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0:00 - 0:20

How to do cross-sectional network analyses?

A 6,5-**minute tutorial** of Pnet, utilizing Exponential Random Graph Models (ERGMs, *p**)

› Gijs Huitsing, René Veenstra, Peng Wang, and the WALM-labgroup

Exponential Random Graph Models

- Analyze complete networks
- They include random effects, capturing the *irregularity* of everyday life
- Tie formation is assumed to depend on others.
  - For example, sharing many friends makes the establishment of a friendship more likely
- Homogeneity is assumed, which means that network parameters are the same for all actors in the network.

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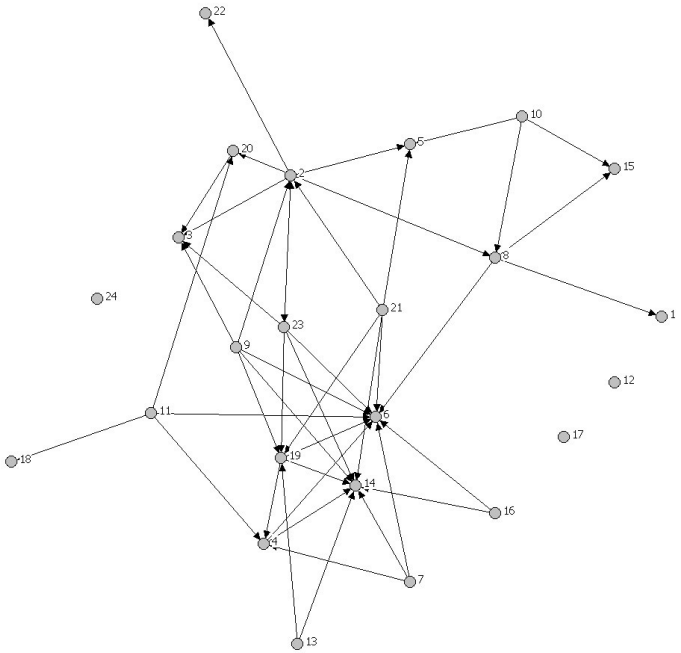
1:00 - 1:20

Network Analyses = Modeling networks

Observed network



Needs to be estimated

Estimated network

?

How?

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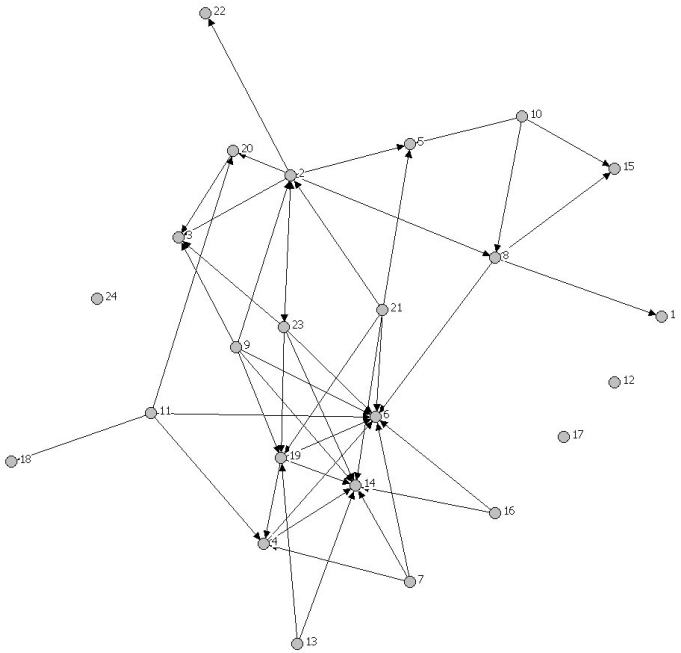
1:20 - 1:40

Network Analyses = Modeling networks

Observed network



Needs to be estimated

Estimated network

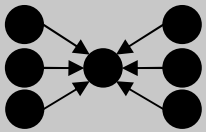
By means of **configurations**:

These are subsets of actors and ties between them:

e.g.,

-Reciprocity

- Indegree distribution



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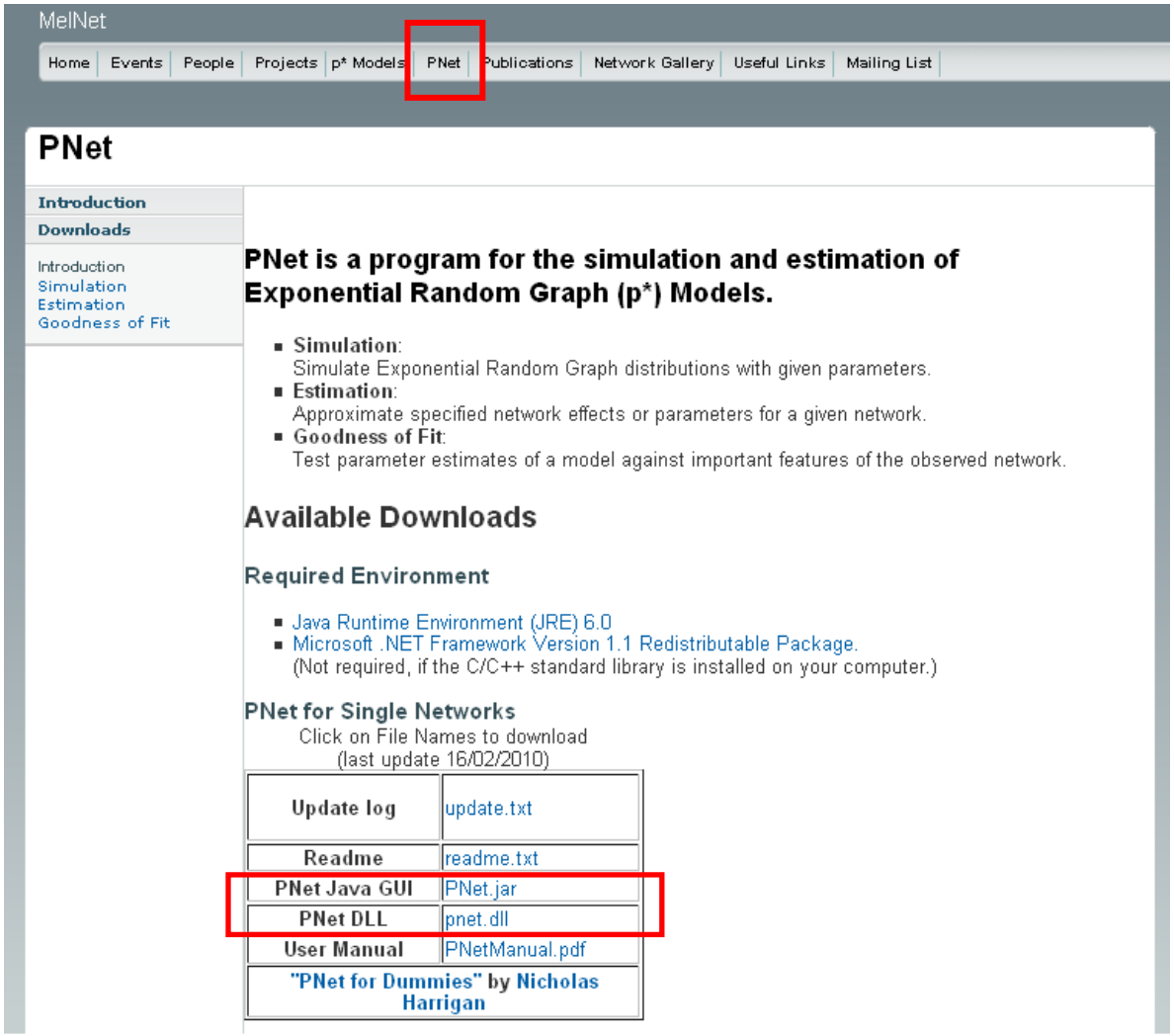
Step 1:

1:40 - 1:55

- Download the program Pnet
- **sna.unimelb.edu.au/**



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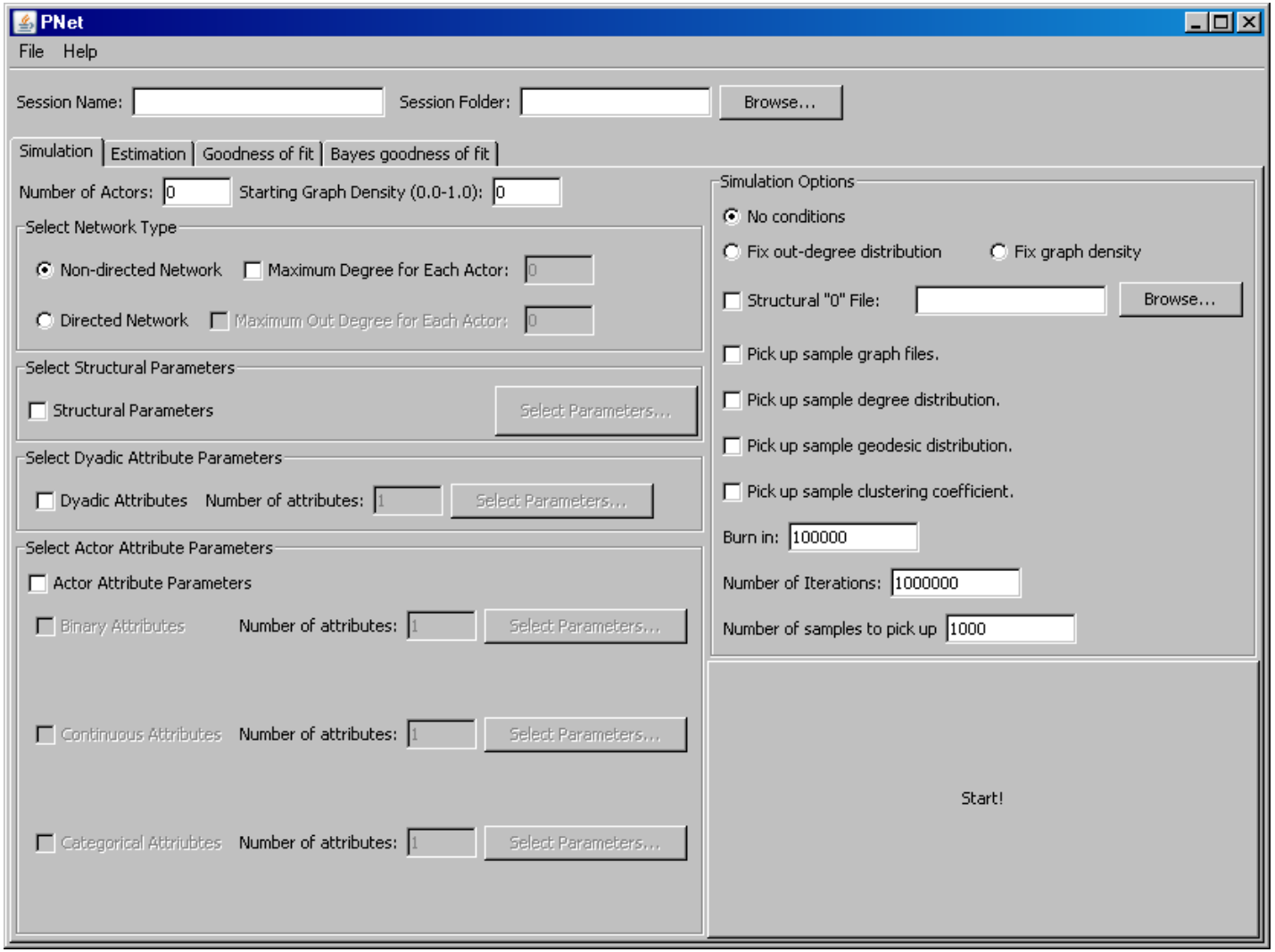
Step 2:

1:55 - 2:05

› Open the program!



