Experimental designs
ANOVA

QTL for aggression in Drosophila

Exam 11-12 January 2018

http://studerende.au.dk/studier/fagportaler/datalogi/eksamen/eksamensplaner/eksamensplan-vinter/

Experimental Designs

(READ THE BOOK)

Power test

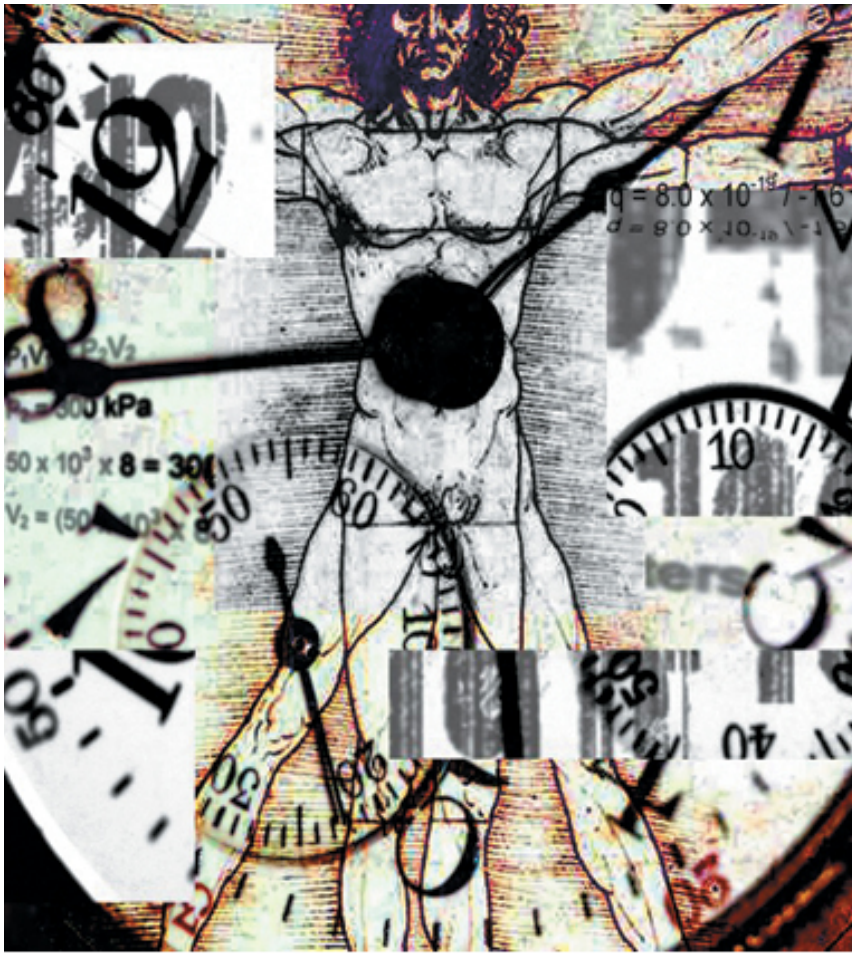
(READ THE BOOK)

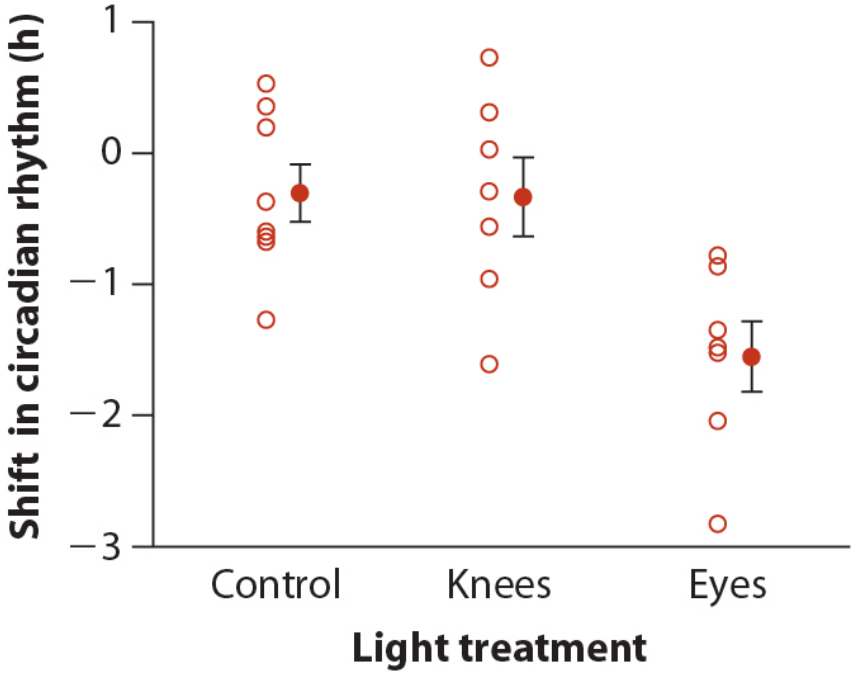
Try and think about how you would do a power analysis in R: decicide what sample size is needed to achieve a given p-value with probability 90% to detect a difference in means of 10, 30% and 50%

