The Social Structure of Communication in Major Accounting Research Journals[*]

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1. Introduction

This study examines the social structure that exists for communicating accounting research ideas in major accounting journals. Understanding the structure of who communicates with whom in these journals is important for several reasons. First, the type of communication structure has an impact on field- and organization-level outcomes such as innovativeness, creativity, and project success (e.g., Singh 2010; Steen, MacAulay, and Kastelle 2010; Uzzi and Spiro 2005). Second, structure type can affect individual-level outcomes such as the quality of research produced and job performance (e.g., Perry-Smith 2006; Rodan and Galunic 2004). Third, prominent members of the accounting academy (e.g., Demski 2007; Hopwood 2007) have expressed concern that the advancement of ideas in accounting, including those published in major journals, has been impeded because accounting exhibits a specific type of structure — tribalism — that leads to narrowly focused and self-perpetuating research.

This is the first study to simultaneously investigate five types of communication structures: a *cohesive whole*, *normal academic field*,[1] and *tribal*, *small world*, and *core/periphery* structures. In a cohesive whole, there is extensive communication among researchers across an entire, well-connected academic field. A normal academic field contains multiple (disconnected) clusters that are centered on research topics such as performance measurement. Tribal and small world structures also contain multiple clusters, but their clusters are formed more narrowly around combinations of topics, theory bases such as economics, and methods such as archival data analysis. In a small world structure, clusters communicate relatively frequently with each other whereas, in a tribal structure, clusters communicate relatively infrequently. Finally, a core/periphery structure contains a single large cluster known as the core. Researchers in the core communicate extensively with each other but not with those in the periphery. Researchers in the periphery communicate toward the core, but not with each other. While cohesive whole structures appear to be academic nirvana, they are impractical to achieve and maintain. Accordingly, normal academic fields and small worlds are thought to be most desirable in terms of advancing ideas (Steen et al. 2010; Pratt 1964).

1. The term *normal academic field* comes from the literature (e.g., Crane 1969) and does not suggest that other types of structures are "abnormal" in any way.

Our analysis proceeds in two stages. First, we use a mathematical algorithm (Newman 2006) to identify whether the field appears to be a cohesive whole or, instead, contains distinct clusters of researchers. Second, having found multiple clusters, we examine whether the communication structure exhibits characteristics of normal academic, tribal, small world, and/or core/periphery structures. We measure communication using citations among authors who published articles during a 25-year period (1984–2008) in five major journals: *Accounting, Organizations and Society* (*AOS*); *Contemporary Accounting Research* (*CAR*); *Journal of Accounting and Economics* (*JAE*); *Journal of Accounting Research* (*JAR*); and *The Accounting Review* (*TAR*). Further, to address changes in the social structure of communication over time, we conduct analyses for each of four subperiods (1984–1989, 1990–1995, 1996–2001, 2002–2008).

We find that the communication structure for accounting research published in these five journals can be characterized largely as part normal academic field and part small world. The field contains multiple clusters, with some clusters being centered on research topics alone, consistent with a normal academic field. Remaining clusters are more narrowly based on combinations of topics, methods, and theory bases. We conclude that these narrower clusters represent a small world because they are close together and exhibit frequent communication. We also find that both small world and normal academic field properties are facilitated by the presence of hubs, individuals whose work and citations allow other researchers to move easily between disparate literatures. One exception to our overall conclusion is that the economics-based archival financial accounting (EBAF) group is partially tribal. While it receives significant portions of other groups' citations, it sends citations mostly to itself. Finally, analyses examining changes over time suggest that the communication structure for the entire field had been predominantly tribal until the most recent period.

The next section motivates our research questions and discusses the literature related to communication structures. Then we describe the analyses used to examine communication structures and our results. The final section summarizes findings, discusses implications of the field's overall structure and limitations of our study, and presents ideas for future research.

2. Literature

The effect of social factors on scientific inquiry is widely accepted (e.g., Whitley 2000; Bourdieu 1988; Merton 1973; Kuhn 1970). In particular, the social structure of communication in a field significantly shapes academic knowledge creation (Merton 1973). We focus on citations as our measure of communication because they are a validated measure of idea transmission (Hargens 1988; McCain 1986a; Kuhn 1970).[2] In particular, we focus on citations of journal articles because these articles are "the public record of validated scientific knowledge" (McCain 1986b: 259). Finally, we study citations at the level of the author rather than at the article or journal level. While individual articles may be very influential in transmitting ideas and spawning research, we believe that authors and their bodies of work are more visible and influential than are single articles (McCain 1986a; White and Griffith 1982). Specifically, as discussed below, we posit that researchers typically bring to mind particular authors rather than individual articles when thinking about a given topic area.

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2.   In general, communication among researchers can occur through reading or writing articles, as evidenced by citations, acknowledgments for providing comments, or downloads; listening to or giving presentations at conferences and workshops; working together, as measured by co-authorships; and informal discussions.

Process of citation behavior

While there are a variety of forms that citation structures can take, we hypothesize that there is a general process of citation behavior. Variation in the specifics of the process leads to different communication structures. Support for our hypothesized process comes from open-ended interviews we conducted with four experienced and four inexperienced (Ph.D. student) colleagues.

We posit that the process of reading and citing other individuals' research is sensitive to costs and benefits. Assume a researcher faces the problem of whether to locate, read, and cite all the literature for a given topic such as performance measurement. The benefits of completing this task include increasing the chances of finding gaps in the literature and identifying multiple research questions that lead to publications. However, the costs are enormous; the researcher is likely to find thousands of citations, the reading of which could take a lifetime.[3]

When costs outweigh benefits, people use adaptive strategies to reduce costs (Payne, Bettman, and Johnson 1993). Typically, the first strategy is to rely on knowledge held in memory (Bonner 2008). For the task of finding, reading, and citing previous studies related to a given topic, we propose that researchers first look for, read, and cite the work of authors whose names come to mind. Consistent with this, each interviewee mentioned that they think first of specific authors (rather than articles) when thinking about a research area. Inexperienced researchers mentioned that they generate names of authors using sources such as their dissertation advisors.[4] Names that come to mind easily have the highest strength in memory. Strength of authors' names is based, for example, on experience reading those authors' articles, hearing them speak, and working with them as colleagues. Naturally, researchers must value the work of authors whose names are recalled or they will not read and/or cite it (Borgatti and Cross 2003). If reading these authors' work is sufficient for generating ideas that are publishable in major journals,[5] there is little incentive to read further. When researchers are unable to generate ideas with sufficient publication potential from the studies they initially read, we believe that they read cites from those studies. Because the benefits from reading cites increasingly distant from the work originally brought to mind are perceived to diminish, we suggest that the probability that researchers continue reading beyond the articles cited by the papers they initially read diminishes dramatically and continues to diminish with each additional step in the citation trail. Hence, we suggest that the average researcher is unlikely to read beyond cites of cites. Beyond this point, s/he probably changes ideas and starts the reading/citing process anew. Our interviewees' comments were consistent with these steps of the process as well — no one mentioned reading beyond cites of cites.[6] Ultimately, what creates variation in communication structures across fields are the experiences, values and incentives of researchers, and thus the types of authors whose work they read and cite.

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3.   A search for studies related to performance measurement on Google Scholar yielded over 198,000 results.

4.   When asked whether their reading/citing process would differ for a topic in a new, less familiar area (versus a familiar one), interviewees again said they search databases using author names, then read articles written by those authors. They generate author names by asking colleagues who are more familiar with the new area.

5.   This assumption is viable given prominent scholars' comments about the marginal contribution of much published research (e.g., Demski 2001).

6.   Clearly, other characteristics of an academic environment affect citing behavior. For example, changes in technology and the information environment (e.g., the advent of the Internet and *SSRN*) have lowered the costs of locating cites. Perhaps increased ease of locating articles increases the probability they will be read. The incentive to cite individuals who may be reviewers or tenure letter writers may also affect which authors' articles are read and cited.

Types of communication structures among researchers

One possible structure for communication among researchers in an academic field is a *cohesive whole*. A cohesive whole occurs when there is extensive communication among researchers who study different topics. While a cohesive whole may sound optimal, for this structure to emerge researchers' experiences must allow them to become knowledgeable about, and value, the work of authors who study a wide variety of topics and use a variety of methods and theories. Such a structure is practically infeasible for a number of reasons. First, given limited time in the coursework stage of doctoral programs, most researchers do not have broad early experiences. Further, once employed, researchers are unable to keep up with a wide array of material because of cognitive and time limitations (de Solla Price 1986).[7] