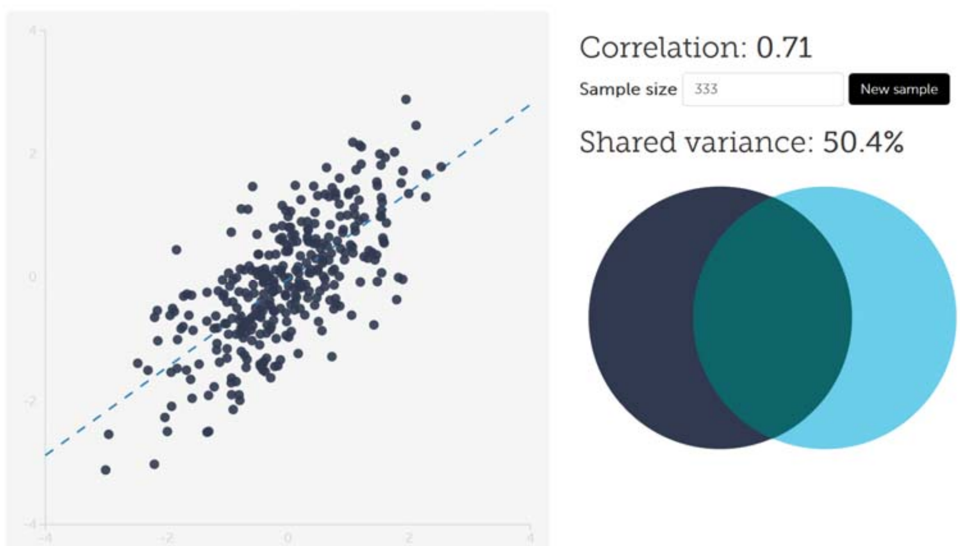
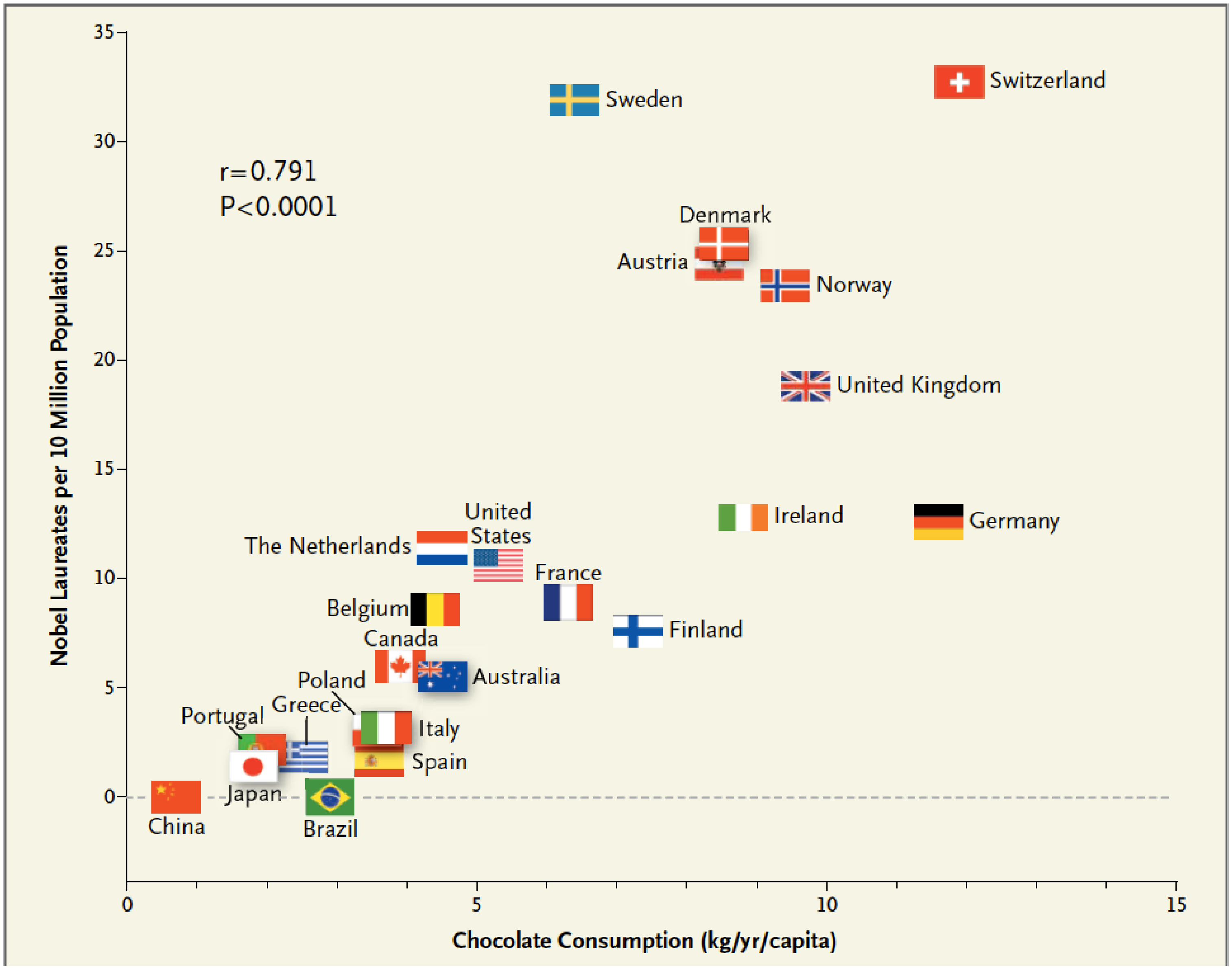
