

# Visualizing Social Connections in the Humanities: Beyond Bibliometrics

by Chris Alen Sula

## Digital Humanities and Information Visualization

### EDITOR'S SUMMARY

Reflecting the formal record of scholarly communication, bibliometrics in the humanities may inaccurately represent scholars as solitary, making limited references to colleagues. Bibliometric methods are derived from scientific and technical literature, where joint authorship and co-citation are more common than in the humanities. Yet the influence of social connections among humanities scholars is strong and lasting, especially through chains of personal relationships. The most significant social connections among academics are those between student and teacher, among departmental colleagues and, to a lesser extent, among conference participants and association members. Documenting the connections includes acknowledgments and citations but largely goes beyond bibliometrics, drawing on dissertation front matter, attendance records and departmental rosters. Visualization of these connections can disclose invisible colleges and spheres of influence, useful in the humanities as well as other fields.

### KEYWORDS

|                         |                |
|-------------------------|----------------|
| informal communication  | social aspects |
| scholarly communication | bibliometrics  |
| invisible colleges      | humanities     |
| communication patterns  |                |

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Intellectual history and critical self-reflection are distinguishing features long associated with the humanities. The growing movement of digital humanities affords new opportunities for studying both through high-volume, longitudinal datasets on people and publications, as well as advanced algorithmic analyses. In addition, visualization techniques can help render this information in salient ways and open new paths for exploration. This article addresses one intersection of digital humanities and information visualization: the study of social connections among humanists. The first section reviews previous studies of the structure of the humanities, particularly bibliometrics, and notes the limitations of this approach. The second section discusses several studies that support greater consideration of social connections in the humanities as well as data sources from which such connections may be gathered. Three broad categories of relationships are discussed, including student/teacher ties, departmental colleagues and other relationships, such as conference participants. The final two sections address the prospects for visualizing these connections, most notably in the form of network graphs, and speculate on the larger significance of this social analysis, both for the humanities and for the academy in general.

### Bibliometrics and Its Limits for the Humanities

Those who study the structure of academic disciplines have long been interested in connections among scholars. Most often, this interest has taken the form of bibliometrics: the study of patterns and relationships in the formal record of scholarly communication. Occasionally, this approach has been supplemented with information about conference proceedings, funding streams, personal website links and other “altmetrics” – usually in attempts to give deeper meaning to citation patterns. Visualization techniques, particularly network graphs, have also helped to harness bibliometric

analysis for the purposes of constructing global and field-specific maps of scholarly exchange and forecasting areas of growth and excellence.

In considering the application of bibliometrics to the humanities, it must be noted that most bibliometricians have developed their methods and measurements on scientific and technical literature, quite often examining co-authorship and co-citation over the span of a few years. Studies of humanistic literature show that humanists do engage in patterns of co-citation, yet they credit each other less frequently than scientists, often cite materials over 10 years old and rarely publish multi-authored articles [1]. Linmans, for example, reports that in the 27-year period between 1980 and 2007, journal publications in the humanities averaged a flat 1.06 authors per article [2]. In addition, humanists are still likely to publish and cite monographs, which have received less attention in the recent bibliometric literature. Simply put, journal citation and authorship in the humanities lend less grist for the bibliometrician's mill.

More problematic, the mere fact that one humanist references or acknowledges another says little about the type or significance of the relationship between the two. Hellqvist discusses a number of studies that show that humanists are more likely than scientists to use integral references, which tend to associate their own views with those they reference, as well as negative references, which object to other authors' claims [3]. Even studies that disambiguate acknowledgments into different types, such as conceptual, editorial, financial, instrumental/technical, moral or reader [4], fail to capture qualitative elements of conceptual ties, such as agreement, disagreement, intellectual indebtedness and so on. These different valences of reference and acknowledgement cannot be ignored, since intellectual disputes are the bread and butter of humanists.

Together, these differences suggest that a fuller picture of the humanities will require additional sources of data beyond scholarly communication. While formal transactions are important, they need not exclude other sources of information that can supplement and provide additional context for citation, multiple authorship and the like. With that in mind, it is worth considering social factors that influence the humanities as well as the data available about them.

### Social Connections in the Humanities

As Weedman has noted, humanists are often portrayed as solitary and isolated figures [4]. Yet this perception has been based primarily on studies of formal communication. Studies of informal communication among humanists have stressed the similarities between humanists and non-humanists. For example, Weedman's study of scholars of children's literature found that the informal communication needs and behaviors of humanists were similar to those of researchers in other disciplines and that more than 50% of those surveyed said at least half of their ideas could be traced back to conversations with others [5].

The presence of informal intellectual exchange among humanists should come as little surprise. Historically, it has been common to discuss *schools of thought*, both in Western and Eastern intellectual history. Randall Collins distinguishes four senses of this term: (1) individuals with similar modes of thought (who need not be contemporaries), (2) intellectual influences among scholars, (3) chains of personal relationships and (4) organizations where authority and property are passed through succession [6]. The third category is most relevant in discussing social connections among humanists and, in fact, can be seen as mediating the other three. Personal connections serve as vehicles for aligning thought and doctrine, for transmitting influence through circulating publications and ideas and controlling limited attention space in the field and for establishing and maintaining actual social organizations.

The specific mechanisms through which personal connections exert their influence may be explained in terms of social psychology. Morrow and Sula hypothesize that *uniformity pressure* and *confirmation bias* work in tandem to disseminate ideas, reinforce some and relegate others [7]. Uniformity pressure is a form of social pressure that induces members of a group to seek uniformity of opinion within the group, while confirmation bias subsumes several more specific psychological tendencies that lead individuals to seek and believe information that is consistent with their existing beliefs and to ignore, to disbelieve or to be more critical of information that is inconsistent with their existing beliefs. The presence of uniformity pressure is well documented in enduring social groups, which may include academic

departments, and it is considered by many psychologists to be among the largest problems for human reasoning.

