

Biometrical Age-Based Latent Growth Curve Modeling

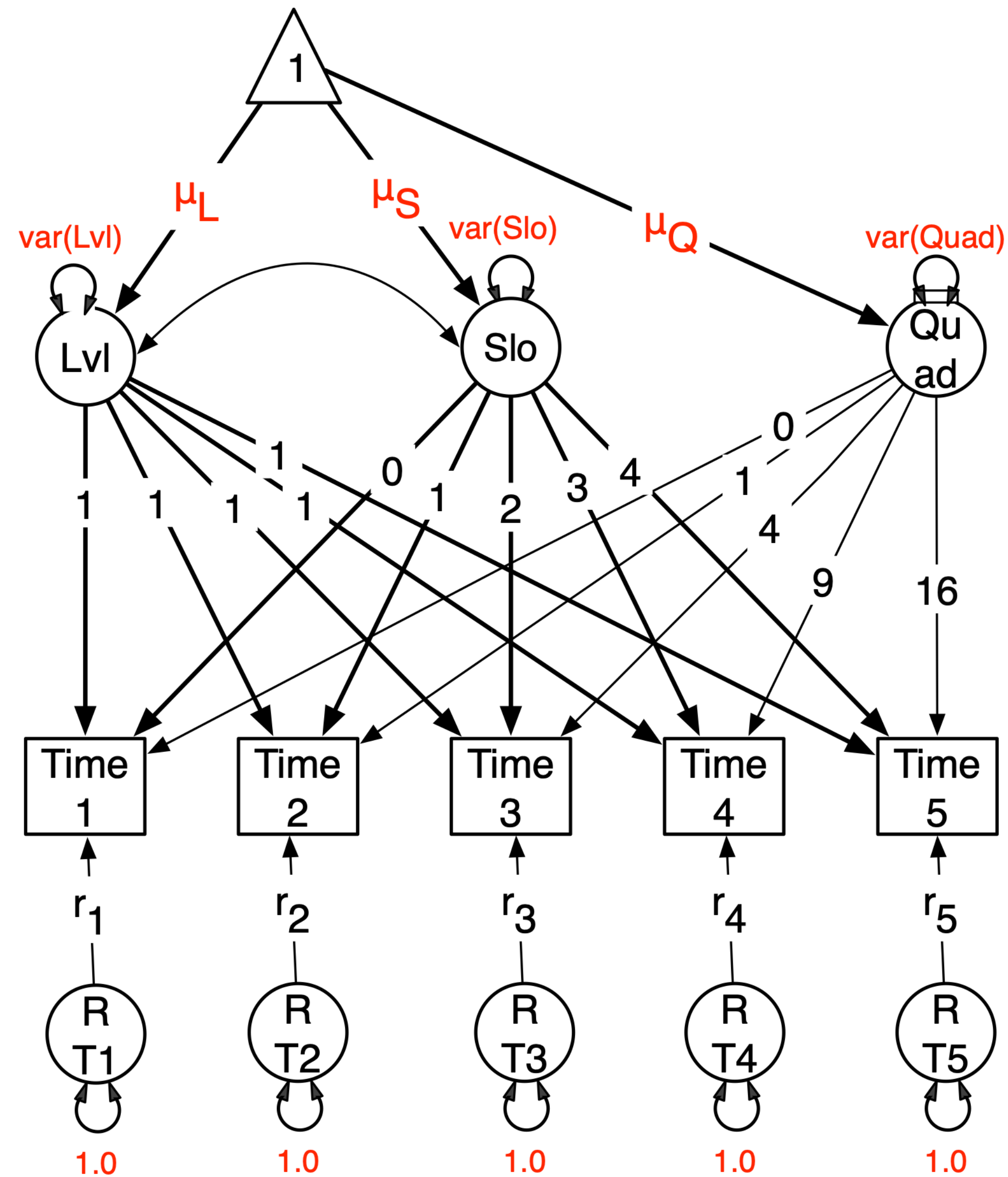
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Boulder Colorado NIMH Workshop June 2022

LGC Model



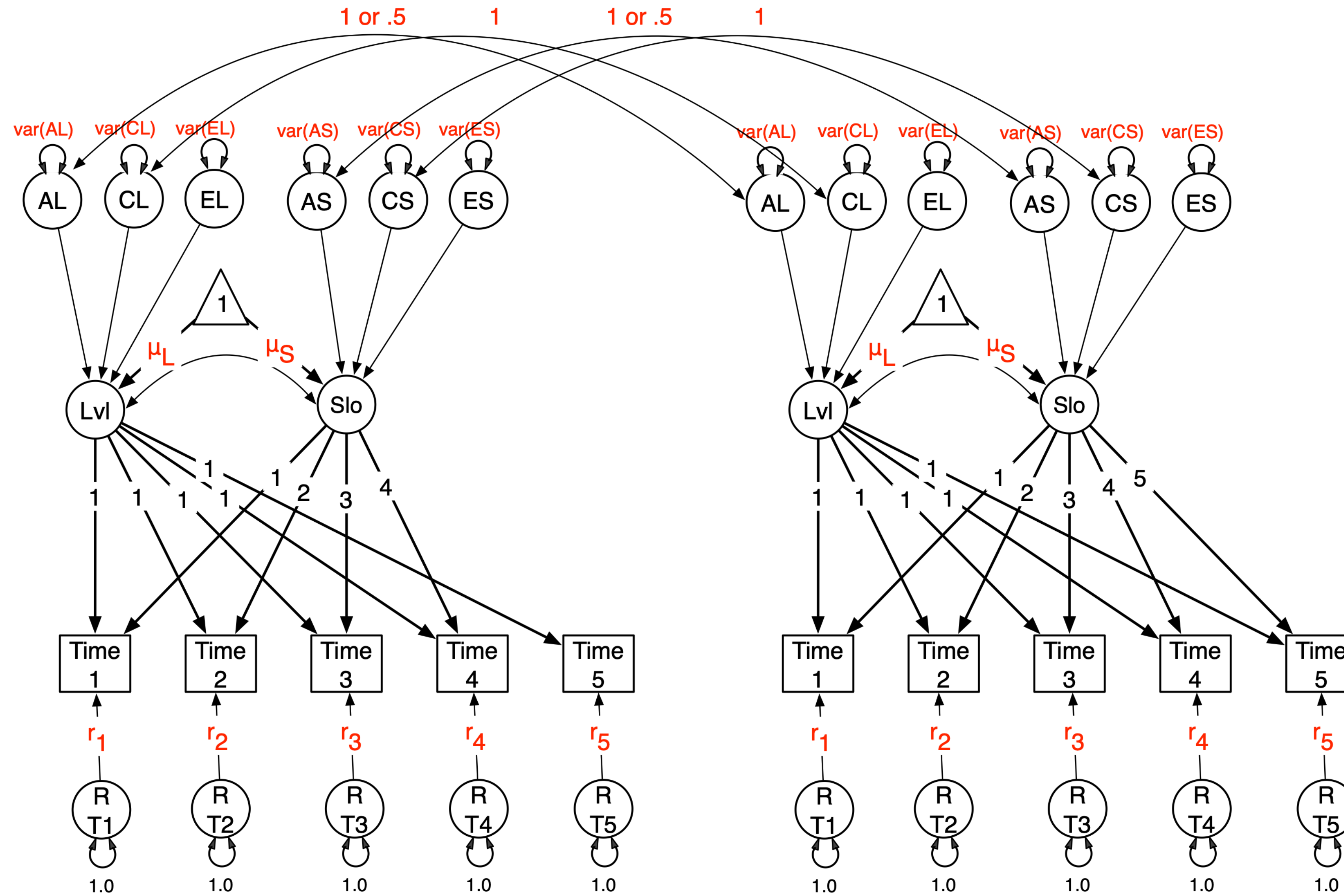
Fixed Effects: Triangles

Random Effects: Circles

Random Effects can be partitioned!

