

# Visualizing the History of Ideas

Ian Wojtowicz  
 Massachusetts Institute of Technology  
 Program in Art, Culture & Technology  
 400 Main St, E14-140Q  
 Cambridge, MA, 02142  
 iwoj@mit.edu

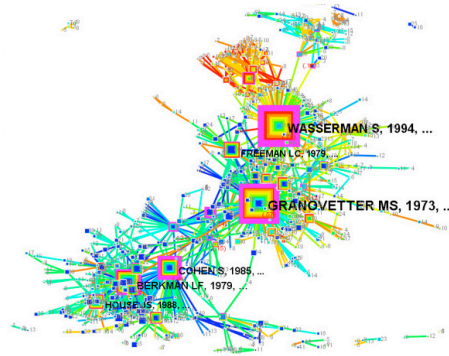
**This presentation surveys the field of citation data visualization and presents new prototypes that illuminate broad intellectual regions (epistemes) through their temporal structures (paradigm shifts).**

Eugene Garfield founded the contemporary field of tracking and measuring the dynamics of scientific publishing in the 1955 when he wrote a seminal article for *Science* entitled *Citation Indexes for Science: A New Dimension in Documentation through Associate of Ideas*. A few years later, Garfield went on to start found the Institute for Scientific Information (ISI) whose various citation indexes (grouped together in their flagship product, *The Web of Science*) have for decades been the primary source of information about the growth dynamics of scientific knowledge in the English-speaking world.

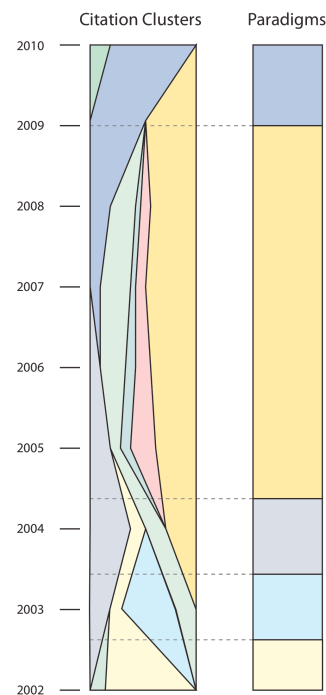
Concurrently, the historian of science Thomas Kuhn published his important text *The Structure of Scientific Revolutions*, in which he contests the notion of gradual change in scientific thinking. Instead, Kuhn posits that scientific ideas establish paradigms within which change is slow and referential, marked by occasional rapid revolutionary moments where new ideas replace existing ones.

To go beyond science into other forms of knowledge production, it is useful to follow Michel Foucault's notion of the *episteme* as a "historical a priori [in which] ideas could appear, sciences be established, experience be reflected in philosophies, rationalities to be formed." (Foucault, xxiii) It is within this notion that the desire for mapping the history of ideas can take striking new forms. With the growth of the Internet and ever more accessible databases of public knowledge, the field of data visualization has grown from a specialization into a necessity of understanding contemporary society.

With this in mind, this talk will survey the current state of knowledge visualization along with examples of designs in other domains to suggest future directions that will bring alive the process of exploring ideas in throughout recorded history.



**Figure 1:** CiteSpace, a current tool for citation network visualization, displaying academic publications written on the topic of Social Network Analysis (Chen)



**Figure 2:** An example of how complex historical citation information can be reduced to a much simpler visual representation.



**Figure 3:** An example of how these citation histories can be portrayed compactly along with search criteria.