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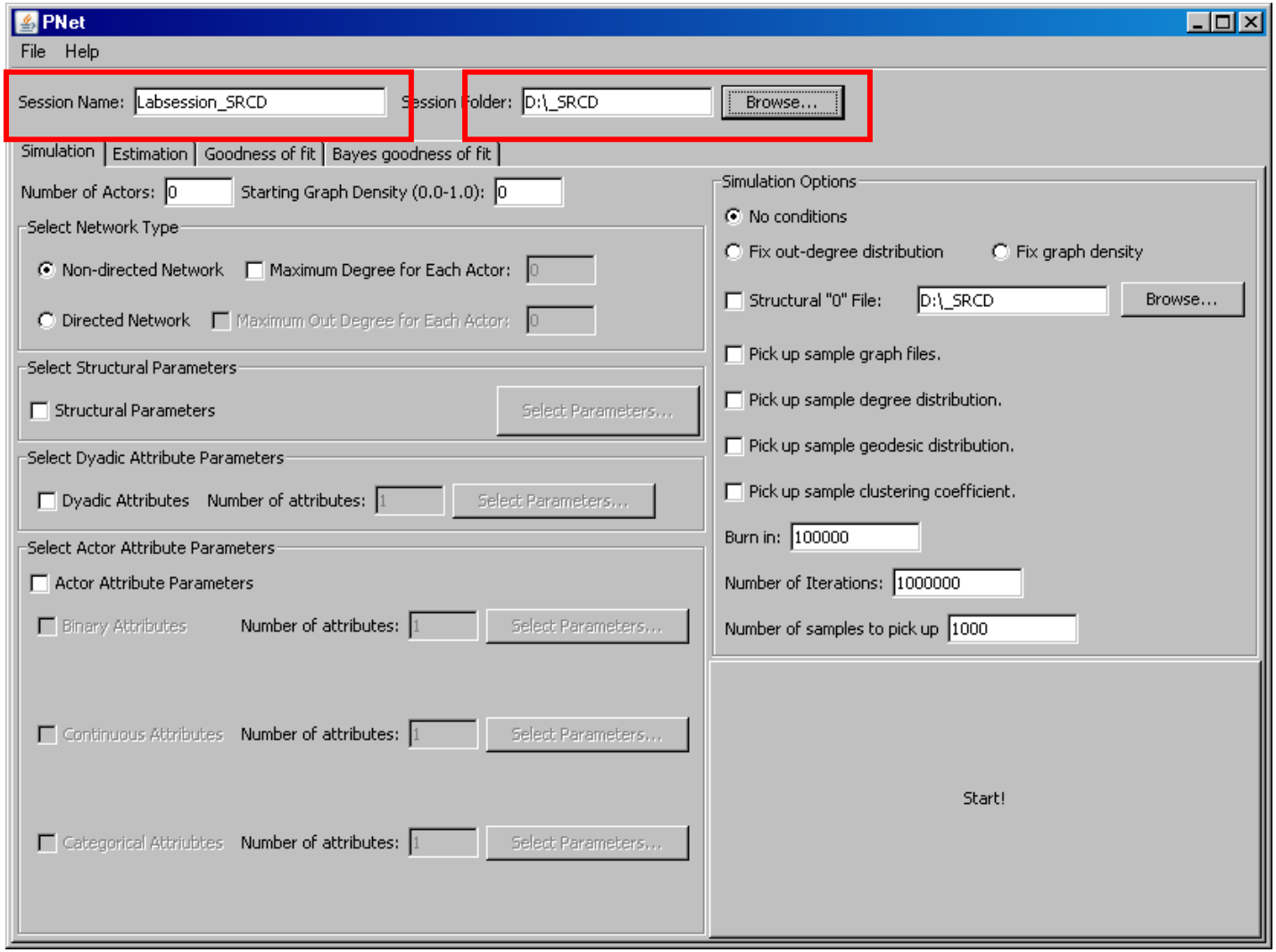
Step 3:

2:05 - 2:20

› Provide session name and select folder with the data



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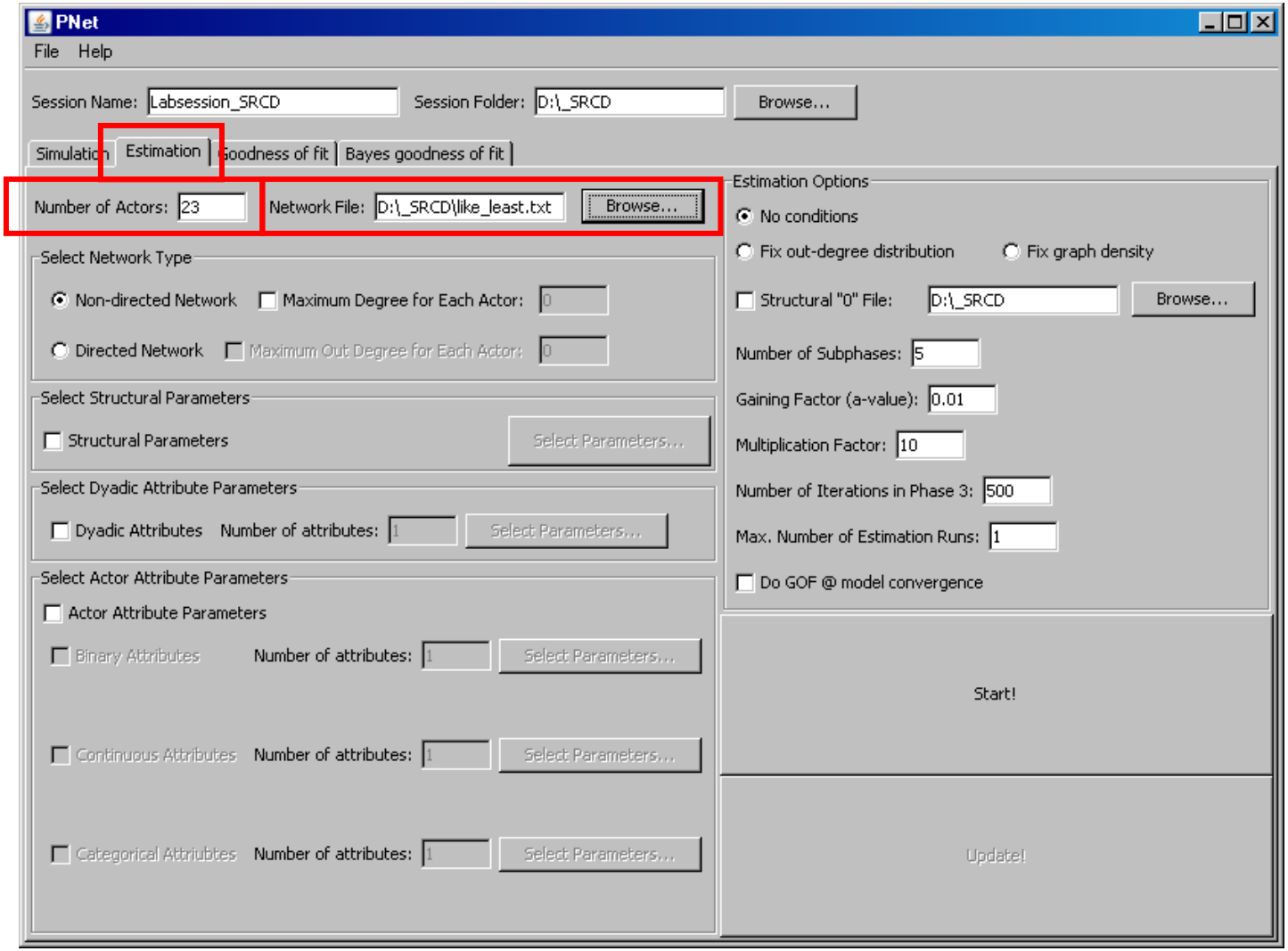
Step 4:

2:20 - 2:40

› Press estimation, provide number of children in the classroom, and select the network file