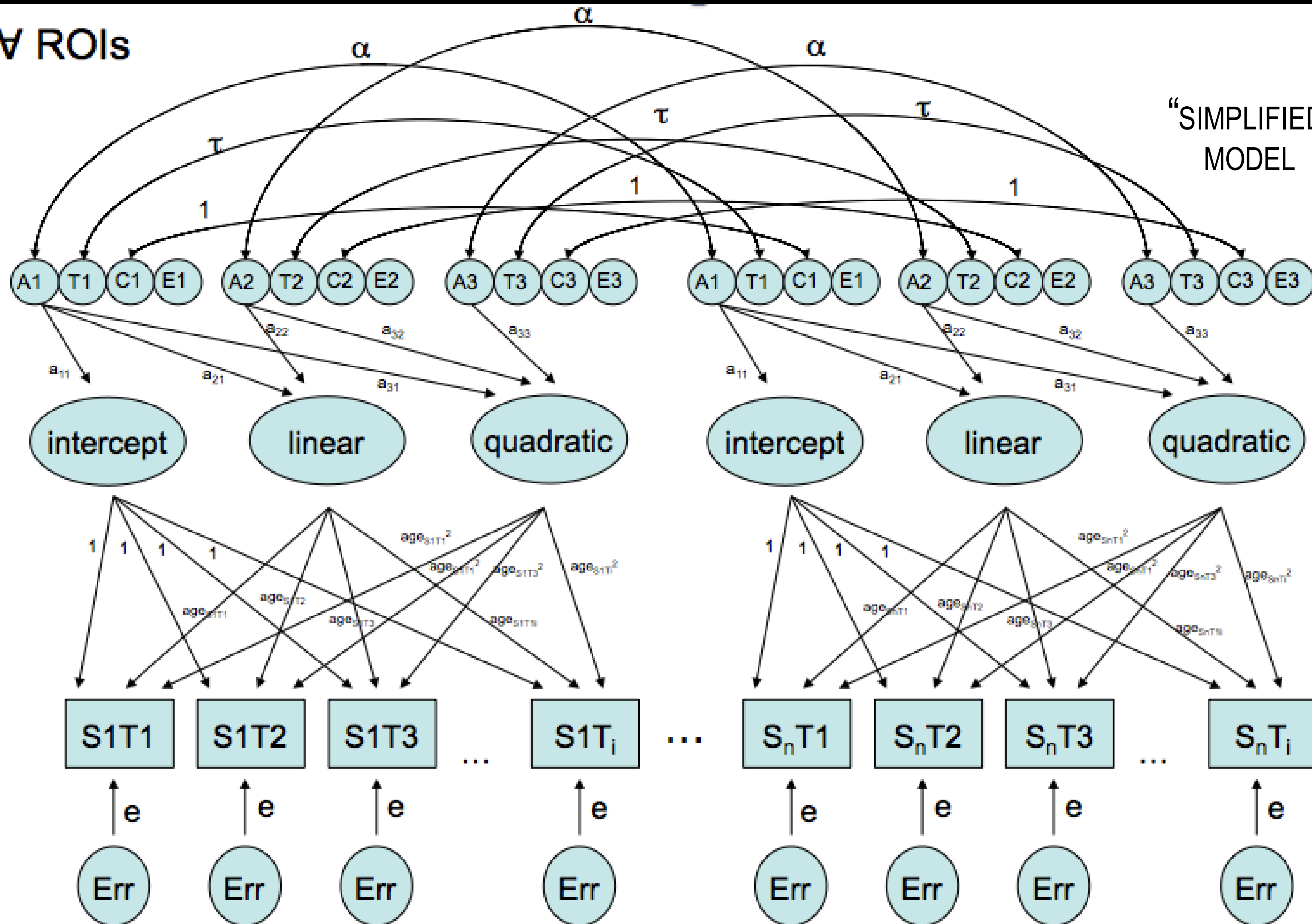
Linear growth rare, but need 4+ occasions for Quadratic

Biometric LGC Model



✓ ROIs

F2



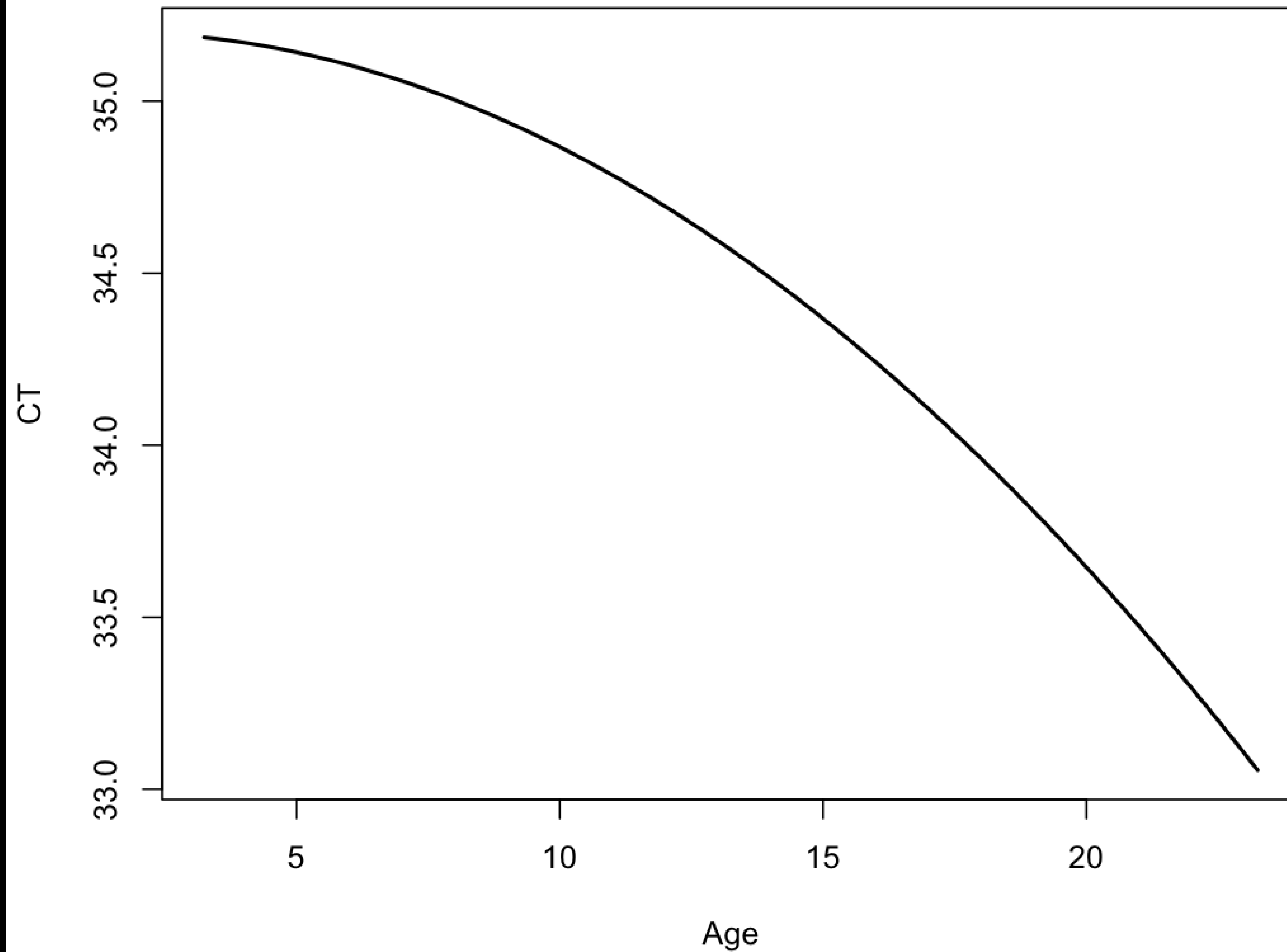
$\alpha = 1$ for MZ-MZ covariances, 0.5 otherwise
 $\tau = 1$ for twin-twin covariances, 0 otherwise

