Power Calculation Practical

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Power Calculations Empirical

- Attempt to Grasp the NCP from Null
- Simulate Data under theorized model
- Calculate Statistics and Perform Test
- Given α , how many tests $p < \alpha$
- Power = (#hits)/(#tests)

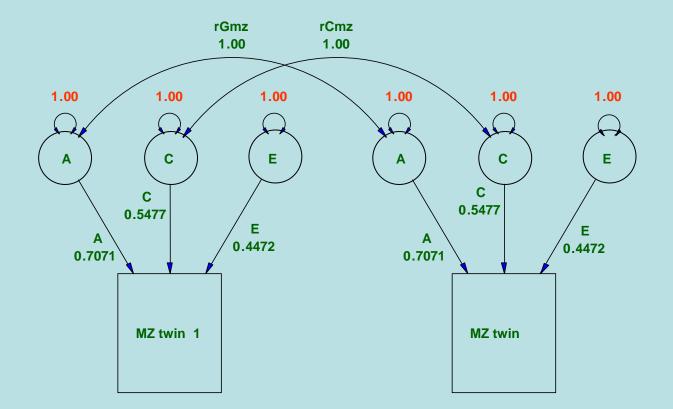
Practical: Empirical Power 1

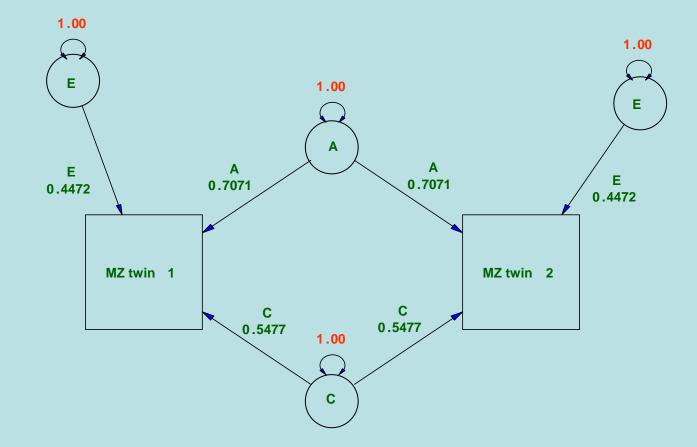
- We will Simulate Data under a model online
- We will run an ACE model, and test for C
- We will then submit our results and Jeff will collate the empirical values
- While that is being calculated, we'll talk about theoretical power calculations

Practical: Empirical Power 2

- First get 2008powerpractical.ppt, ace.mx and rprog.R from
- /faculty/ben/2008/power/practical/.
- We'll talk about what the R program does before we run it

