Beta
##                   estimate        se        lcl        ucl
## pi:(Intercept) -0.2497441 0.8601178 -1.9355749  1.4360868
## p:(Intercept)   1.8841462 1.3075667 -0.6786846  4.4469771
## p:mixture2     -3.6829942 1.8332488 -7.2761619 -0.0898265
## c:(Intercept)   0.9694005 0.2503915  0.4786331  1.4601679
## f0:(Intercept)  1.7161426 2.5619012 -3.3051839  6.7374690
##
##
## Real Parameter pi
##
##
## mixture:1 0.4378865
##
##
## Real Parameter p
##
##                    1         2         3         4         5         6
## mixture:1 0.8680866 0.8680866 0.8680866 0.8680866 0.8680866 0.8680866
## mixture:2 0.1419914 0.1419914 0.1419914 0.1419914 0.1419914 0.1419914
##
##
## Real Parameter c
##
##               2     3     4     5     6
## mixture:1 0.725 0.725 0.725 0.725 0.725
## mixture:2 0.725 0.725 0.725 0.725 0.725
##
##
## Real Parameter f0
##
##         1
##  5.563028
##
## Output summary for FullHet model
## Name : pi(~1)p(~time + mixture)c()f0(~1)
##
## Npar :  9  (unadjusted=8)
## -2lnL:  50.46091
## AICc :  70.01264  (unadjusted=67.691682)
##
## Beta
##                      estimate           se           lcl          ucl
```

```
## pi:(Intercept) -2.294952e-01    0.6798570    -1.5620149    1.1030245
## p:(Intercept)  -1.054112e+00    0.7076124    -2.4410319    0.3328087
## p:time2         8.890415e-01    0.7822768    -0.6442210    2.4223040
## p:time3        -1.105860e+00    0.7670459    -2.6092696    0.3975502
## p:time4         6.286349e-07    0.7551232    -1.4800409    1.4800422
## p:time5         1.212067e+00    0.8018793    -0.3596164    2.7837507
## p:time6         1.212056e+00    0.8018785    -0.3596263    2.7837376
## p:mixture2      2.572074e+00    0.5507380     1.4926277    3.6515206
## f0:(Intercept) -1.314244e+01 3269.0836000 -6420.5463000 6394.2614000
##
##
## Real Parameter pi
##
##
## mixture:1 0.4428767
##
##
## Real Parameter p
##
##                    1         2         3         4         5         6
## mixture:1 0.2584363 0.4588259 0.1034031 0.2584365 0.5394070 0.5394041
## mixture:2 0.8202383 0.9173598 0.6015920 0.8202384 0.9387755 0.9387749
##
##
## Real Parameter c
##
##                    2         3         4         5         6
## mixture:1 0.4588259 0.1034031 0.2584365 0.5394070 0.5394041
## mixture:2 0.9173598 0.6015920 0.8202384 0.9387755 0.9387749
##
##
## Real Parameter f0
##
##             1
##  1.960242e-06
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture + time)c(~1)f0(~1)
##
## Npar :  10  (unadjusted=5)
## -2lnL:  54.94338
## AICc :  76.85642  (unadjusted=65.443377)
##
## Beta
##                    estimate           se           lcl          ucl
## pi:(Intercept)  -1.8005494 1.191335e+03 -2.336818e+03 2.333217e+03
## p:(Intercept)    2.8205994 1.123357e+03 -2.198959e+03 2.204600e+03
## p:mixture2      -2.7809408 1.173102e+03 -2.302060e+03 2.296498e+03
## p:time2         -0.2998134 2.571622e+02 -5.043378e+02 5.037382e+02
## p:time3        -17.6939860 2.981918e+03 -5.862253e+03 5.826865e+03
## p:time4         -1.4353402 2.856215e+02 -5.612534e+02 5.583827e+02
## p:time5         -0.0407609 2.918421e+02 -5.720513e+02 5.719697e+02
## p:time6         35.5995130 1.298273e+05 -2.544258e+05 2.544970e+05
## c:(Intercept)    0.9694006 2.503915e-01  4.786331e-01 1.460168e+00
```

```
## f0:(Intercept) -39.0366100 1.485199e+05 -2.911381e+05 2.910600e+05
##
##
## Real Parameter pi
##
##
## mixture:1 0.1417842
##
##
## Real Parameter p
##
##                    1         2            3         4         5 6
## mixture:1 0.9437789 0.9255862 3.471924e-07 0.7998343 0.9415766 1
## mixture:2 0.5099134 0.4353257 2.151905e-08 0.1985023 0.4997244 1
##
##
## Real Parameter c
##
##               2     3     4     5     6
## mixture:1 0.725 0.725 0.725 0.725 0.725
## mixture:2 0.725 0.725 0.725 0.725 0.725
##
##
## Real Parameter f0
##
##             1
##  1.113308e-17
##
## Output summary for FullHet model
## Name : pi(~1)p(~time)c()f0(~1)
##
## Npar :  8  (unadjusted=6)
## -2lnL:  65.74697
## AICc :  82.97774  (unadjusted=78.452851)
##
## Beta
##                       estimate           se           lcl           ucl
## pi:(Intercept) -5.518579e-05 2508.4160000 -4916.4955000 4916.4954000
## p:(Intercept)   2.876821e-01    0.4409586    -0.5765967    1.1519610
## p:time2         6.286087e-01    0.6540473    -0.6533240    1.9105413
## p:time3        -7.731900e-01    0.6295773    -2.0071616    0.4607815
## p:time4        -1.226992e-07    0.6236095    -1.2222748    1.2222745
## p:time5         8.754686e-01    0.6759766    -0.4494456    2.2003829
## p:time6         8.754686e-01    0.6759767    -0.4494457    2.2003830
## f0:(Intercept) -2.256863e+01    0.0000000   -22.5686250  -22.5686250
##
##
## Real Parameter pi
##
##
## mixture:1 0.4999862
##
##
## Real Parameter p
```

```
##
##                   1         2         3         4         5         6
## mixture:1 0.5714286 0.7142857 0.3809524 0.5714286 0.7619048 0.7619048
## mixture:2 0.5714286 0.7142857 0.3809524 0.5714286 0.7619048 0.7619048
##
##
## Real Parameter c
##
##                   2         3         4         5         6
## mixture:1 0.7142857 0.3809524 0.5714286 0.7619048 0.7619048
## mixture:2 0.7142857 0.3809524 0.5714286 0.7619048 0.7619048
##
##
## Real Parameter f0
##
##             1
##  1.579685e-10
##
## Output summary for FullHet model
## Name : pi(~1)p(~time)c(~1)f0(~1)
##
## Npar :  9  (unadjusted=5)
## -2lnL:  54.94338
## AICc :  74.4951  (unadjusted=65.443377)
##
## Beta
##                       estimate           se           lcl           ucl
## pi:(Intercept)  6.472716e-05    0.0000000  6.472716e-05  6.472716e-05
## p:(Intercept)   2.876820e-01    0.4409586 -5.765969e-01  1.151961e+00
## p:time2        -5.108255e-01    0.8027731 -2.084261e+00  1.062610e+00
## p:time3        -1.965901e+01 7902.2500000 -1.550807e+04  1.546875e+04
## p:time4        -1.673976e+00    1.2018505 -4.029603e+00  6.816506e-01
## p:time5        -2.876819e-01    1.0929068 -2.429779e+00  1.854415e+00
## p:time6         2.297211e+01    0.0000000  2.297211e+01  2.297211e+01
## c:(Intercept)   9.694005e-01    0.2503915  4.786331e-01  1.460168e+00
## f0:(Intercept) -2.390330e+01    0.0000000 -2.390330e+01 -2.390330e+01
##
##
## Real Parameter pi
##
##
## mixture:1 0.5000162
##
##
## Real Parameter p
##
##                   1         2            3   4   5 6
## mixture:1 0.5714286 0.4444444 3.864926e-09 0.2 0.5 1
## mixture:2 0.5714286 0.4444444 3.864926e-09 0.2 0.5 1
##
##
## Real Parameter c
##
##               2     3     4     5     6
```

```
## mixture:1 0.725 0.725 0.725 0.725 0.725
## mixture:2 0.725 0.725 0.725 0.725 0.725
##
##
## Real Parameter f0
##
##             1
##  4.158423e-11
```

Et on inspecte les résultats.

