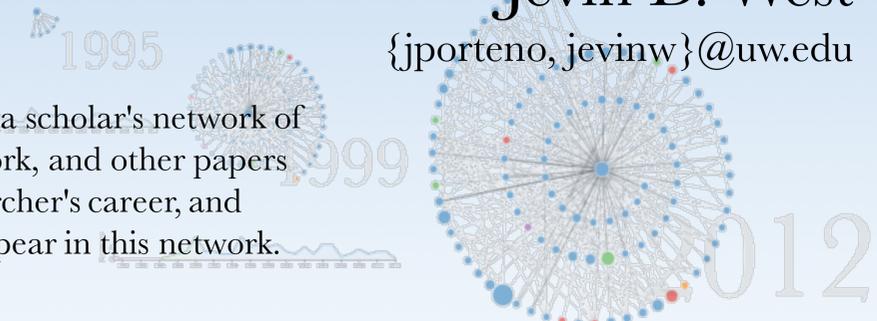


Visualizing Scholarly Influence Over Time

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Demo: scholar.eigenfactor.org

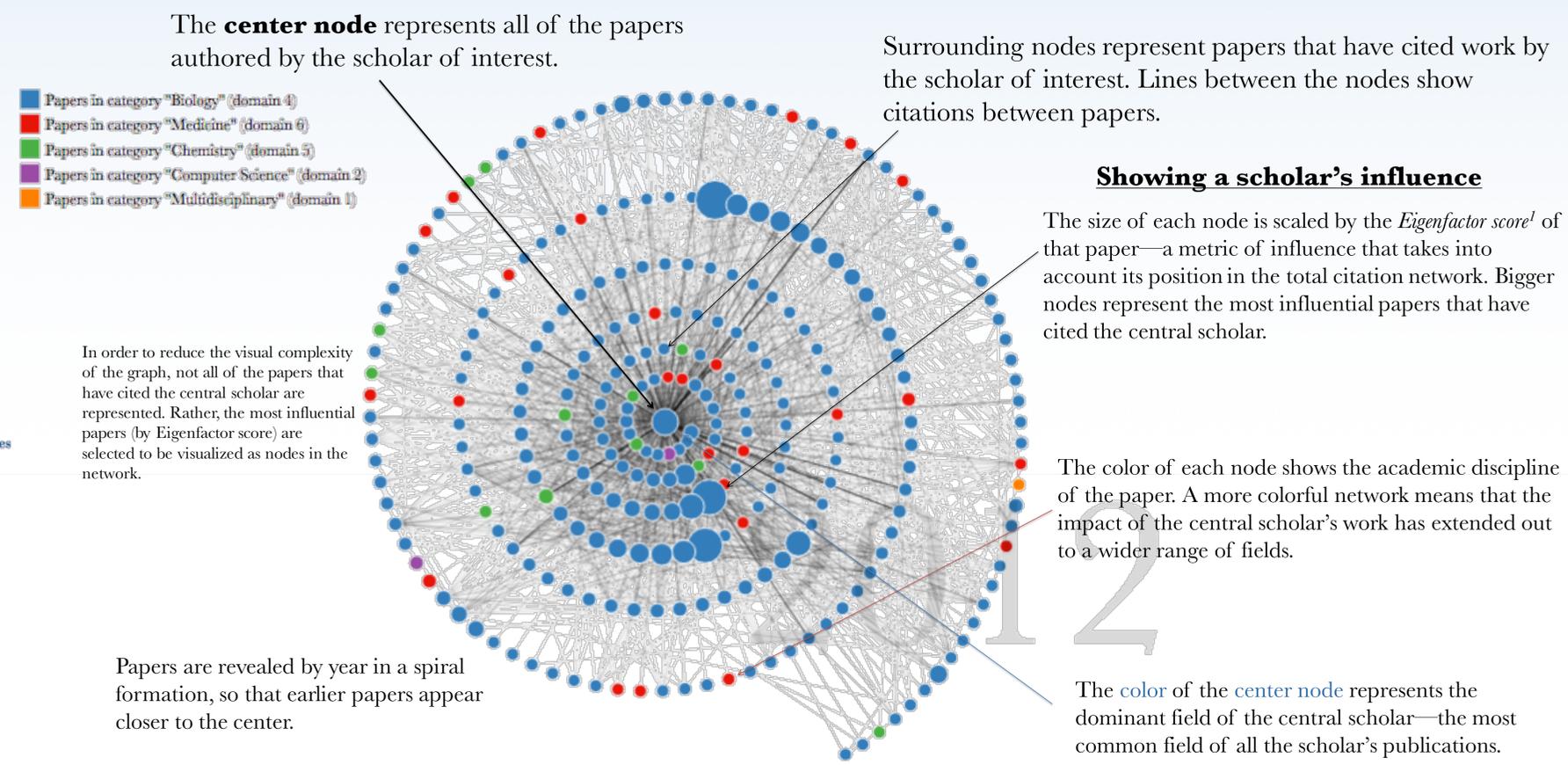
This visualization tool shows the influence a researcher has had both within his or her own field and across other fields, illustrating a local view of a scholar's network of influence and telling the story of how this influence has developed over time. The author of interest is represented as the central node in a network, and other papers that have cited papers written by this author are shown as circular nodes surrounding the central one. The animation starts early in the researcher's career, and progresses forward in time. As new papers appear, they send out links representing citations, both to the central node and to other nodes that appear in this network.



How can we assess the impact of research?



The **Pew Scholars** Program in the Biomedical Sciences provides four years of early-career funding to young researchers in health-related fields. This subset of scholars provides a useful case study for exploring narrative visualizations of scholarly influence, although the methods are generalizable to all scholars. The program is highly selective, and its scholars tend to have a great deal of impact in the biomedical sciences. Using this subset of scholars also gives us the opportunity to explore the overall impact of the Pew program, developing visual and quantitative techniques that will address the larger question of how to define and assess scholarly impact.