ANOVA fundamental Qs

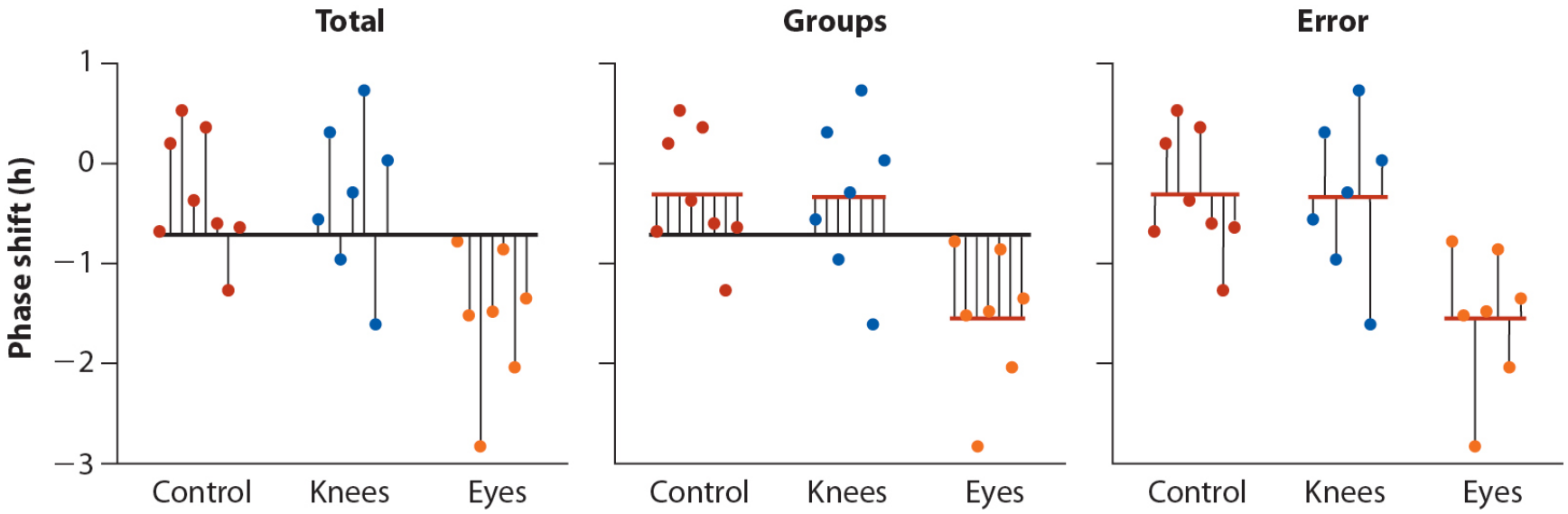
- Are differences among a priori groups real ?
- How much does one factor explain of the variation of one “response” variable
- Fixed or Random ?

Shift in circadian rythm



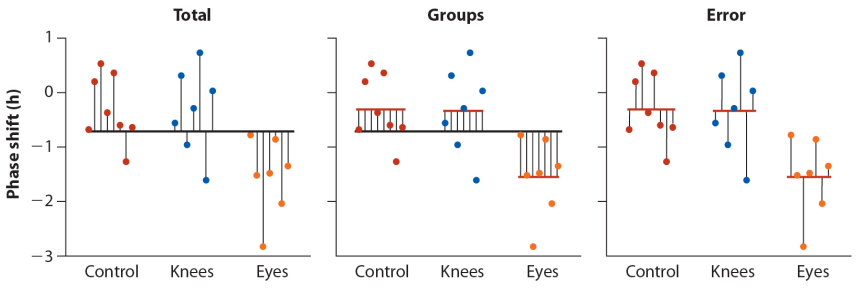


ANOVA fundamental intuition



Partition of sum of squares and F test

$SS_{total} = SS_{groups} + SS_{error}$



$MS_{groups} = SS_{groups} / df_{groups}$

$MS_{error} = SS_{error} / df_{errors}$

$Fobs = Ms_{groups} / Ms_{error}$

H_o is true: we expect F ~1,
$F \sim F(df_{groups}, df_{error})$

H_o is false: we expect F >1

Null distribution for the F statistic

H_o is true: we expect F ~1,

More formally F~ $F(df_{groups}, df_{error})$

P-value =$P[F>F_{obs}]$

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in R :
dF(…) pF(…) rF(…)