Note Err can be similarly partitioned

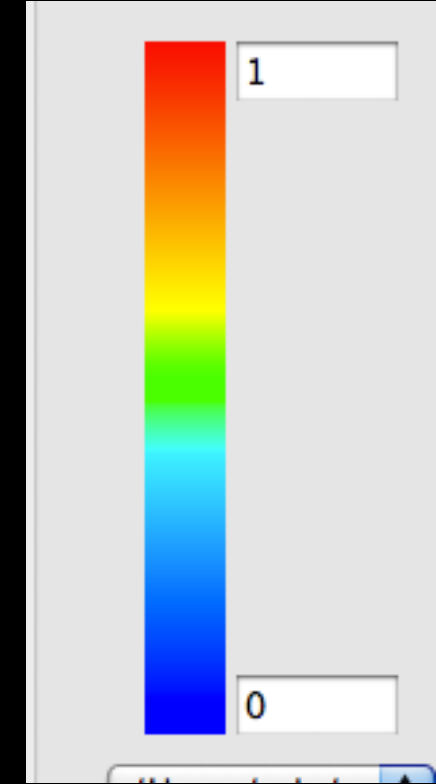
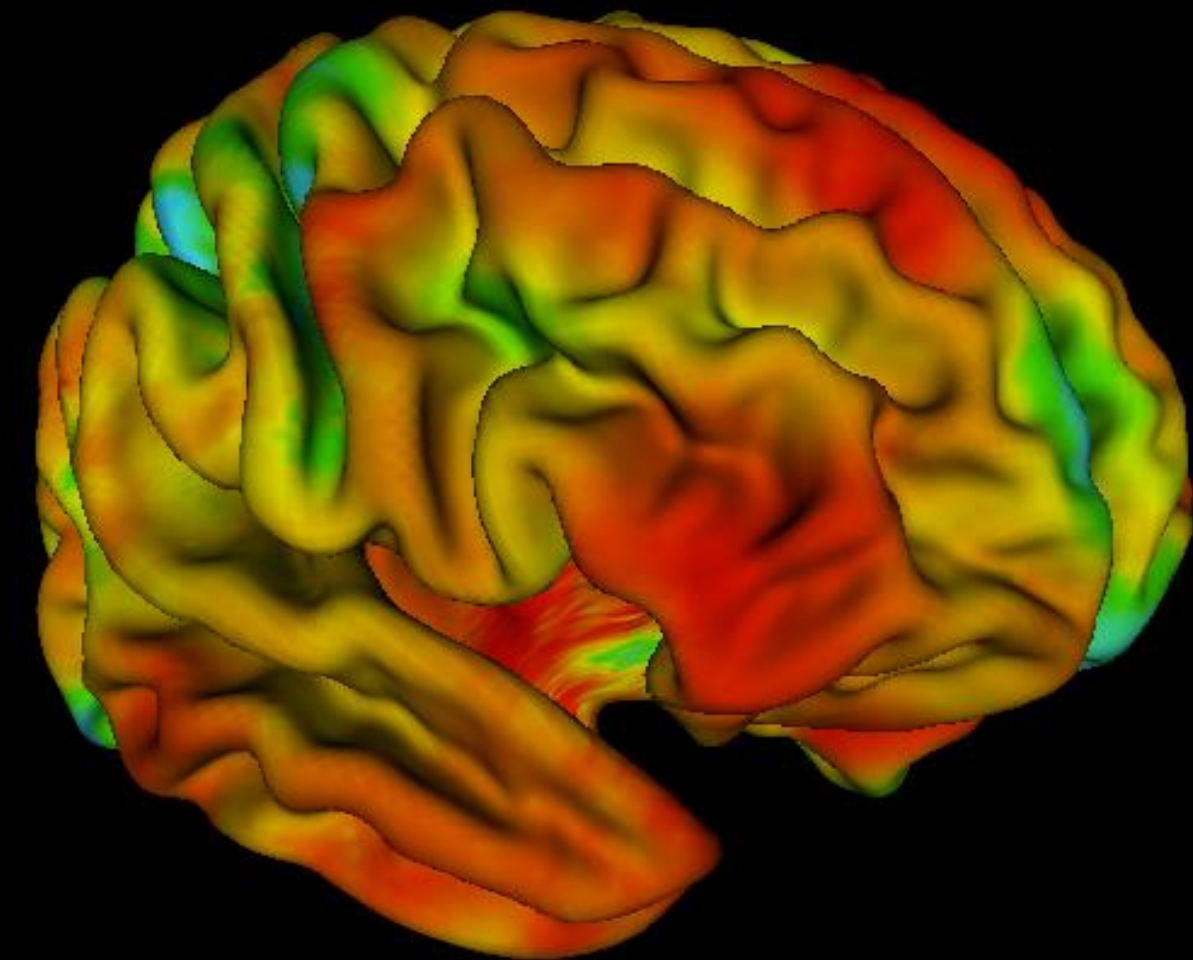
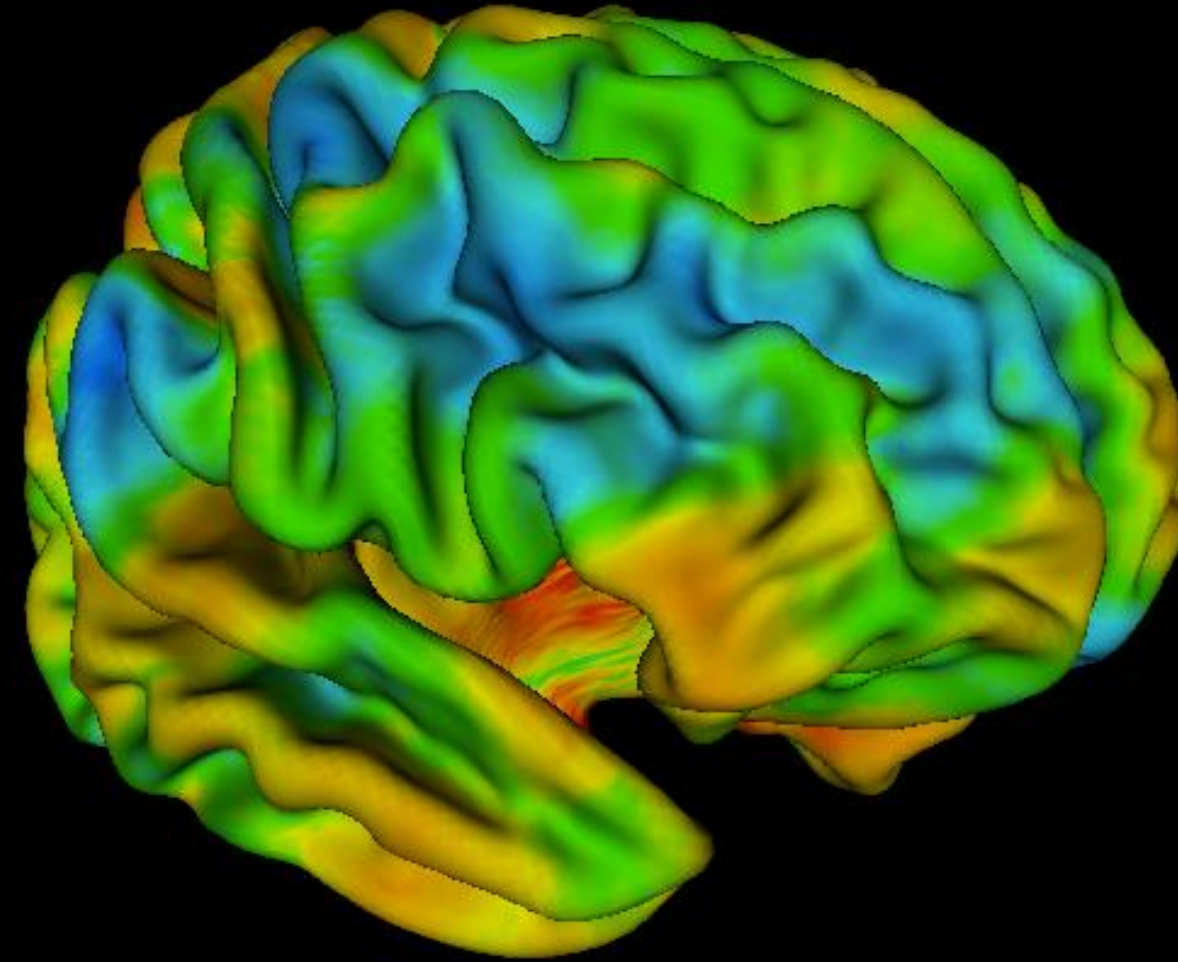
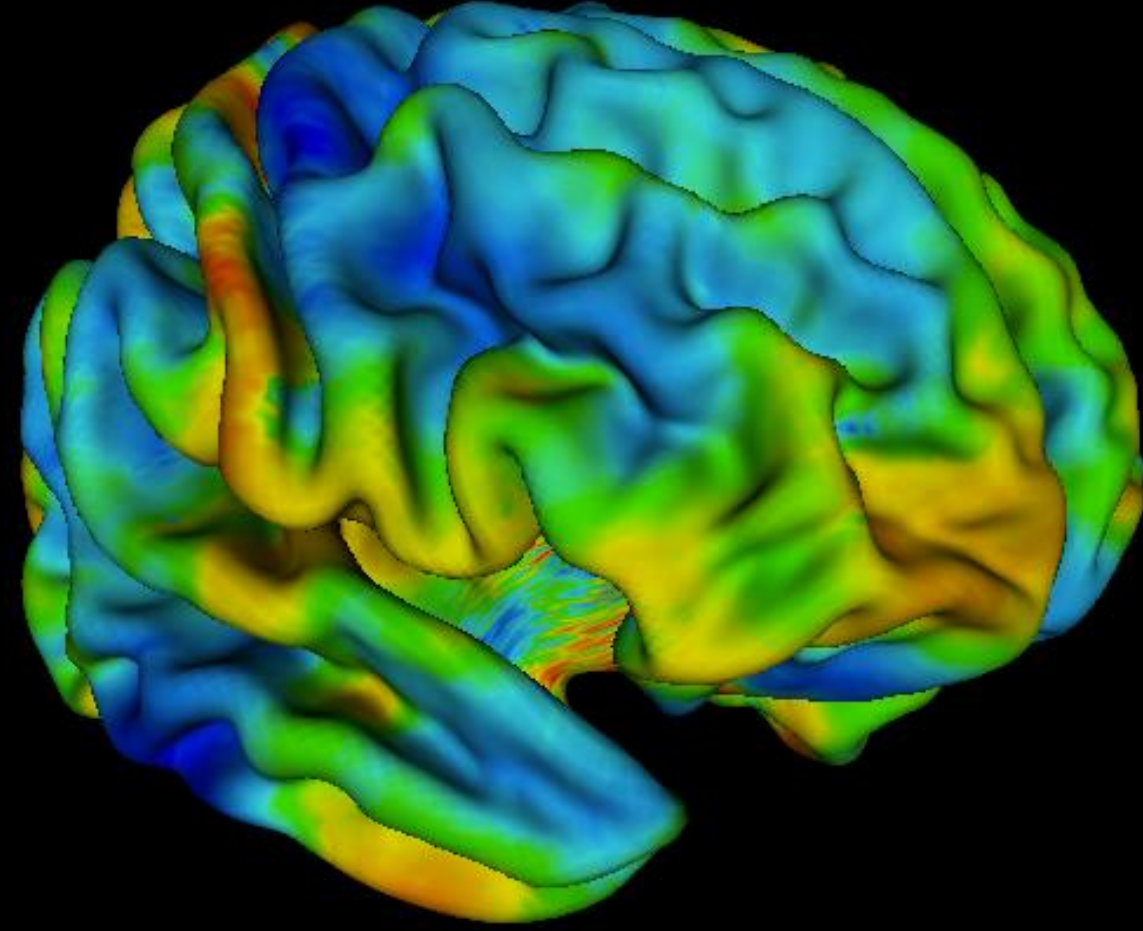
Main Features