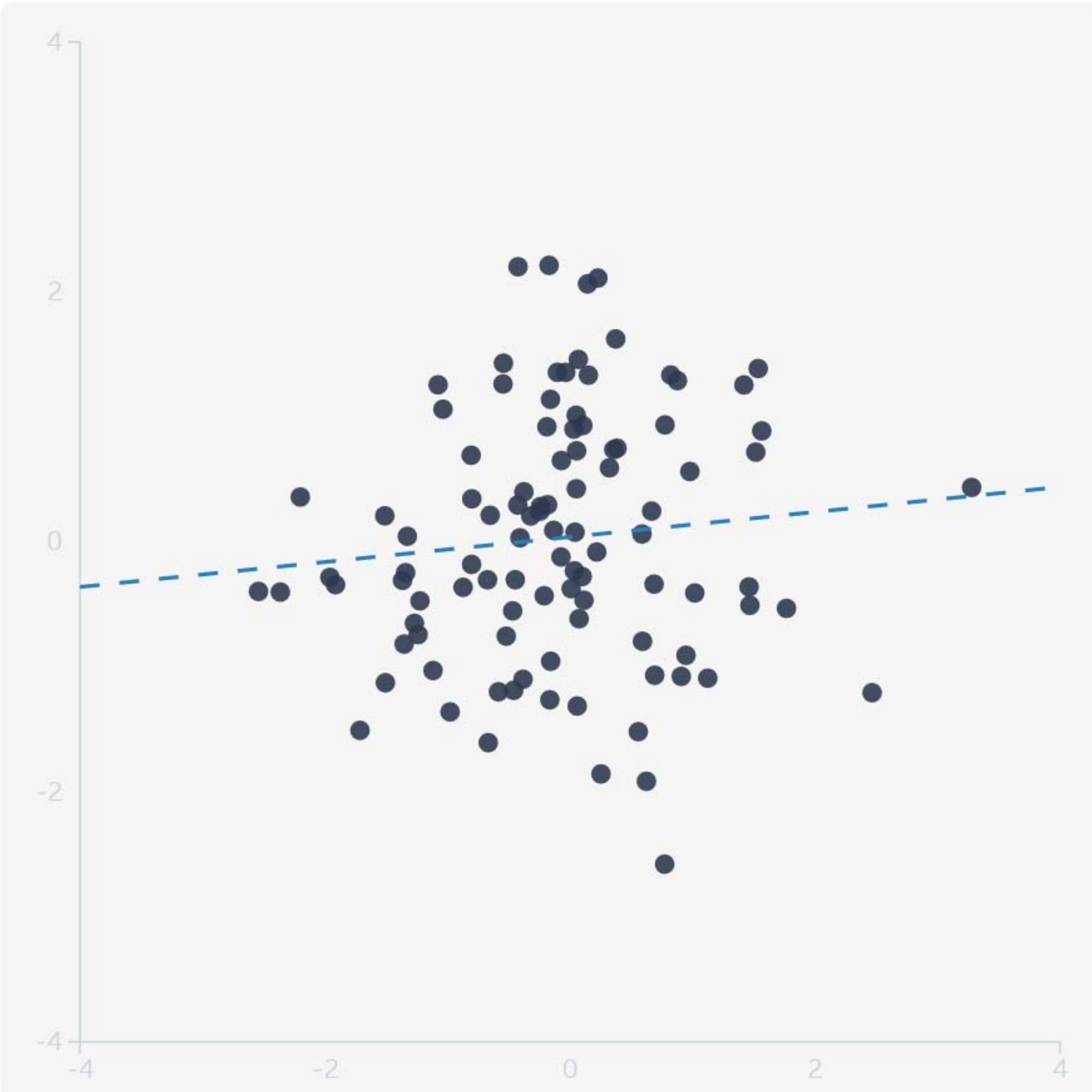
Correlations



