

measurements	
$T_{r,s}$	
31	
40	
39	
19	
$T_{1..} = 129$	
25	
62	
45	
33	
$T_{2..} = 165$	
$T = 294$	

S/R

$$\frac{1}{C} \sum^R \sum^n T_{r,s}^2 - \frac{1}{nC} \sum^R T_{r..}^2 = 2,405.20 - 2,193.30 = 211.90$$

WITHIN SUBJECTS

$$\sum^R \sum^C \sum^n X_{rvi}^2 - \frac{1}{C} \sum^R \sum^n T_{r,s}^2 = 2,664.00 - 2,405.20 = 258.80$$

COLUMNS

$$\frac{1}{nR} \sum^C T_{r..}^2 - \frac{T^2}{nRC} = 2,287.00 - 2,160.90 = 126.10$$

R x C

$$\begin{aligned} \frac{1}{n} \sum^R \sum^C T_{rc.}^2 - \frac{1}{nC} \sum^R T_{r..}^2 - \frac{1}{nR} \sum^C T_{r..}^2 + \frac{T^2}{nRC} \\ = 2,347.50 - 2,193.30 - 2,287.00 + 2,160.90 = 28.10 \end{aligned}$$

SC/R

$$\begin{aligned} \sum^R \sum^C \sum^n X_{rvi}^2 - \frac{1}{C} \sum^R \sum^n T_{r,s}^2 - \frac{1}{n} \sum^R \sum^C T_{rc.}^2 + \frac{1}{nC} \sum^R T_{r..}^2 \\ = 2,664.00 - 2,405.20 - 2,347.50 + 2,193.30 = 104.60 \end{aligned}$$

TOTAL

$$\sum^R \sum^C \sum^n X_{rvi}^2 - \frac{T^2}{nRC} = 2,664.00 - 2,160.90 = 503.10$$

The analysis-of-variance table for these data is shown in Table 19.6. The degrees of freedom for rows are $R - 1 = 2 - 1 = 1$; for columns are, $C - 1 = 5 - 1 = 4$; and for $R \times C$ interaction are, $(R - 1)(C - 1) =$

Table 19.6
Analysis of variance for the data of Table 19.5

Source	Sum of squares	Degrees of freedom	Variance estimate
Between subjects	244.30		
Rows	32.40	1	$32.40 = s_r^2$
S/R	211.90	6	$35.32 = s_{sr}^2$
Within subjects	258.80		
Columns	126.10	4	$31.53 = s_c^2$
R x C	28.10	4	$7.03 = s_{rc}^2$
SC/R	104.60	24	$4.36 = s_{sctr}^2$
Total	503.10	39	