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Quiz 2 CCA

A researcher has collected data on three psychological variables and four academic variables (standardized test scores).

She is interested in how the set of psychological variables relates to the academic variables. The dataset has 600 observations on seven variables. The psychological variables are locus of control, self-concept and motivation.

The academic variables are standardized tests in reading, writing, math and science. Conduct a Canonical Correlation Analysis (CCA) to address the stated research objective. Use any statistical software of your choice to generate the required outputs. Provide a comprehensive interpretation of the results.

Results

All canonical functions are significant p val less than 0.05

Canonical Corr of 0.44 means it has moderate relationship

Wilks' Lambda of 0.80 small but confirms a relationship

Chi-square of 132.25 and df of 12 (statistically significant).

	Dimension	Canonical Corr	Wilks' Lambda	Chi-Square	df	p-value
0	1	0.446436	0.800694	132.254127	12	0.00000
1	2	0.153359	0.781863	146.415113	6	0.00000
2	3	0.022503	0.781467	146.716501	2	0.00000

Function 1 heavily influenced by *locus of control and motivation* while the subject group have all high and positive loadings. ***This suggests that students that are motivated and feels that they are in charge of their own are overall better performing specially with reading and writing.***

While for other 2 functions (DIM2,DIM3) they are statistically significant but values are too low to come up with insights

physcological group loadings			
	Dim1	Dim2	Dim3
locus_of_control	0.914292	-0.393641	-0.095478
self_concept	0.099976	-0.421308	0.901390
motivation	0.585314	0.606133	0.538526

subject group loadings			
	Dim1	Dim2	Dim3
read	0.880434	-0.244905	0.273057
write	0.910126	0.220975	-0.339797
math	0.799992	-0.187928	0.283571
science	0.694107	-0.675884	-0.237673

Canonical Weights

- Locus of control dominates Dim 1
- Self-concept dominates Dim 3
- Motivation contributes across all dimensions specially Dim 2

Psy weights			
	Dim1	Dim2	Dim3
locus_of_control	0.876809	-0.472235	-0.090557
self_concept	-0.174754	-0.488415	0.854934
motivation	0.447959	0.733788	0.510771

- Write strongly defines Dim 1
- Science dominates Dim 2
- Read + Math help define Dim 3

subject weights			
	Dim1	Dim2	Dim3
read	0.617204	-0.335039	0.496473
write	0.743148	0.257804	-0.599997
math	0.253335	-0.121205	0.465700
science	-0.051115	-0.898107	-0.420289

Redundancy

As for meaningful relationship, the canonical variate from psychological variables explains **7.9%** of the variance in academic variables while Academic variate explains **13.6%** of psychological variance. The outcome supports out function 1 where not only its statistical significance but also meaningful in real life application

	redundancy_X	redundancy_Y	Redundancy_X to Y	Redundancy_Y to X
Dim1	0.396173	0.681316	0.078959	0.135790
Dim2	0.233283	0.150236	0.005487	0.003533
Dim3	0.370544	0.081731	0.000188	0.000041

Cross Loadings

psychological variables on academic canonical variates

locus_of_control (0.408) and motivation (0.261) both show moderate relationships with the academic canonical variate. This confirms our answer that high academic scores are related to locus_of_control and motivation variable. The other dimensions don't have significant values to draw conclusion.

Cross loadings of psychological variables (X) on academic canonical variates (V)			
	Dim1	Dim2	Dim3
locus_of_control	0.408171	-0.060368	-0.002149
self_concept	0.044630	-0.064611	0.020284
motivation	0.261310	0.092956	0.012119

Academic variables on psychological canonical variates

Writing (0.406) and Reading (0.393) show the strongest cross-loadings, followed by Math (0.357) and Science with (0.310) is slightly lower. ***This shows that motivation and locus_of_control are moderately linked to high performance while reading and writing best show the psychological aspect for each students.***

Cross loadings of academic variables (Y) on psychological canonical variates (U)			
	Dim1	Dim2	Dim3
read	0.393058	-0.037552	0.006145
write	0.406313	0.033895	-0.007647
math	0.357146	-0.028815	0.006381
science	0.309875	-0.103648	-0.005349

This study shows that in order for students to learn better/ perform better in their subjects students must possess the qualities of “motivation” and “locus of control” (personal agency). Locus of control is the most powerful link to academic success based from the data while reading and writing displays the psychological standing of the student.