Chocolate consumption is related to winning Nobel prizes



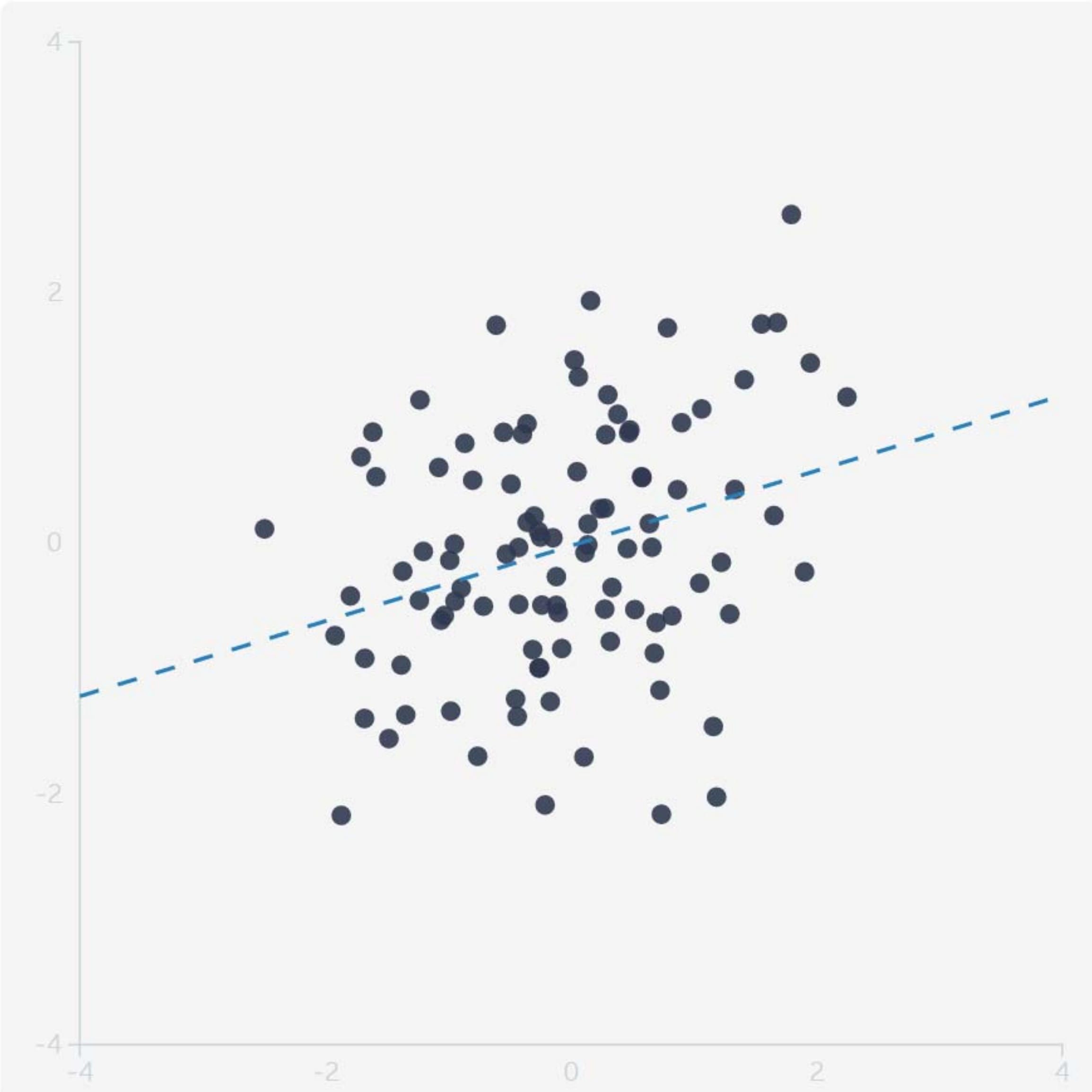
Messerli, 2012, NEJM



$r = 0.1$

small

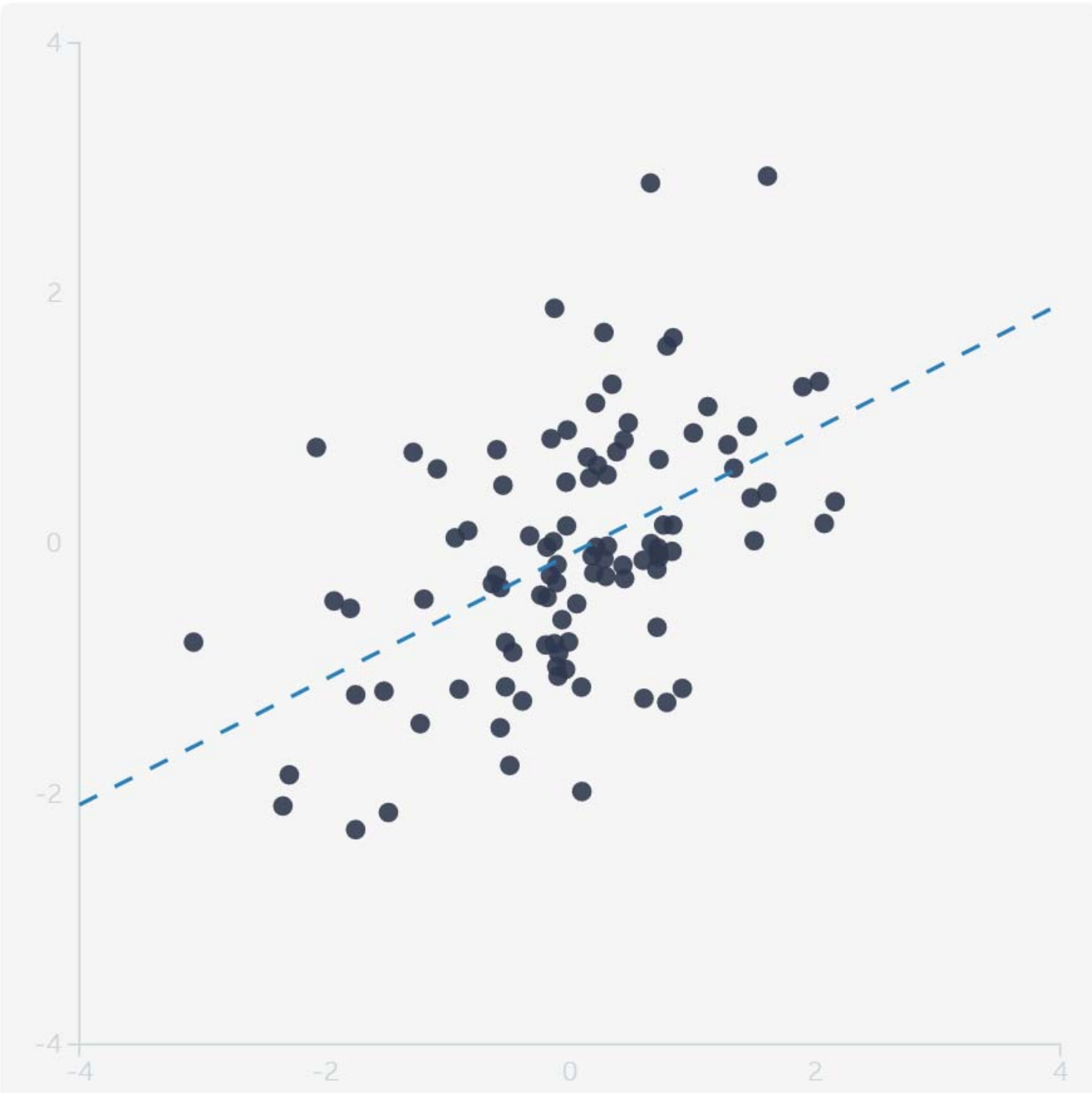
http://rpsychologist.com/d3/correlation/



