Poli 891
Spring 2010
Prof. Baumgartner

Questions for Week 7 March 1

Readings: Barabasi, *Linked*, Merton, and a recommended article of your choice

1. The literature here provides a very wide range of examples of power-laws. What do they seem to have in common? Is there any effort to explain the set of phenomena for which we would *not* expect to see a power-law? Where are the bounds? Do the authors argue that power laws are *everywhere?* Who does the best job of this explaining the limits?
2. Some of the discussion has to do with the mathematical field of "graph theory." This has to do with how many direct links there are between two or more objects. (Social examples: how many people you talk to at a party, or how many lobbyists lobby on a given bill; technical examples, how many electric wires go into the same routing station…) This leads to the "six degrees" hypothesis. Explain what that really means (including what it does not mean, that everyone is literally six degrees from everyone else). Explain why it matters. What are the implications of humans being embedded in networks that may be more or less dense?
3. What is a model of preferential attachment? What are situations where preferential attachment does and does not apply? Is that the key element for where one would expect to see power laws?
4. What about a model of proportionate growth? Is that the same as a model of preferential attachment? If the rich get richer, does that produce a power law? That is, if wealth grows in proportion to how much wealth you already have, is that it?
5. Review Merton's argument in his 1968 *Science* article about citation counts. Are citation counts similarly proportionate in their growth, just like income might be? What is the mechanism? Why would you cite an obscure article? How often will that happen as compared to a well known one?
6. Go to NetLogo and play around, get used to it. (Not a paper assignment)

For your general interest and to make things super clear, attached is a simple presentation of a Normal distribution. The distribution presented is the cumulative distribution of a Normal series, just the positive values, from zero to infinity. The y-axis scale shows the cumulative number of cases that have a given value or a higher value. So, there are 500-some cases that have a value of at least zero (that is, *all* the cases!). Then only about 130 cases have a value of 5 or more, and just 9 cases have a value of over 10. So it's just a normal curve with a pretty small variance. The two subsequent plots are the exact same data presented on a semi-log and then a log-log curve. In order to generate a straight line on the last plot, the number of cases extremely far out in the tail would have to be huge. A normal curve, no matter what its variance, can never do that. Note, however, that it is not completely far off the line on the semi-log presentation. Keep this in mind as you do the readings this week. When these power-law distributions show up, it means that there are many many cases in places where no Normal curve could possibly put them.

Baumgartner, POLI 891, Useful background for week 7 on power laws.

Three presentations of the same data