```
mouse.results
```

```
##                                 model npar     AICc DeltaAICc       weight
## 5   pi(~1)p(~time + mixture)c()f0(~1)    9 70.01264  0.000000 0.5912507178
## 3          pi(~1)p(~mixture)c()f0(~1)    4 72.24101  2.228371 0.1940380874
## 4        pi(~1)p(~mixture)c(~1)f0(~1)    5 73.92531  3.912674 0.0835882720
## 8           pi(~1)p(~time)c(~1)f0(~1)    9 74.49510  4.482464 0.0628661683
## 2              pi(~1)p(~1)c(~1)f0(~1)    4 75.09858  5.085942 0.0464914752
## 6 pi(~1)p(~mixture + time)c(~1)f0(~1)   10 76.85642  6.843783 0.0193046980
## 1                pi(~1)p(~1)c()f0(~1)    3 81.89285 11.880212 0.0015560243
## 7             pi(~1)p(~time)c()f0(~1)    8 82.97774 12.965100 0.0009045571
##   Deviance
## 5 41.07714
## 3 54.52665
## 4 54.04153
## 8 45.55960
## 2 57.38422
## 6 45.55960
## 1 66.31235
## 7 56.36319
```

Les noms des modèles.

```
names(mouse.results)
```

```
## [1] "p.dot"          "p.dot.behav"    "p.h"            "p.h.behav"
## [5] "p.h.time"       "p.h.time.behav" "p.time"         "p.time.behav"
## [9] "model.table"
```

On examine les résultats obtenus selon le meilleur modèle (#5).

```
mouse.results$p.h.time$results$real
```

```
##                 estimate        se          lcl       ucl fixed note
## pi g1 m1    4.428767e-01 0.1677458 1.733577e-01 0.7508264
## p g1 t1 m1  2.584363e-01 0.1356118 8.009680e-02 0.5824426
## p g1 t2 m1  4.588259e-01 0.1689830 1.825834e-01 0.7629283
## p g1 t3 m1  1.034031e-01 0.0672803 2.705790e-02 0.3235294
## p g1 t4 m1  2.584365e-01 0.1356118 8.009690e-02 0.5824428
## p g1 t5 m1  5.394070e-01 0.1691692 2.356603e-01 0.8164581
## p g1 t6 m1  5.394041e-01 0.1691693 2.356583e-01 0.8164563
```

```
## p g1 t1 m2  8.202383e-01 0.1135911 5.020027e-01 0.9538194
## p g1 t2 m2  9.173598e-01 0.0623667 6.888150e-01 0.9823537
## p g1 t3 m2  6.015920e-01 0.1590739 2.913698e-01 0.8472180
## p g1 t4 m2  8.202384e-01 0.1135911 5.020028e-01 0.9538194
## p g1 t5 m2  9.387755e-01 0.0482114 7.476208e-01 0.9875572
## p g1 t6 m2  9.387749e-01 0.0482119 7.476189e-01 0.9875571
## f0 g1 a0 t1 1.960242e-06 0.0064082 7.376710e-10 0.0052090
```

```
mouse.results$p.h.time$results$derived
```

```
## $`N Population Size`
##   estimate lcl      ucl
## 1       21  21 21.00521
```

On procède de même pour les femelles.

```
mouse.proc <- process.data(mouseF,
                           begin.time = 1,
                           model = "FullHet")
mouse.ddl <- make.design.data(mouse.proc)
```

La liste des modèles.

```
run.mouse <- function() {

  # sans l'effet sexe
  p.dot <- list(formula =  ~ 1, share = TRUE)
  p.dot.behav <- list(formula =  ~ 1)
  p.time <- list(formula =  ~ time, share = TRUE)
  p.h <- list(formula = ~ mixture, share = TRUE)
  p.time.behav <- list(formula =  ~ time)
  p.h.behav <- list(formula =  ~ mixture)
  p.h.time <- list(formula = ~ time + mixture, share = TRUE)
  p.h.time.behav <- list(formula =  ~ mixture + time)

  mouse.model.list <- create.model.list("FullHet")

  mouse.results <- mark.wrapper(mouse.model.list,
                                data = mouse.proc,
                                ddl = mouse.ddl)

  return(mouse.results)
}
```

On lance Mark.

```
mouse.results <- run.mouse()
```

```
##
## Output summary for FullHet model
## Name : pi(~1)p(~1)c()f0(~1)
##
```

```
## Npar :  3  (unadjusted=2)
## -2lnL:  70.33432
## AICc :  76.57922  (unadjusted=74.455532)
##
## Beta
##                     estimate           se           lcl          ucl
## pi:(Intercept) -1.431333e-06 1003.3124000 -1966.4924000 1966.4924000
## p:(Intercept)  -4.302319e-01    0.2268952    -0.8749465    0.0144827
## f0:(Intercept) -1.077745e+00    3.2711849    -7.4892676    5.3337774
##
##
## Real Parameter pi
##
##
## mixture:1 0.4999996
##
##
## Real Parameter p
##
##                   1        2        3        4        5        6
## mixture:1 0.394071 0.394071 0.394071 0.394071 0.394071 0.394071
## mixture:2 0.394071 0.394071 0.394071 0.394071 0.394071 0.394071
##
##
## Real Parameter c
##
##                  2        3        4        5        6
## mixture:1 0.394071 0.394071 0.394071 0.394071 0.394071
## mixture:2 0.394071 0.394071 0.394071 0.394071 0.394071
##
##
## Real Parameter f0
##
##          1
##  0.3403622
##
## Output summary for FullHet model
## Name : pi(~1)p(~1)c(~1)f0(~1)
##
## Npar :  4  (unadjusted=3)
## -2lnL:  68.40103
## AICc :  76.8134  (unadjusted=74.645923)
##
## Beta
##                     estimate        se           lcl           ucl
## pi:(Intercept) -3.008408e-07 0.0000000 -3.008408e-07 -3.008408e-07
## p:(Intercept)  -1.006541e+00 0.5819551 -2.147172e+00  1.340916e-01
## c:(Intercept)  -2.231435e-01 0.2738613 -7.599117e-01  3.136246e-01
## f0:(Intercept)  9.499847e-01 1.5239235 -2.036905e+00  3.936875e+00
##
##
## Real Parameter pi
##
##
```

```
## mixture:1 0.4999999
##
##
## Real Parameter p
##
##                   1         2         3         4         5         6
## mixture:1 0.2676574 0.2676574 0.2676574 0.2676574 0.2676574 0.2676574
## mixture:2 0.2676574 0.2676574 0.2676574 0.2676574 0.2676574 0.2676574
##
##
## Real Parameter c
##
##                   2         3         4         5         6
## mixture:1 0.4444445 0.4444445 0.4444445 0.4444445 0.4444445
## mixture:2 0.4444445 0.4444445 0.4444445 0.4444445 0.4444445
##
##
## Real Parameter f0
##
##        1
##  2.58567
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture)c()f0(~1)
##
## Npar :  4
## -2lnL:  69.88198
## AICc :  78.29435
##
## Beta
##                   estimate        se       lcl       ucl
## pi:(Intercept) -0.7074719 2.7619404 -6.120875 4.7059314
## p:(Intercept)   0.2046798 1.0008656 -1.757017 2.1663764
## p:mixture2     -1.0885029 0.8765191 -2.806480 0.6294747
## f0:(Intercept)  0.0850357 2.0866750 -4.004848 4.1749188
##
##
## Real Parameter pi
##
##
## mixture:1 0.3301577
##
##
## Real Parameter p
##
##                   1         2         3         4         5         6
## mixture:1 0.5509921 0.5509921 0.5509921 0.5509921 0.5509921 0.5509921
## mixture:2 0.2923862 0.2923862 0.2923862 0.2923862 0.2923862 0.2923862
##
##
## Real Parameter c
##
##                   2         3         4         5         6
## mixture:1 0.5509921 0.5509921 0.5509921 0.5509921 0.5509921
```

