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Collaborating, Connecting, and Clustering in the Humanities: A Case Study of Networked Scholarship in an Interdisciplinary, Dispersed Team

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Abstract

To what extent does networked scholarship in the humanities parallel established models in the sciences? The present study examines the connections of a 7-year interdisciplinary, dispersed, collaborative network composed of 33 humanities scholars investigating the Hispanic Baroque. Our findings suggest that project membership leads to greater network density and integration, without necessarily increasing the level of in-depth collaboration typically found in the sciences. Hence, collaborative models in the humanities, while increasingly important, are distinct from their counterparts in the sciences. The study provides a more nuanced view of networked scholarship because it demonstrates that large-scale collaborative projects can yield a high level of integration of the overall network, while at the same time allowing for strong thematic clustering. This dual structural process is relevant because not all network members can form dense relations with one another. Furthermore, we identified that principal investigators showed different networking strategies.

Keywords

social networks, networked scholarship, digital humanities, communication behavior, interdisciplinary clusters, collaboration

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Introduction

Networked scholarship is increasingly becoming an essential part of academic work because it represents an important means of sharing ideas, collaborating, consulting with colleagues, and disseminating research findings (Quan-Haase, 2012; Siemens, 2009). Recently, there has been a move in academia toward formalizing collaborative networks by providing funds and grants to large clusters of disciplinary or interdisciplinary scholars with the goal of increasing the exchange of information, collaborative writing and publishing, as well as the possibilities for networking (see the articles in this issue).

While this model has worked well in the sciences where projects and papers most commonly have multiple authors, there is less evidence of its success in the humanities. Where the sciences often rely on research laboratories where students and other collaborators work together, the "laboratory" of the humanist scholar has usually been the physical or digital library or archive (Barrett, 2005; Goodrich-Jones, 1995; Stone, 1982; Wiberley & Jones, 1989).

Thus, the work of humanists tends to be solitary, consisting primarily of reading and writing (Stone, 1982). Although humanists, like other scholars, meet at conferences and frequently exchange information and ideas about their work with colleagues (Ross, Terras, Warwick, & Welsh, 2011), they are usually less inclined to engage in close collaborations. That is, most publishing, data analysis, and grant writing in the humanities is still single or dual authored (Lariviere, Gingras, & Archambault, 2006). Although there has been much optimism about how the collaborative model could be applied to the humanities to increase information flow, copublishing, and innovation, few studies have actually observed the extent to which such networks are successful in practice (Chuk, Hoetzlein, Kim, & Panko, 2012; McGrath, 2011). Yet scholars in the humanities are becoming more aware of the relevance of networking and the use of boundary-spanning teams to stimulate creativity, address novel research questions, and tackle complex problems. In particular, the digital humanities have attracted attention with their focus on interdisciplinary work, collaborative problem solving, and the integration of computing resources (Humanist Discussion Group, 2007; Siemens, 2009). In addition, the widespread use of computer-mediated communication, e-mail, social media (e.g., Twitter and blogs), and other digital tools (e.g., Mendeley, Zotero) present alternative means for humanities scholars to engage with one another, regardless of whether or not they are a part of the digital humanities (Kirschenbaum, 2012; Ross et al., 2011).

The present article employs a case study of a dispersed network of humanities scholars who work on the Hispanic Baroque Project that spans geographic and disciplinary boundaries. Project members are located in geographically dispersed locales—including Spain, the United Kingdom, Canada, Brazil, Mexico, Bolivia, Australia, and the United States—and have carried out activities in several other countries. The range of subjects is also varied as the project brings together diverse areas of expertise—Cultural Transfers, Literary History, Mathematics, Art History, Architecture, Sociology, History, Anthropology, Music, and Complexity Theory—to

shed light on the emergence and spread of cultural patterns in areas influenced by the Hispanic Baroque.

The Hispanic Baroque Project provides an interesting case study of networked scholarship. First, members participate in loosely coupled groups that work together in a distributed fashion on overarching research problems. Second, the work is not done completely virtually, as project members meet face-to-face about once a year and also connect at association conferences and other scholarly gatherings. This presents interesting challenges for how to fill communication gaps between face-to-face meetings and keep a cohesive network during the multiyear period. Third, only a few scholars in the project knew each other when the project began. As a result, the project has presented an opportunity for new collaborative links to emerge that may continue beyond the lifespan of the project.

Specifically, we address two research questions associated with how networked scholarship functions in the humanities.

Research Question 1: How are members of the Hispanic Baroque Project collaborating? Who are the key scholars in the network?
Research Question 2: To what extent are the ties among the scholars in the projects organized around thematic groups? Are these groups more internally or externally oriented? What is the role of the thematic groups in the overall functioning of the network?

Literature Review

We start with a brief review of the literature on networked work and then discuss key findings on how networked scholars work and operate.

Networked Work

Over the past 30 years, network analysts have argued that social structure has changed from social interactions occurring in tightly knit groups toward the formation of loosely connected networks (Quan-Haase & Wellman, 2008; Rainie & Wellman, 2012). This change has not only affected how individuals socialize with friends and family but also how they work. Termed *networked work*, this process encompasses "participation in multiple teams for multiple purposes" with the potential for workers being "physically and organizationally dispersed" (Rainie & Wellman, 2012, pp. 171-172). Networked work is growing and is increasingly relevant because it allows firms to adapt quickly to changing demands in the economy and to better deal with highly competitive environments (Nardi, Whittaker, & Schwarz, 2000; see the other articles in this issue). At the center of networked work lies the transition from clearly defined roles and hierarchically structured work processes, toward horizontal communication among colleagues and collaboration across formal boundaries, including hierarchies (Quan-Haase, 2009, 2010; Quan-Haase & Wellman, 2006, 2008).