- Enables modeling of longitudinal data, regardless of # of occasions
- Allows for variable intervals between occasions of measurement
- Partitions variation in Level, Slope etc. factors into A(CDT)E components
- Potentially models residual variation into ACE components
- May be able to adjust for different measurement error at different ages
- Extends to multivariate & other types of relatives

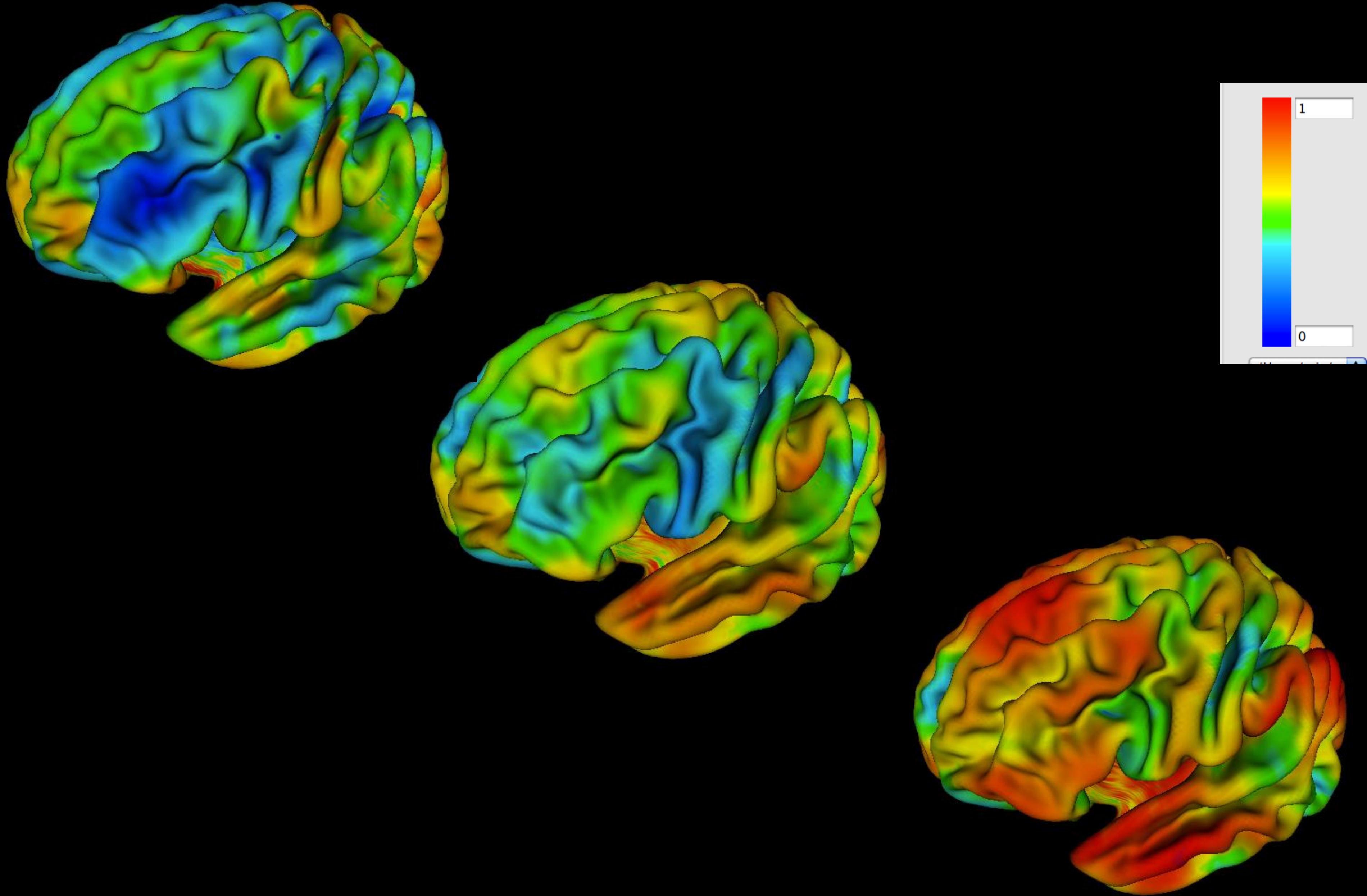
Right Cortical Thickness with Age



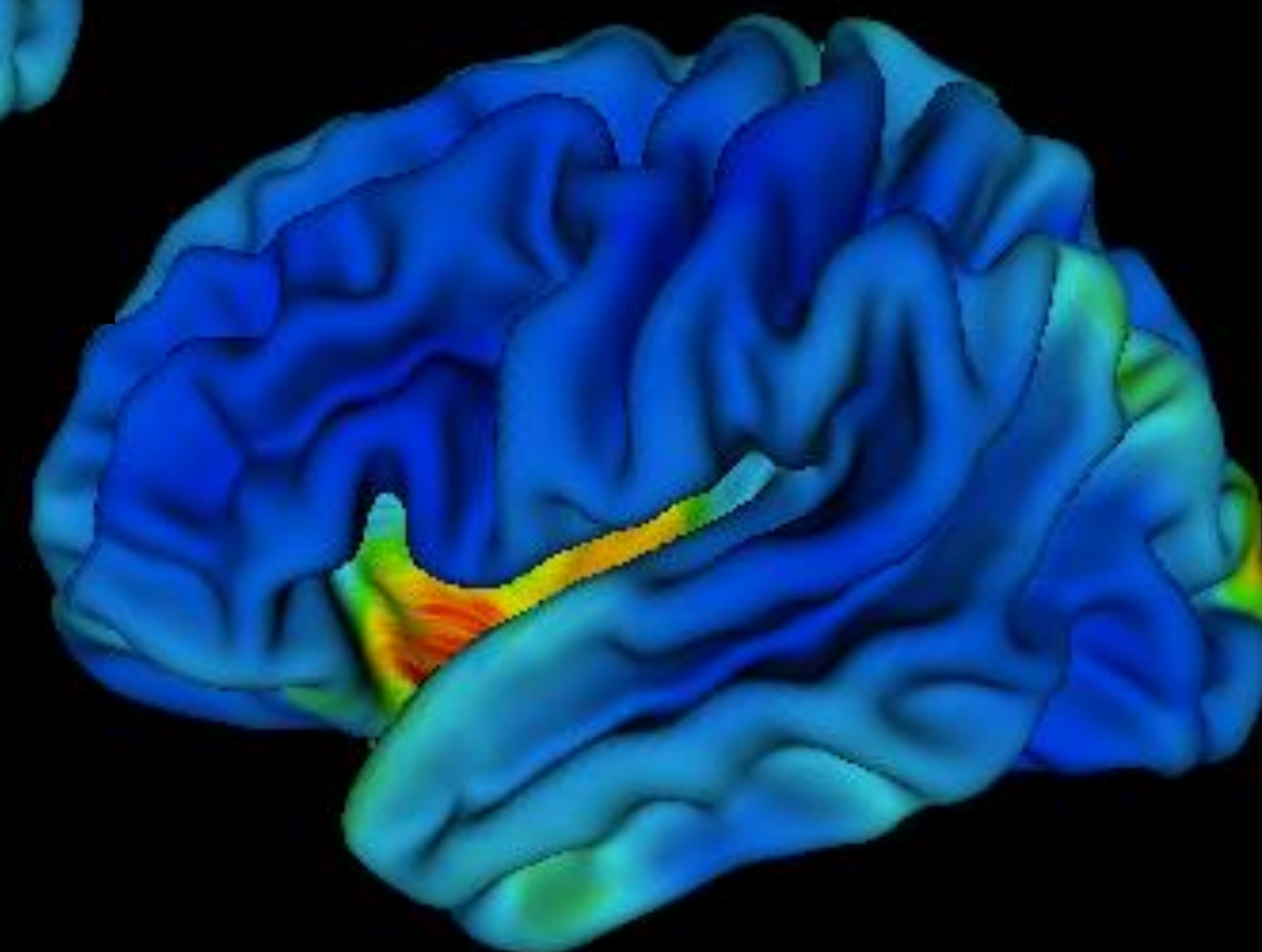
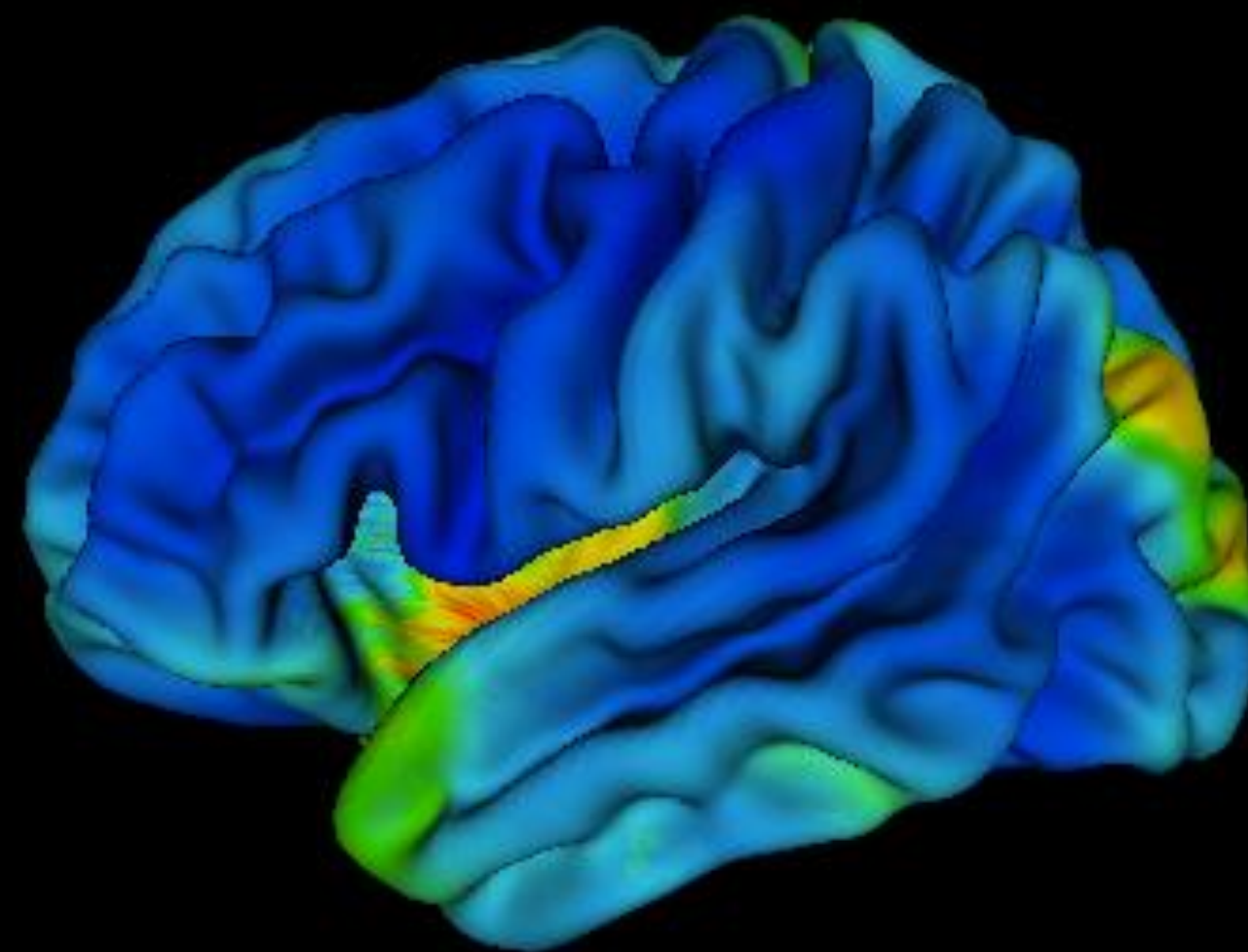
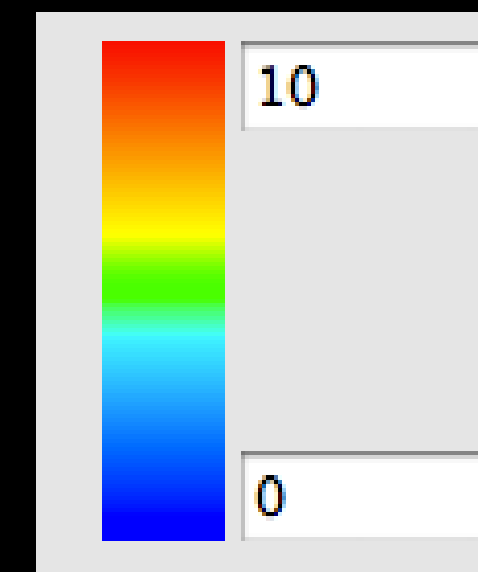
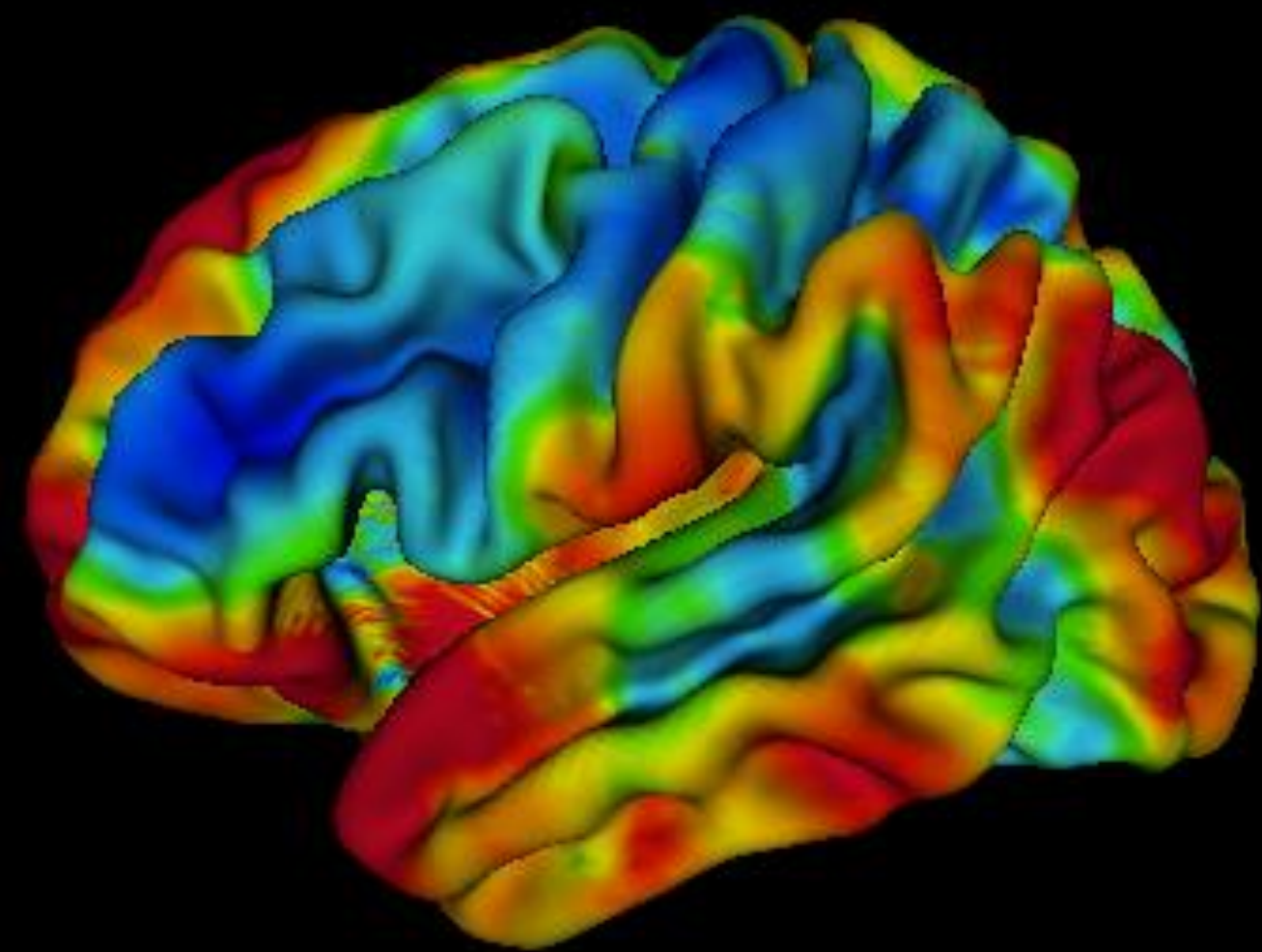
Heritability (%) ages 5-10-15