Simulation of the MZs: model

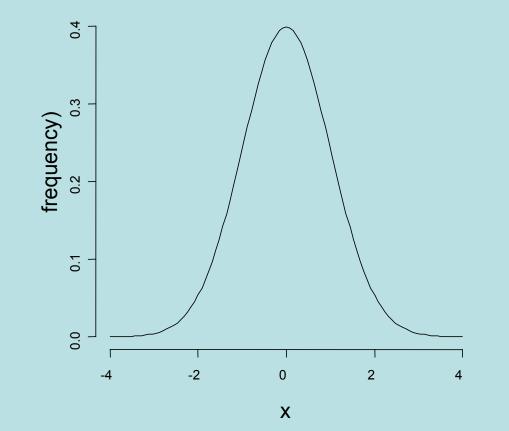


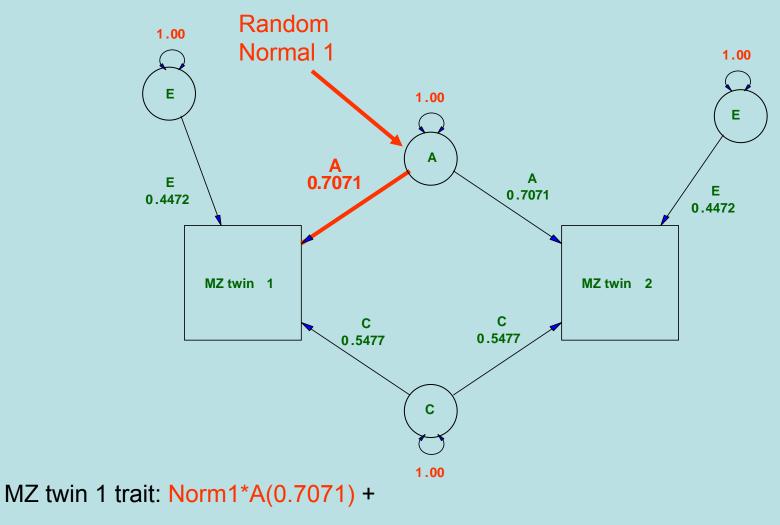


When we simulate

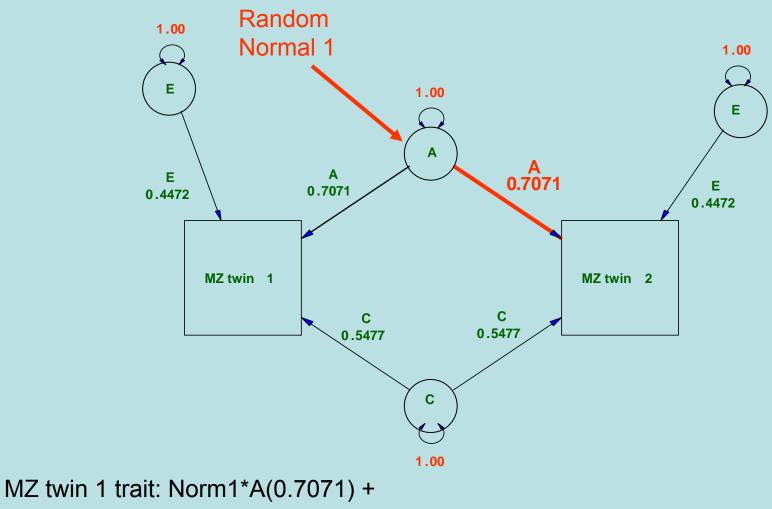
- From a path diagram, we can simulate trait values from simulating each latent trait
- These latent traits are assumed to be normal (μ=0,σ²=1)
- The latent trait is then multiplied by the path coefficient

What's a random normal

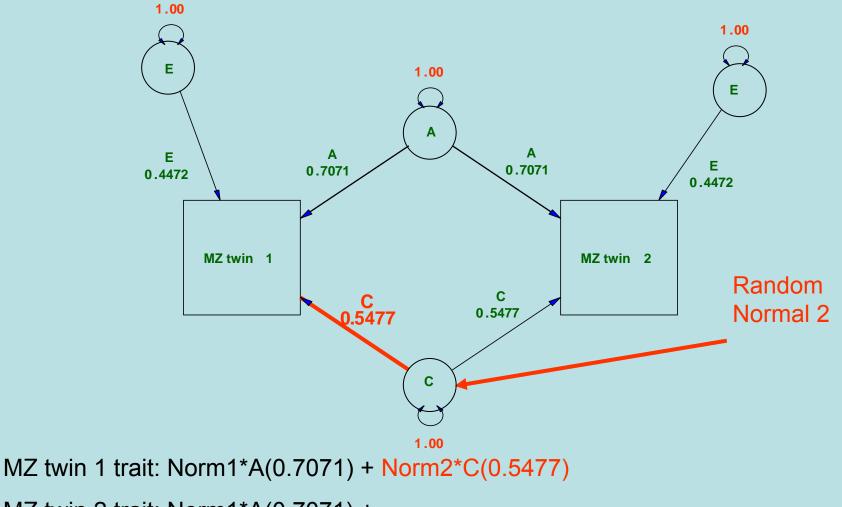




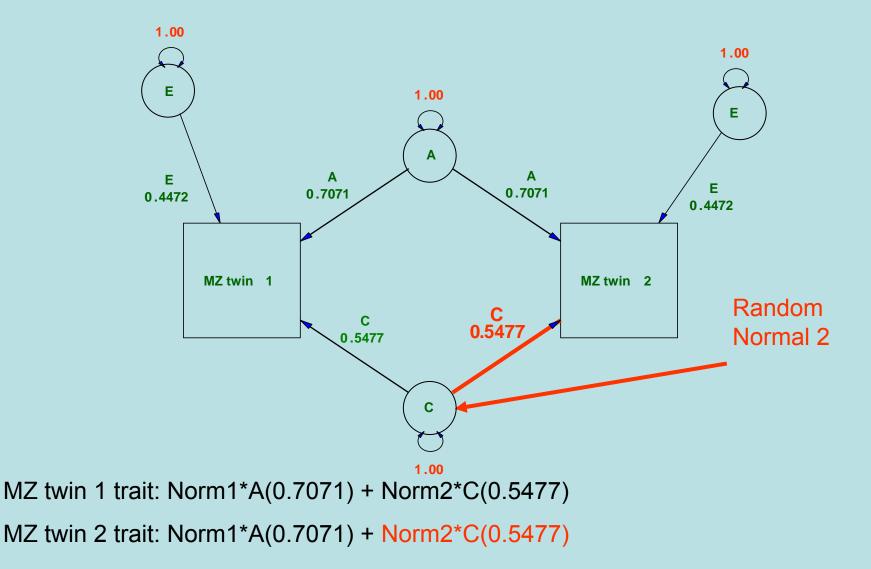
MZ twin 2 trait:

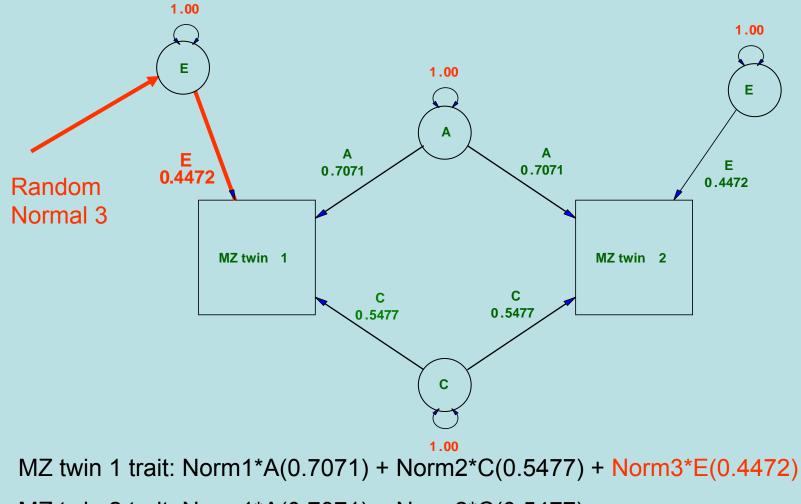


MZ twin 2 trait: Norm1*A(0.7071) +

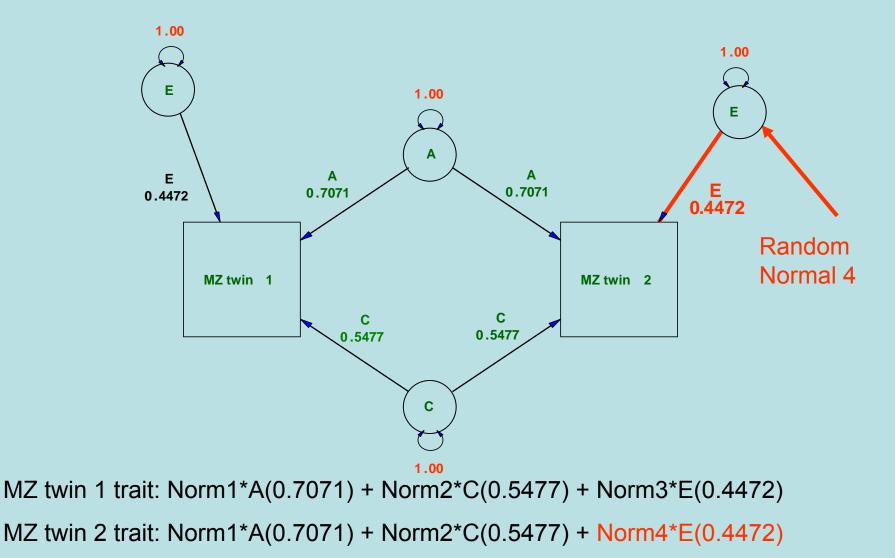


MZ twin 2 trait: Norm1*A(0.7071) +

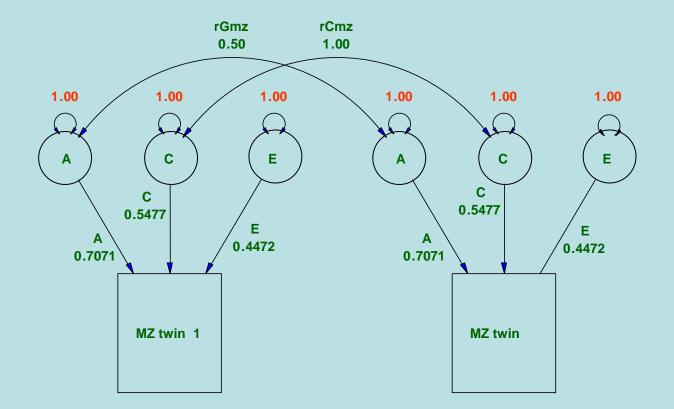


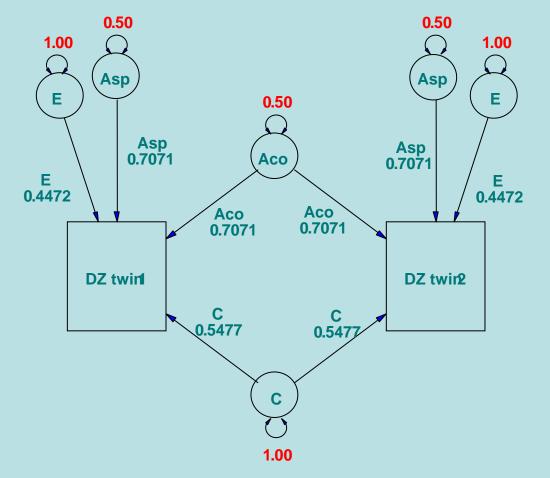


MZ twin 2 trait: Norm1*A(0.7071) + Norm2*C(0.5477) +

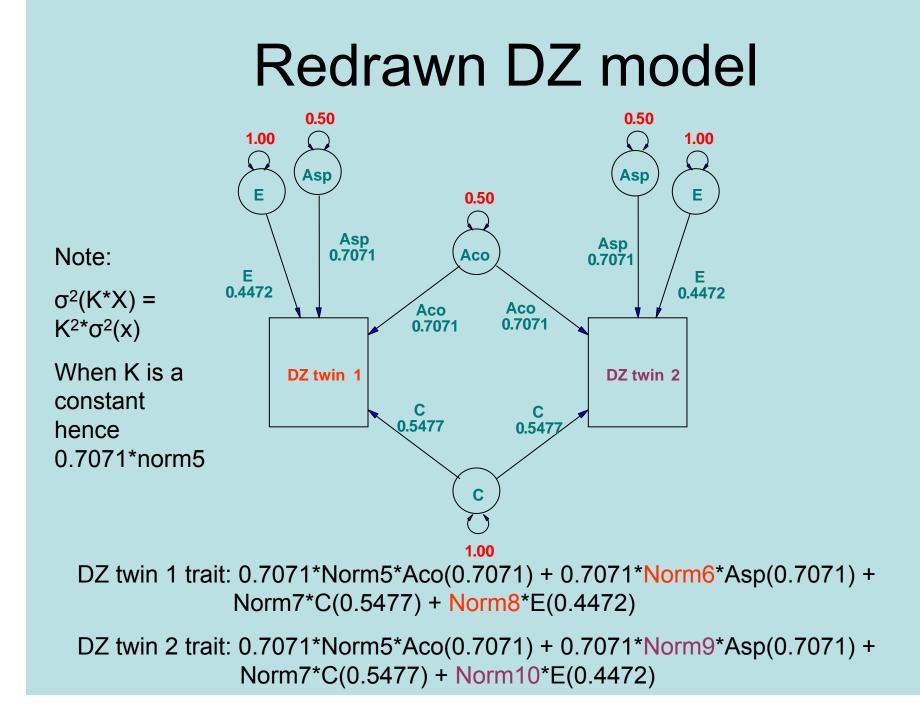


Simulation of the DZs: model





How many random normals will we need to supply a trait value for both DZ twins?



Simulation conditions

- 50% additive genetic variance
- 30% common environment variance
- 20% specific environment variance

Notes on the R program

- When you run the R program it is essential that you change your working directory to where you saved the Mx script.
- File menu then Change dir...
- After changing directory, load the R program.
- A visual guide to this follows this slide

Picture of the menu

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Type 'q()' to q	uit R.		CHANGE DIR			
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Picture of the dialog box

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Running the R script

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Change dir or 'licence()' for distribution details.							
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Exit how to cite R or R packages in publications. SOURCE R CODE							
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Type 'q()' to quit R. This is where we							
[Previously saved workspace restored]							
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Screenshot of source code selection