Despite its merits, networked work can also lead to negative changes. Losses in productivity can result from multitasking across boundaries and teams, workflow interruptions, shifts in attention, and loss of focus as a result of heavy reliance on computer-mediated communication (Gonzalez & Mark, 2004; Su & Mark, 2008). Another possible hurdle can be the absence of clear work processes if members are not aware of the others responsibilities. In cases where workers are physically dispersed, information sharing may be hindered, making coordination difficult. This may lead to reduced productivity as time is spent coordinating and clarifying project goals. These problems are particularly pronounced in new teams, where members do not know each other and do not have a common language or work culture (Chuk et al., 2012; Karpova, Correia, & Baran, 2008; Rainie & Wellman, 2012).

Networked Scholarship

Networked scholarship is networked work done by that peculiar breed of knowledge workers: academics. It goes beyond scholarship that is bounded geographically, that is, where scholars engage in limited international collaborative work, and whose primary interactions take place with colleagues in the same department or institution. It describes the transition to scholarship that integrates a wide range of information and communication technologies into all aspects of scholarly practice, including writing, communicating with other scholars, and disseminating and reviewing information. It is the product of both "a shared interest in a specialty and . . . ties of friendship, information, advice, and collaboration" (Wellman, Koku, & Hunsinger, 2006, p. 1430), such that scholarly communication becomes rapid, informal, and innovative. It goes "beyond post facto reporting back by networking across sectors throughout the entire research process" (Sprain, Endres, & Petersen, 2010, p. 443) to actual collaboration via the interconnection of "interpretation, narrative evidence, commentary, and other scholarly activities" (Thomas, 2004, p. 66). These ties are not limited to scholars but are often transsectoral, including coordination and cooperation with all stakeholders and policy makers who are interested in a specific research problem (Sprain et al., 2010).

Many scholarly networks have numerous characteristics of networked organizations, such as boundary-spanning information flows and decentralized nonhierarchical communication structures (Dimitrova & Wellman, 2015). However, not all disciplines have fully adopted networked work. Generally, the practices of networked scholarship are "common in research where they are well aligned with the information-related and creative nature of work and with scholarly traditions of collaboration" (Dimitrova et al., 2013, p. 274). As a result, much of the literature on networked scholarship has tended to focus on the sciences (Wellman et al., 2006), where the structure and composition of scholarly networks and the nature of computer-based collaborative communication have become central topics of study (Dimitrova et al., 2013; Kirschenbaum, 2012; Ross et al., 2011; Siemens, 2009; Wellman et al., 2006).

Hence, our research is a rare study of networked scholarship in the humanities. We expect that some findings will parallel those found in other fields, but there will also be differences as the work of humanists is more focused on the book as a research

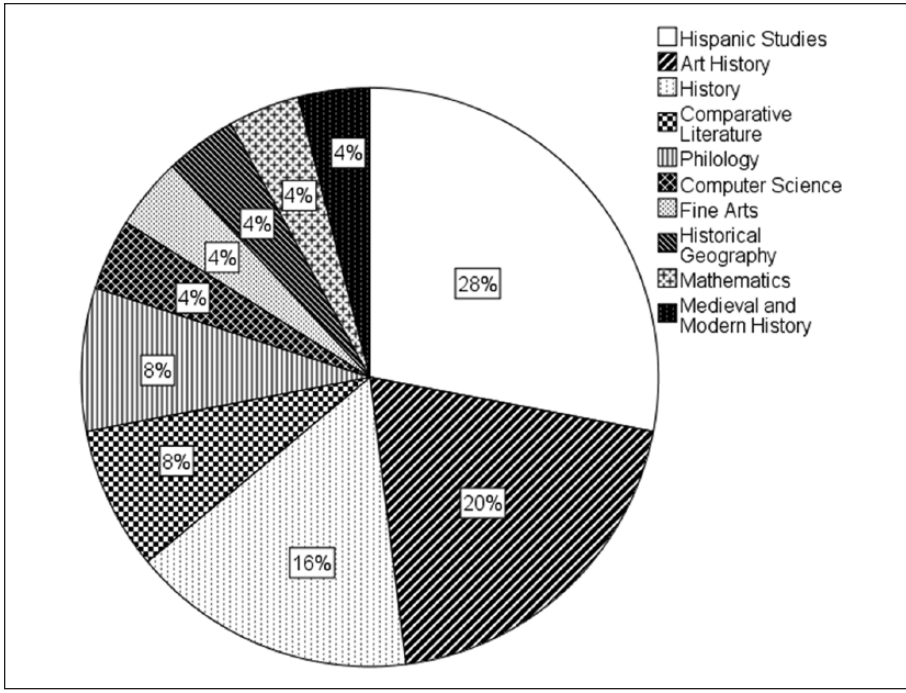

Figure 1. Disciplinary affiliation of Hispanic Baroque Project members.

object, historical archives, and theoretical analysis, whereas the natural, computational, and social sciences tend to focus on the analysis of empirical data, journal articles, and conference papers as venues of publication and short-term outputs. As the humanities continue to integrate collaborative, dispersed models of scholarly work, a better understanding is needed of how these networks function.

Methodology

We focus on members of the Hispanic Baroque Project, a 7-year project that started in 2007 and ended in 2014. The project's interdisciplinary research team had two main goals: (a) academic meetings and resulting publications on the topic and (b) a program for training graduate students. Growth was built into the original plan to take advantage of initiatives emerging from interactions among scholars after the first annual full-team meeting.

