POLS 541
Fall 2006
Prof. Baumgartner

Questions for Week 11 Nov 16

Readings: Barabasi, *Linked*, and a couple articles

1. The literature here provides a very wide range of examples of power-laws. What do they seem to have in common?
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 these network findings?
3. What is a model of preferential attachment? Why do we care?
4. What about a model of proportionate growth? Would that be the same? If the rich get richer, does that produce a power law?
5. Review Merton's argument in his 1968 *Science* article with the subsequent evidence about citation counts. Is he confirmed?
6. Is a model about how long it takes for something to happen (bursts, or burstiness in Barabasi's Transylvanian English!) subject to the same dynamics as models of degree of change? Are there any important differences? Look at the 2005 *Nature* article in some detail.
7. 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 and what do you think are the bounds?

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, PLSC 541, Useful background for week 11 on power laws.

Three presentations of the same data