

Two-Way Mixed ANOVA

Speakers	Word Pairs		\bar{X}_{sub}	SD		
	Mother Tongue	Bilingual				
English	Subject 1	5	15	10.0	5.0	
	Subject 2	13	6	9.5	3.5	
	Subject 3	2	5	3.5	1.5	
	Subject 4	3	14	8.5	5.5	
	Subject 5	9	4	6.5	2.5	
	Subject 6	10	1	5.5	4.5	
	\bar{X}_{Sp-WP}	6.97	\bar{X}_{Sp-WP}	7.50	\bar{X}_{Sp}	7.23
	SD	4.31	SD	5.68	SD	4.82
French	Subject 7	2	11	6.5	4.5	
	Subject 8	5	4	4.5	0.5	
	Subject 9	2	2	2.0	0.0	
	Subject 10	4	6	5.0	1.0	
	Subject 11	6	2	4.0	2.0	
	Subject 12	9	3	6.0	3.0	
	\bar{X}_{Sp-WP}	4.67	\bar{X}_{Sp-WP}	4.67	\bar{X}_{Sp}	4.67
	SD	2.66	SD	3.45	SD	2.93
	\bar{X}_{WP}	5.82	\bar{X}_{WP}	6.08	\bar{X}_{total}	6.0
	SD	3.62	SD	4.72		

Two-Way Mixed ANOVA

Computations

Sums of squares	Degrees of freedom
-----------------	--------------------

Total SS = $(X - \bar{X}_{total})^2$ where X : single score	# of scores - 1
--	-----------------

Subjects SS = $[k (\bar{X}_{sub} - \bar{X}_{total})^2]$ where k : # of scores for each subject	# of subjects - 1
---	-------------------

Speakers SS = $[k (\bar{X}_{Sp} - \bar{X}_{total})^2]$ where k : # of scores for each level of Speakers	# of Speakers - 1
--	-------------------

Subjects within Speakers SS = Subjects SS - Speakers SS	k(# of subjects within Speakers - 1)
--	--------------------------------------

Word Pairs SS = $[k (\bar{X}_{WP} - \bar{X}_{total})^2]$ where k : # of scores for each level of Word Pairs	# of Word Pairs - 1
--	---------------------

Interaction (Speakers X Word Pairs) SS = $[k (\bar{X}_{Sp-WP} - \bar{X}_{total})^2]$ - Speakers SS - Word Pairs SS where k : # of scores for each cell (Sp-WP)	(# of Speakers - 1) X (# of Word Pairs - 1)
--	---

Interaction (word pairs X subjects within Speakers) SS = Total SS - Word Pairs SS - Subjects SS - Interaction (Speakers X Word Pairs) SS	(# of Word Pairs - 1) X k(# of subjects within Speakers - 1)
--	---

Table of Variance: Two-Way Mixed: One Within Subject Variable, One Between Subjects Variable

Source	SS	df	MS	F	p
<u>Between Subjects</u>					
Speakers	39.53	1	39.53	4.385	0.0627
Subjects within Speakers	90.13	10	9.01		
<u>Within Subjects</u>					
Word Pairs	0.43	1	0.43	0.016	0.9004
Word Pairs X Speakers	0.43	1	0.43	0.016	0.9004
Word Pairs X Subjects within Speakers	258.87	10	25.89		
Total	389.38	23			