To create and maintain a network of exchange among this globally dispersed and multidisciplinary team (Figure 1), the project has had to rely on a combination of face-to-face meetings and virtual work. Face-to-face meetings occurred for both the thematic groups and the entire network. In addition, interactions have taken place via e-mail, chat, blogs, and other electronic tools.

Sample

Within the overall Hispanic Baroque Project, there were four lines of thematic investigation: (a) Identities (10 members), (b) Technologies (12 members), (c) Neo-Baroque (7 members), and (d) Complexity (4 members)—each coordinated by a group leader. All scholars in the network were invited via e-mail to participate in an online survey, between July 2011 and April 2012. We collected data from graduate students and three types of faculty: principal investigators (PIs), team leaders, and participating scholars. We obtained a response rate of 20 of 33 faculty members (61%) plus 8 graduate students, for a final sample size of 28.

Measurement

We used a social network analytic approach to study these loosely connected humanists (see also the other articles in this issue). The survey used a social network questionnaire specifically designed by the NAVEL team for the study of scholarly networks (Dimitrova, Mok, & Wellman, 2015; Hayat & Mo, 2015). We asked about three distinct networks in the survey:

1. *Preproject collaboration*: Relationships between actors prior to the initiation of the project: "Who you have worked with before the beginning of the Hispanic Baroque Project, such as collaborated on a research project, consulted, or wrote a paper. These activities do not have to be necessarily related to the Hispanic Baroque Project."
2. *Advice*: Advice relationships during the duration of the project: "Who you received advice from, or provided advice to, since the inception of the Hispanic Baroque Project when you had a question or a problem related to scholarship. These do not have to be necessarily related to the Hispanic Baroque Project."
3. *Relationship*: "Your relationship with people in the Hispanic Baroque Project." For the relationship graph, ties were given a weight value based on the nature of the relationship: 0 = *Unknown to me*; 1 = *Know by name*; 2 = *Acquaintance*; 3 = *Friend*; and 4 = *Close friend*.

As we were not able to collect data prior to the initiation of the project, we used a proxy measure to assess the preproject collaboration network. A concern often raised with social network analysis studies is the accuracy of reports made by respondents about their relationships. In particular, this problem can affect evaluations of relationships in the past. Previous studies suggest that respondents tend to focus on "stable" patterns of exchange rather than on specific time periods (Freeman, Romney, & Freeman, 1987). Hence, if there is a bias in the present study, it would be toward respondents overestimating the number of project members they knew prior to the start of the project.

For Research Question 2, we investigated the level of connectivity within the network's four groups, which are formed along each of the lines of investigation, as well

as the existing interconnectedness between them. *Inter*group density was calculated by generating a graph that included all of the members of two groups (e.g., Identities and Technologies) and then only including the ties shared by members of different groups. By contrast, *intra*group density was calculated by generating a graph of each group and examining the ties between its members. This produced a silo index, ranging from −1 to 1, with positive values indicating high internal orientation.

Using the Python module NetworkX, we generated two series of three graphs. The first series represented the relationships between the participants who responded to all three network-based survey questions, resulting in multidirected graphs that allowed directional and parallel ties. These graphs were then analyzed employing three methods: NetworkX's built-in algorithms for determining statistical properties, Gephi's graph visualization capabilities for more intuitive visual inspections, and Python's Pandas and Matplotlib for statistical analyses and data visualization.

Results

Key Scholars in the Scholarly Networks

To identify the key scholars in each of the three networks (Research Question 1), we use the four most widely used centrality measures: indegree measures to analyze incoming ties, outdegree measures to analyze outgoing ties, closeness measures to determine the distance between actors in a connected graph, and betweenness measures to analyze the extent to which actors serve as connectors between otherwise unconnected actors (Freeman, 1978/1979; Rothenberg et al., 1995). We also examine if the same scholars are central across all three networks, compare the centrality of individuals across the four centrality measures, and use demographic data collected through the online survey to better understand who those central scholars are.

The leveling of degree centrality scores after the seventh position for the preproject collaboration and advice graphs suggests that seven networked scholars are especially central. As expected, the two PIs (#0 and #6) were central in the *preproject* network as they recruited and coordinated scholars from four continents who could bring their expertise to bear on the topic. Their centrality scores also reflect their individual domain expertise on the cross-disciplinary topic of the Hispanic Baroque and help explain their connections with scholars from various fields. However, the connectivity of the two PIs was not much greater than that of several other members (see Figure 2). Moreover, Scholar 4 shows greater outdegree and closeness scores than both PIs. This scholar took on a leadership role within the thematic group, as well as in the overall network, actively organizing project events, helping with the preparation of conferences, and taking on the role of editor for a project-related book.

Prior to the start of the project, few collaborative ties were present among project members, and some of those that did exist were supervisor–student relationships. This low level of connectivity prior to project initiation is not surprising, as prior research has shown that scholarly work networks tend to be sparsely knit.