```
## mixture:2 0.2923862 0.2923862 0.2923862 0.2923862 0.2923862
##
##
## Real Parameter f0
##
##         1
##  1.088756
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture)c(~1)f0(~1)
##
## Npar :  5  (unadjusted=4)
## -2lnL:  68.40103
## AICc :  79.02603  (unadjusted=76.813396)
##
## Beta
##                       estimate          se           lcl          ucl
## pi:(Intercept) -3.316300e-03 827.4515900 -1621.8085000 1621.8018000
## p:(Intercept)  -1.006540e+00   0.8526116    -2.6776587    0.6645790
## p:mixture2     -1.896553e-07   1.2441745    -2.4385823    2.4385819
## c:(Intercept)  -2.231436e-01   0.2738613    -0.7599116    0.3136245
## f0:(Intercept)  9.499832e-01   1.5239203    -2.0369007    3.9368671
##
##
## Real Parameter pi
##
##
## mixture:1 0.4991709
##
##
## Real Parameter p
##
##                    1         2         3         4         5         6
## mixture:1 0.2676576 0.2676576 0.2676576 0.2676576 0.2676576 0.2676576
## mixture:2 0.2676575 0.2676575 0.2676575 0.2676575 0.2676575 0.2676575
##
##
## Real Parameter c
##
##                    2         3         4         5         6
## mixture:1 0.4444444 0.4444444 0.4444444 0.4444444 0.4444444
## mixture:2 0.4444444 0.4444444 0.4444444 0.4444444 0.4444444
##
##
## Real Parameter f0
##
##         1
##  2.585666
##
## Output summary for FullHet model
## Name : pi(~1)p(~time + mixture)c()f0(~1)
##
## Npar :  9
## -2lnL:  62.12122
```

```
## AICc :  82.07774
##
## Beta
##                   estimate        se        lcl       ucl
## pi:(Intercept) -0.7417547 2.0079748 -4.6773854 3.1938761
## p:(Intercept)  -0.8527033 1.0601442 -2.9305859 1.2251794
## p:time2         0.7040738 0.8546605 -0.9710609 2.3792084
## p:time3         1.5054179 0.8304250 -0.1222151 3.1330509
## p:time4         1.2546829 0.8331169 -0.3782263 2.8875920
## p:time5         1.7491630 0.8315548  0.1193156 3.3790104
## p:time6         1.7491629 0.8315547  0.1193156 3.3790103
## p:mixture2     -1.3140905 0.8181677 -2.9176992 0.2895183
## f0:(Intercept)  0.0661197 2.0573267 -3.9662407 4.0984801
##
##
## Real Parameter pi
##
##
## mixture:1 0.3226206
##
##
## Real Parameter p
##
##                    1         2         3         4         5         6
## mixture:1 0.2988661 0.4629109 0.6576219 0.5991632 0.7102214 0.7102214
## mixture:2 0.1027723 0.1880517 0.3404306 0.2865681 0.3970838 0.3970838
##
##
## Real Parameter c
##
##                    2         3         4         5         6
## mixture:1 0.4629109 0.6576219 0.5991632 0.7102214 0.7102214
## mixture:2 0.1880517 0.3404306 0.2865681 0.3970838 0.3970838
##
##
## Real Parameter f0
##
##         1
##  1.068355
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture + time)c(~1)f0(~1)
##
## Npar :  10  (unadjusted=6)
## -2lnL:  61.55523
## AICc :  83.97281  (unadjusted=74.439437)
##
## Beta
##                    estimate           se           lcl          ucl
## pi:(Intercept)   0.2384293 0.000000e+00  2.384293e-01 2.384293e-01
## p:(Intercept)   -3.6609430 9.863739e+02 -1.936954e+03 1.929632e+03
## p:mixture2       3.1229026 7.389810e+02 -1.445280e+03 1.451526e+03
## p:time2          1.2864668 0.000000e+00  1.286467e+00 1.286467e+00
## p:time3          3.8010027 8.287645e+02 -1.620578e+03 1.628179e+03
```

```
## p:time4          3.6349977 9.919292e+02 -1.940546e+03 1.947816e+03
## p:time5          3.6587242 9.886194e+02 -1.934035e+03 1.941353e+03
## p:time6         22.2681650 1.065901e+04 -2.086940e+04 2.091393e+04
## c:(Intercept)   -0.2231433 2.738613e-01 -7.599114e-01 3.136248e-01
## f0:(Intercept) -20.1200700 5.149488e+03 -1.011312e+04 1.007288e+04
##
##
## Real Parameter pi
##
##
## mixture:1 0.5593265
##
##
## Real Parameter p
##
##                    1         2         3         4         5 6
## mixture:1 0.0250639 0.0851398 0.5349578 0.4935141 0.4994453 1
## mixture:2 0.3686436 0.6788357 0.9631361 0.9567671 0.9577379 1
##
##
## Real Parameter c
##
##                    2         3         4         5         6
## mixture:1 0.4444445 0.4444445 0.4444445 0.4444445 0.4444445
## mixture:2 0.4444445 0.4444445 0.4444445 0.4444445 0.4444445
##
##
## Real Parameter f0
##
##             1
##  1.827951e-09
##
## Output summary for FullHet model
## Name : pi(~1)p(~time)c()f0(~1)
##
## Npar :  8  (unadjusted=7)
## -2lnL:  62.94848
## AICc :  80.49687  (unadjusted=78.139968)
##
## Beta
##                      estimate          se           lcl          ucl
## pi:(Intercept)  3.451711e-06 608.3487500 -1192.3636000 1192.3636000
## p:(Intercept)  -1.554470e+00   0.6394801    -2.8078508   -0.3010887
## p:time2         6.626583e-01   0.8281838    -0.9605820    2.2858986
## p:time3         1.414955e+00   0.7993852    -0.1518398    2.9817503
## p:time4         1.178215e+00   0.8034179    -0.3964838    2.7529146
## p:time5         1.647838e+00   0.7997696     0.0802891    3.2153862
## p:time6         1.647838e+00   0.7997697     0.0802891    3.2153864
## f0:(Intercept) -1.620881e+00   5.1618909   -11.7381870    8.4964253
##
##
## Real Parameter pi
##
##
```

```
## mixture:1 0.5000009
##
##
## Real Parameter p
##
##                   1         2         3         4        5         6
## mixture:1 0.1744416 0.2907362 0.4651778 0.4070306 0.523325 0.5233251
## mixture:2 0.1744416 0.2907362 0.4651778 0.4070306 0.523325 0.5233251
##
##
## Real Parameter c
##
##                   2         3         4        5         6
## mixture:1 0.2907362 0.4651778 0.4070306 0.523325 0.5233251
## mixture:2 0.2907362 0.4651778 0.4070306 0.523325 0.5233251
##
##
## Real Parameter f0
##
##          1
##  0.1977244
##
## Output summary for FullHet model
## Name : pi(~1)p(~time)c(~1)f0(~1)
##
## Npar :  9  (unadjusted=6)
## -2lnL:  61.55523
## AICc :  81.51175  (unadjusted=74.439437)
##
## Beta
##                       estimate           se           lcl           ucl
## pi:(Intercept)  4.603152e-05 1.448222e+03 -2.838516e+03  2838.5161000
## p:(Intercept)  -1.540445e+00 6.362091e-01 -2.787415e+00    -0.2934753
## p:time2         6.241543e-01 8.687704e-01 -1.078636e+00     2.3269443
## p:time3         1.945910e+00 9.063270e-01  1.695091e-01     3.7223112
## p:time4         1.540445e+00 1.185227e+00 -7.825995e-01     3.8634891
## p:time5         1.540445e+00 1.550730e+00 -1.498985e+00     4.5798752
## p:time6         2.980599e+01 4.461185e+04 -8.740941e+04 87469.0270000
## c:(Intercept)  -2.231436e-01 2.738613e-01 -7.599117e-01     0.3136245
## f0:(Intercept) -2.799599e+01 0.000000e+00 -2.799599e+01   -27.9959940
##
##
## Real Parameter pi
##
##
## mixture:1 0.5000115
##
##
## Real Parameter p
##
##                   1         2   3         4   5 6
## mixture:1 0.1764706 0.2857143 0.6 0.4999999 0.5 1
## mixture:2 0.1764706 0.2857143 0.6 0.4999999 0.5 1
##
```

```
##
## Real Parameter c
##
##                   2         3         4         5         6
## mixture:1 0.4444444 0.4444444 0.4444444 0.4444444 0.4444444
## mixture:2 0.4444444 0.4444444 0.4444444 0.4444444 0.4444444
##
##
## Real Parameter f0
##
##             1
##  6.942153e-13
```

Et on inspecte les résultats.

