F Test for Hierarchical Regression

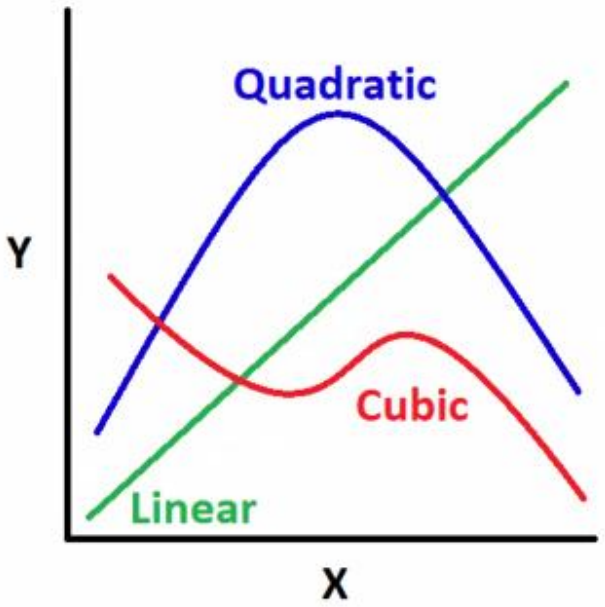
Restricted Model (R; fewer IVs) $Y = B_0 + B_1X_1 + e \rightarrow R_R^2 = 1 - \sigma_{e_R}^2$

Full Model (F; more IVs) $Y = B_0 + B_1X_1 + B_2X_2 + e \rightarrow R_F^2 = 1 - \sigma_{e_F}^2$

$\Delta R^2 = R_F^2 - R_R^2$ –OR– $\Delta R^2 = \left(1 - \sigma_{e_F}^2\right) - \left(1 - \sigma_{e_R}^2\right) = \sigma_{e_R}^2 - \sigma_{e_F}^2$

$$F_{\Delta R^2} = \frac{\frac{\sigma_{e_R}^2 - \sigma_{e_F}^2}{df_R - df_F}}{\frac{\sigma_{e_F}^2}{df_F}} = \frac{\frac{\left(1-R_R^2\right)-\left(1-R_F^2\right)}{(N-J_R-1)-(N-J_F-1)}}{\frac{1-R_F^2}{N-J_F-1}} = \frac{\frac{R_F^2-R_R^2}{J_F-J_R}}{\frac{1-R_F^2}{N-J_F-1}}, \text{ with } \underline{\text{df}} = \frac{J_F-J_R}{N-J_F-1}$$

Polynomial Regression



Model 1 (linear): $Y = B_0 + B_1X + e \rightarrow R^2_{Lin}$

Model 2 (quadratic): $Y = B_0 + B_1X + B_2X^2 + e \rightarrow R^2_{Quad}$

Model 3 (cubic): $Y = B_0 + B_1X + B_2X^2 + B_3X^3 + e \rightarrow R^2_{Cub}$

Model 4 (quartic): $Y = B_0 + B_1X + B_2X^2 + B_3X^3 + B_4X^4 + e \rightarrow R^2_{Quar}$

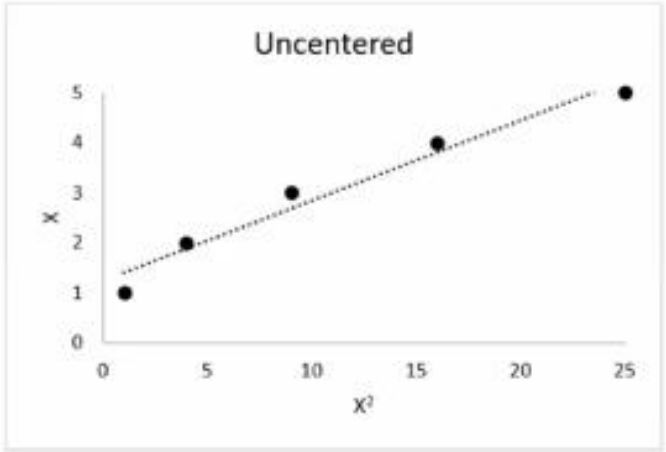
Variance Uniquely Explained by:

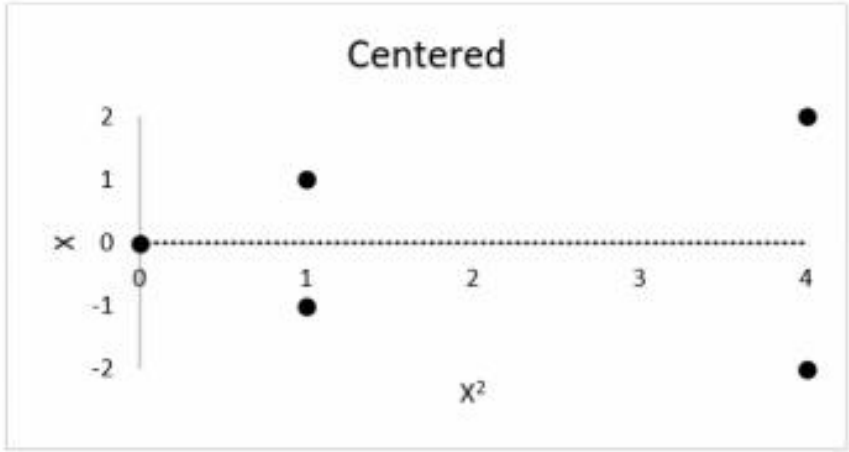
Quadratic Effect: $\Delta R^2 = R^2_{Quad} - R^2_{Lin}$

Cubic Effect: $\Delta R^2 = R^2_{Cub} - R^2_{Quad}$

Quartic Effect: $\Delta R^2 = R^2_{Quar} - R^2_{Cub}$

Eliminates nonessential multicollinearity





Logistic Regression

		Predicted Class	
		Yes (1)	No (0)
Actual Class	Yes (1)	**True Positive (A)**	**False Negative (B)**
	No (0)	**False Positive (C)**	**True Negative (D)**

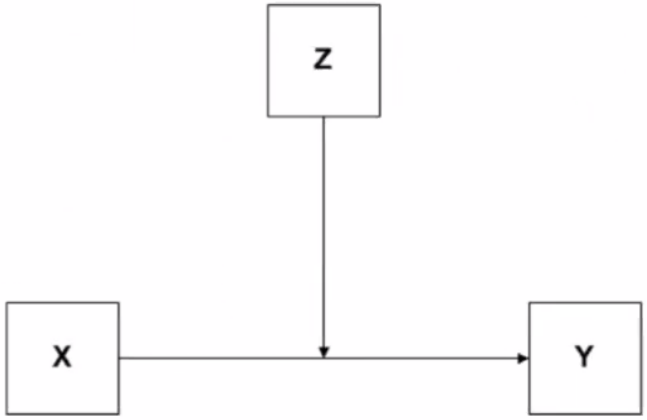
$$\text{Sensitivity} = \frac{True\ Positives}{Actual\ Positives} = \frac{A}{A+B}$$

$$\text{Specificity} = \frac{True\ Negatives}{Actual\ Negatives} = \frac{D}{C+D}$$

$$\text{Percentage Accuracy in Classification (PAC)} = \frac{Correct}{All} = \frac{A+D}{A+B+C+D}$$

$$\text{McFadden's Pseudo-}R^2 = \frac{Reduction\ in\ Error}{Total\ Error} = \frac{\left(\frac{Deviance_{Null}}{2}\right) - \left(\frac{Deviance_{Residual}}{2}\right)}{\frac{Deviance_{Null}}{2}}$$

Moderation



Model 1 (restricted): $Y = B_0 + B_1X + B_2Z + e \rightarrow R_R^2$

Model 2 (full): $Y = B_0 + B_1X + B_2Z + B_3(X * Z) + e \rightarrow R_F^2$

$$\Delta R^2 = R_F^2 - R_R^2$$

Interaction Types