Given the likelihood of social influence in the humanities, it is worth considering which types of social connections are most prominent, as well as the documentation that may exist about them. The remainder of this section focuses on two types of relationships: student/teacher relationships and departmental colleagues. Other relationships, including conference participation, are briefly discussed.

**Student/Teacher Relationships.** Student/teacher relationships are among the oldest and most significant ties in humanities, especially relationships between advisors and doctoral students. Uniformity pressure and confirmation bias may explain the significance of this relationship in the following way: newer students in academic departments find themselves unable to match the intellectual abilities of higher-status faculty and more advanced students and either adopt the views of the group in which they find themselves or gravitate toward those who already share their views. In either case, confirmation bias may further entrench whatever views are adopted, perpetuating them through several generations of scholars. Of course, rational mechanisms may intervene and override these others mechanisms, but it is no understatement to say that many students have followed in the footsteps of their advisors.

Data on these relationships is documented in dissertation front matter, which lists advisors and committees and often includes acknowledgements that offer further insights into the contributions of particular individuals. Since the mid-19th century, dissertation procedures have been formalized in Anglo-American and Continental institutions (and earlier in some other cases), providing a large source of this data over roughly a dozen decades. Though less significant, other teacher/student relationships can be gathered from attendance records or roughly inferred by comparing students' dates of attendance in a program with the lists of faculty teaching in the program at the time, narrowed according to the students' and faculty members' areas of interest.

**Departmental Colleagues.** Another important relationship is that of departmental colleagues. A case study of community college faculty found

that the average faculty member has three to five close collegial relationships and regards less intimate collegial relationships as a standard part of the college environment [8]. Gender, age, parental status, workload and physical proximity influenced the development and maintenance of these relationships, and departmental colleagues serve as information sources, discussion partners and readers of unpublished manuscripts. Universities maintain annual or biannual listings of departmental faculty, providing clear documentation of appointments. Specific relationships, however, may need to be inferred based on acknowledgments and citations in formal scholarly communication.

**Other Relationships.** While perhaps less common, relationships of correspondence, conference attendance, membership in the same professional associations, editorial relationships and personal friends also contribute to the social structure of the humanities, and some (for example, correspondence) are particularly important during particular time periods like the early modern period. Some of these are clearly documented (see Table 1), while others may not be. A fuller study of the significance of these connections and possible sources of documentation is needed.

**TABLE 1. Social relationships and documentation of them.**

| Type of Relationship                   | Documentation                               |
|--|---|
| <b>Student/Teacher Relationships</b>   |   |
| Advisor/advisee                        | Dissertation front matter                   |
| Classroom student/teacher              | Various sources                             |
| <b>Peer/Peer Relationships</b>         |   |
| Faculty colleague                      | University catalogs                         |
| Student colleague from graduate school | Dissertation acknowledgments, degree dates* |
| <b>Other Relationships</b>             |   |
| Conference participant                 | Conference programs, proceedings, CVs       |
| Correspondent                          | Letters, references, acknowledgments        |
| Editor/Contributor                     | Anthologies, journals                       |
| Member of an association/society       | Organization rosters                        |

The \* indicates that relationships may be roughly inferred from these documents, though further study should be conducted to determine the confidence interval of these inferences.

### Visualizing Social Connections

While additional data on social connections would provide a fuller picture of the humanities, it also presents challenges of representation, particularly with respect to longitudinal data. Where textual representations might be nearly impossible to comprehend, visualization may help to amplify cognition, extend working memory and allow for greater exploration of such data.

Network graphs have been used to aid social network analysis from its beginnings. However, large-scale networks with many nodes and overlapping connections have also been shown to hinder pattern recognition – the main reason for employing visualization in the first place. Several proposals have been studied for simplifying social network graphs, including algorithms for reducing overlapping connections, fisheye techniques that focus on particular areas at a time, clustering or omitting fine detail, limiting “degrees of interest” to provide details only on demand and building flexible systems for network exploration [9]. It would be premature to speculate which methods work best for visualizing data on social connections in the humanities, and alternatives to network graphs should also be explored. Brandeis and Nick, for example, present an intriguing “gestaltline” approach that combines sparklines with Gestalt-based glyphs to visualize asymmetric relations in longitudinal social networks [10], precisely the type of relations one encounters in the humanities.

Simply put, there is no shortage of techniques for experimentation, and digital humanists should test different visualization methods for potential insights, such as emerging areas of research and “invisible colleges” that

drive research in scholarly fields, including the humanities [5], clustering that suggests hidden subfields or potentially emerging breaks and so forth. This use of social data also need not exclude the use of bibliometric data. Starting with bibliometric information, different weights may be assigned to citations, multiple authorship and social connections to yield a hybrid visualization that is more inclusive than either of the simple visualizations alone. Determining the nature and weight of these connections is an important area for further study. These studies will also provide fruitful ground for comparison with traditional bibliometric analyses of scientific literature.

### Conclusion

Whereas traditional bibliometric analyses have focused on purely quantitative measures of formal scholarly communication among scientists, this essay has advanced the role of social connections in the humanities and their potential to bring qualitative nuance to bibliometrics. Social data may bridge the bibliometric gaps that exist in the humanities and provide critical context for references and acknowledgments. In addition, a fuller picture of the humanities will help to clarify the ways in which the humanities and sciences differ, beyond citation patterns and authorship practices. And if – as some suspect – the social structures of the humanities and sciences are largely the same, the methods of analysis and visualization developed for the humanities may, in turn, be applied to the sciences, yielding a richer picture of scholarship across the academy as a whole. ■

*Resources on next page*

### Resources Mentioned in the Article

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