Lecture 4: Understanding the small world phenomena

Sociology 204: Social Networks, Spring 2021

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1/2: Small world models

Review:

- empirical vs modeling approaches

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- empirical approach runs into difficulties

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Today we will see two different small world models and then an empirical assessment

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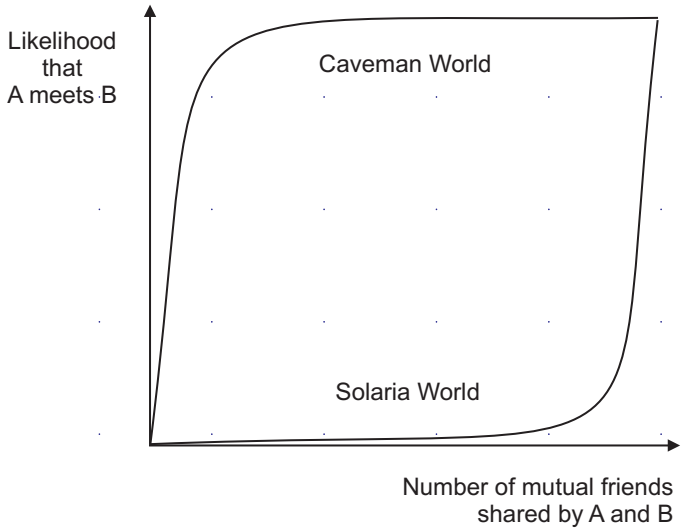
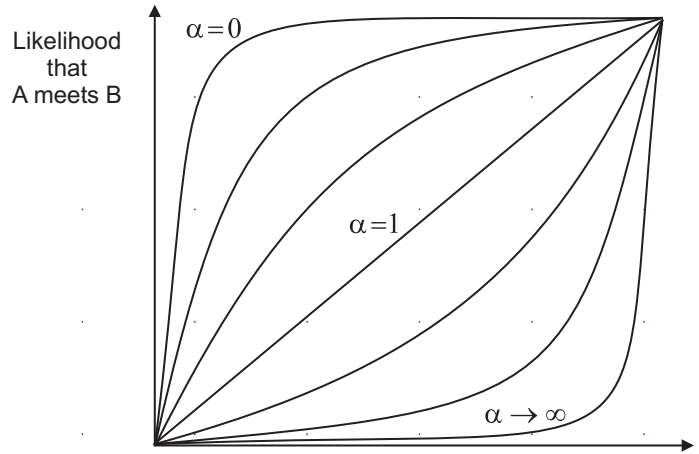
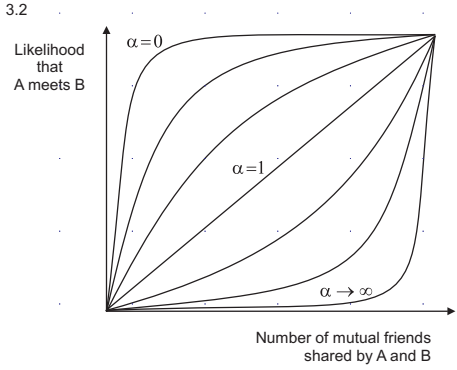
- small overlapping groups that are linked by people who belong to multiple groups
- social network evolve
- not all relationships are equally likely
- occasionally we do things that are not determined by existing network structure

3.1


Likelihood
that
A meets B
Caveman World
Solaria World
Number of mutual friends
shared by A and B

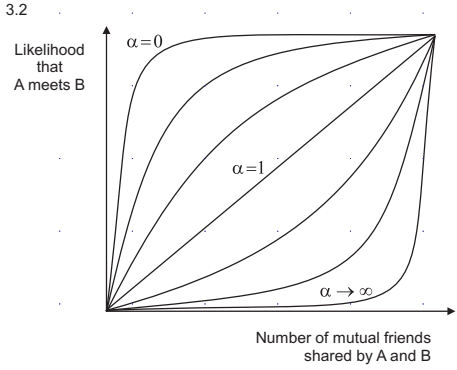
3.2


Likelihood
that
A meets B
α = 0
α = 1
α → ∞
Number of mutual friends
shared by A and B



As technology changes do you think we are moving more toward:

1. caveman world ($\alpha = 0$)
2. solaria world ($\alpha \to \infty$)



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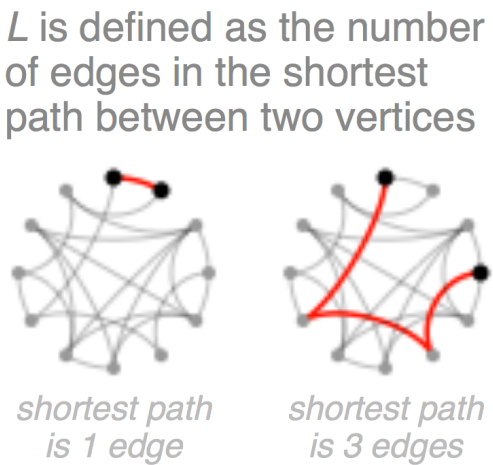
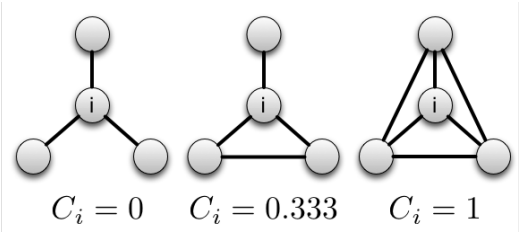
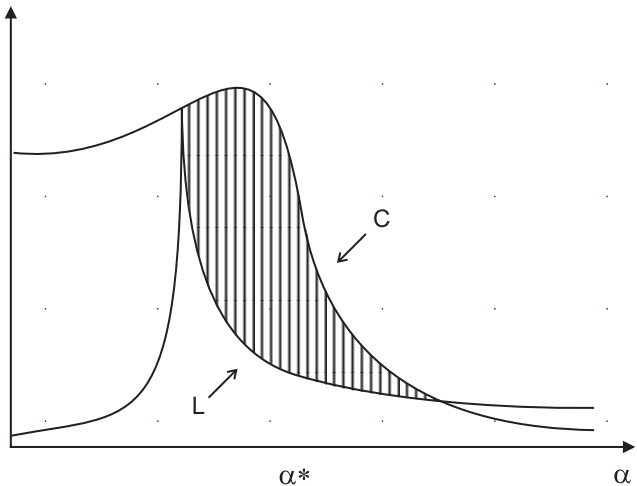
First metric:
Characteristics path length L: number of edges in shortest path, averaged over all paths

