

Spurring Transformations

If a geomorphologist wants to pursue a new career, she might consider the history of science. Many regions change slowly through long periods of gradual erosion or deposition with occasional sudden, cataclysmic episodes that significantly alter an area's landscape dynamics. In a similar way, new knowledge frequently grows through the steady completion of highly focused research projects, with each adding to theories and paradigms just as a house is built slowly, brick by brick. At times, however, prevailing wisdom is shaken by unorthodox new approaches that open vistas to new insights that previously had never been contemplated. Examples of these once radical but now accepted perspectives include Darwin's writings on evolution, Wegener's studies that paved the way to understand continental drift, Einstein's theory of relativity, and the Alvarez's proposition that a bolide's impact led to mass extinctions at the end of the Cretaceous.

While the evolutionary creation of knowledge through incremental analysis and synthesis remains a significant form of knowledge generation, increasing attention has focused on the processes that yield dramatically different new insights and approaches. The National Science Board (NSB), which provides oversight and policies for the National Science Foundation (NSF), has given considerable attention to transformative research, which it defines as "research driven by ideas that have the potential to radically change our understanding of an important existing scientific or engineering concept or leading to the creation of a new paradigm or field of science or engineering." A May 2007 NSB report adds, "Such research also is characterized by its challenge to current understanding or its pathway to new frontiers." (www.nsf.gov/nsb/documents/2007/tr_report.pdf.)

The NSB report has generated lively discussion within NSF and the numerous research communities it serves, particularly because of the NSB recommended that "NSF develop a distinct, Foundation-wide Transformative Research Initiative (TRI) distinguishable by its potential impact on

prevailing paradigms and by the potential to create new fields of science, to develop new technologies, and to open new frontiers." Many actions have echoed the classic scientific retort, "Yes, but...?" Yes, I appreciate that the constant challenging of new findings and ideas that characterizes scientific inquiry makes it especially difficult to fully assess the viability and value of unorthodox new ideas and approaches. But is the best way to explore these new approaches to totally divorce them from standing NSF programs, which are implied to deal only with "non-transformative" or "mundane" science?

This is not the space to try to assess whether the Geography and Regional Science Program and other NSF geography-relevant programs or competitions support incremental vs. transformational science. In recent years, GRS panelists have identified projects they thought had special transformative potential at the end of each panel meeting, and projects identified in this way were given special consideration for funding. Because it supported interdisciplinary research projects bridging the human and natural sciences at scales not possible through any other mechanism, the Dynamics of Coupled Natural and Human Systems (CNH) Program has been described by top NSF leaders as inherently transformative. NSF has added the transformative potential of projects as part of its Intellectual Merit review criterion. What more should be done at NSF is yet to be determined.

What can we do as geographers, both individually and collectively, to stimulate transformative discovery? As individuals, we can be more creative in our thinking. "Thinking outside the box" is easier said than done, however. If someone learned how to routinely make Archimedean Eureka-inducing discoveries, they would have made lots of money selling it to folks like you and me.

We can improve our capabilities for responding to new ideas posed by others. We can strive to be more open to new and different ideas and to withhold the natural impulse to criticize ideas that run counter to the way we see things. We can view ideas that we've never thought of before as good things rather than bad, waiting until we have had much more time to explore their potential as well as the limitations of these new ideas before we reject much or all of the idea. We can also redefine the ways we judge "success" and "failure." Knowledge is gained whenever new ideas are tested. By pursuing new ideas and sharing the results regardless of their outcomes, we can benefit from research findings regardless of the result. If a bold new idea fails to pan out — as many

do — we can still benefit from learning why it didn't work out as its proponents had hoped. More openness to exploring a wide range of possibilities could provide a better testbed for unorthodox ideas and approaches that ultimately prove to be transformative.

What can the AAG do to stimulate transformative pursuits? Our open meeting policy enables all who want to share their ideas at our meetings to do so. Our journals are geared to presenting research ideas after the research has been done, but we may want to think about ways to enable them or other media to become forums for exploring dramatically different new ideas while they are still in the developmental stages.

What can we do as geographers in the AAG, at NSF, and in other settings to stimulate transformative research in the future? Please share your thoughts with me and others so that we can incorporate your views into our future thinking.

Best wishes for a great holiday season and a happy, productive 2008! ■

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