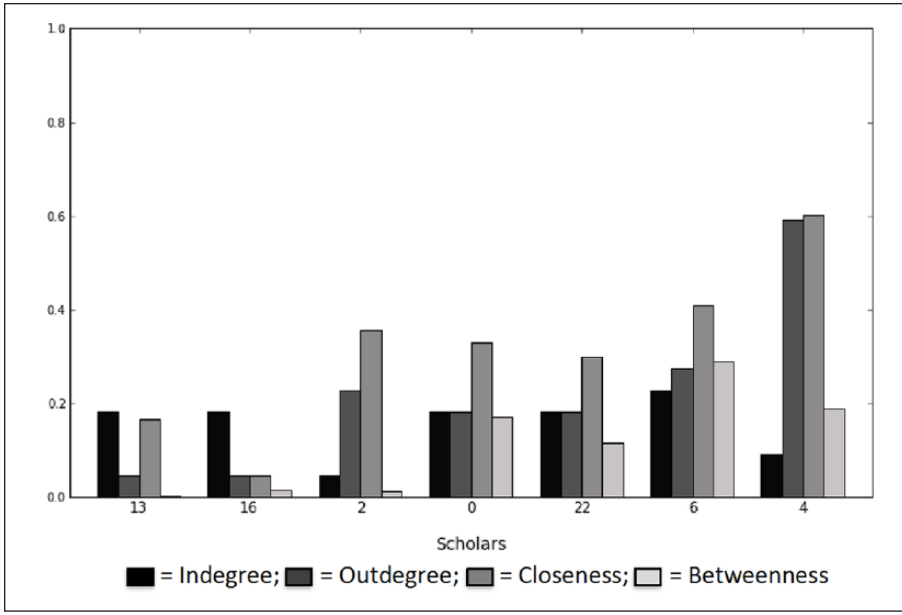

Figure 2. Centrality measures for preproject network.

One of the PIs (#0) is the most central in the *advice* network (see Figure 3). The outdegree score (.77) of this scholar is much higher than the indegree score (.31), suggesting that this PI sought advice from many members across all thematic groups, but fewer members went to the PI for advice. Yet this PI also has the highest closeness and betweenness scores, facilitating the flow of information within and between groups in the network, and helping integrate disconnected nodes.

The second PI (#6) shows a different pattern of connectivity with higher indegree (.45) and lower outdegree (.36) values, sharing position 2 in the advice-giving network with two group members. Despite many members seeking this scholar for advice, this PI's closeness and betweenness scores are lower than that of #0, suggesting that the two PIs have different networking strategies.

Our findings suggest that the nature of connectivity is distinct among the most central individuals in the advice network. Some scholars, such as #10, are equally oriented toward seeking advice from others and being sought out by others for advice, while other scholars' centrality is principally a result of their notability in the network or thematic group.

Three members of the Identities group are key players in the advice network (#7, #4, and #16), occupying positions 1 (.5), 2 (.45), and 6 (.4), respectively. While neither a PI nor a group leader, overall #7 was the scholar most others sought out for advice within the Identities group. Yet this scholar did not appear among the top seven in the preproject network, suggesting that few people had worked with this scholar prior to

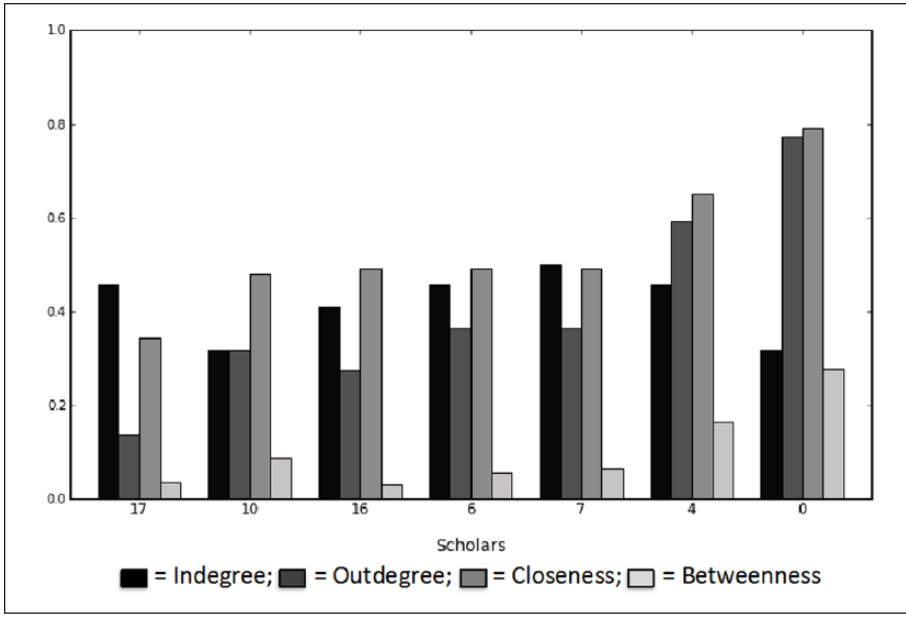

Figure 3. Centrality measures for advice network.

the start of the project. This suggests that several key scholars have become more integrated and well-known in the network, regardless of their hierarchical positions and preproject connectedness.

Two members of the Neo-Baroque group are also among the top seven central members. Scholar 10, in position 7, is the group's team leader and is an active member who equally seeks (.31) and gives advice (.31). Scholar 10 also ranks third in the overall network's betweenness, a position associated with the control of information flows.

By contrast, #17 has a combination of a high indegree (.45) and a low outdegree (.14) score. Even though this scholar has not reached out to others for advice, many scholars value this person as a source for advice. Yet this scholar's lack of advice seeking results in a low betweenness score, suggesting less influence over the flow of information.

Figure 4 shows high scores across centrality measures for the top seven scholars in the relationship network. The indegree measure suggests that both PIs (#0 and #6) are very central, with indegree scores of 1.0 and .81, and outdegree scores of 1.0 and .86, respectively. Two PIs (#0 and #6) are also well connected with members of all thematic groups. At the same time, #4, #17, and #10, who are central in the advice network, are also central in the relationship network.

While graduate students did not occupy central positions in the preproject or advice networks, two are among the top scholars in the relationship network. Moreover, one student (#5) surpasses the centrality scores of other project members, but not their betweenness scores.