$r = 0.3$

medium

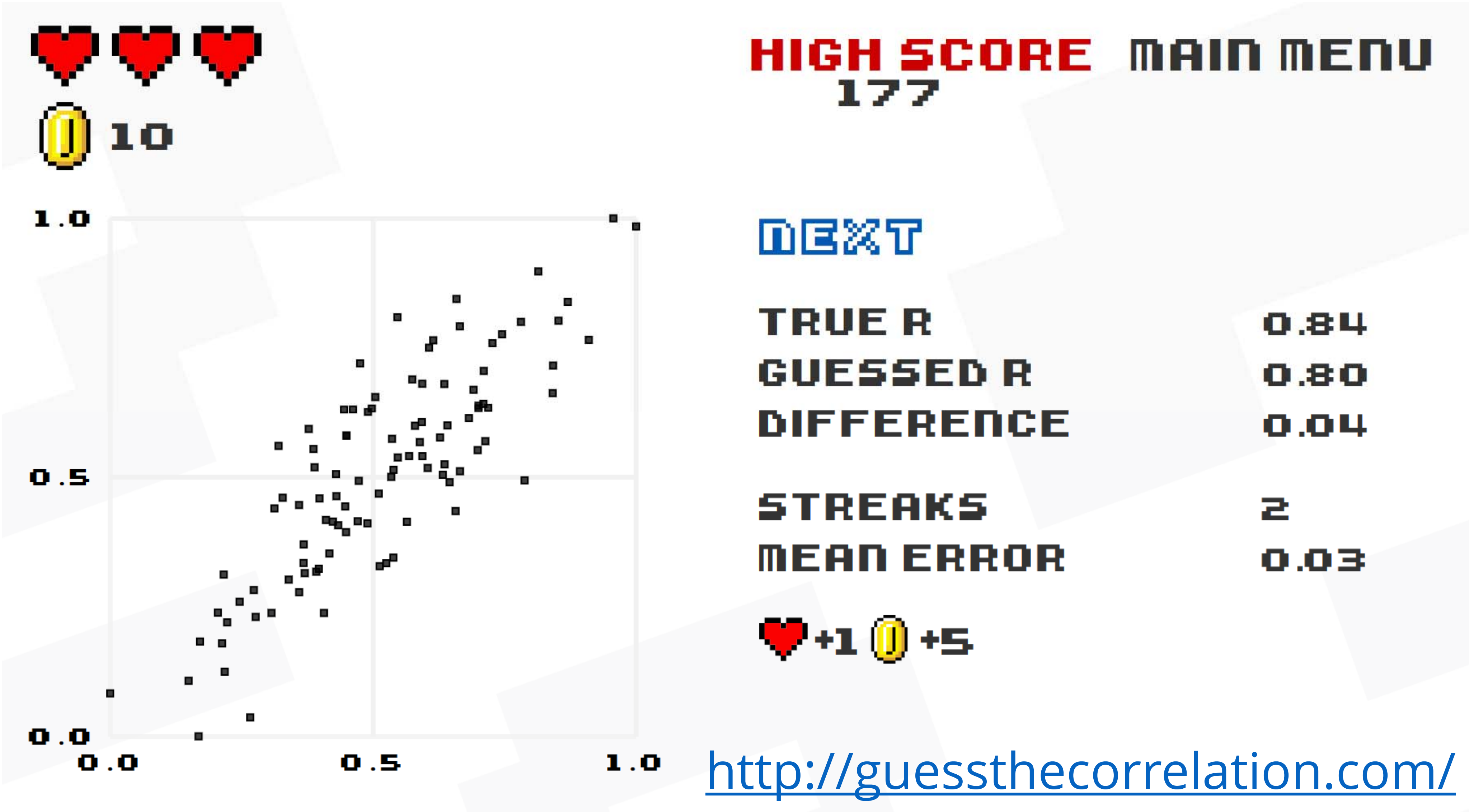
http://rpsychologist.com/d3/correlation/