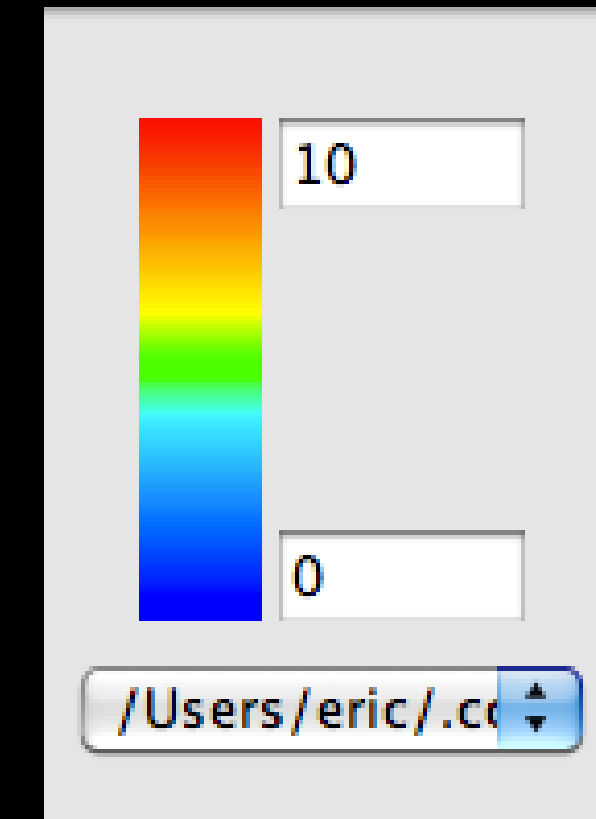
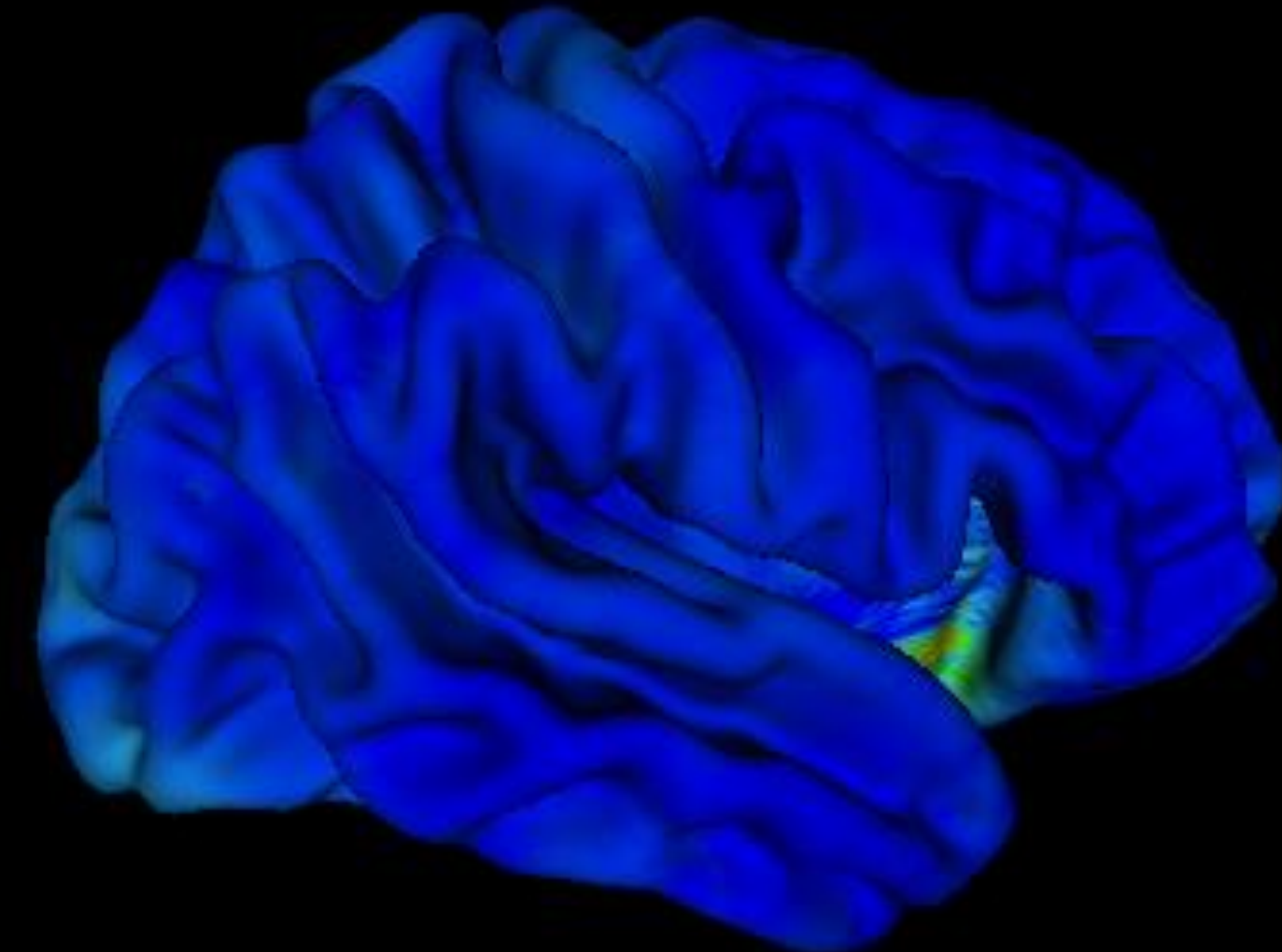
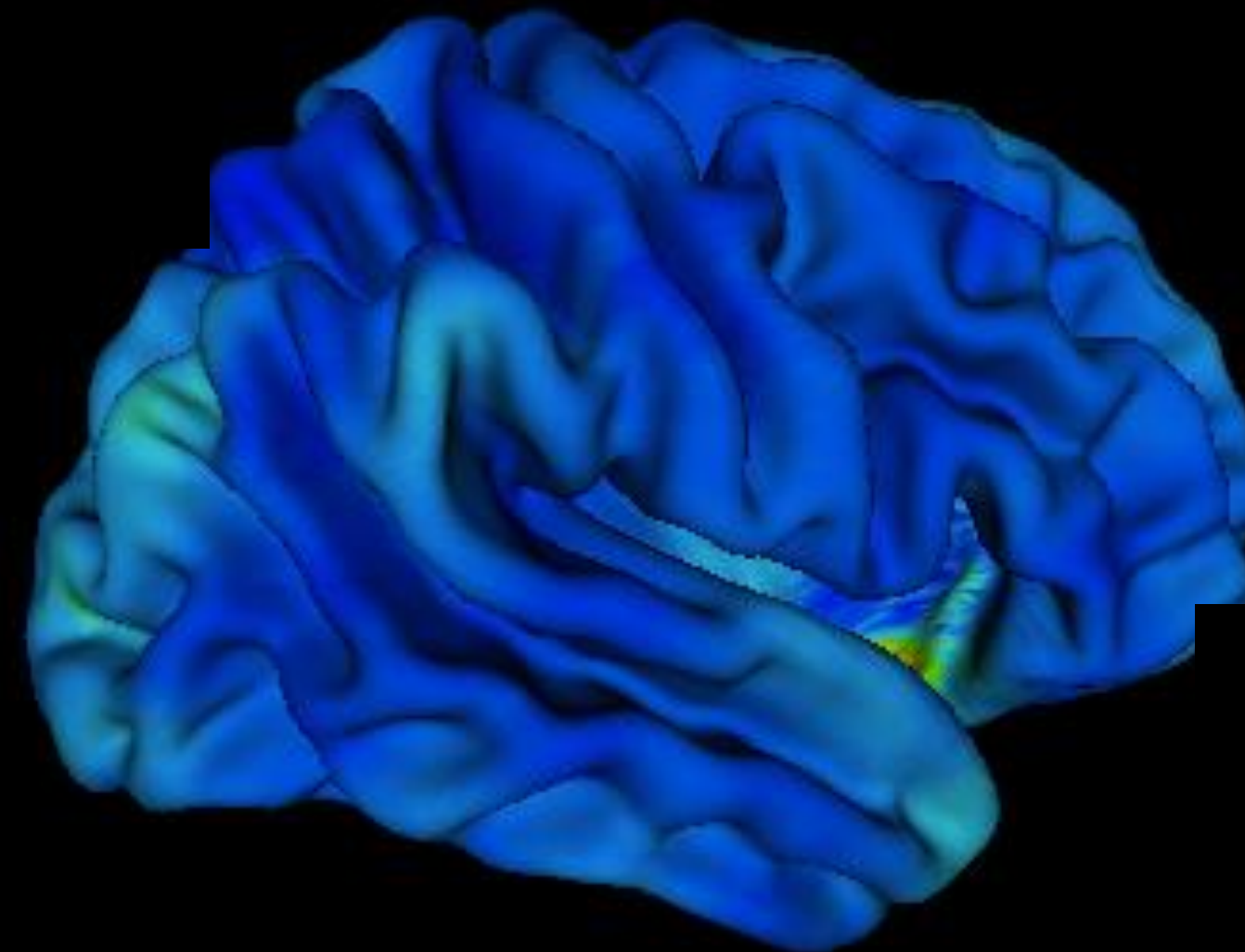
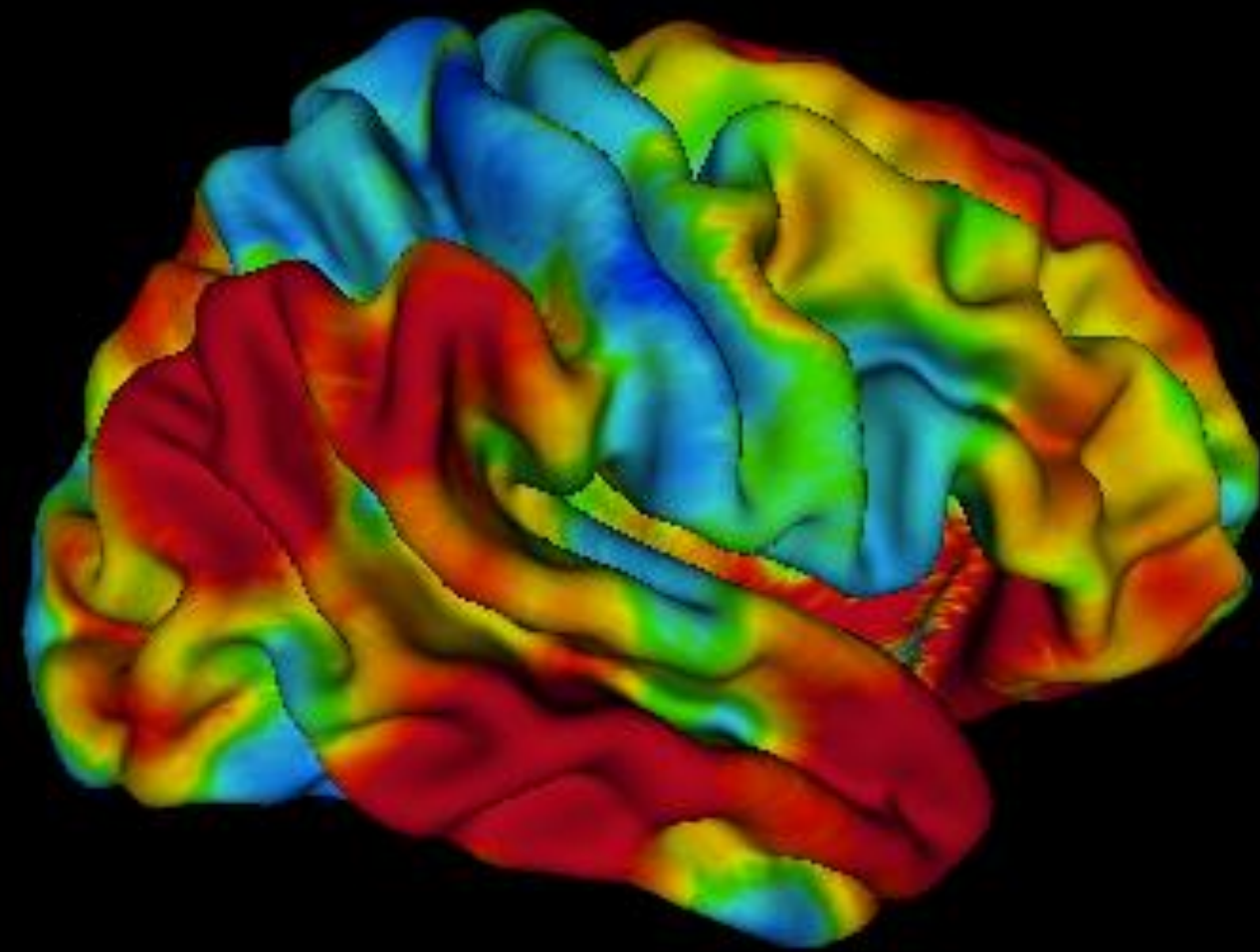
Heritability (%) ages 5-10-15