```
mouse.results
```

```
##                                 model npar     AICc DeltaAICc      weight
## 1               pi(~1)p(~1)c()f0(~1)    3 76.57922 0.0000000 0.342157625
## 2             pi(~1)p(~1)c(~1)f0(~1)    4 76.81340 0.2341782 0.304351242
## 3          pi(~1)p(~mixture)c()f0(~1)    4 78.29435 1.7151332 0.145140891
## 4        pi(~1)p(~mixture)c(~1)f0(~1)    5 79.02603 2.4468070 0.100672030
## 7             pi(~1)p(~time)c()f0(~1)    8 80.49687 3.9176471 0.048252515
## 8           pi(~1)p(~time)c(~1)f0(~1)    9 81.51175 4.9325298 0.029049656
## 5   pi(~1)p(~time + mixture)c()f0(~1)    9 82.07774 5.4985248 0.021889545
## 6 pi(~1)p(~mixture + time)c(~1)f0(~1)   10 83.97281 7.3935905 0.008486497
##   Deviance
## 1 46.56039
## 2 44.62709
## 3 46.10805
## 4 44.62709
## 7 39.17455
## 8 37.78130
## 5 38.34729
## 6 37.78130
```

Les noms des modèles.

```
names(mouse.results)
```

```
## [1] "p.dot"          "p.dot.behav"    "p.h"            "p.h.behav"
## [5] "p.h.time"       "p.h.time.behav" "p.time"         "p.time.behav"
## [9] "model.table"
```

On examine les résultats obtenus selon le meilleur modèle (#1).

```
mouse.results$p.dot$results$real
```

```
##              estimate          se           lcl       ucl fixed note
## pi g1 m1    0.4999996 250.8281100 5.562677e-309 1.0000000
## p g1 t1 m1  0.3940710   0.0541778  2.942261e-01 0.5036206
## f0 g1 a0 t1 0.3403622   1.1133875  1.573820e-02 7.3608300
```

```
mouse.results$p.dot$results$derived
```

```
## $`N Population Size`
##   estimate      lcl      ucl
## 1 17.34036 17.01574 24.36083
```

Analyse avec un effet sexe

Il est un peu dommage de séparer mâles et femelles en deux analyses séparées. En effet, on pourrait vouloir tester un effet sexe sur la probabilité de détection. On reprend l'analyse en considérant le jeu de données dans son entier.

```
mouse <- convert.inp("dat/deer-mouse-sex2G-MF.inp",
                     group.df = data.frame(sex = c("M","F")),
                     covariates = NULL)
head(mouse)
```

```
##         ch freq sex
## 1:1 111111    1   M
## 1:3 110011    1   M
## 1:4 110111    1   M
## 1:5 111111    1   M
## 1:6 110111    1   M
## 1:7 111110    1   M
```

```
tail(mouse)
```

```
##          ch freq sex
## 2:28 001010    1   F
## 2:29 001000    1   F
## 2:30 000100    1   F
## 2:32 000110    1   F
## 2:34 000010    1   F
## 2:38 000001    1   F
```

On passe à la définition des modèles maintenant. On commence par préparer les données. On utilise l'option "groups =”sex"" pour préciser qu'on va considérer des modèles avec l'effet sexe.

```
mouse.proc <- process.data(mouse,
                           begin.time = 1,
                           model = "FullHet",
                           groups = "sex")
mouse.ddl <- make.design.data(mouse.proc)
```

La liste des modèles. Ce sont les mêmes qu'au-dessus, auxquels on a ajouté d'autres modèles avec l'effet sexe.

```
run.mouse <- function() {

  # sans l'effet sexe
  p.dot <- list(formula =  ~ 1, share = TRUE)
```

```
  p.dot.behav <- list(formula =  ~ 1)
  p.time <- list(formula =  ~ time, share = TRUE)
  p.h <- list(formula = ~ mixture, share = TRUE)
  p.time.behav <- list(formula =  ~ time)
  p.h.behav <- list(formula =  ~ mixture)
  p.h.time <- list(formula = ~ time + mixture, share = TRUE)
  p.h.time.behav <- list(formula =  ~ mixture + time)

  # avec l'effet sexe
  p.sex <- list(formula =  ~ sex, share = TRUE)
  p.sex.behav <- list(formula =  ~ sex)
  p.time.sex <- list(formula =  ~ time + sex, share = TRUE)
  p.time.behav.sex <- list(formula =  ~ sex + time)
  p.h.sex <- list(formula = ~ mixture + sex, share = TRUE)
  p.h.behav.sex <- list(formula =  ~ sex + mixture)
  p.h.time.sex <- list(formula = ~ time + mixture + sex, share = TRUE)
  p.h.time.behav.sex <- list(formula =  ~ sex + mixture + time)

  mouse.model.list <- create.model.list("FullHet")

  mouse.results <- mark.wrapper(mouse.model.list,
                                data = mouse.proc,
                                ddl = mouse.ddl)

  return(mouse.results)
}
```

On fait tourner tous ces modèles, et on inspecte le classement.

```
mouse.results <- run.mouse()
```

```
##
## Output summary for FullHet model
## Name : pi(~1)p(~1)c()f0(~1)
##
## Npar :  3
## -2lnL:  157.6728
## AICc :  163.78
##
## Beta
##                       estimate           se           lcl           ucl
## pi:(Intercept) -1.523447e-04    0.0000000 -1.523447e-04 -1.523447e-04
## p:(Intercept)   1.053605e-01    0.1326371 -1.546082e-01  3.653291e-01
## f0:(Intercept) -1.875630e+01 6344.7765000 -1.245452e+04  1.241701e+04
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.4999619
##
## Group:sexM
##
```

```
## mixture:1 0.4999619
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158
## mixture:2 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158
## mixture:2 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158
## mixture:2 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158
## mixture:2 0.5263158 0.5263158 0.5263158 0.5263158 0.5263158
##
##
## Real Parameter f0
## Group:sexF
##             1
##  7.148937e-09
##
## Group:sexM
##             1
##  7.148937e-09
##
## Output summary for FullHet model
## Name : pi(~1)p(~1)c(~1)f0(~1)
##
## Npar :  4  (unadjusted=3)
## -2lnL:  147.5555
## AICc :  155.7349  (unadjusted=153.66264)
##
## Beta
##                      estimate        se           lcl           ucl
## pi:(Intercept)  8.074206e-05 0.0000000  8.074206e-05  8.074206e-05
## p:(Intercept)  -5.331234e-01 0.0000000 -5.331234e-01 -5.331234e-01
## c:(Intercept)   4.554756e-01 0.1772735  1.080195e-01  8.029316e-01
## f0:(Intercept) -3.145512e-01 1.1370157 -2.543102e+00  1.914000e+00
##
##
## Real Parameter pi
## Group:sexF
##
```

```
## mixture:1 0.5000202
##
## Group:sexM
##
## mixture:1 0.5000202
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.3697887 0.3697887 0.3697887 0.3697887 0.3697887 0.3697887
## mixture:2 0.3697887 0.3697887 0.3697887 0.3697887 0.3697887 0.3697887
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.3697887 0.3697887 0.3697887 0.3697887 0.3697887 0.3697887
## mixture:2 0.3697887 0.3697887 0.3697887 0.3697887 0.3697887 0.3697887
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
## Group:sexF
##          1
##  0.7301164
##
## Group:sexM
##          1
##  0.7301164
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture)c()f0(~1)
##
## Npar :  4
## -2lnL:  142.225
## AICc :  150.4043
##
## Beta
##                   estimate        se        lcl       ucl
## pi:(Intercept)  0.4152350 0.6397350 -0.8386457 1.6691157
## p:(Intercept)  -0.7271249 0.4231257 -1.5564513 0.1022015
## p:mixture2      2.0499902 0.3936867  1.2783642 2.8216162
## f0:(Intercept) -0.5151996 1.9306834 -4.2993391 3.2689399
##
```

