



THE VARIATE

COM 631/731

The Variate

- As defined by Hair et al.: “Linear combination of variables formed in a multivariate technique by deriving empirical weights applied to a set of variables specified by the researcher”
- It is essentially a scale...a combination of two or more individual measures...that is often derived from a multivariate procedure

The Variate

- The variables are specified by the researcher, whereas the weights are determined by the multivariate technique in some multiple regression formula.
- A sample formula:
 - Variate value = $w_1X_1 + w_2X_2 + w_3X_3 + \dots + w_kX_k$
- Think of this as analogous to a *recipe*, where the variables (X's) are different ingredients, and the weights (w's) are the amounts of each ingredient to be used in the recipe.
- However, in multivariate techniques, the “recipes” are created by the procedures, to maximize something!

The Variate as Recipe



The Variate as Recipe

- Just as you can make different food items from different recipes using the same ingredients, there can be multiple variates created from the same set of variables.
 - e.g., In factor analysis, we usually see more than one factor emerge from a set of variables.



Examples of Variates

Multivariate Procedure	Variate
Multiple Regression	Regression equation
Factor Analysis	Factor (F)
Discriminant Analysis	Discriminant function (DF)
Logistic Regression	Logistic regression equation
MANOVA	Discriminant function (DF)
Canonical Correlation	Canonical variate (CV)

- The generic variate formula:
 - Variate value = $w_1X_1 + w_2X_2 + w_3X_3 + \dots$
- Multiple regression:
 - Unstandardized:

$$Y' = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \dots$$
 - Standardized:

$$Y'_z = \beta_1X_{1z} + \beta_2X_{2z} + \beta_3X_{3z} + \beta_4X_{4z} + \dots$$
- Factor analysis:

$$F1 = \beta_{1a}X_{1z} + \beta_{2a}X_{2z} + \beta_{3a}X_{3z} + \dots$$

$$F2 = \beta_{1b}X_{1z} + \beta_{2b}X_{2z} + \beta_{3b}X_{3z} + \dots$$
- Discriminant analysis:

$$DF1 = \beta_{1a}X_{1z} + \beta_{2a}X_{2z} + \beta_{3a}X_{3z} + \dots$$

$$DF2 = \beta_{1b}X_{1z} + \beta_{2b}X_{2z} + \beta_{3b}X_{3z} + \dots$$
- Logistic regression:
 - Logit = $\ln(\text{Odds}) = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \dots$
- MANOVA: TBA
- Canonical correlation: TBA

end