

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Collective behavior in the evolution of scientific research interests¹ TAO JIA, Department of Physics and Computer Science, Rensselaer Polytechnic Institute, Troy, NY, 12180 USA, DASHUN WANG, IBM Thomas J. Watson Research Center, Yorktown Heights, NY, 10598 USA, GYORGY KORNISS, Department of Physics, Rensselaer Polytechnic Institute, Troy, NY, 12180 USA, BOLESŁAW SZYMANSKI, Department of Computer Science, Rensselaer Polytechnic Institute, Troy, NY, 12180 USA — Scientific research is strongly associated with the researchers' interests in particular areas or disciplines. On one hand, the stable research interest enables one to gain the expertise by repetitive practices specialized in a certain field. On the other hand, occasional change on the area of interest may reinvigorate one's research. To date, we lack a quantitative understanding on the likelihood of the research interest change, the consequent impact and the internal mechanism of this dynamical process. Here we analyze the publication records of over 14,000 scientists and quantitatively measure their research interest transitions. Our result shows that the fraction of scientists drops exponentially with the extent of transition, indicating that most scientists keep their interests quite stable. While it is rare, those who change demonstrate a higher-than-average chance to increase the productivity and impact. We propose a theoretical model that reproduces not only the observations in interest evolution but also the patterns of publication activities, allowing us to probe the short-term benefits of exploitation on the established field and the long-term returns of exploration on the new lines of inquiry.

¹Supported in part by ARL NS-CTA, ONR and ARO.

Tao Jia
Rensselaer Polytechnic Institute

Date submitted: 10 Nov 2014

Electronic form version 1.4