```
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.6023425
##
## Group:sexM
##
## mixture:1 0.6023425
##
##
## Real Parameter p
## Group:sexF
##                  1        2        3        4        5        6
## mixture:1 0.325826 0.325826 0.325826 0.325826 0.325826 0.325826
## mixture:2 0.789658 0.789658 0.789658 0.789658 0.789658 0.789658
##
## Group:sexM
##                  1        2        3        4        5        6
## mixture:1 0.325826 0.325826 0.325826 0.325826 0.325826 0.325826
## mixture:2 0.789658 0.789658 0.789658 0.789658 0.789658 0.789658
##
##
## Real Parameter c
## Group:sexF
##                  2        3        4        5        6
## mixture:1 0.325826 0.325826 0.325826 0.325826 0.325826
## mixture:2 0.789658 0.789658 0.789658 0.789658 0.789658
##
## Group:sexM
##                  2        3        4        5        6
## mixture:1 0.325826 0.325826 0.325826 0.325826 0.325826
## mixture:2 0.789658 0.789658 0.789658 0.789658 0.789658
##
##
## Real Parameter f0
## Group:sexF
##         1
##  0.5973813
##
## Group:sexM
##         1
##  0.5973813
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture)c(~1)f0(~1)
##
## Npar :  5  (unadjusted=4)
## -2lnL:  147.5555
## AICc :  157.8258  (unadjusted=155.73487)
##
## Beta
##                      estimate           se           lcl          ucl
## pi:(Intercept) -4.256124e+00 1873.9373000 -3677.1734000 3668.6611000
```

```
## p:(Intercept)  -5.330952e-01    4.9575059   -10.2498070    9.1836165
## p:mixture2     -2.864003e-05    5.0179182    -9.8351485    9.8350912
## c:(Intercept)   4.554756e-01    0.1772735     0.1080196    0.8029317
## f0:(Intercept) -3.145570e-01    1.7272252    -3.6999185    3.0708045
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.013979
##
## Group:sexM
##
## mixture:1 0.013979
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.3697953 0.3697953 0.3697953 0.3697953 0.3697953 0.3697953
## mixture:2 0.3697886 0.3697886 0.3697886 0.3697886 0.3697886 0.3697886
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.3697953 0.3697953 0.3697953 0.3697953 0.3697953 0.3697953
## mixture:2 0.3697886 0.3697886 0.3697886 0.3697886 0.3697886 0.3697886
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
## Group:sexF
##          1
##  0.7301122
##
## Group:sexM
##          1
##  0.7301122
##
## Output summary for FullHet model
## Name : pi(~1)p(~sex + mixture)c(~1)f0(~1)
##
## Npar :  6  (unadjusted=5)
## -2lnL:  146.6121
```

```
## AICc :  158.9921  (unadjusted=156.88232)
##
## Beta
##                       estimate           se           lcl          ucl
## pi:(Intercept) -3.073267e+00 1739.4506000 -3412.3966000 3406.2500000
## p:(Intercept)  -7.198811e-01    3.4124852    -7.4083523    5.9685900
## p:sexM          3.998280e-01    0.4141433    -0.4118929    1.2115489
## p:mixture2     -1.528536e-06    3.5502929    -6.9585758    6.9585728
## c:(Intercept)   4.554756e-01    0.1772735     0.1080195    0.8029316
## f0:(Intercept) -4.253469e-01    1.8511702    -4.0536404    3.2029467
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.0442235
##
## Group:sexM
##
## mixture:1 0.0442235
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.3274192 0.3274192 0.3274192 0.3274192 0.3274192 0.3274192
## mixture:2 0.3274188 0.3274188 0.3274188 0.3274188 0.3274188 0.3274188
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.4206628 0.4206628 0.4206628 0.4206628 0.4206628 0.4206628
## mixture:2 0.4206624 0.4206624 0.4206624 0.4206624 0.4206624 0.4206624
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
## Group:sexF
##         1
##  0.6535431
##
## Group:sexM
##         1
##  0.6535431
```

```
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture + sex)c()f0(~1)
##
## Npar :  5
## -2lnL:  136.9887
## AICc :  147.2589
##
## Beta
##                   estimate        se        lcl       ucl
## pi:(Intercept)  0.8595297 0.6488545 -0.4122251 2.1312844
## p:(Intercept)  -0.2402765 0.3895820 -1.0038572 0.5233041
## p:mixture2     -2.6445011 1.5398731 -5.6626525 0.3736503
## p:sexM          1.3318665 0.4291945  0.4906452 2.1730877
## f0:(Intercept)  1.0300685 1.9350595 -2.7626482 4.8227851
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.7025624
##
## Group:sexM
##
## mixture:1 0.7025624
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.4402182 0.4402182 0.4402182 0.4402182 0.4402182 0.4402182
## mixture:2 0.0529112 0.0529112 0.0529112 0.0529112 0.0529112 0.0529112
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.7486810 0.7486810 0.7486810 0.7486810 0.7486810 0.7486810
## mixture:2 0.1746662 0.1746662 0.1746662 0.1746662 0.1746662 0.1746662
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.4402182 0.4402182 0.4402182 0.4402182 0.4402182
## mixture:2 0.0529112 0.0529112 0.0529112 0.0529112 0.0529112
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.7486810 0.7486810 0.7486810 0.7486810 0.7486810
## mixture:2 0.1746662 0.1746662 0.1746662 0.1746662 0.1746662
##
##
## Real Parameter f0
## Group:sexF
##         1
```

```
##  2.801258
##
## Group:sexM
##         1
##  2.801258
##
## Output summary for FullHet model
## Name : pi(~1)p(~time + mixture)c()f0(~1)
##
## Npar :  9
## -2lnL:  130.1122
## AICc :  148.9379
##
## Beta
##                   estimate        se        lcl        ucl
## pi:(Intercept) -0.3904000 0.5954130 -1.5574094  0.7766095
## p:(Intercept)   0.7291675 0.5906032 -0.4284149  1.8867498
## p:time2         0.6856497 0.5287543 -0.3507087  1.7220082
## p:time3         0.1412194 0.5316898 -0.9008927  1.1833315
## p:time4         0.5517946 0.5286141 -0.4842890  1.5878782
## p:time5         1.3531218 0.5386832  0.2973026  2.4089410
## p:time6         1.3531219 0.5386832  0.2973028  2.4089411
## p:mixture2     -2.1869350 0.4019844 -2.9748246 -1.3990455
## f0:(Intercept) -0.7217371 2.2058899 -5.0452814  3.6018072
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.403621
##
## Group:sexM
##
## mixture:1 0.403621
##
##
## Real Parameter p
## Group:sexF
##                    1         2         3         4         5         6
## mixture:1 0.6746226 0.8045246 0.7048262 0.7826135 0.8891698 0.8891698
## mixture:2 0.1888090 0.3160212 0.2113932 0.2878246 0.4738624 0.4738624
##
## Group:sexM
##                    1         2         3         4         5         6
## mixture:1 0.6746226 0.8045246 0.7048262 0.7826135 0.8891698 0.8891698
## mixture:2 0.1888090 0.3160212 0.2113932 0.2878246 0.4738624 0.4738624
##
##
## Real Parameter c
## Group:sexF
##                    2         3         4         5         6
## mixture:1 0.8045246 0.7048262 0.7826135 0.8891698 0.8891698
## mixture:2 0.3160212 0.2113932 0.2878246 0.4738624 0.4738624
##
```

