Preliminaries

```
> library(FSA)      # for ageBias(), agePrecision()
> setwd("C:/aaaWork/Web/fishR/courses/Vermont2014/CourseMaterial/")
```

Lake Huron Alewife – Otolith-Scale Bias?

```
> d <- read.csv("Data/AlewifeLH.csv",header=TRUE)
> str(d)
'data.frame': 104 obs. of  2 variables:
 $ otoliths: int  0 0 1 1 1 1 1 1 1 1 ...
 $ scales  : int  0 0 0 1 1 1 1 1 1 1 ...
> ab1 <- ageBias(otoliths~scales,data=d,col.lab="Otolith Age",row.lab="Scale Age")
> summary(ab1,what="symmetry",flip.table=TRUE)
Raw agreement table (square & flipped)
          Otolith Age
Scale Age  0  1  2  3  4  5  6  7  8  9 10
       10  -  -  -  -  -  -  -  -  -  -  -
        9  -  -  -  -  -  -  -  -  -  -  -
        8  -  -  -  -  -  -  -  -  -  -  -
        7  -  -  -  -  -  -  -  -  -  -  -
        6  -  -  -  -  -  -  2  1  -  1  2
        5  -  -  -  -  1  4  2  5  4  -  -
        4  -  -  -  - 12  4  3  1  1  -  -
        3  -  -  4 11  5  2  1  -  -  -  -
        2  -  3 16  2  -  -  -  -  -  -  -
        1  - 14  -  -  -  -  -  -  -  -  -
        0  2  1  -  -  -  -  -  -  -  -  -

Bowker's (Hoenig's) Test of Symmetry
 df chi.sq         p
 16  34.47 0.004698
> summary(ab1,what="bias")
Summary of Scale Age by Otolith Age
 otoliths  n min max mean     SE       t   adj.p   sig   LCI  UCI
        0  2   0   0 0.00     NA      NA      NA FALSE    NA   NA
        1 18   0   2 1.11 0.1111    1.00 0.33138 FALSE 0.877 1.35
        2 20   2   3 2.20 0.0918    2.18 0.16836 FALSE 2.008 2.39
        3 13   2   3 2.85 0.1041   -1.48 0.33098 FALSE 2.619 3.07
        4 18   3   5 3.78 0.1292   -1.72 0.31112 FALSE 3.505 4.05
        5 10   3   5 4.20 0.2494   -3.21 0.05354 FALSE 3.636 4.76
        6  8   3   6 4.62 0.3750   -3.67 0.04801  TRUE 3.738 5.51
        7  7   4   6 5.00 0.2182   -9.16 0.00071  TRUE 4.466 5.53
        8  5   4   5 4.80 0.2000  -16.00 0.00071  TRUE 4.245 5.36
        9  1   6   6 6.00     NA      NA      NA FALSE    NA   NA
       10  2   6   6 6.00     NA      NA      NA FALSE    NA   NA
```
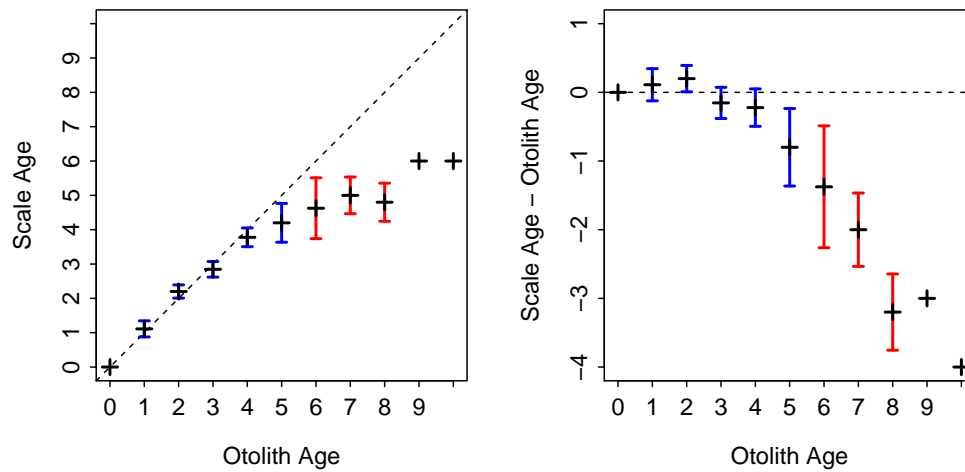
```
> plot(ab1)                        # LEFT
> plot(ab1,difference=TRUE)        # RIGHT
```


Striped Bass – Reader Precision?

```
> sb <- read.csv("Data/StripedBass4.csv",header=TRUE)
> str(sb)

'data.frame': 1202 obs. of  2 variables:
 $ reader1: int  2 2 2 2 2 2 2 2 2 2 ...
 $ reader2: int  2 2 2 2 2 2 2 2 2 2 ...

> ap1 <- agePrecision(reader1~reader2,data=sb)
> summary(ap1,what="agreement")

Percentage of fish by differences in ages between pairs of assignments
      0       1       2       3       4       5
61.8136 30.3661  6.7388  0.7488  0.1664  0.1664

> summary(ap1,what="precision")

Precision summary statistics
    n R   CV   APE PercAgree
 1202 2 3.98 2.815     61.81
```

```
> ab2 <- ageBias(reader1~reader2,data=sb,col.lab="Reader 1",row.lab="Reader 2")
> summary(ab2,what="symmetry",flip.table=TRUE)
Raw agreement table (square & flipped)
        Reader 1
Reader 2  2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20
      20  -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   1   -
      19  -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -
      18  -   -   -   -   -   -   -   -   -   -   -   1   -   -   -   -   1   -   -
      17  -   -   -   -   -   -   -   -   -   -   -   -   -   1   -   1   -   -   -
      16  -   -   -   -   -   -   -   -   -   -   -   -   -   -   2   1   -   -   -
      15  -   -   -   -   -   -   -   -   -   -   1   2   2   3   -   -   -   -   -
      14  -   -   -   -   -   -   -   -   -   2   6   8   5   4   -   -   -   -   -
      13  -   -   -   -   -   -   1   -   -   3   5   8   1   -   -   -   -   -   -
      12  -   -   -   -   -   -   -   1  17  13  23   9   1   -   -   -   -   -   -
      11  -   -   -   -   -   1   1   4  22  25   4   1   -   -   -   -   -   -   -
      10  -   -   -   -   -   2  15  51 144  24   2   1   -   -   -   -   -   -   -
       9  -   -   -   -   1   1  29  89  32   4   -   -   -   -   -   -   -   -   -
       8  -   -   -   -   3  21  97  25   9   -   -   -   -   -   -   -   -   -   -
       7  -   -   -   3  23 149  38   5   -   -   -   -   -   -   -   -   -   -   -
       6  -   -   -   6  51  15   2   -   -   -   -   -   -   -   -   -   -   -   -
       5  -   -   5  45  10   1   -   1   -   -   -   -   -   -   -   -   -   -   -
       4  -   6  25   5   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -
       3  4  25   1   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -
       2 50   -   1   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -

Bowker's (Hoenig's) Test of Symmetry
 df chi.sq         p
 37  72.69 0.0004127

> plot(ab2)      # Left
> plot(ab2,difference=TRUE,ylim=c(-1.2,1))    # Right
```