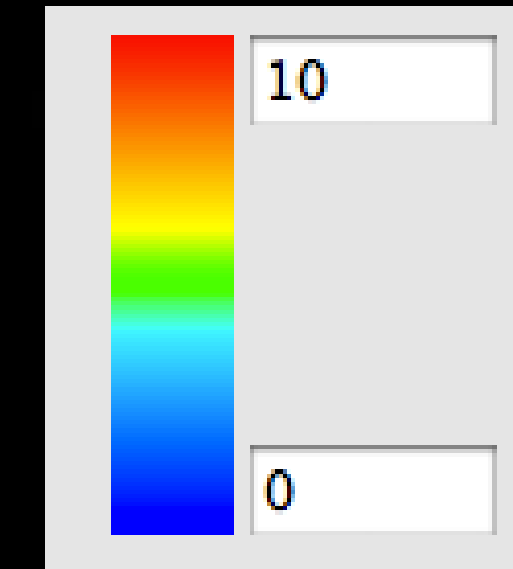
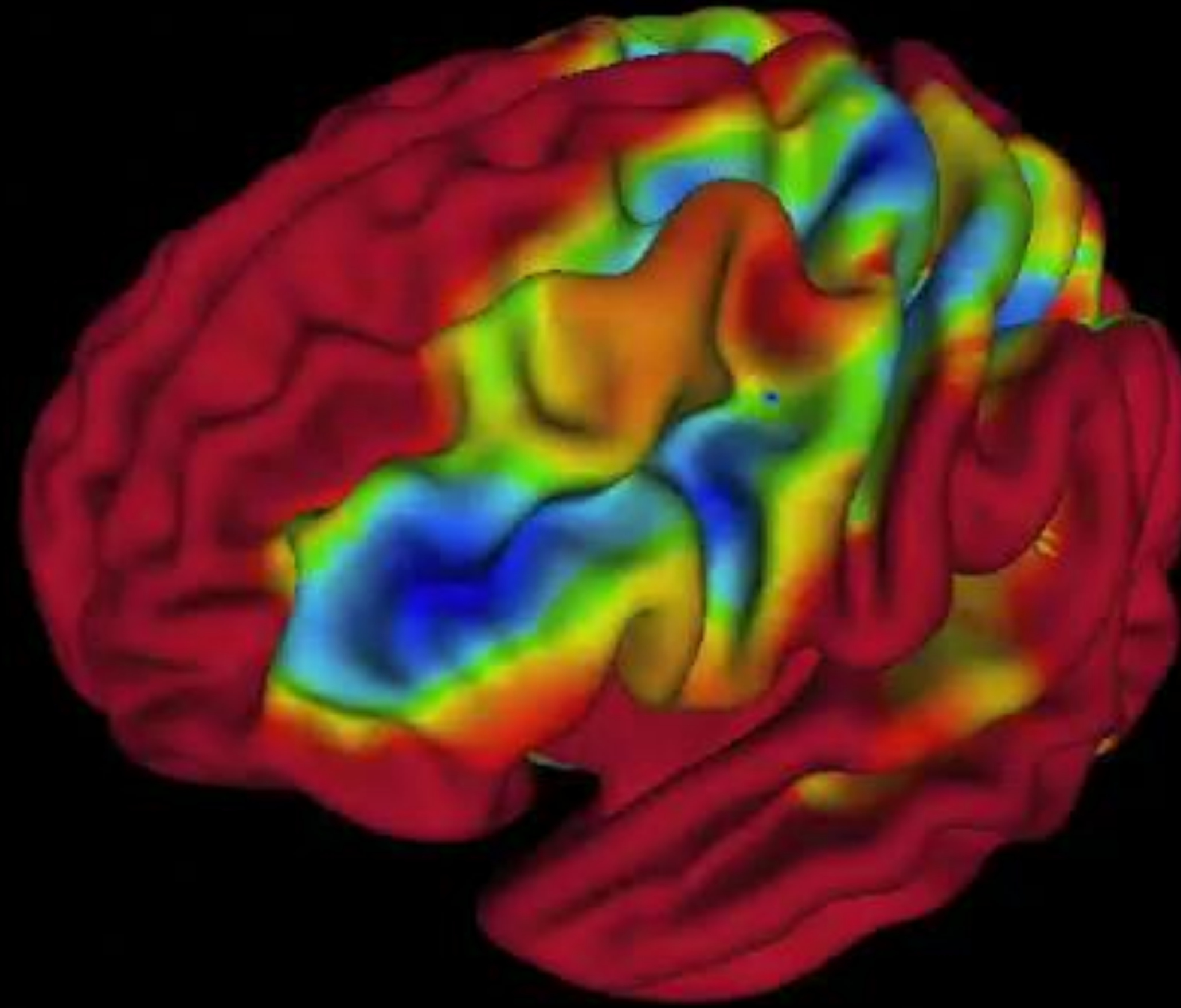
Genetic Variance Estimates ages 5-10- 15



