


Compare 2+ group means

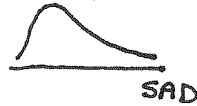
1. G groups = $\frac{g(g-1)}{2}$ t-tests

$$\frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{1}{n_1} + \frac{1}{n_2} \frac{s_1^2(n_1-1) + s_2^2(n_2-1)}{n_1+n_2-2}}} \sim t_{n_1+n_2-2}$$


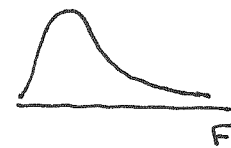
2. Calculate SAD (or MAD)

$$SAD = |\bar{X}_1 - \bar{X}_2| + |\bar{X}_1 - \bar{X}_3| + |\bar{X}_2 - \bar{X}_3|$$

Run randomization test

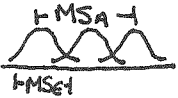


3. ANOVA

$$\frac{MSA}{MSE} \sim F_{\frac{g-1}{N-g}}$$


$$MSA = \frac{\sum n_a (\bar{X}_a - M)^2}{a-1}$$

$$MSE = \frac{\sum (x_i - \bar{X}_a)^2}{N-a} = \frac{\sum (n_a - 1) s_a^2}{N-a}$$



4. Randomized MSR

- Calculate MSR = $\frac{MSA}{MSE}$
- Randomize treatments
 - Calculate MSR*
 - Repeat many times



+
t-tests
make sense

Few assumptions
Easy to understand
Does not inflate
 α -error rate

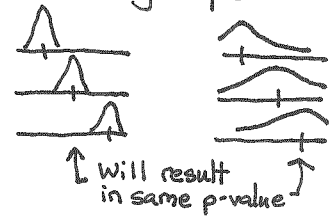
Considers both
between-group
and within-group
variation
Does not inflate
 α -error rate
Can estimate
effect size (η^2)

Same advantages
as ANOVA
Requires few
assumptions
(no normality or
equal variance
assumption)

-
 α -error
inflates

$\alpha = 1 - [(1-\alpha)]^{g(g-1)/2}$
Requires assumptions* of
normality; equal variances

Only considers variation
between groups; not
within groups



Requires* normality;
equal variances

Requires computer

* ANOVA is robust
against violations
of assumptions when
sample sizes are
equal.