```
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.8045246 0.7048262 0.7826135 0.8891698 0.8891698
## mixture:2 0.3160212 0.2113932 0.2878246 0.4738624 0.4738624
##
##
## Real Parameter f0
## Group:sexF
##         1
##  0.4859074
##
## Group:sexM
##         1
##  0.4859074
##
## Output summary for FullHet model
## Name : pi(~1)p(~mixture + time)c(~1)f0(~1)
##
## Npar :  10  (unadjusted=6)
## -2lnL:  141.8872
## AICc :  162.901  (unadjusted=154.26727)
##
## Beta
##                    estimate           se           lcl          ucl
## pi:(Intercept)  -3.3586808    0.0000000    -3.3586808   -3.3586808
## p:(Intercept)    3.4952700  774.0378500 -1513.6190000 1520.6095000
## p:mixture2      -4.0073397  777.0725300 -1527.0695000 1519.0549000
## p:time2         -0.1210164    0.0000000    -0.1210164   -0.1210164
## p:time3          0.1064058    0.0000000     0.1064058    0.1064058
## p:time4         -0.1810868    0.0000000    -0.1810868   -0.1810868
## p:time5          0.5120652    0.0000000     0.5120652    0.5120652
## p:time6         22.0170590    0.0000000    22.0170590   22.0170590
## c:(Intercept)    0.4554755    0.1772735     0.1080195    0.8029316
## f0:(Intercept) -20.1620540 3758.3834000 -7386.5936000 7346.2695000
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.033612
##
## Group:sexM
##
## mixture:1 0.033612
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5 6
## mixture:1 0.9705529 0.9668901 0.9734464 0.9649122 0.9821429 1
## mixture:2 0.3747085 0.3468111 0.3999523 0.3333313 0.4999989 1
##
## Group:sexM
##                   1         2         3         4         5 6
```

```
## mixture:1 0.9705529 0.9668901 0.9734464 0.9649122 0.9821429 1
## mixture:2 0.3747085 0.3468111 0.3999523 0.3333313 0.4999989 1
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
## Group:sexF
##             1
##  1.752795e-09
##
## Group:sexM
##             1
##  1.752795e-09
##
## Output summary for FullHet model
## Name : pi(~1)p(~sex + mixture + time)c(~1)f0(~1)
##
## Npar :  11  (unadjusted=7)
## -2lnL:  141.1712
## AICc :  164.3934  (unadjusted=155.68027)
##
## Beta
##                     estimate           se           lcl          ucl
## pi:(Intercept) -16.2491880    0.0000000   -16.2491880  -16.2491880
## p:(Intercept)    0.3299073 1912.0784000 -3747.3439000 3748.0037000
## p:sexM           0.3745802    0.4435507    -0.4947792    1.2439397
## p:mixture2      -0.9681131 1912.0798000 -3748.6446000 3746.7084000
## p:time2         -0.1419039    0.5558620    -1.2313934    0.9475856
## p:time3          0.1050465    0.6332037    -1.1360328    1.3461258
## p:time4         -0.2688953    0.7841455    -1.8058205    1.2680298
## p:time5          0.3881694    0.8858537    -1.3481038    2.1244426
## p:time6         36.4118870    0.0000000    36.4118870   36.4118870
## c:(Intercept)    0.4554755    0.1772735     0.1080194    0.8029315
## f0:(Intercept) -28.6523550    0.0000000   -28.6523550  -28.6523550
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 8.77137e-08
##
## Group:sexM
##
```

```
## mixture:1 8.77137e-08
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5 6
## mixture:1 0.5817368 0.5468629 0.6070560 0.5152483 0.6721833 1
## mixture:2 0.3456522 0.3142962 0.3697803 0.2875934 0.4378145 1
##
## Group:sexM
##                   1         2         3         4         5 6
## mixture:1 0.6691820 0.6370501 0.6920102 0.6072082 0.7488817 1
## mixture:2 0.4344727 0.3999846 0.4604381 0.3699291 0.5310958 1
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
## Group:sexF
##             1
##  3.601143e-13
##
## Group:sexM
##             1
##  3.601143e-13
##
## Output summary for FullHet model
## Name : pi(~1)p(~time + mixture + sex)c()f0(~1)
##
## Npar :  10
## -2lnL:  125.3031
## AICc :  146.3169
##
## Beta
##                   estimate        se        lcl       ucl
## pi:(Intercept)  0.8562572 0.6675066 -0.4520558 2.1645701
## p:(Intercept)  -0.8381403 0.6738151 -2.1588179 0.4825373
## p:time2         0.6470859 0.5129320 -0.3582607 1.6524326
## p:time3         0.1318703 0.5137401 -0.8750602 1.1388009
## p:time4         0.5190743 0.5121576 -0.4847545 1.5229032
## p:time5         1.3006931 0.5277910  0.2662227 2.3351636
## p:time6         1.3006931 0.5277911  0.2662227 2.3351636
## p:mixture2     -2.5544278 1.9136264 -6.3051357 1.1962800
## p:sexM          1.3736221 0.5177322  0.3588671 2.3883772
```

```
## f0:(Intercept)  0.7154294 2.5701293 -4.3220242 5.7528830
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.7018781
##
## Group:sexM
##
## mixture:1 0.7018781
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.3019266 0.4523812 0.3304236 0.4209034 0.6136196 0.6136196
## mixture:2 0.0325285 0.0603423 0.0369444 0.0534795 0.1098890 0.1098890
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.6307607 0.7654092 0.6609100 0.7416488 0.8624957 0.8624957
## mixture:2 0.1172280 0.2023195 0.1315783 0.1824447 0.3277778 0.3277778
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.4523812 0.3304236 0.4209034 0.6136196 0.6136196
## mixture:2 0.0603423 0.0369444 0.0534795 0.1098890 0.1098890
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.7654092 0.6609100 0.7416488 0.8624957 0.8624957
## mixture:2 0.2023195 0.1315783 0.1824447 0.3277778 0.3277778
##
##
## Real Parameter f0
## Group:sexF
##         1
##  2.045065
##
## Group:sexM
##         1
##  2.045065
##
## Output summary for FullHet model
## Name : pi(~1)p(~sex)c()f0(~1)
##
## Npar :  4  (unadjusted=2)
## -2lnL:  146.1409
## AICc :  154.3203  (unadjusted=150.19425)
##
## Beta
```

```
##                      estimate           se           lcl           ucl
## pi:(Intercept)   0.000442623    0.0000000  4.426230e-04  4.426230e-04
## p:(Intercept)   -0.397301800    0.2019497 -7.931232e-01 -1.480400e-03
## p:sexM           0.916601900    0.2733468  3.808421e-01  1.452362e+00
## f0:(Intercept) -17.632495000 3935.8364000 -7.731872e+03  7.696607e+03
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.5001107
##
## Group:sexM
##
## mixture:1 0.5001107
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.4019608 0.4019608 0.4019608 0.4019608 0.4019608 0.4019608
## mixture:2 0.4019608 0.4019608 0.4019608 0.4019608 0.4019608 0.4019608
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841
## mixture:2 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.4019608 0.4019608 0.4019608 0.4019608 0.4019608
## mixture:2 0.4019608 0.4019608 0.4019608 0.4019608 0.4019608
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841
## mixture:2 0.6269841 0.6269841 0.6269841 0.6269841 0.6269841
##
##
## Real Parameter f0
## Group:sexF
##             1
##  2.199402e-08
##
## Group:sexM
##             1
##  2.199402e-08
##
## Output summary for FullHet model
## Name : pi(~1)p(~sex)c(~1)f0(~1)
##
## Npar :  5  (unadjusted=4)
```

```
## -2lnL:  146.6121
## AICc :  156.8823  (unadjusted=154.79143)
##
## Beta
##                      estimate        se           lcl           ucl
## pi:(Intercept) -6.318484e-06 0.0000000 -6.318484e-06 -6.318484e-06
## p:(Intercept)  -7.198823e-01 0.3614792 -1.428382e+00 -1.138310e-02
## p:sexM          3.998281e-01 0.4141434 -4.118930e-01  1.211549e+00
## c:(Intercept)   4.554755e-01 0.1772735  1.080195e-01  8.029316e-01
## f0:(Intercept) -4.253476e-01 1.8511692 -4.053639e+00  3.202944e+00
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.4999984
##
## Group:sexM
##
## mixture:1 0.4999984
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.3274189 0.3274189 0.3274189 0.3274189 0.3274189 0.3274189
## mixture:2 0.3274189 0.3274189 0.3274189 0.3274189 0.3274189 0.3274189
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.4206625 0.4206625 0.4206625 0.4206625 0.4206625 0.4206625
## mixture:2 0.4206625 0.4206625 0.4206625 0.4206625 0.4206625 0.4206625
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
## Group:sexF
##          1
##  0.6535426
##
## Group:sexM
##          1
##  0.6535426
```