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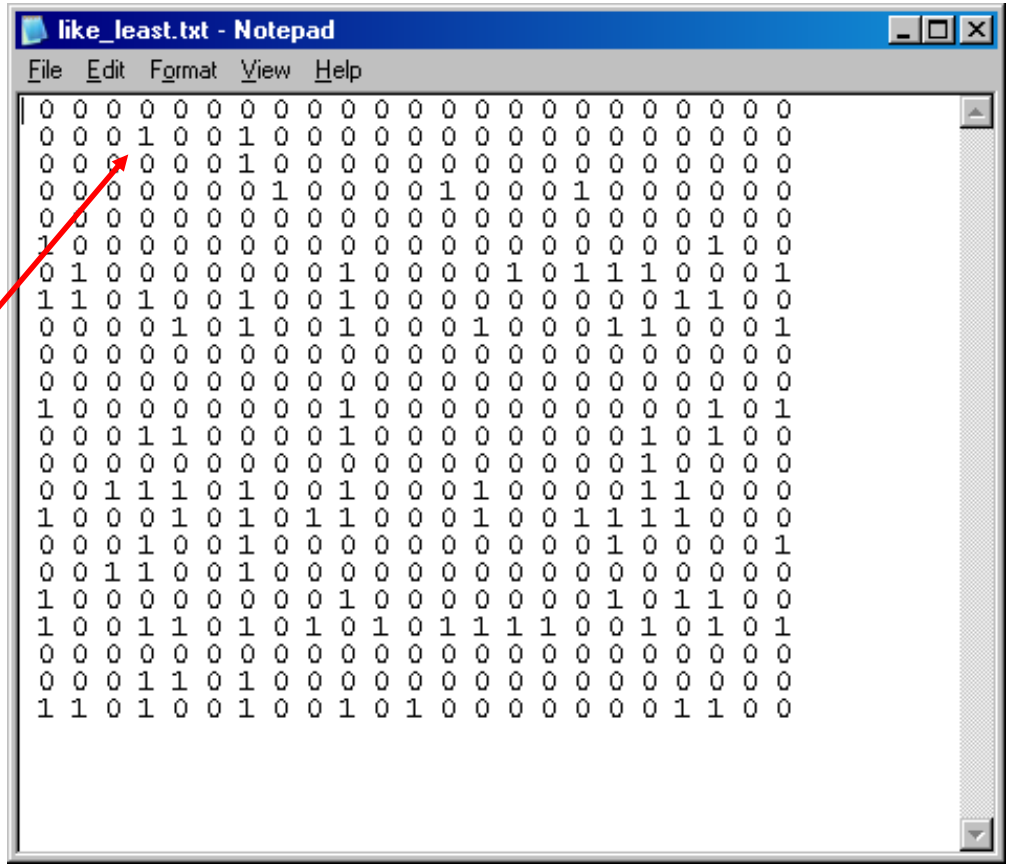
Network file

2:40 - 3:10

- A matrix with rows and columns equal to the number of children in the classrooms
- “1” indicate a tie, “0” indicate no tie.
- For example, child 2 nominates child 4



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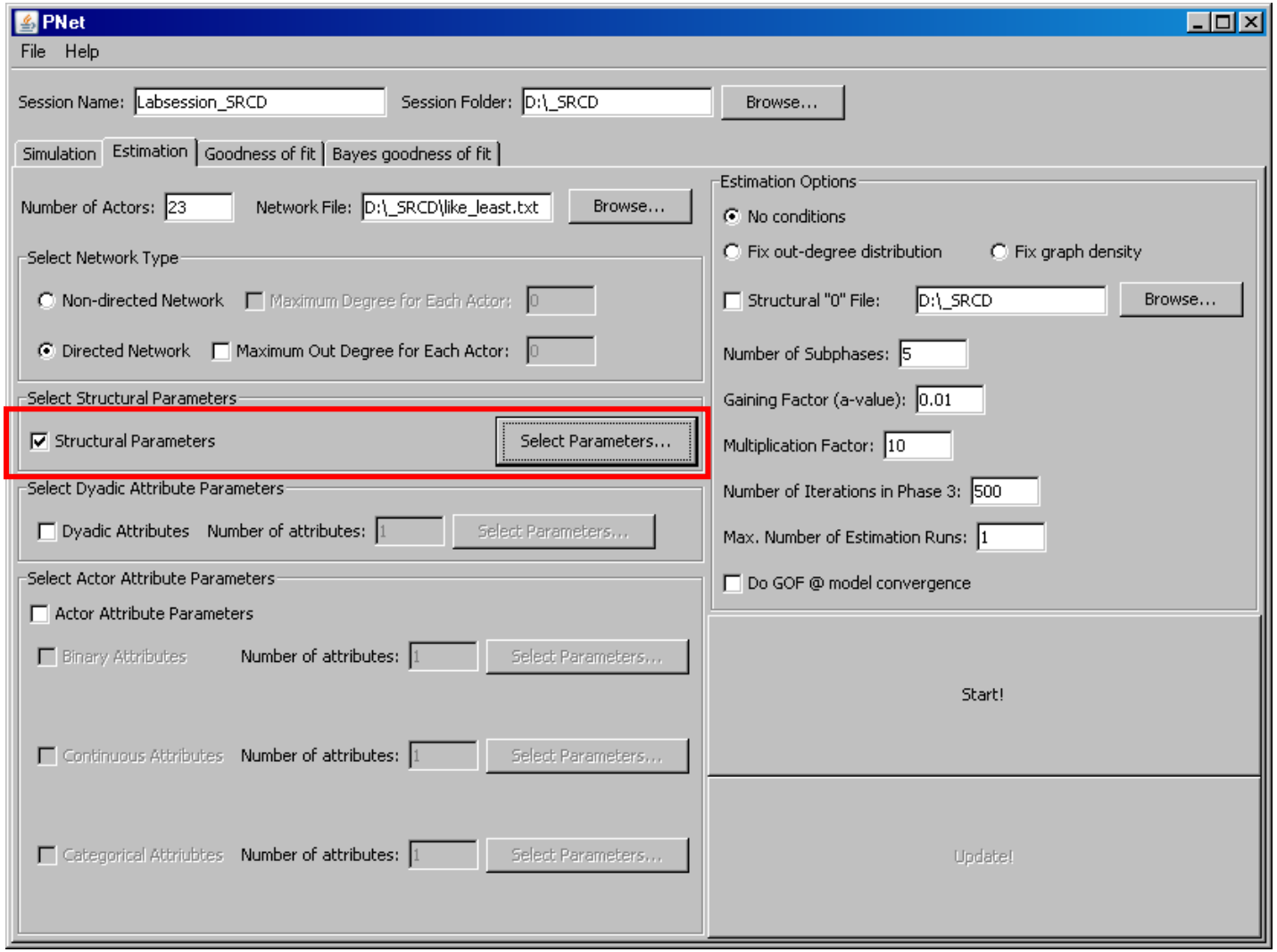
Step 5:

3:10 - 3:20

› Select the structural parameters



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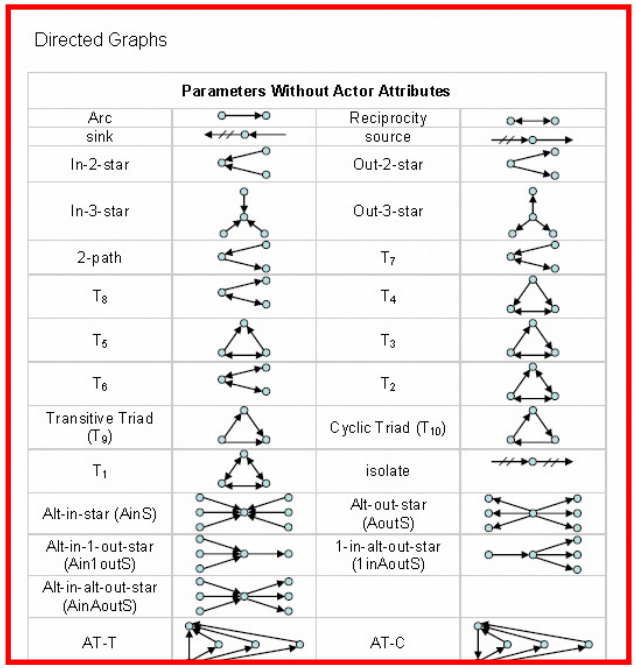
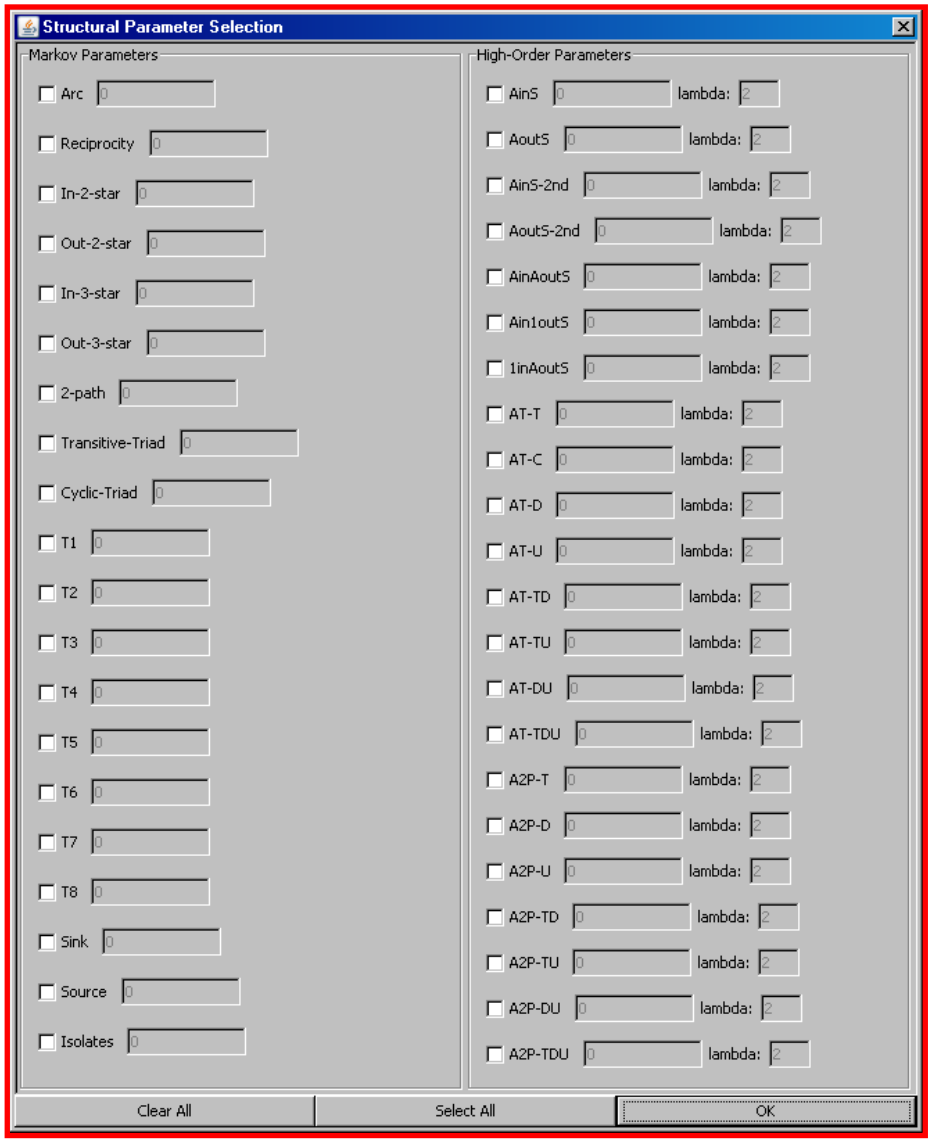
Parameters

3:20 - 3:45



Explanations of the meaning of the parameters can be found in the PNet-manual (see PNet-website)



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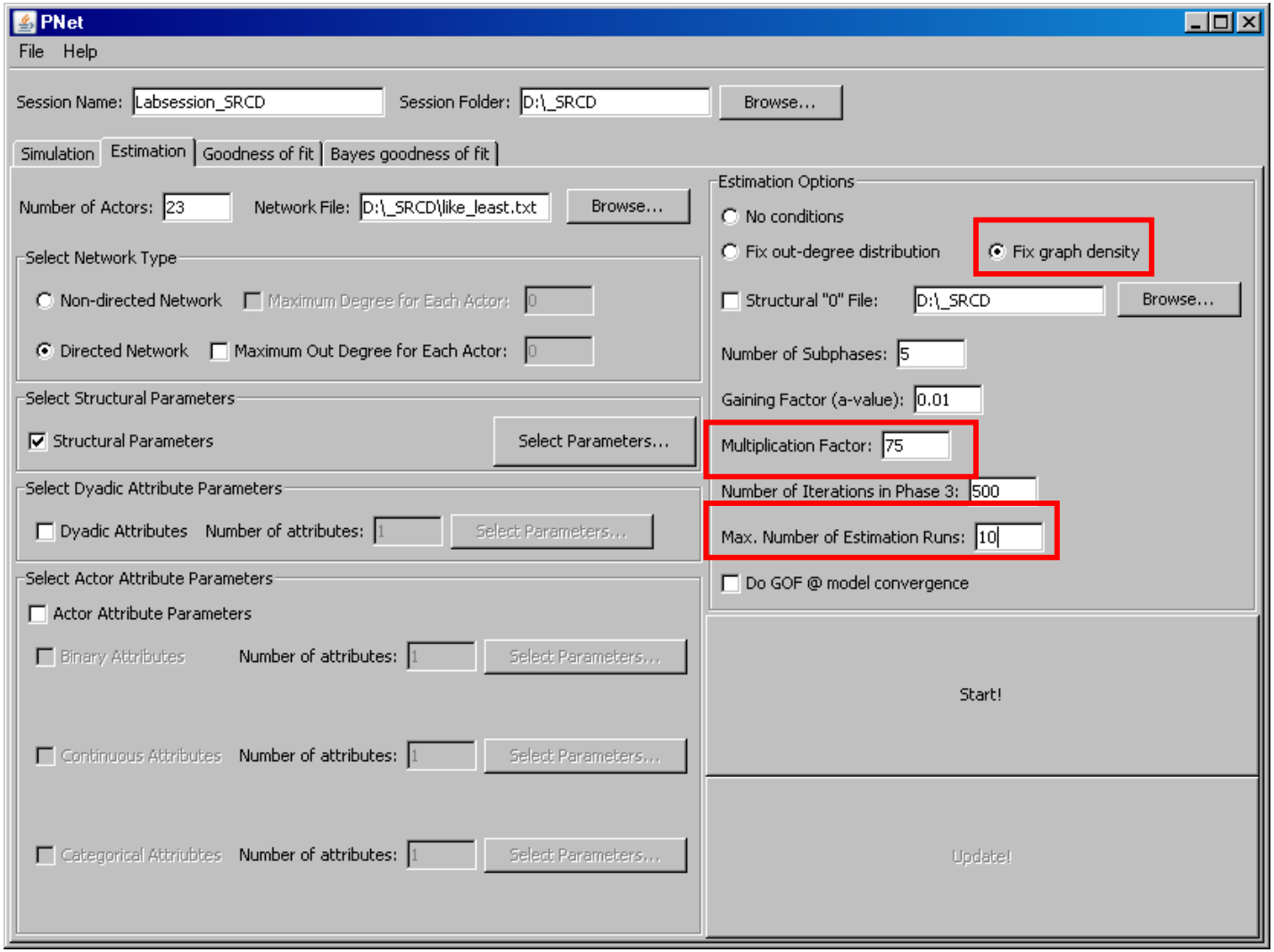
Step 6:

3:45 - 4:05

› Fix the graph density, increase the multiplication factor (>50), and set the estimation runs to 10



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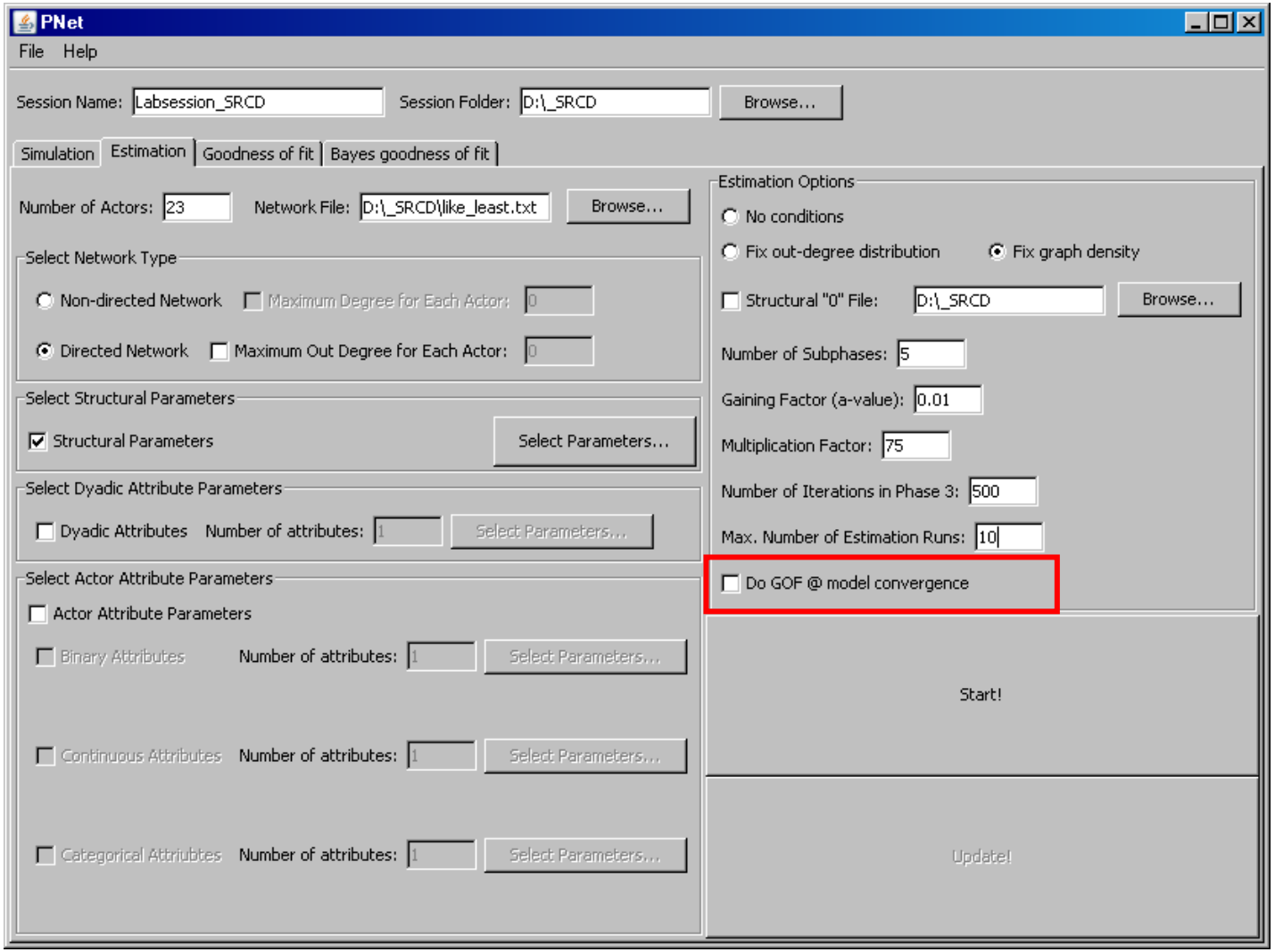
Step 7:

4:05 - 4:15

› Request a GoF (Goodness of Fit)



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4:15 - 4:45

Goodness of fit

- Compares parameters of observed networks with estimated parameters
- Convergence t-ratio =

$$\frac{\text{(Observed network - Mean simulated networks)}}{\text{Standard error simulated networks}}$$

The smaller the ratio, the less difference between estimated and observed parameters!