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How do I know if it has worked?

- If you have run the R program correctly, then the file sim.fun ought to be in the directory where your rprog.R and ACE.mx is.
- If not, try again or raise your hand.

When you have finished

- Record your A², C², and E² from the full model [1st part of the script]
- Note the chi square test from dropping C²
- Report these online to Jeff, and he'll make some pretty pictures:
- <u>https://ibgwww.colorado.edu/limesurvey/in</u> <u>dex.php?sid=98196&newtest=Y</u>

Theoretical power calculations

- Either derive the power solutions by hand (though this requires lots of time and more IQ points than I have)
- Use Mx to setup the variance covariance structure and use option power to generate power levels

Quick note on the power calculations for Mx

- Total sample size is reported at the end of the script
- The sample size proportions for your groups are maintained.
- For example if we say 50 MZ pairs and 100 DZ pairs, then Mx will assume 1/3 of your sample is MZ and 2/3 is DZ

Time to look at a script

- Open power.mx, and we'll chat about it.
- Quick overview of what the script does:
 - Generates the variance covariance structure under the full model (1st half)
 - Intentionally fits the wrong model (by dropping the parameter of interest for power calculations) (2nd half)
 - Based on the number of observations that you supply generates power estimates.

Theoretical script

- Following chatting, depending on time, here are some suggestions:
 - Change ratio of MZ and DZ keeping same total sample size
 - Drop A rather than C
 - Change effect sizes for A, C, or E