```
##
## Output summary for FullHet model
## Name : pi(~1)p(~time)c()f0(~1)
##
## Npar :  8  (unadjusted=6)
## -2lnL:  147.8409
## AICc :  164.4985  (unadjusted=160.22102)
##
## Beta
##                       estimate           se           lcl          ucl
## pi:(Intercept)  4.555243e-05  647.6640500 -1.269421e+03 1.269422e+03
## p:(Intercept)  -4.274440e-01    0.3318809 -1.077931e+00 2.230427e-01
## p:time2         5.328046e-01    0.4644357 -3.774895e-01 1.443099e+00
## p:time3         1.089899e-01    0.4670113 -8.063521e-01 1.024332e+00
## p:time4         4.274440e-01    0.4641208 -4.822329e-01 1.337121e+00
## p:time5         1.081371e+00    0.4765166  1.473981e-01 2.015343e+00
## p:time6         1.081371e+00    0.4765166  1.473981e-01 2.015343e+00
## f0:(Intercept) -1.867822e+01 5920.6442000 -1.162314e+04 1.158578e+04
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.5000114
##
## Group:sexM
##
## mixture:1 0.5000114
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3   4         5         6
## mixture:1 0.3947368 0.5263158 0.4210526 0.5 0.6578948 0.6578948
## mixture:2 0.3947368 0.5263158 0.4210526 0.5 0.6578948 0.6578948
##
## Group:sexM
##                   1         2         3   4         5         6
## mixture:1 0.3947368 0.5263158 0.4210526 0.5 0.6578948 0.6578948
## mixture:2 0.3947368 0.5263158 0.4210526 0.5 0.6578948 0.6578948
##
##
## Real Parameter c
## Group:sexF
##                   2         3   4         5         6
## mixture:1 0.5263158 0.4210526 0.5 0.6578948 0.6578948
## mixture:2 0.5263158 0.4210526 0.5 0.6578948 0.6578948
##
## Group:sexM
##                   2         3   4         5         6
## mixture:1 0.5263158 0.4210526 0.5 0.6578948 0.6578948
## mixture:2 0.5263158 0.4210526 0.5 0.6578948 0.6578948
##
##
```

```
## Real Parameter f0
## Group:sexF
##             1
##  7.729522e-09
##
## Group:sexM
##             1
##  7.729522e-09
##
## Output summary for FullHet model
## Name : pi(~1)p(~time)c(~1)f0(~1)
##
## Npar :  9  (unadjusted=6)
## -2lnL:  141.8872
## AICc :  160.7129  (unadjusted=154.26727)
##
## Beta
##                      estimate           se           lcl          ucl
## pi:(Intercept)  4.180510e-05    0.0000000  4.180510e-05 4.180510e-05
## p:(Intercept)  -4.274442e-01    0.3318809 -1.077931e+00 2.230423e-01
## p:time2        -2.011644e-01    0.5493738 -1.277937e+00 8.756082e-01
## p:time3         2.197840e-02    0.6228344 -1.198777e+00 1.242734e+00
## p:time4        -2.657024e-01    0.7811175 -1.796693e+00 1.265288e+00
## p:time5         4.274446e-01    0.8813689 -1.300039e+00 2.154928e+00
## p:time6         2.613831e+01    0.0000000  2.613831e+01 2.613831e+01
## c:(Intercept)   4.554755e-01    0.1772735  1.080194e-01 8.029316e-01
## f0:(Intercept) -2.513313e+01 9798.7510000 -1.923069e+04 1.918042e+04
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.5000105
##
## Group:sexM
##
## mixture:1 0.5000105
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5 6
## mixture:1 0.3947368 0.3478261 0.3999998 0.3333335 0.5000001 1
## mixture:2 0.3947368 0.3478261 0.3999998 0.3333335 0.5000001 1
##
## Group:sexM
##                   1         2         3         4         5 6
## mixture:1 0.3947368 0.3478261 0.3999998 0.3333335 0.5000001 1
## mixture:2 0.3947368 0.3478261 0.3999998 0.3333335 0.5000001 1
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
```

```
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
## Group:sexF
##             1
##  1.215682e-11
##
## Group:sexM
##             1
##  1.215682e-11
##
## Output summary for FullHet model
## Name : pi(~1)p(~sex + time)c(~1)f0(~1)
##
## Npar :  10  (unadjusted=7)
## -2lnL:  141.1712
## AICc :  162.185  (unadjusted=155.68027)
##
## Beta
##                      estimate           se           lcl          ucl
## pi:(Intercept)  9.319352e-05  447.2336800 -8.765779e+02 8.765781e+02
## p:(Intercept)  -6.382084e-01    0.4191031 -1.459650e+00 1.832336e-01
## p:sexM          3.745842e-01    0.4435507 -4.947752e-01 1.243944e+00
## p:time2        -1.419054e-01    0.5558618 -1.231395e+00 9.475838e-01
## p:time3         1.050488e-01    0.6332032 -1.136029e+00 1.346127e+00
## p:time4        -2.689062e-01    0.7841463 -1.805833e+00 1.268021e+00
## p:time5         3.881600e-01    0.8858537 -1.348113e+00 2.124433e+00
## p:time6         2.101029e+01 9119.8759000 -1.785395e+04 1.789597e+04
## c:(Intercept)   4.554754e-01    0.1772735  1.080193e-01 8.029314e-01
## f0:(Intercept) -1.994766e+01 3491.0254000 -6.862358e+03 6.822462e+03
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.5000233
##
## Group:sexM
##
## mixture:1 0.5000233
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5 6
## mixture:1 0.3456516 0.3142954 0.3697803 0.2875906 0.4378116 1
## mixture:2 0.3456516 0.3142954 0.3697803 0.2875906 0.4378116 1
```

```
##
## Group:sexM
##                  1         2        3         4         5 6
## mixture:1 0.434473 0.3999845 0.460439 0.3699269 0.5310938 1
## mixture:2 0.434473 0.3999845 0.460439 0.3699269 0.5310938 1
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
## mixture:2 0.6119403 0.6119403 0.6119403 0.6119403 0.6119403
##
##
## Real Parameter f0
## Group:sexF
##           1
##  2.1719e-09
##
## Group:sexM
##           1
##  2.1719e-09
##
## Output summary for FullHet model
## Name : pi(~1)p(~time + sex)c()f0(~1)
##
## Npar :  9  (unadjusted=7)
## -2lnL:  135.7705
## AICc :  154.5961  (unadjusted=150.27955)
##
## Beta
##                       estimate           se           lcl          ucl
## pi:(Intercept) -7.457291e-05 2048.1532000 -4014.3803000 4014.3802000
## p:(Intercept)  -9.848605e-01    0.3813511    -1.7323086   -0.2374123
## p:time2         5.630688e-01    0.4776016    -0.3730303    1.4991679
## p:time3         1.149498e-01    0.4796141    -0.8250939    1.0549935
## p:time4         4.515735e-01    0.4771381    -0.4836172    1.3867642
## p:time5         1.142637e+00    0.4904565     0.1813418    2.1039314
## p:time6         1.142637e+00    0.4904566     0.1813425    2.1039324
## p:sexM          9.614723e-01    0.2811732     0.4103729    1.5125718
## f0:(Intercept) -1.632765e+01 2552.2085000 -5018.6565000 4986.0012000
##
##
## Real Parameter pi
## Group:sexF
##
## mixture:1 0.4999814
##
## Group:sexM
```