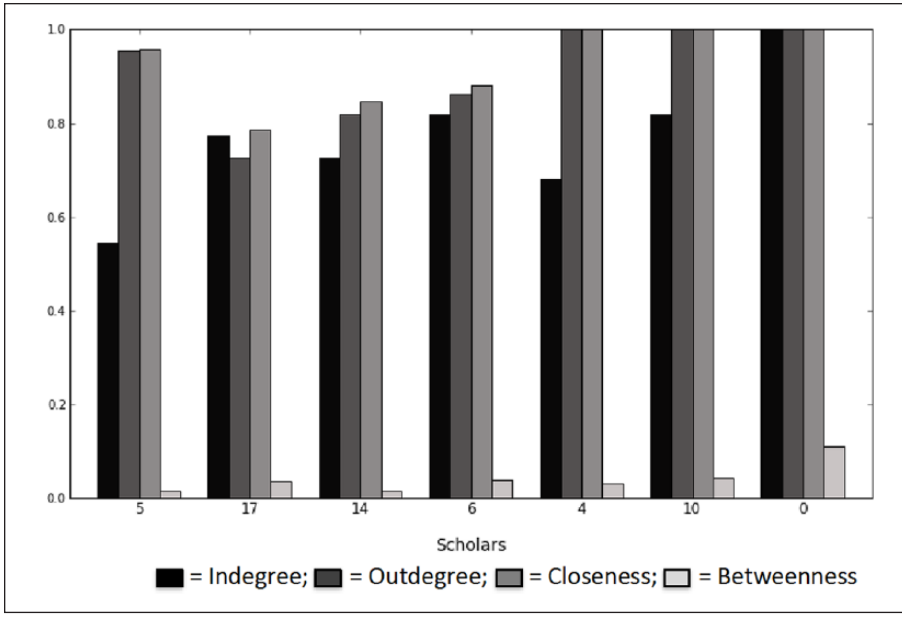

Figure 4. Centrality measures for relationship network.

Table 1. Intra-and Intergroup Tie Density in the Preproject Network.

Project group	1	2	3	4
1. Technologies	.42			
2. Identities	.04	.20		
3. Neo-Baroque	.07	.02	.50	
4. Complexity	.00	.02	.00	.33

Intragroup and Intergroup Networks of Collaboration

To understand the role played by the thematic groups, we analyzed the density of ties within and between them. The low to moderate preproject density score within each group ranged from .20 to .50, showing that several members of each group had worked with one another before the beginning of the project (Table 1). By contrast, there were few preproject ties between the groups, suggesting that project members had not collaborated previously across groups. The intergroup preproject density scores ranged from 0, for the Complexity/Technologies group (4 and 12 members, respectively), to .07 for the Neo-Baroque/Technologies group (7 and 12 members, respectively). As such, there are hardly any ties that connected these groups before the Hispanic Baroque Project began.

Table 2. Intra-and Intergroup Tie Density in the Advice Network.

Project group	1	2	3	4
1. Technologies	.43			
2. Identities	.03	.52		
3. Neo-Baroque	.12	.08	.83	
4. Complexity	.03	.09	.08	.43

Table 3. Intra-and Intergroup Tie Density in the Relationship Network.

Project group	1	2	3	4
1. Technologies	.67			
2. Identities	.13	.93		
3. Neo-Baroque	.42	.25	.83	
4. Complexity	.18	.29	.33	.86

By contrast, the advice network, with data from when the project was ongoing, shows moderate to high densities within the groups (Table 2). The Neo-Baroque group shows the highest density at .83, whereas the Technologies and Complexity groups show the lowest density values at .43. Similar to the preproject intergroup densities, there are few intergroup advice ties, with a maximum density of .12 for the ties between the Neo-Baroque and Technologies groups. While the Technologies group has several intergroup ties with the Neo-Baroque group, it has the lowest intergroup density at .03 with both the Identities and Complexity groups. The relatively consistent sparseness of intergroup ties suggests that researchers did not establish the relationships necessary to facilitate the intergroup exchange of advice. Considering that the majority of meetings and gatherings happened within groups, and only two of the meetings incorporated the larger network, this may reflect a lack of opportunity to establish strong ties between groups.

With respect to the relationships network, three groups have high integration, with internal density above .8 (Table 3). The network density for the Identities group is especially high, at .93, as this 10-member group is almost fully internally connected. Only the Technologies group at .67 is somewhat lower, but still has a majority of internal connections.

As with the advice network, intergroup density in the relationship network is lower, ranging from .13 (Identities-Technologies) to .42 (Neo-Baroque-Technologies). The Neo-Baroque and Technologies groups share the most external connections (.42), while the Identities group—which is the most internally connected—has few external connections to other groups.

The silo index (McCulloh, Armstrong, & Johnson, 2013) gives a more precise indication of the internal and external orientation of the groups (Figure 5). The high internal scores (+ silo index) of the Complexity and Identities groups in the preproject

