

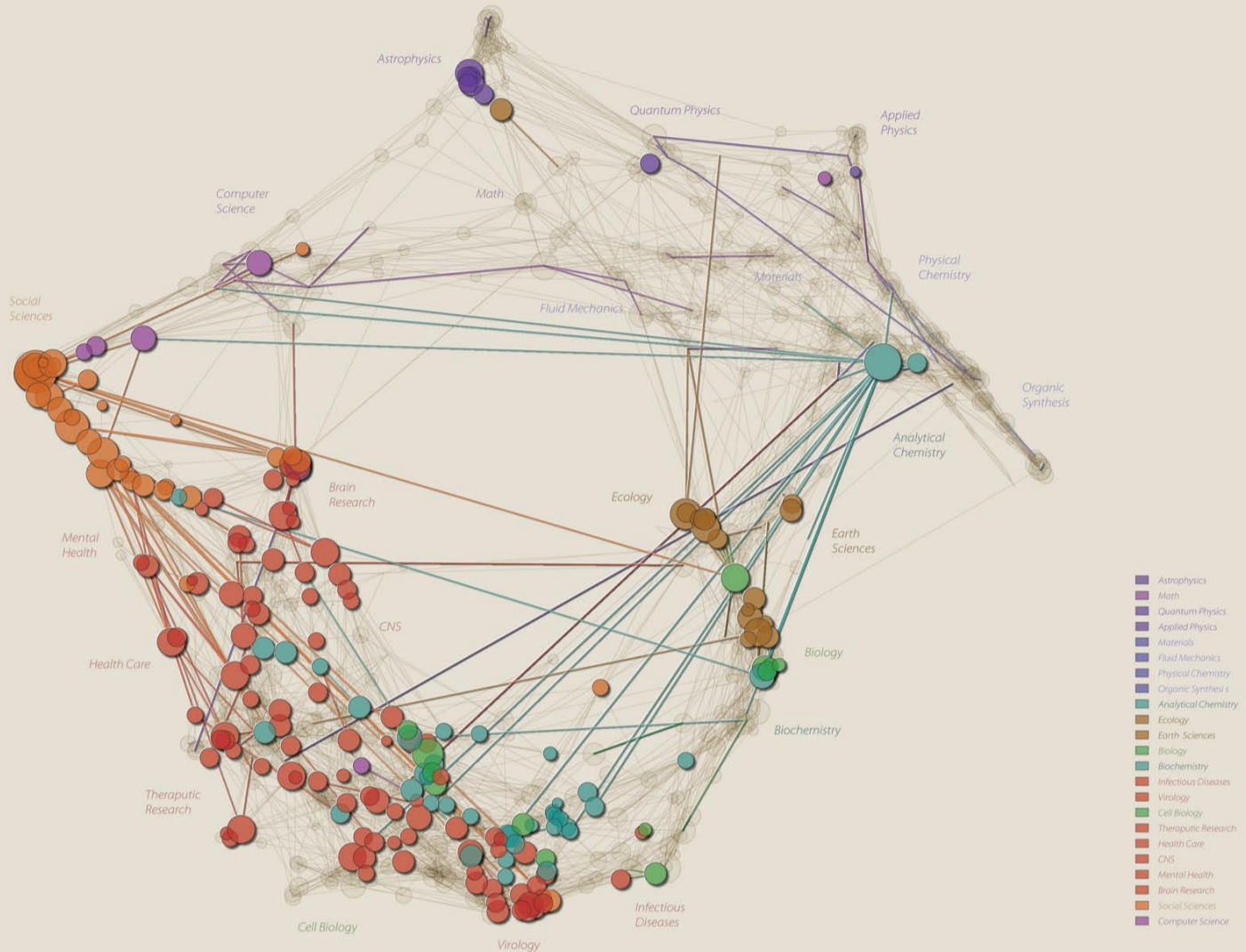
THE STRENGTHS OF NATIONS

This network diagram represents areas of science; comparing colored overlays can help us understand how different nations emphasize different topics. Each circular node represents scientific publications exploring a particular topic, more accurately called a paradigm. There are 776 high-level paradigms distributed in a ring-like structure, including those that concern physics (at approximately 1:00), Chemistry (2:00), nodes that form the jutting peninsula of Organic Chemistry (at 3:00), clusters of nodes dealing with Earth Sciences and Biology (4:00), an interesting span of teal Biochemistry (from 4:00 to 6:00), linking Chemistry to Medicine (from 6:00 to 8:00), the Social Sciences (9:00) and Applied Math (including Computer Science, at 10:00). Edges linking nodes represent scientific publications that explore more than one topic.

A nation's emphasis in specific areas of science is represented by the highlighted nodes and edges. Nodes and edges are only highlighted if a nation publishes significantly more in that area than expected. For example, the United States tends to publish significant numbers of papers in the social sciences and the medical sciences (from 6:00 to 9:00) and in areas of agricultural science (the band of nodes around 4:00). There is also an exceptionally strong node on the far right (in the chemistry, colored light teal because its main concern is biochemistry) which represents papers dealing with work that interprets basic research in chemistry for use in the more applied areas of medicine.

Nations that emphasize interdisciplinary work will have more weight on long edges, linking topics that are more distant from one another. The diagram below suggests that the large biochemistry node is a center of interdisciplinary research. This node contains papers that discuss many of the newest methods for drug development, e.g., proteomics and biomarkers. Otherwise, the U.S. does not show an exceptional level of interdisciplinary research; there is a noticeable lack of interdisciplinary research in math, engineering and the physical sciences. Interestingly, there is an equally noticeable tendency for interdisciplinary research between medicine and the social sciences—especially dealing with issues of mental health.

The United States of America



The nations most similar to the United States are The United Kingdom, Australia and Canada. There are differences, though: The UK has an even greater emphasis on the network spanning social sciences and mental health. Australia has more emphasis on biology, and Canada is relatively distinct from all three with its broad interdisciplinary pattern and strength in computer science.

The two European nations with the most scientific publications (France and Germany) excel in physics and chemistry. France's network emphasizes engineering applications: the band of nodes that are closer to the center of the diagram. Germany emphasizes the more theoretical aspects of chemistry and physics: the nodes that tend to be further from the center. Spain, on the other hand, focuses on science that links to agriculture: the band of nodes from 3:00 to 6:00. Each European nation has distinct profiles that represent their idiosyncratic histories.

The two Pacific rim nations with the most similar profile are China and Taiwan. Both strongly address applied mathematics: from computer science on the left towards engineering and applied physics on the right. Japan explores the medical areas (lower left) and physical chemistry (the band of nodes on the upper right). There is a great deal of interdisciplinary work within these two broad areas, but relatively few edges spanning these areas—the very areas that the US works to tie together.