> 1- pf(q =7.29,df1 = 2, df2 = 19)
[1] 0.004470876
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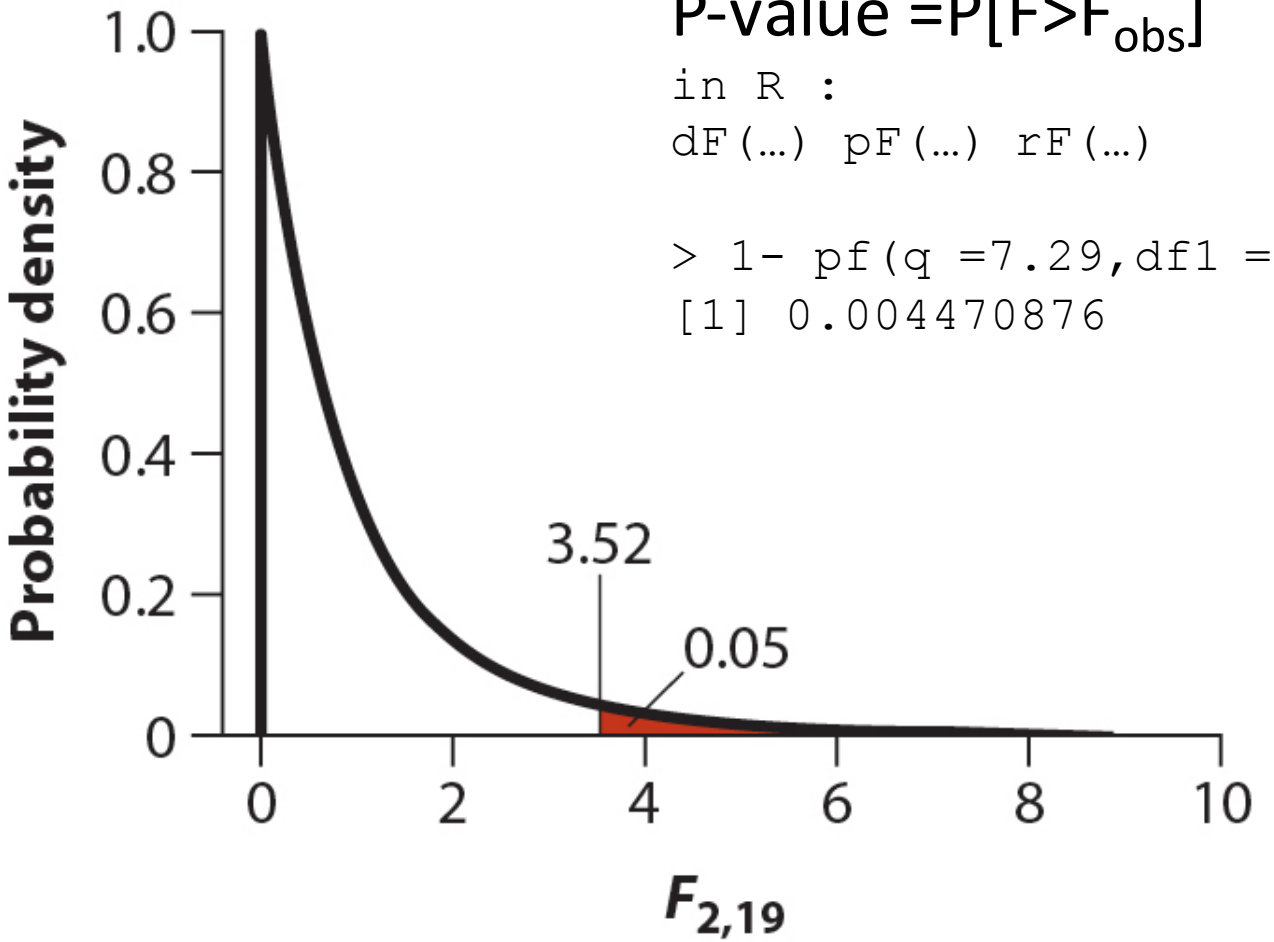