The **center node** represents all of the papers authored by the scholar of interest.

Surrounding nodes represent papers that have cited work by the scholar of interest. Lines between the nodes show citations between papers.

Showing a scholar's influence

The size of each node is scaled by the *Eigenfactor score*¹ of that paper—a metric of influence that takes into account its position in the total citation network. Bigger nodes represent the most influential papers that have cited the central scholar.

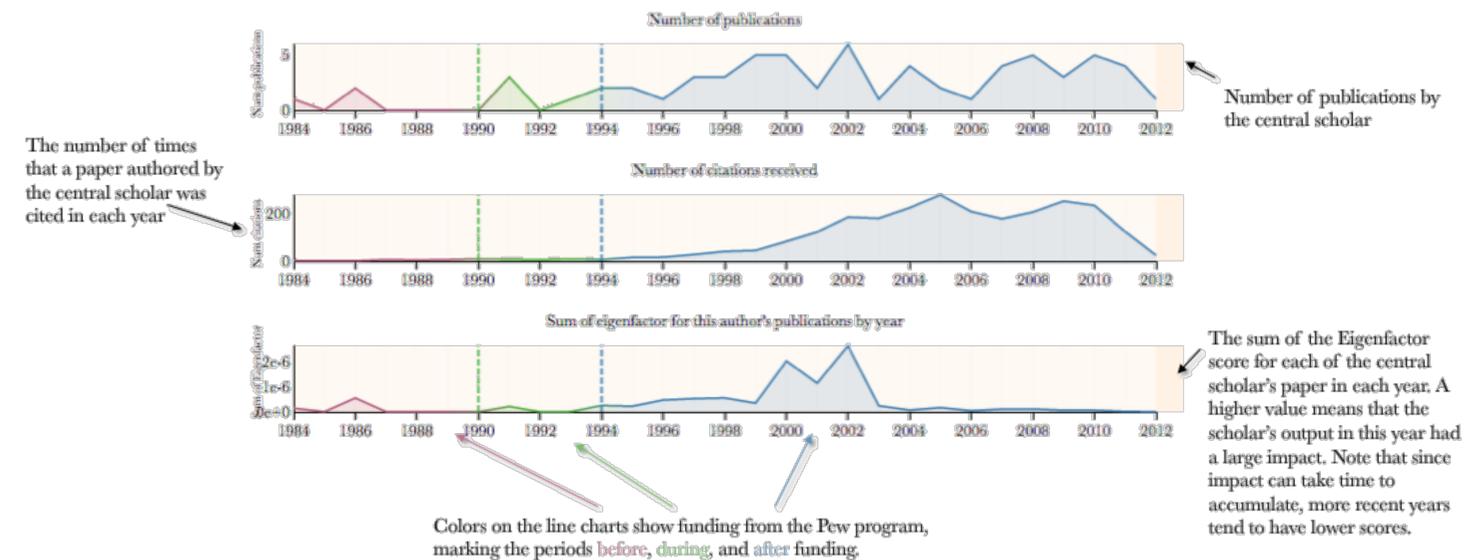
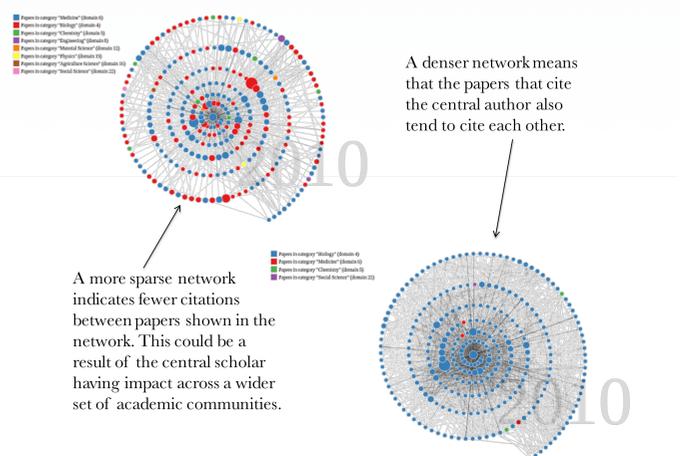
The color of each node shows the academic discipline of the paper. A more colorful network means that the impact of the central scholar's work has extended out to a wider range of fields.

The **color** of the **center node** represents the dominant field of the central scholar—the most common field of all the scholar's publications.

In order to reduce the visual complexity of the graph, not all of the papers that have cited the central scholar are represented. Rather, the most influential papers (by Eigenfactor score) are selected to be visualized as nodes in the network.

Papers are revealed by year in a spiral formation, so that earlier papers appear closer to the center.

A note on comparing authors: Scales are relative to each author, so the size of the nodes and the y-axes on the timelines are not consistent between authors. For this reason, direct comparison between different authors is not recommended. However, comparing the *relative densities* of the graphs can reveal information about the types of communities represented:



The number of times that a paper authored by the central scholar was cited in each year

The sum of the Eigenfactor score for each of the central scholar's paper in each year. A higher value means that the scholar's output in this year had a large impact. Note that since impact can take time to accumulate, more recent years tend to have lower scores.

Colors on the line charts show funding from the Pew program, marking the periods **before**, **during**, and **after** funding.

Future directions

- Explore new ways of *comparing and adding context*. One method is comparing the Pew scholars to the alternates, those who were considered but ultimately not selected (see figure for a preliminary analysis).
- Integrate audio interviews to add richness to the narrative.
- Automating annotation and narration by detecting changes in the network