

$\tau_k$  represents the effect of the  $k$ th treatment,  
 $\epsilon$  is a random error term, assumed to be Normally distributed with mean zero and variance,  $\sigma^2$ .

### ANOVA table

| Source             | d.f               | SS             | MS=SS/df       | MS Ratio                        |
|--------------------|-------------------|----------------|----------------|---------------------------------|
| Between Rows       | a-1               | SS(rows)       | MS(rows)       | $\frac{MS(Rows)}{MS(Error)}$    |
| Between Columns    | a-1               | SS(columns)    | MS(columns)    | $\frac{MS(Columns)}{MS(Error)}$ |
| Between Treatments | a-1               | SS(treatments) | MS(treatments) |                                 |
| Error              | (a-1)(a-2)        | SS(Error)      | MS(Error)      |                                 |
| Total(about mean)  | a <sup>2</sup> -1 |                |                |                                 |

### Test of treatment differences

$$H_0: \alpha_1 = \alpha_2 = \dots = \alpha_k$$

$H_1$ : not all  $\alpha_i$ 's are equal.

$$F = \frac{MS(treatments)}{MS(Error)} \sim F_{(a-1), (a-1)(a-2), \alpha}$$

Reject  $H_0$  if

We could also test the effectiveness of a Latin square design by testing for row and column differences.

### Tests of Between-Subjects Effects

Dependent Variable: Productivity of bank tellers

| Source          | Type III Sum of Squares | df | Mean Square | F     | Sig. |
|-----------------|-------------------------|----|-------------|-------|------|
| Corrected Model | 1115.6                  | 12 | 92.97       | 1.77  | .166 |
| Intercept       | 9840.6                  | 1  | 9840.6      | 188.1 | .000 |
| MUSIC           | 494.1                   | 4  | 123.5       | 2.36  | .112 |
| WEEK            | 261.3                   | 4  | 65.34       | 1.24  | .342 |
| DAY             | 360.1                   | 4  | 90.04       | 1.72  | .210 |
| Error           | 627.6                   | 12 | 52.30       |       |      |
| Total           | 11584.1                 | 25 |             |       |      |
| Corrected Total | 1743.3                  | 24 |             |       |      |

a. R Squared = .640 (Adjusted R Squared = .280)