Basic to do list with ANOVA in R … (see also the R code)

Identify the design
- Fixed Factor
- Random Factor

Fit the model accordingly: y ~ x
- lm()
- lme

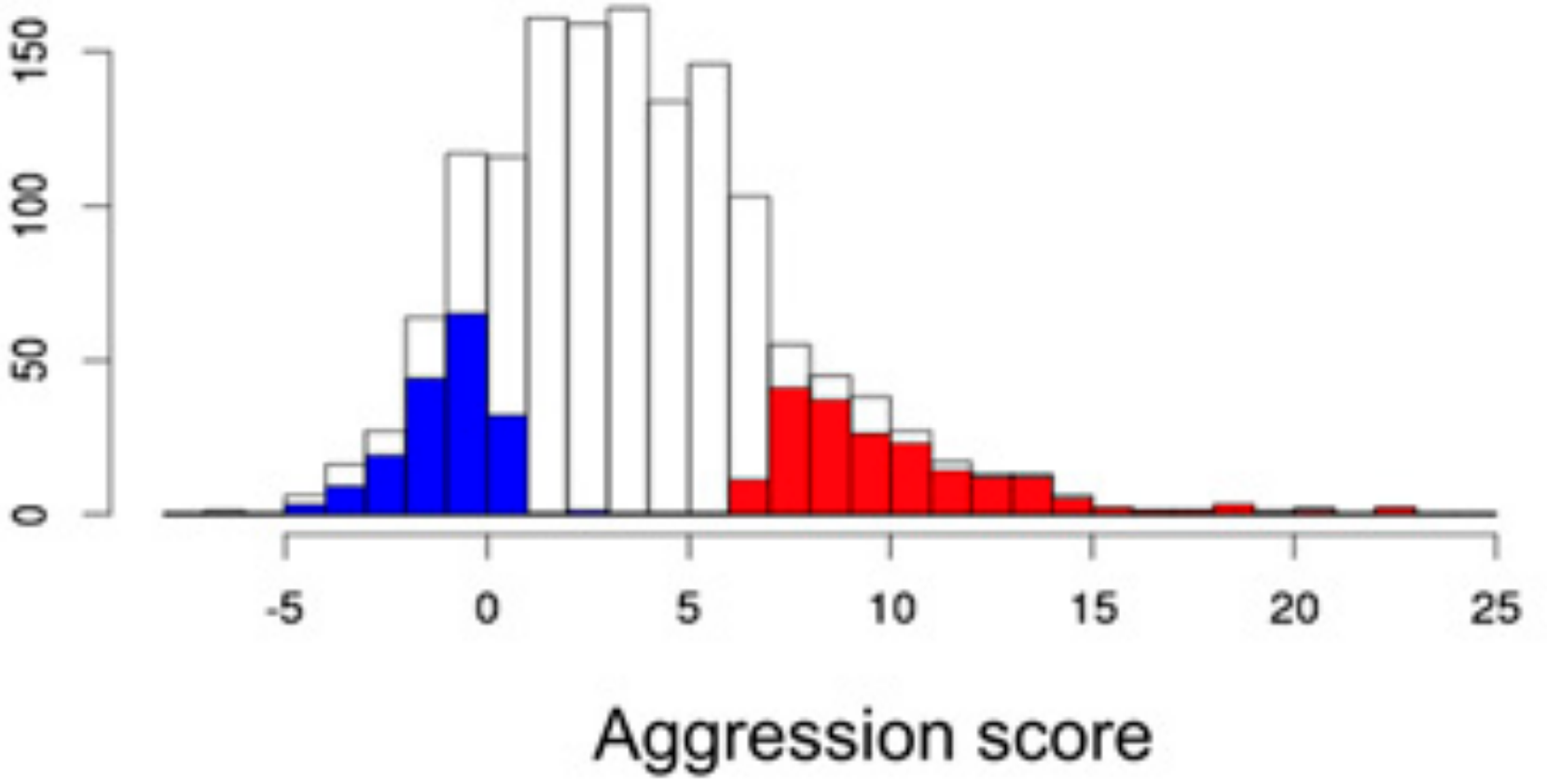
Test hypothesis
- F-tests and their dfs
- permutations

Check the model
- trend in residuals
- normality of residuals

Male aggression

- https://www.youtube.com/watch?v=uJaDoTigvEI

Drosophila male agression



Manhattan plot for SNPs associated with aggression