$r = 0.5$
large

http://rpsychologist.com/d3/correlation/

Correlations range from 0 (no effect) to -1 or +1



http://guessthecorrelation.com/

Convert d to r

$$r = \frac{d_s}{\sqrt{d_s^2 + \frac{N^2 - 2N}{n_1 n_2}}}$$

R^2, η^2, ω^2, ε^2

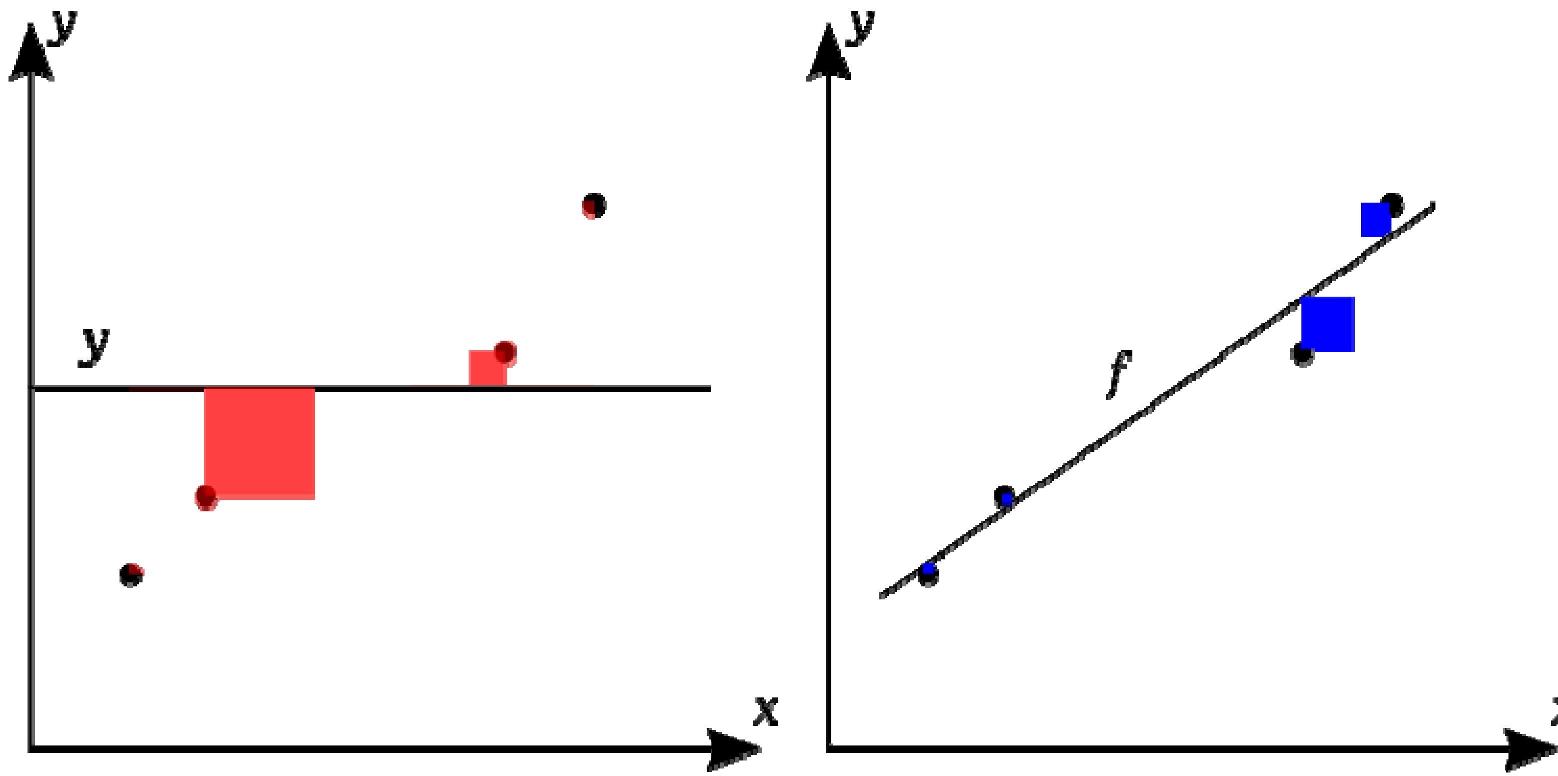
proportion of total variance explained by an effect

ε^2 is least biased

(Okada, 2013)