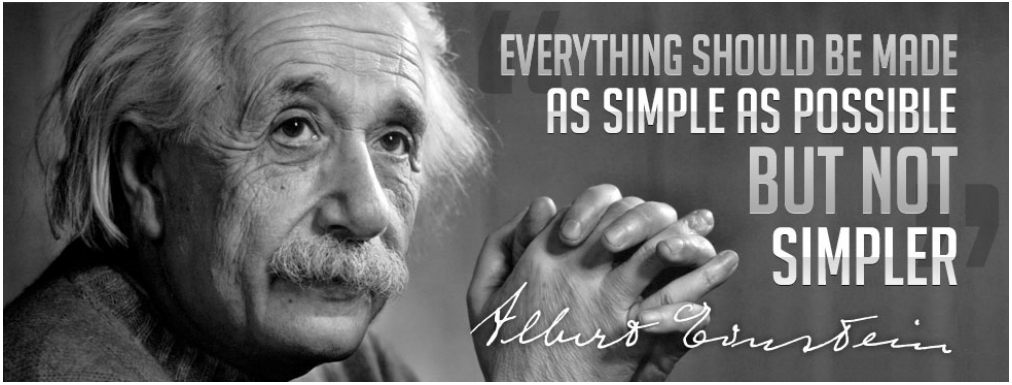


Second metric:
Clustering coefficient C: probability that a two friends of a randomly chosen person are friends



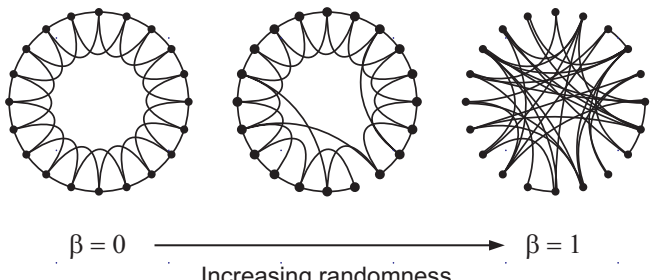
3.4



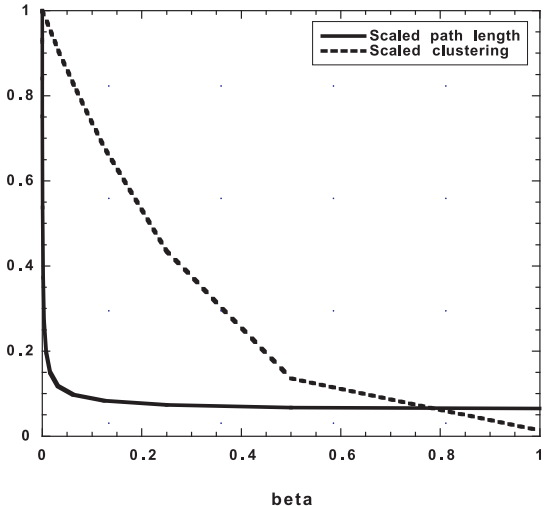


http://vireomd.net/blog/dhc/einstein-kiss.html

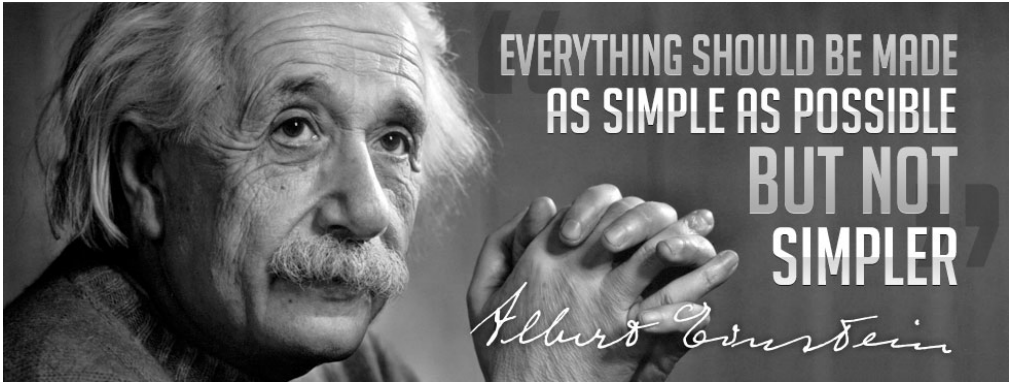
3.6



3.7


Scaled path length
Scaled clustering
1
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1
beta

Demo: `http://mathinsight.org/small_world_network`



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Are real networks small world networks?