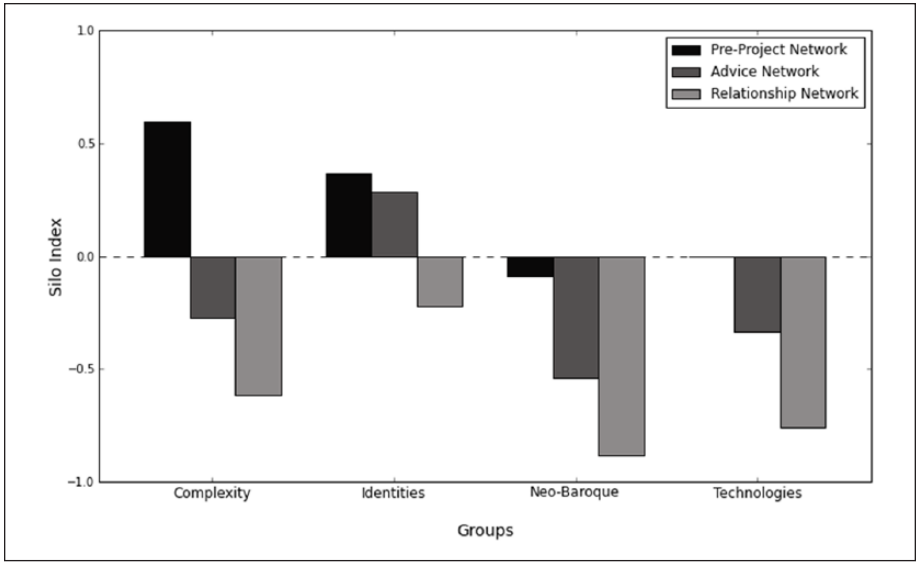

Figure 5. Silo index for groups.

network show that more members had worked with each other before the Hispanic Baroque Project began than with members of other groups. By contrast, the Neo-Baroque and Technologies groups had few, if any, working relationships internally before the Hispanic Baroque Project began (left hand bars for each group in Figure 5).

The situation is different for the advice network that developed after the Hispanic Baroque Project began. All groups—except Identities—demonstrate an external orientation with a negative silo index, with the seven Neo-Baroque members showing the highest external orientation (middle bars for each group in Figure 5). This group is rather unique, as it has a highly dense internal advice network (.86), but also many external ties, including strong interconnections with the Technologies group.

The only group with a positive silo index is Identities, consistent with the density scores in Tables 1 to 3, showing that it is the most internally focused group. However, discovering a strong external orientation for the advice network is rather surprising, as one would have expected groups to seek advice internally, instead of externally. It appears that project members distinguished between internal work within groups and getting advice more broadly from outside their own group, taking advantage of the connectivity of the overall Hispanic Baroque Project.

Such external connectivity shows up even more strongly for the relationship network (right hand bars for each group in Figure 5). Overall, project members know each other and have developed a set of working and friendship relations, both within and outside their groups. This shows that the thematic groups have not created silos, but rather have helped organize work, while allowing for the establishment of important

cross-group linkages and the integration of the overall network. Even the more insular Identities group has a weak positive external orientation in their relationships.

In short, the present study shows both strong and weak connections in the network of the Hispanic Baroque Project. Members have relationships with many of their colleagues and work together organizing events, coediting volumes, and digitizing materials. Although they work principally within their own thematic group, they also have multiple advice giving and relational ties outside of their groups. However, most work ties are within the four groups and rarely cross project boundaries. Some relationship ties are less demanding—just "knowing" somebody—and so are likely to be more numerous and reach outside the scholars' own thematic groups.

Discussion

The Hispanic Baroque Project has shown some key network characteristics—both planned and emerging through interaction.

Dual Structural Process

The study demonstrates that projects with a relatively large size for the humanities can yield widespread relationships in the overall network, while allowing for strong thematic clustering within groups. We refer to this phenomenon as a *dual structural process* as it allows members to be working within their groups, while also keeping an external orientation to other groups.

Thematic Group Connections

Groups played key roles in the clustering of the network, and density scores revealed that connections were much stronger within groups than between them. While most scholars are closely connected within their groups, not all were equally well-connected. For instance, the midsize Identities group (with 10 members) was almost completely connected, whereas the somewhat larger Technologies group (with 12 members) had a more sparsely knit network. Understanding these variations, and what kinds of activities and factors help groups connect, is important for future research. Is it only size that matters?

Cross-Boundary Connections

Intergroup connections vary across the three networks examined. In the preproject network, each group was a relatively densely knit team of scholars with few external connections. Moreover, throughout the Hispanic Baroque Project, work was principally done by individual scholars or within their thematic groups. Yet as the project developed, advice and relationship networks extended to scholars in other groups, facilitating the flow of information across geographic, disciplinary, and thematic boundaries. Interestingly, the most densely connected group, Identities, was the only

one with a positive silo index for advice, suggesting its strong internal focus may have hindered its members from reaching out to other groups. Yet there were other groups that had both strong internal and external orientation. One example is the relatively high density of connections (.50) between the Technologies and Neo-Baroque groups, stemming from a mutual meeting in Mexico City in 2007, the initial year of the project. Such in-person interactions facilitate tie formation and maintenance.

Hierarchy

The PIs were key scholars in the network, but several project members also were central in the advice network even though they did not occupy key positions in the formal hierarchy. The centrality of these scholars suggests that closeness, mutual understanding, and trust characterize these kinds of ties. Regardless of hierarchical position, advice seeking was established within thematic groups as a result of time spent together, mutual interests, and shared tasks. We also identified two graduate students as key players in the relationship network. These students were especially apt to seek advice from other group members, make themselves aware of other group members' work, and actively collaborate with them.

Networking Roles

The two PIs had different patterns of connections with project members: PI #0 actively sought advice from the network (outdegree of .77), while fewer scholars went to this PI for advice (indegree of .31). By contrast, PI #6 focused on providing advice to the network (indegree of .45) while not seeking as much advice from others (outdegree of .36). As a result, the closeness and betweenness scores for #6 are lower than that of #0, suggesting that the two PIs have different networking strategies. For one PI, it was important to ask questions, discuss project-related content, and seek input from other members. As a result of this active role in the network, possibly others went to this actors less frequently for advice. For the other PI it was important to be available to others for providing answers, discussing the project, and providing advice both related to the project organization as well as the content. By occupying a central role in the advice giving network, it was less important for this PI to seek information from other members of the network. This created an unbalanced relation between the PI and the network. When looking at the contributions of the PIs to the overall network function, it seems useful to have PIs with different network orientations as this provides a balance between seeking and giving advice. If there had been only a single PI in the project, it would have been more difficult for this PI to fulfill both roles simultaneously. Future research may focus on better understanding the networking patterns of PIs and their contribution to the overall network function.