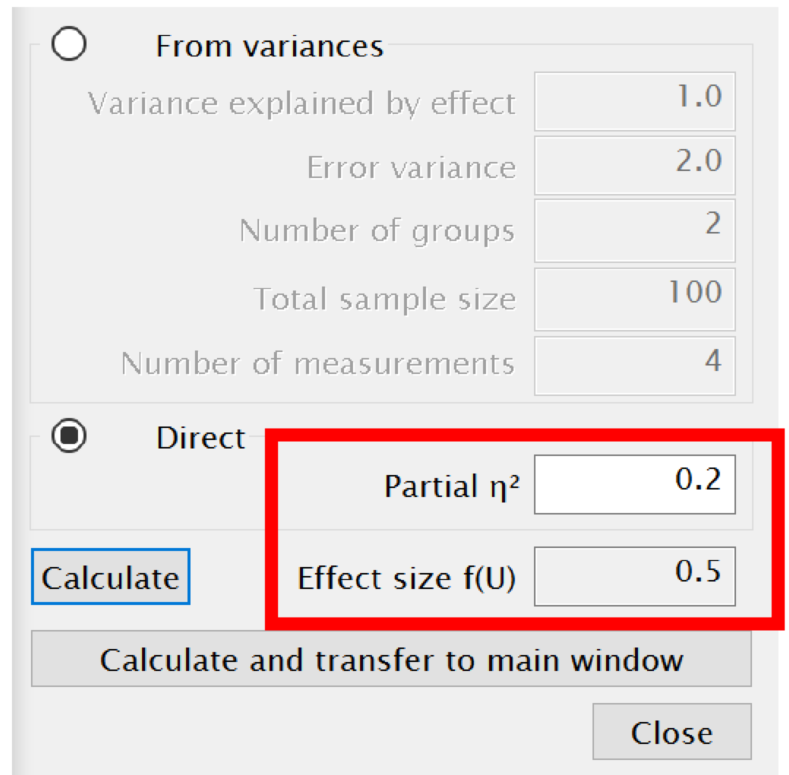
(ω^2 recommended, maybe due to a faulty random number generator!)

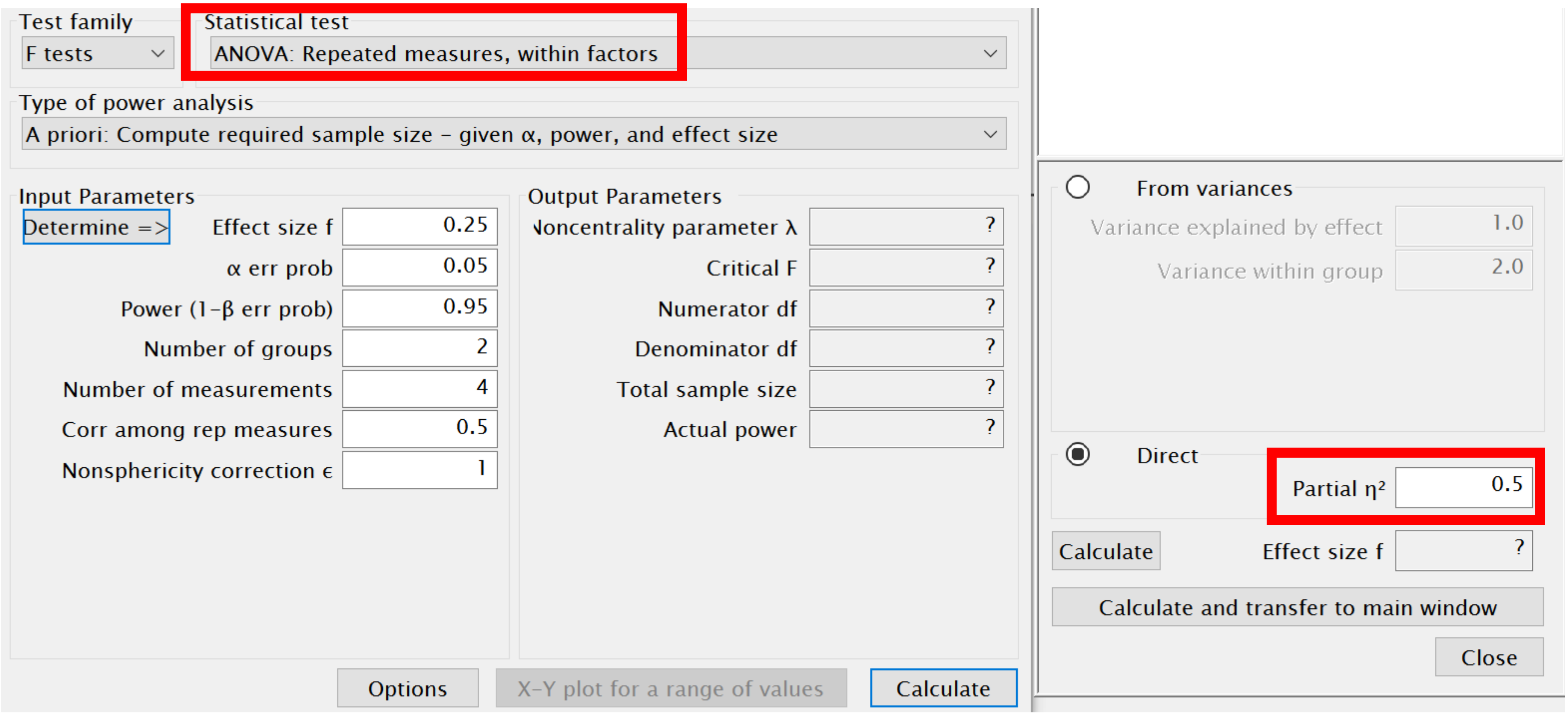
How much does the relationship between x and y reduce the error?