Estimated (<0.10) & unestimated (<2.00) parameters

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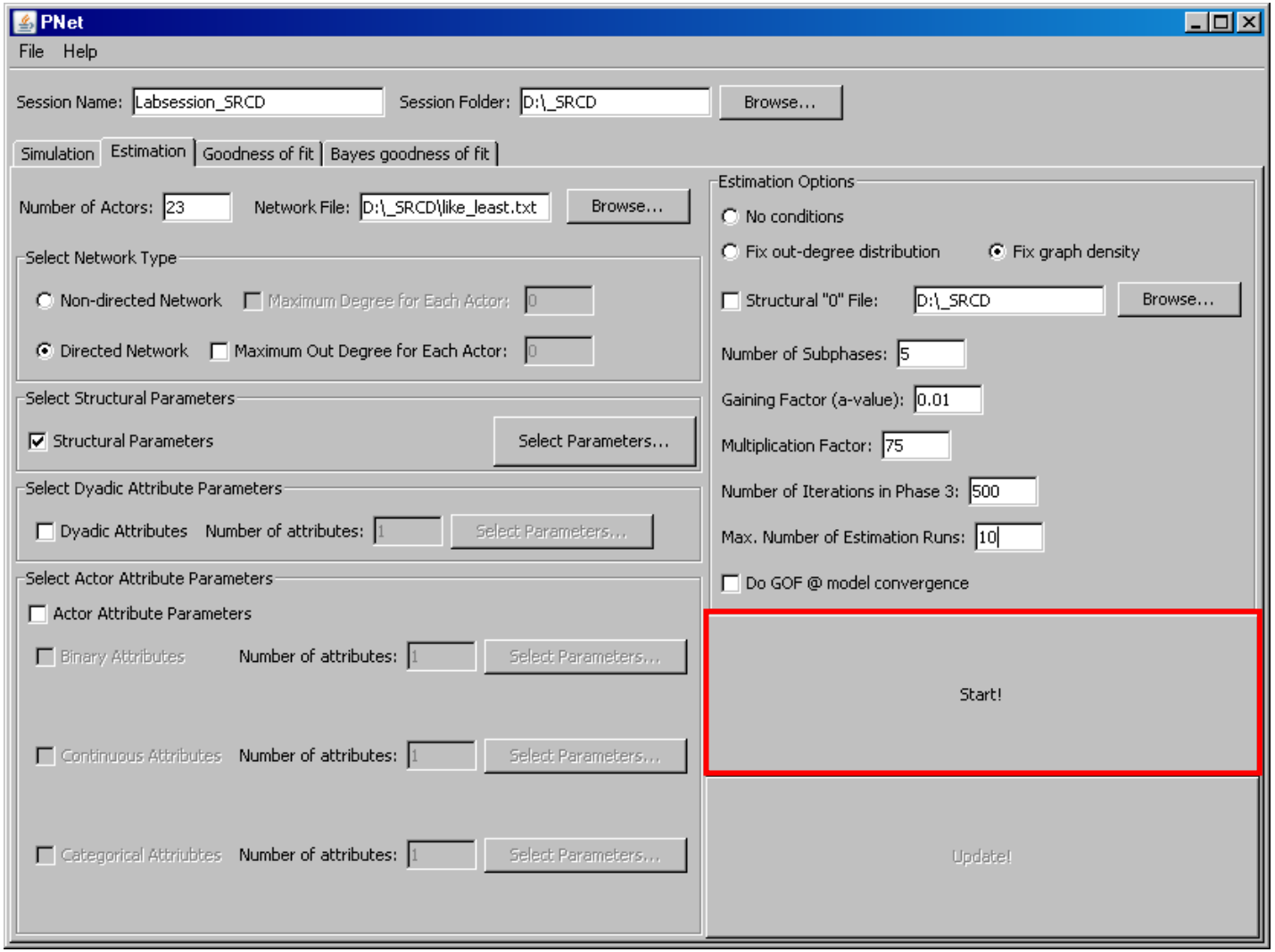
Step 8:

4:45 - 4:55

› Press Start!



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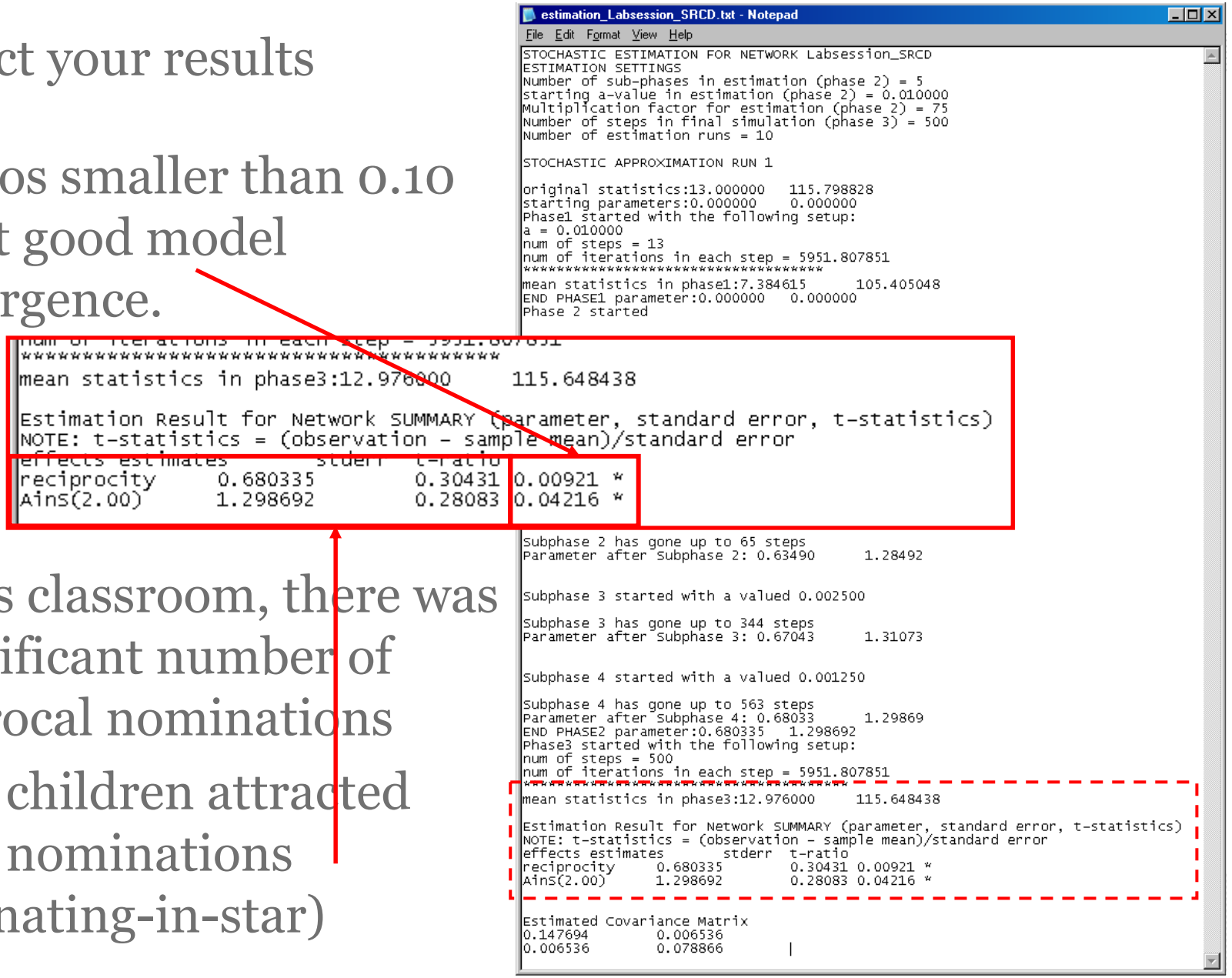
Step 9:

4:55 - 5:25

- Inspect your results
- T-ratios smaller than 0.10 reflect good model convergence.
- In this classroom, there was a significant number of reciprocal nominations
- Some children attracted many nominations (alternating-in-star)



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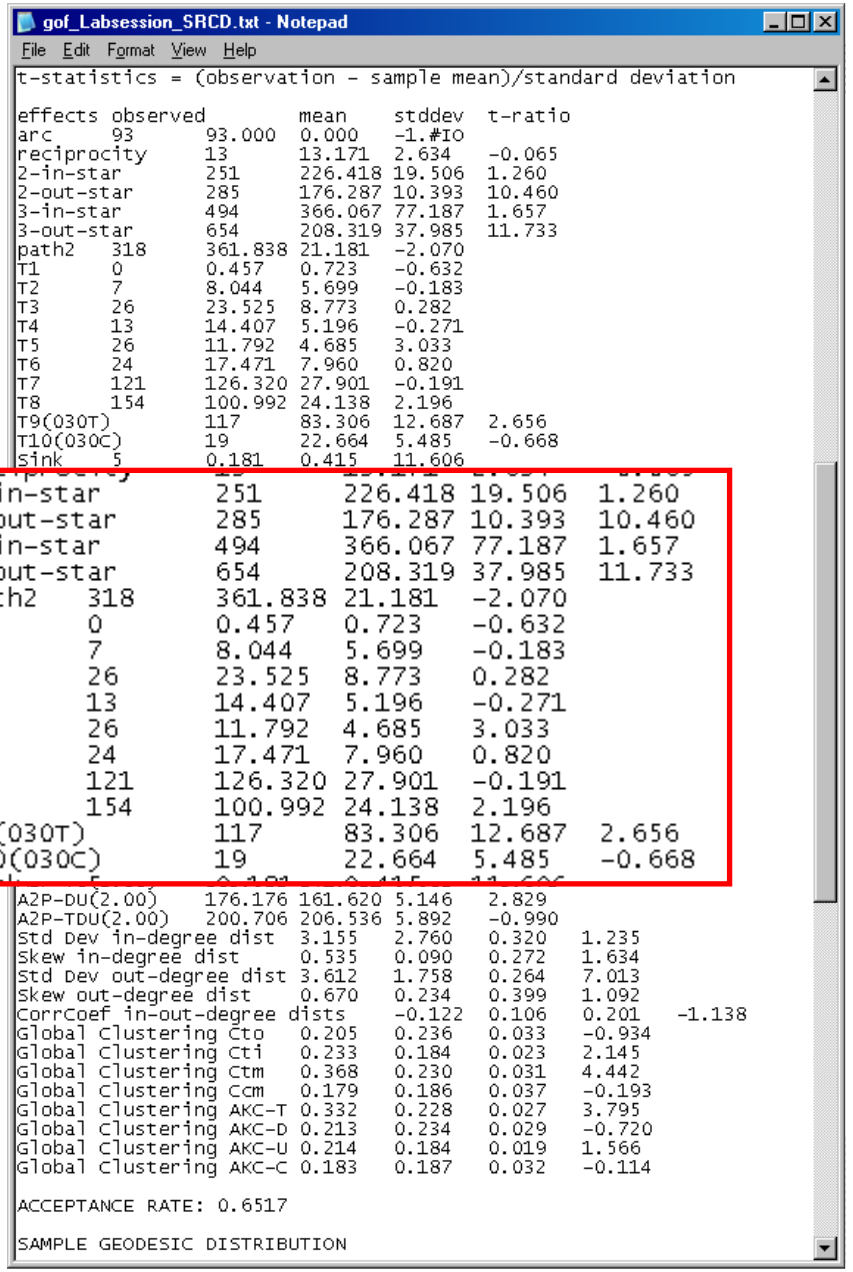
Step 10:

5:25 - 5:55

- Inspect model convergence
- All t-ratios should be smaller than 2 to reflect good model convergence.
- This model is not good, many parameters are under- or overestimated
- The solution would be to include more parameters



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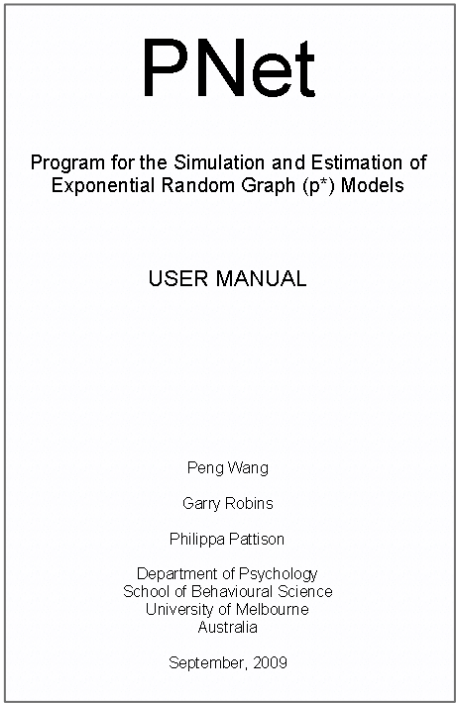
5:55 - 6:15

Need help??

- See: **sna.unimelb.edu.au/**
- See the PNet manual, or the PNet for Dummies guide
- Or contact us:
  g.e.huitsing@rug.nl


PNet

Program for the Simulation and Estimation of Exponential Random Graph (p*) Models

USER MANUAL

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Garry Robins

Philippa Pattison

Department of Psychology
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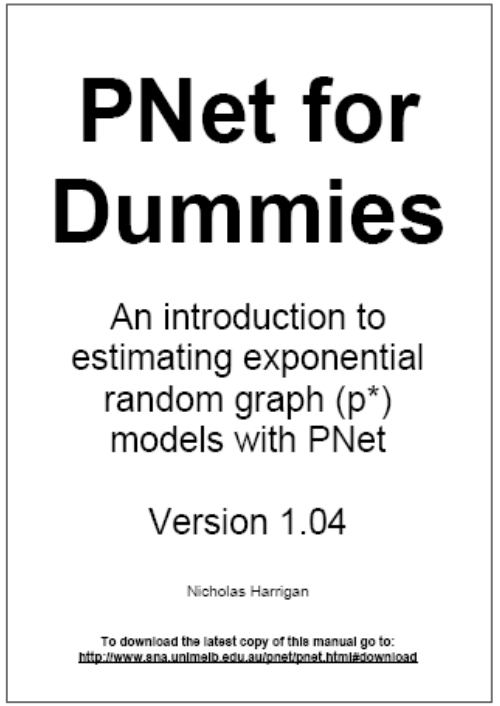
September, 2009


PNet for Dummies

An introduction to estimating exponential random graph (p*) models with PNet

Version 1.04

Nicholas Harrigan

To download the latest copy of this manual go to:
http://www.sna.unimelb.edu.au/pnet/pnet.html#download

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Now you are also qualified to perform ERGMs!

www.gmw.rug.nl/~veenstra/