The current special issue—and our research—has shown that networked scholarship can entail the exchange of information, insights, and advice across geographic and disciplinary boundaries within connected networks focused on thematic research questions. Yet networked scholarship in the humanities does not necessarily entail

direct coauthorship, cowriting, or coanalyzing of data, as is often the case in the sciences and digital humanities. As research develops, we may find that humanities scholarship will not closely resemble the model of collaboration developed in the sciences but consist of more loosely coupled ties mediated by both digital media and in-person exchanges. These networks of collaboration can be an important step in developing methods and practices that are unique to the needs of humanities scholars.

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References

Barrett, A. (2005). The information-seeking habits of graduate student researchers in the humanities. *Journal of Academic Librarianship*, *31*, 324-331.

Chuk, E., Hoetzlein, R., Kim, D., & Panko, J. (2012). Creating socially networked knowledge through interdisciplinary collaboration. *Arts and Humanities in Higher Education*, *11*, 93-108.

Dimitrova, D., Mok, D., & Wellman, B. (2015). Changing ties in a far-flung, multidisciplinary research network: The case of GRAND. *American Behavioral Scientist*, *59*(4), XX-XX. doi:10.1177/0002764214556803

Dimitrova, D., & Wellman, B. (2015). Networked work and network research: New forms of teamwork in the triple revolution. *American Behavioral Scientist*, *59*(4), XX-XX. doi:10.1177/0002764214556811

Dimitrova, D., Wellman, B., Gruzd, A., Hayat, I., Mo, G. Y., Mok, D., & Zhuo, X. (2013). NAVEL gazing: Studying a networked scholarly organization. In E. Kranakis (Ed.), *Advances in network analysis and its applications* (pp. 271-298). Berlin, Germany: Springer.

Freeman, L. C. (1978/1979). Centrality in social networks conceptual clarification. *Social Networks*, *1*, 215-239.

Freeman, L. C., Romney, A. K., & Freeman, S. (1987). Cognitive structure and informant accuracy. *American Anthropologist*, *89*, 310-325.

Gonzalez, M. V., & Mark, G. (2004). Constant, constant, multi-tasking craziness: Managing multiple working spheres. *Conference on Human Factors in Computing Systems*, *6*, 113-120.

Goodrich-Jones, W. (1995). The disappearance of the library: Issues in the adoption of information technology by humanists. *New Directions for Higher Education*, *90*, 33-41.

Hayat, T., & Mo, G. Y. (2015). Advice giving and receiving within a research network. *American Behavioral Scientist*, *59*(4), XX-XX. doi:10.1177/0002764214556802

Humanist Discussion Group. (2007). *Forming the digital humanities*. Humanist Archives (*Vol. 21*). Retrieved from http://www.digitalhumanities.org/humanist/Archives/Virginia/v21/subject.html

Karpova, E., Correia, A. P., & Baran, E. (2008). Learn to use and use to learn: Technology in virtual collaboration experience. *Internet and Higher Education*, *12*, 45-52.

Kirschenbaum, M. (2012). What is digital humanities and what is it doing in English departments? In M. K. Gold (Ed.), *Debates in the digital humanities* (pp. 3-11). Minneapolis: University of Minnesota Press.

Lariviere, V., Gingras, Y., & Archambault, É. (2006). Canadian collaboration networks: A comparative analysis of the natural sciences, social sciences and the humanities. *Scientometrics*, *68*, 519-533.

McCulloh, I., Armstrong, H., & Johnson, A. (2013). *Social network analysis with applications*. Hoboken, NJ: Wiley.

McGrath, L. (2011). *Collaborative approaches to the digital in English studies*. Logan, UT: Computers and Composition Digital Press.

Nardi, B. A., Whittaker, S., & Schwarz, H. (2000, May). It's not what you know, it's who you know: Work in the information age. *First Monday*, *5*(5). Retrieved from http://firstmonday.org/ojs/index.php/fm/rt/printerFriendly/741/650

Quan-Haase, A. (2009). *Information brokering in the high-tech industry: Online social networks at work*. Berlin, Germany: Lambert Academic.

Quan-Haase, A. (2010). Self-regulation in instant messaging (IM): Failures, strategies, and negative consequences. *International Journal of e-Collaboration*, *6*(3), 22-42.

Quan-Haase, A. (2012). Research and teaching in real-time: 24/7 collaborative networks. In D. Rasmussen Neal (Ed.), *Social media for academics* (pp. 39-58). Sawston, England: Chandos.

Quan-Haase, A., & Wellman, B. (2006). Hyperconnected network: Computer-mediated community in a high-tech organization. In C. Heckscher & P. Adler (Eds.), *The firm as a collaborative community: Reconstructing trust in the knowledge economy* (pp. 281-333). Oxford, England: Oxford University Press.

Quan-Haase, A., & Wellman, B. (2008). From the computerization movement to computerization: Communication networks in a high-tech organization. In K. L. Kraemer & M. S. Elliott (Eds.), *Computerization movements and technology diffusion: From mainframes to ubiquitous computing* (pp. 203-224). Medford, NJ: Information Today.