```
##
## mixture:1 0.4999814
##
##
## Real Parameter p
## Group:sexF
##                   1         2         3         4         5         6
## mixture:1 0.2719284 0.3960881 0.2952729 0.3697506 0.5393624 0.5393626
## mixture:2 0.2719284 0.3960881 0.2952729 0.3697506 0.5393624 0.5393626
##
## Group:sexM
##                   1         2         3         4         5         6
## mixture:1 0.4941532 0.6317381 0.5228744 0.6054403 0.7538493 0.7538494
## mixture:2 0.4941532 0.6317381 0.5228744 0.6054403 0.7538493 0.7538494
##
##
## Real Parameter c
## Group:sexF
##                   2         3         4         5         6
## mixture:1 0.3960881 0.2952729 0.3697506 0.5393624 0.5393626
## mixture:2 0.3960881 0.2952729 0.3697506 0.5393624 0.5393626
##
## Group:sexM
##                   2         3         4         5         6
## mixture:1 0.6317381 0.5228744 0.6054403 0.7538493 0.7538494
## mixture:2 0.6317381 0.5228744 0.6054403 0.7538493 0.7538494
##
##
## Real Parameter f0
## Group:sexF
##             1
##  8.109488e-08
##
## Group:sexM
##             1
##  8.109488e-08
```

```
mouse.results
```

```
##                                       model npar     AICc  DeltaAICc
## 10   pi(~1)p(~time + mixture + sex)c()f0(~1)   10 146.3169  0.0000000
## 6           pi(~1)p(~mixture + sex)c()f0(~1)    5 147.2589  0.9420054
## 7          pi(~1)p(~time + mixture)c()f0(~1)    9 148.9379  2.6209832
## 3                 pi(~1)p(~mixture)c()f0(~1)    4 150.4044  4.0874273
## 11                    pi(~1)p(~sex)c()f0(~1)    4 154.3203  8.0033573
## 16            pi(~1)p(~time + sex)c()f0(~1)    9 154.5961  8.2792232
## 2                     pi(~1)p(~1)c(~1)f0(~1)    4 155.7349  9.4179473
## 12                  pi(~1)p(~sex)c(~1)f0(~1)    5 156.8823 10.5653954
## 4                pi(~1)p(~mixture)c(~1)f0(~1)    5 157.8258 11.5088454
## 5         pi(~1)p(~sex + mixture)c(~1)f0(~1)    6 158.9921 12.6752156
## 14                 pi(~1)p(~time)c(~1)f0(~1)    9 160.7129 14.3959432
## 15           pi(~1)p(~sex + time)c(~1)f0(~1)   10 162.1850 15.8680800
## 8        pi(~1)p(~mixture + time)c(~1)f0(~1)   10 162.9010 16.5840800
## 1                       pi(~1)p(~1)c()f0(~1)    3 163.7800 17.4630380
```

```
## 9  pi(~1)p(~sex + mixture + time)c(~1)f0(~1)   11 164.3934 18.0764773
## 13                   pi(~1)p(~time)c()f0(~1)    8 164.4985 18.1815394
##          weight  Deviance
## 10 4.810921e-01  92.14539
## 6  3.003823e-01 103.83095
## 7  1.297445e-01  96.95452
## 3  6.232391e-02 109.06727
## 11 8.796731e-03 112.98321
## 16 7.663335e-03 102.61275
## 2  4.336576e-03 114.39780
## 12 2.443328e-03 113.45435
## 4  1.524454e-03 114.39780
## 5  8.508249e-04 113.45435
## 14 3.599059e-04 108.72947
## 15 1.723925e-04 108.01347
## 8  1.205150e-04 108.72947
## 1  7.765649e-05 124.51511
## 9  5.714406e-05 108.01347
## 13 5.421971e-05 114.68322
```

Les noms des modèles.

```
names(mouse.results)
```

```
##  [1] "p.dot"              "p.dot.behav"        "p.h"
##  [4] "p.h.behav"          "p.h.behav.sex"      "p.h.sex"
##  [7] "p.h.time"           "p.h.time.behav"     "p.h.time.behav.sex"
## [10] "p.h.time.sex"       "p.sex"              "p.sex.behav"
## [13] "p.time"             "p.time.behav"       "p.time.behav.sex"
## [16] "p.time.sex"         "model.table"
```

On examine le meilleur modèle selon l'AIC (#9).

```
mouse.results$p.h.time.behav.sex$results$real
```

```
##                 estimate          se           lcl          ucl fixed note
## pi gF m1    8.771370e-08   0.0000000  8.771370e-08 8.771370e-08
## p gF t1 m1  5.817368e-01 465.2451900 7.736800e-309 1.000000e+00
## p gF t2 m1  5.468629e-01 473.8206000 6.713257e-309 1.000000e+00
## p gF t3 m1  6.070560e-01 456.1055200 8.593745e-309 1.000000e+00
## p gF t4 m1  5.152483e-01 477.5753200 5.912642e-309 1.000000e+00
## p gF t5 m1  6.721833e-01 421.3322900 1.140620e-308 1.000000e+00
## p gF t6 m1  1.000000e+00   0.0000000  1.000000e+00 1.000000e+00
## p gF t1 m2  3.456522e-01   0.0947914  1.885212e-01 5.456813e-01
## p gF t2 m2  3.142962e-01   0.1027713  1.525465e-01 5.385600e-01
## p gF t3 m2  3.697803e-01   0.1284258  1.661336e-01 6.334306e-01
## p gF t4 m2  2.875934e-01   0.1549021  8.401850e-02 6.398601e-01
## p gF t5 m2  4.378145e-01   0.2145716  1.236070e-01 8.113238e-01
## p gF t6 m2  1.000000e+00   0.0000000  1.000000e+00 1.000000e+00
## p gM t1 m1  6.691820e-01 423.2911400 1.125225e-308 1.000000e+00
## p gM t2 m1  6.370501e-01 442.1057700 9.763632e-309 1.000000e+00
## p gM t3 m1  6.920102e-01 407.5255100 1.249858e-308 1.000000e+00
```

```
## p gM t4 m1  6.072082e-01 456.0432800 8.599233e-309 1.000000e+00
## p gM t5 m1  7.488817e-01 359.5817300 1.658896e-308 1.000000e+00
## p gM t6 m1  1.000000e+00   0.0000000  1.000000e+00 1.000000e+00
## p gM t1 m2  4.344727e-01   0.0941799  2.660221e-01 6.195522e-01
## p gM t2 m2  3.999846e-01   0.1223693  1.970411e-01 6.442440e-01
## p gM t3 m2  4.604381e-01   0.1498085  2.074316e-01 7.356186e-01
## p gM t4 m2  3.699291e-01   0.1708553  1.224688e-01 7.118148e-01
## p gM t5 m2  5.310958e-01   0.2073689  1.813035e-01 8.527869e-01
## p gM t6 m2  1.000000e+00   0.0000000  1.000000e+00 1.000000e+00
## c gF t2 m1  6.119403e-01   0.0420970  5.269786e-01 6.906012e-01
## f0 gF a0 t1 3.601143e-13   0.0000000  3.601143e-13 3.601143e-13
```

```
mouse.results$p.h.time.behav.sex$results$derived
```

```
## $`N Population Size`
##   estimate lcl ucl
## 1       17  17  17
## 2       21  21  21
```

Et un autre modèle, le modèle #2 classé 13ème.

```
mouse.results$p.dot.behav$results$real
```

```
##              estimate        se       lcl       ucl fixed note
## pi gF m1    0.5000202 0.0000000 0.5000202 0.5000202
## p gF t1 m1  0.3697887 0.0000000 0.3697887 0.3697887
## c gF t2 m1  0.6119403 0.0420970 0.5269787 0.6906012
## f0 gF a0 t1 0.7301164 0.8301539 0.1224619 4.3529452
```

```
mouse.results$p.dot.behav$results$derived
```

```
## $`N Population Size`
##   estimate      lcl      ucl
## 1 17.73012 17.12246 21.35295
## 2 21.73012 21.12246 25.35295
```

Nettoyage

On supprime les fichiers temporaires.

```
rm(list = ls(all = TRUE))
cleanup(ask = FALSE)
```