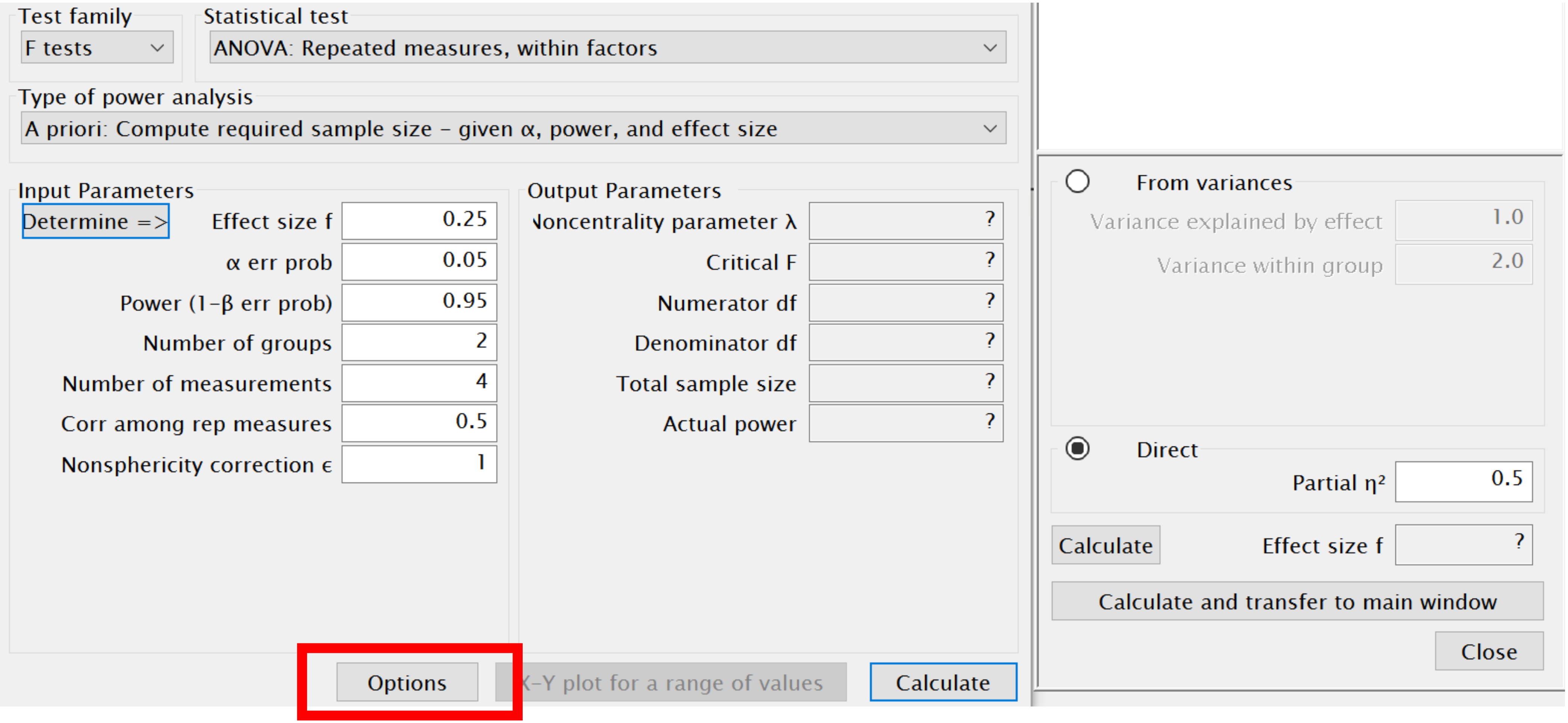


$$R^2 = \frac{SS_{res}}{SS_{tot}}$$

$$f = \sqrt{\frac{\eta^2}{1-\eta^2}}$$




Test family
F tests
Statistical test
ANOVA: Repeated measures, within factors
Type of power analysis
A priori: Compute required sample size – given α, power, and effect size
Input Parameters
Determine =>
Effect size f
0.25
α err prob
0.05
Power (1–β err prob)
0.95
Number of groups
2
Number of measurements
4
Corr among rep measures
0.5
Nonsphericity correction ϵ
1
Output Parameters
Noncentrality parameter λ
Critical F
Numerator df
Denominator df
Total sample size
Actual power
?
Options
X–Y plot for a range of values
Calculate
From variances
Variance explained by effect
1.0
Variance within group
2.0
Direct
Partial η²
0.5
Calculate
Effect size f
?
Calculate and transfer to main window
Close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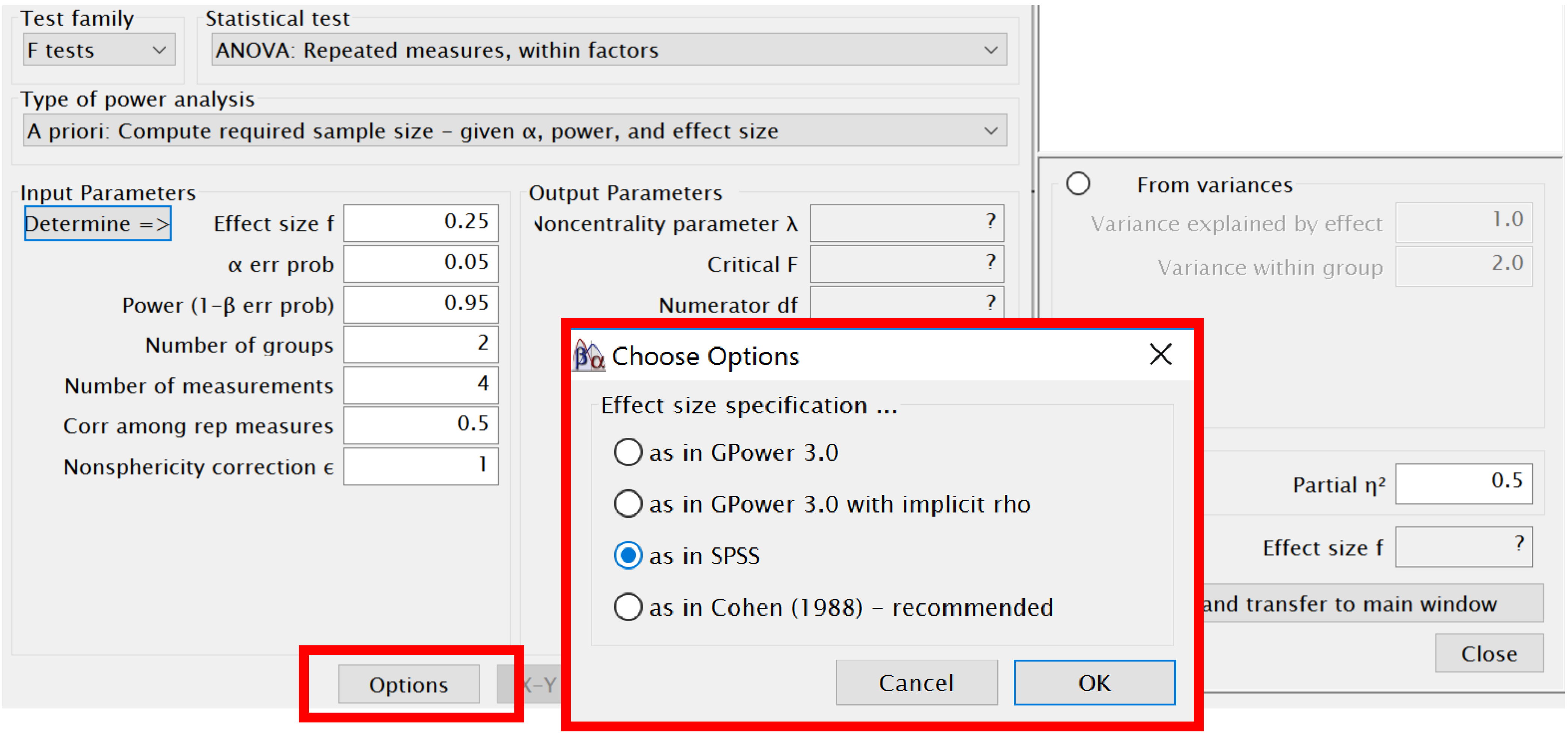
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0.05
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0.95
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Number of measurements
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Corr among rep measures
0.5
Nonsphericity correction ϵ
1
Output Parameters
Noncentrality parameter λ
?
Critical F
?
Numerator df
?
Options
Choose Options
Effect size specification ...
as in GPower 3.0
as in GPower 3.0 with implicit rho
as in SPSS
as in Cohen (1988) – recommended
Cancel
OK
From variances
Variance explained by effect
1.0
Variance within group
2.0
Partial η²
0.5
Effect size f
?
and transfer to main window
Close

$$\eta_p^2, \omega_p^2, \varepsilon_p^2$$

Partial variance explained by only 1 factor (good for experimental designs)

η^2 is identical to η_p^2 in One-Way ANOVA.

Cohen (1988) has provided benchmarks to define small ($f = 0.10$), medium ($f = 0.25$), and large ($f = 0.50$) effects.

Cohen (1988) has provided benchmarks to define small ($\eta^2 = 0.0099$), medium ($\eta^2 = 0.0588$), and large ($\eta^2 = 0.1379$) effects.

Cohen actually meant η_p^2, not η^2 - so use these benchmarks for partial eta-squared.

Olejnik & Algina (2003) propose generalized eta-squared η_G^2. Generalizes to between and within designs r-family effect sizes allow you to quantify the degree of association between two variables.