Rainie, L., & Wellman, B. (2012). *Networked: The new social operating system*. Cambridge: MIT Press.

Ross, C., Terras, M., Warwick, C., & Welsh, A. (2011). Enabled backchannel: Conference Twitter use by digital humanists. *Journal of Documentation*, *67*, 214-237. doi:10.1108/00220411111109449

Rothenberg, R. B., Potterat, J. J., Woodhouse, D. E., Darrow, W. W., Muth, S. Q., & Klovdahl, A. S. (1995). Choosing a centrality measure: Epidemiologic correlates in the Colorado Springs study of social networks. *Social Networks*, *17*, 273-297.

Siemens, L. (2009). "It's a team if you use 'reply all'": An exploration of research teams in digital humanities environments. *Literary & Linguistic Computing*, *24*, 225-233. doi:10.1093/llc/fqp009

Sprain, L., Endres, D., & Petersen, T. R. (2010). Research as a transdisciplinary networked process: A metaphor for difference-making research. *Communication Monographs*, *77*, 441-444.

Stone, S. (1982). Humanities scholars: Information needs and uses. *Journal of Documentation*, *38*, 292-313.

Su, N. M., & Mark, G. (2008, April). *Communication chains and multitasking*. Paper presented at the Conference on Human Factors in Computing Systems, Florence, Italy.

Thomas, W. G. (2004). Computing and the historical imagination. In S. Schreibman, R. Siemens, & J. Unsworth (Eds.), *A companion to digital humanities* (pp. 56-68). Oxford, England: Blackwell.

Wellman, B., Koku, E., & Hunsinger, J. (2006). Networked scholarship. In J. Weiss (Ed.), *The international handbook of virtual learning environments* (pp. 1429-1447). Dordrecht, Netherlands: Springer.

Wiberley, S. E., Jr., & Jones, W. G. (1989). Patterns of information seeking in the humanities. *College & Research Libraries*, *50*, 638-645.

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Introduction

Networked scholarship is increasingly becoming an essential part of academic work because it represents an important means of sharing ideas, collaborating, consulting with colleagues, and disseminating research findings (Quan-Haase, 2012; Siemens, 2009). Recently, there has been a move in academia toward formalizing collaborative networks by providing funds and grants to large clusters of disciplinary or interdisciplinary scholars with the goal of increasing the exchange of information, collaborative writing and publishing, as well as the possibilities for networking (see the articles in this issue).

While this model has worked well in the sciences where projects and papers most commonly have multiple authors, there is less evidence of its success in the humanities. Where the sciences often rely on research laboratories where students and other collaborators work together, the "laboratory" of the humanist scholar has usually been the physical or digital library or archive (Barrett, 2005; Goodrich-Jones, 1995; Stone, 1982; Wiberley & Jones, 1989).

Thus, the work of humanists tends to be solitary, consisting primarily of reading and writing (Stone, 1982). Although humanists, like other scholars, meet at conferences and frequently exchange information and ideas about their work with colleagues (Ross, Terras, Warwick, & Welsh, 2011), they are usually less inclined to engage in close collaborations. That is, most publishing, data analysis, and grant writing in the humanities is still single or dual authored (Lariviere, Gingras, & Archambault, 2006). Although there has been much optimism about how the collaborative model could be applied to the humanities to increase information flow, copublishing, and innovation, few studies have actually observed the extent to which such networks are successful in practice (Chuk, Hoetzlein, Kim, & Panko, 2012; McGrath, 2011). Yet scholars in the humanities are becoming more aware of the relevance of networking and the use of boundary-spanning teams to stimulate creativity, address novel research questions, and tackle complex problems. In particular, the digital humanities have attracted attention with their focus on interdisciplinary work, collaborative problem solving, and the integration of computing resources (Humanist Discussion Group, 2007; Siemens, 2009). In addition, the widespread use of computer-mediated communication, e-mail, social media (e.g., Twitter and blogs), and other digital tools (e.g., Mendeley, Zotero) present alternative means for humanities scholars to engage with one another, regardless of whether or not they are a part of the digital humanities (Kirschenbaum, 2012; Ross et al., 2011).

The present article employs a case study of a dispersed network of humanities scholars who work on the Hispanic Baroque Project that spans geographic and disciplinary boundaries. Project members are located in geographically dispersed locales—including Spain, the United Kingdom, Canada, Brazil, Mexico, Bolivia, Australia, and the United States—and have carried out activities in several other countries. The range of subjects is also varied as the project brings together diverse areas of expertise—Cultural Transfers, Literary History, Mathematics, Art History, Architecture, Sociology, History, Anthropology, Music, and Complexity Theory—to

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Collaborating, Connecting, and Clustering in the Humanities: A Case Study of Networked Scholarship in an Interdisciplinary, Dispersed Team

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Abstract

To what extent does networked scholarship in the humanities parallel established models in the sciences? The present study examines the connections of a 7-year interdisciplinary, dispersed, collaborative network composed of 33 humanities scholars investigating the Hispanic Baroque. Our findings suggest that project membership leads to greater network density and integration, without necessarily increasing the level of in-depth collaboration typically found in the sciences. Hence, collaborative models in the humanities, while increasingly important, are distinct from their counterparts in the sciences. The study provides a more nuanced view of networked scholarship because it demonstrates that large-scale collaborative projects can yield a high level of integration of the overall network, while at the same time allowing for strong thematic clustering. This dual structural process is relevant because not all network members can form dense relations with one another. Furthermore, we identified that principal investigators showed different networking strategies.

Keywords

social networks, networked scholarship, digital humanities, communication behavior, interdisciplinary clusters, collaboration

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