

Two-way within ANOVA

Individual Data

	Emotion				\bar{X}_{sub}	SD
	Anger		Fear			
	Sex of Actors					
	Female	Male	Female	Male		
Subject 1	8	6	5	4	5.75	1.5
Subject 2	9	4	4	2	4.75	2.6
Subject 3	7	2	3	0	3.00	2.6
$\bar{X}_{emo-sex}$	8.00	4.00	4.00	2.00		
SD	1.0	2.0	1.0	2.0	\bar{X}_{total}	4.50

Main effect: SEX

	Sex of Actors							
	Female		$\bar{X}_{sex-sub}$	SD	Male		$\bar{X}_{sex-sub}$	SD
Subject 1	8	5	6.50	1.5	6	4	5.00	1.0
Subject 2	9	4	6.50	2.5	4	2	3.00	1.0
Subject 3	7	3	5.00	2.0	2	0	1.00	1.0
\bar{X}_{sex}	6.00				\bar{X}_{sex} 3.00			
SD	2.37				SD 2.10			\bar{X}_{total} 4.50

Main effect: EMOTION

	Emotion							
	Anger		$\bar{X}_{emo-sub}$	SD	Fear		$\bar{X}_{emo-sub}$	SD
Subject 1	8	6	7.00	1.0	5	4	4.50	0.5
Subject 2	9	4	6.50	2.5	4	2	3.00	1.0
Subject 3	7	2	4.50	2.5	3	0	1.50	1.5
\bar{X}_{emo}	6.00				\bar{X}_{emo} 3.00			
SD	2.61				SD 1.79			\bar{X}_{total} 4.50

Two-way within ANOVA

Computations

Sums of squares	Degrees of freedom
Total SS = $(\sum X - \bar{X}_{total})^2$ where X : single score	# of scores - 1
Subject SS = $[k (\bar{X}_{subjects} - \bar{X}_{total})^2]$ where k : # of scores for 1 subject	# of subjects - 1
Sex SS = $[k (\bar{X}_{sex} - \bar{X}_{total})^2]$ where k : # of scores for each Sex	# of Sex - 1
Interaction (Sex X Subject) SS = $[k (\bar{X}_{sex-sub} - \bar{X}_{total})^2] - \text{Subject SS} - \text{Sex SS}$ where k : # of scores for 1 subject at each Sex	(# of Sex - 1) X (# of subjects - 1)
Emotion SS = $[k (\bar{X}_{emotion} - \bar{X}_{total})^2]$ where k : # of scores for each Emotion	# of Emotions - 1
Interaction (Emotion X Subject) SS = $[k (\bar{X}_{emo-sub} - \bar{X}_{total})^2] - \text{Subject SS} - \text{Emotion SS}$ where k : # of scores for 1 subject at each Emotion	(# of Emotions - 1) X (# of subjects - 1)
Interaction (Emotion X Sex) SS = $[k (\bar{X}_{emo-sex} - \bar{X}_{total})^2] - \text{Sex SS} - \text{Emotion SS}$ where k : # of scores for each Emotion-Sex	(# of Emotions - 1) X (# of Sex - 1)
Interaction (Emotion X Sex X Subject) SS = Total SS - Subject SS - Sex SS - Emotion SS - Sex X Subject SS - Emotion X Subject SS - Sex X Emotion SS	(# of Sex - 1) X (# of Emotions - 1) X (# of subjects - 1)

Table of Variance: Two-Way Repeated Measures (Within Subject Design)

Source	SS	df	MS	F	p
Subjects	15.5	2	7.75		
Sex	27.0	1	27.0	15.3	0.059
Sex X Subjects	3.5	2	1.75		
Emotion	27.0	1	27.0	108.0	0.009
Emotion X Subjects	0.5	2	0.25		
Sex X Emotion	3.0	1	3.0	12.0	0.074
Sex X Emotion X Subjects	0.5	2	0.25		