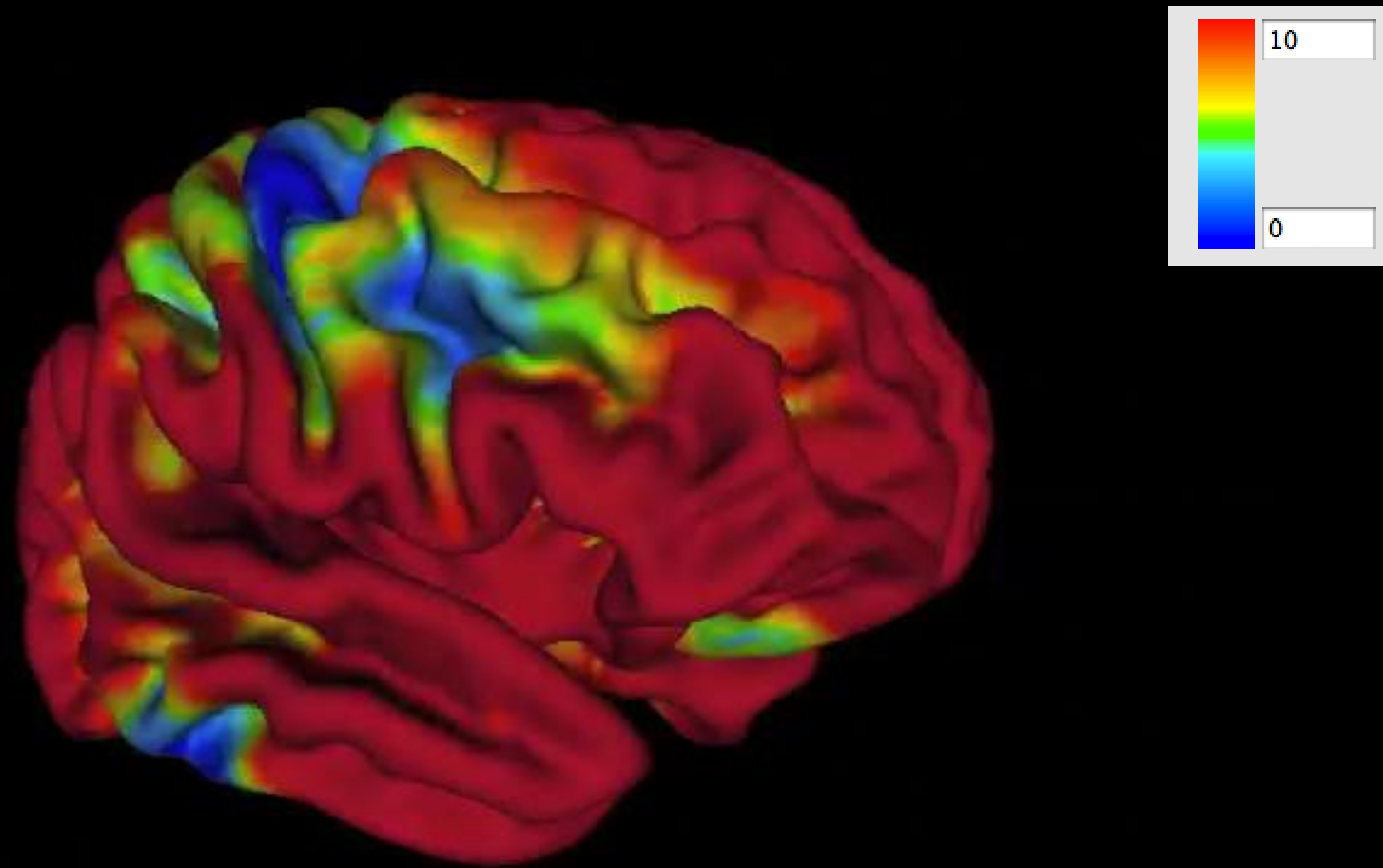
Environmental Variance Estimates 5-10-15



Genetic variance ages 5-18 dynamic (movie)

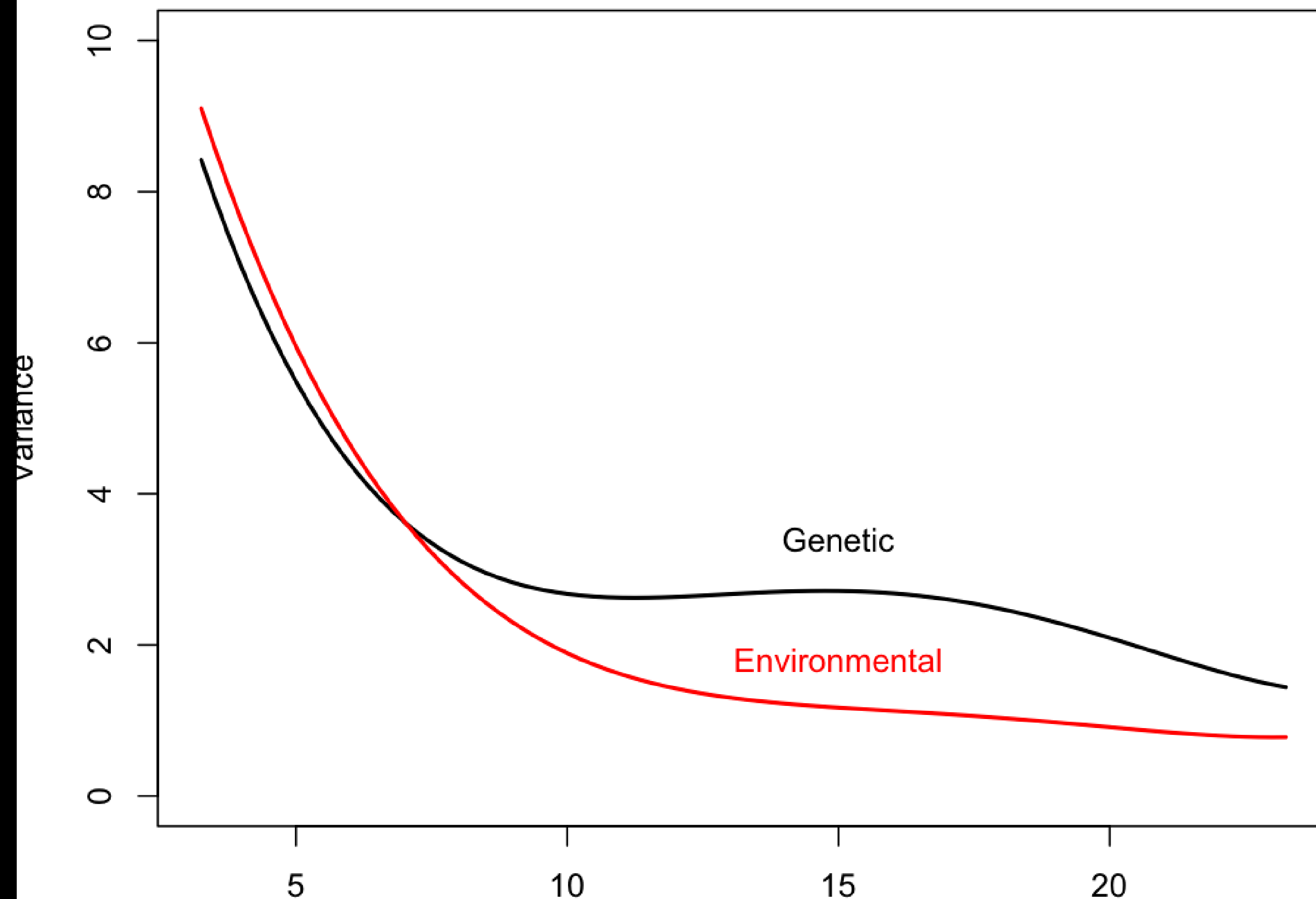


Genetic variance ages 5-18



Heritability Increases

Right Mean CT variance with Age



SUMMARY

- Can estimate ACE+ parameters from Biometrical LGC
- Can calculate estimates for particular ages
- REALLY IMPORTANT: Know difference between genetic variance estimate and heritability
- Understand your data
 - If model-fitting results seem odd, there should be data characteristics that are consistent with them. Find them!