Recap of Central Results

- Longitudinal modeling of non-Gaussian outcomes is hard!
- Generalized Estimating Equations: Marginal model (Population average model)
 - Model mean of response
 - Deals easily with non-gaussian outcomes: GLM
 - Mean model with *working* covariance (nuisance)
- Properties
 - Consistency and normality of $\widehat{oldsymbol{eta}}$
 - Do NOT need to get the working correlation correct (valid)
 - Efficiency gain when working correlation is closer
 - Relies heavily on asymptotics!

Recap of Central Results (2)

• Inference:

- Sandwich estimator for variance
- Robust Wald and Score Tests
- Naive tests when empirical covariance hard to work with
- Relies heavily on asymptotics!
- GEE2: Beyond mean model
 - Add in addition estimating equations for correlation parameters
 - OR instead of correlation
 - Similar results as before (keep mean and correlation models separate)
 - ALR is useful implementation

Key References

- Liang KY. and Zeger S.L. (1986)
- Rotnitzky and Jewell (1990)
- Prentice R.L. (1988).
- Zhao and Prentice (1990) and Prentice and Zhao (1991)
- Fitzmaurice, Laird and Rotnitzky (1993)
- Lipsitz, Laird and Harrington (1991)
- Liang, Zeger and Qaqish (1992)
- Carey, Zeger and Diggle (1993)

Where we are in 571...

- 1. Introduction to Correlated Data
- 2. Linear Mixed Models (HW1)
- 3. Review of GLMs and Quasi-likelihood
- 4. Generalized Estimating Equations (HW2)
- 5. Final project description (HW 4)
- 6. Generalized Linear Mixed Models (HW3)
- 7. Missing Data
- 8. Classical and Modern Multivariate Analysis
- 9. Group Papers Due