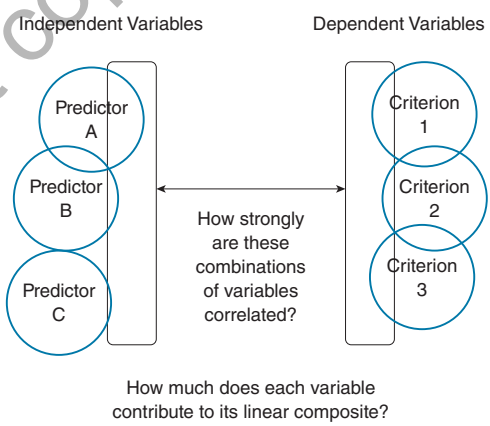
MODULE 34

Canonical Correlation

Independent Variables	**2+**
Level of Measurement	Interval
Number of Levels	Many
Number of Groups	1
Dependent Variables	**2+**
Level of Measurement	Interval
Number of Levels	Many
Measurement Occasions	**1**

Research Design

Canonical correlation is used when the researcher wishes to look at the relationships between several interval level independent variables and several interval level dependent variables. Somewhat similar to **multiple linear regression** (see Module 33), which sees how well a linear composite of predictor variables can explain a single criterion variable, canonical correlation sees how well a linear composite of predictor variables can explain a linear composite of criterion variables. Think of whatever the predictor variables have in common as a variable of its own. How strongly is that variable related to whatever the several criterion variables have in common? Canonical correlation is most often used when an abstract criterion variable can't be measured well with a single score or measurement strategy.



Primary Statistical Question

How strongly are the predictor variables related to the criterion variables?

Example of a Study That Would Use Canonical Correlation

One researcher believed that a good teacher should value the principles of John Dewey, a twentieth-century philosopher, who believed that students should have some say in their own learning. Which personality characteristics are associated with this value system? Three measures that represent this philosophy were identified, two different attitude surveys and a measure of how flexible one is in his or her own beliefs. Scores on these measures were chosen as dependent or criterion variables. The independent (or predictor) variables were three personality traits (*emotional vs. rational*, *imaginative vs. practical*, and *experimenting vs. conservative*).

Analysis

Canonical correlation finds the best combination of predictors that correlates as highly as possible with the best combination of the criterion variables. This combination is a *canonical function*. Many functions can be identified, but, often, only the first function is significant and interpreted, and that is the function shown here. Imagine the results looked like this.

		Standardized Weight
Predictor Variables	Emotional	.345
	Imaginative	.462
	Experimenting	.508
Criterion Variables	Dewey Beliefs Test 1	.748
	Dewey Beliefs Test 2	.533
	Flexibility	.195

The weights are the weights on the equations that define the two linear combinations of variables. They can be compared to each other to see the relative contribution of each variable. Assuming that the overall correlation and each weight are statistically significant, it appears that a Dewey philosophy (as defined mostly by the first Dewey beliefs test) correlates with the personality traits of experimenting, imaginative, and being emotional.

Things to Consider

- As with **multiple linear regression**, canonical correlation can include nominal variables. They are recoded as *dummy variables*, variables with just two levels (or *dichotomous*) that represent a single category of the nominal variable.
- Because there can be a large number of independent variables and a large number of dependent variables, many other statistical procedures can be thought of as specific examples of canonical correlation.
- Canonical correlation is a *multivariate* approach, which means that statistical analyses are made not on matching pairs of single variables but on the combinations of multiple outcome variables. As such, it capitalizes on what is probably a more accurate and meaningful measurement of the often fuzzy concepts researchers wish to use as variables.

Real-Life Study That Inspired This Example

Elmore, R. F., & Ellett, C. D. (1978). A canonical analysis of personality characteristics, personal and teaching practice beliefs, and dogmatism of beginning teacher education students. *Journal of Experimental Education, 47*(2), 112–117.