Northeastern University

http://www.northeastern.edu/insolution/other/2014/05/the-science-of-a-career/

The science of a career

It's the envy of nearly every scientist: a research position at Harvard or MIT, Princeton or Stanford. But new results from Albert-László Barabási's team at Northeastern suggest that moving to one of these "rich club" research institutions might not do all that much for a scientist's career, at least if physics is your game.

Photo via Thinkstock.

The team, lead by **Pierre Deville**, a graduate student visiting from the Universite catholique de Louvain in Belgium, found that moving from a less successful to a more successful research institution doesn't have a meaningful impact on one's career. On the other hand, though, moving in the reverse direction does cause a slight decrease in a researcher's long-term career success. The results were published in the journal ***Nature Scientific Reports*** in April.

How did they figure this out? Well, it wasn't easy–although they didn't do it by hand, as I naively inquired in our interview…that would have just been crazy talk. Turns out there's a constantly growing body of data inherent in the research community to which they could apply sophisticated computational algorithms to ask questions about the mobility patterns of scientists and the impacts those movements have on their success.

That database is the collection of academic journals in which scientists publish their work. Each time they do so, their current affiliation is stamped into history, giving big data researchers like Deville something to play with. For this project, they sifted through more than 400,000 research papers published in the main corpus of physics journals during the years 1950 to 2012.

After cleaning up the data (turns out more than one "J. Smith" could have published a physics paper during that time, and she or he could have been associated with either Northeastern University in Boston or Northeastern University in Shenyang, China…causing a slightly difficult disambiguation problem), the team mapped out the way these researchers moved throughout their careers.

They looked at the number of citations that each researcher had to his or her name and used it as a measure of success. Then they looked at the number of successful researchers at different institutions, to give the universities, companies, and national labs that employed them their own measure of overall "richness".

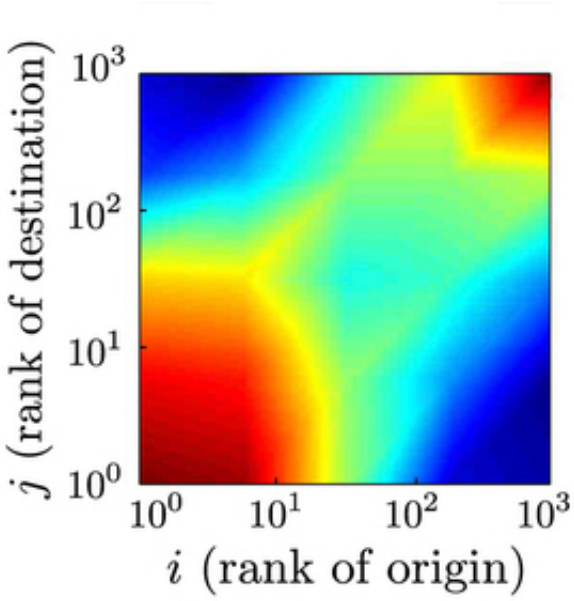
They created a heat map of institutional richness, shown here. The red corners represent the most and least successful institutions, while the blue middle ground represents exactly that — a middle ground of institutions that are neither super successful nor super limited.

They found that researchers tended to make only a few moves

during their careers, most often during their early days. This made sense to Deville and his team, knowing that one usually moves institutions when going from grad school to post doc to tenure track employment but then stays put after reaching that latter mark.

They also found that researchers were three times more likely to move within groups rather than between them. “There are movements between the two groups, but they’re extremely unlikely,” said **Roberta Sinatra**, a post-doctoral fellow in Barabási’s lab.

When a researcher did move between groups, the team saw some interesting things: if the researcher moved to a more successful institution, his or her productivity didn’t change (they kept publishing roughly the same number of papers) and neither did their overall success (number of citations). But if they moved to a less successful institution, they’d still work just as hard (again, publishing the same number of papers), but their success went down (fewer citations).



A heat map of institutional “richness.” The red area in the bottom left corresponds to the richest institutions, while the top right area corresponds to the poorest institutions (in terms of affiliated physics researchers’ success rates). The blue green middle area represents those institutions that are neither extremely rich nor extremely poor. *Image courtesy of Pierre Deville.*

All of this strikes a slightly depressing note, as far as I can see it. Basically, if you don’t start out in the rich club, then you’ll never be as successful as if you did. But if you happen to leave it, well, you can kiss your success (or at least some of it), goodbye. Of course, as Sinatra pointed out, there’s a bit of a chicken-or-egg problem here. Is an institution “rich” because of the success of the researchers it employs, or are those researchers successful merely because of the visibility afforded to them by their affiliation with the rich club?

Jury’s still out. The work is part of an overarching program in Barabasi’s lab to study the science of success–to figure out what it is that turns some people into celebrities while the majority of us can only dream of such opulence. The team believes than understanding these things, especially in individual fields like physics, could provide meaningful insights for both the creators of knowledge and media, as well as the people who regulate it all.

The next step for this particular project is already underway: They are expand their examination beyond the field of physics to look at the entire body of scientific publications over the same time period. They expect it will reveal some nuances of what accounts for success in the various disciplines.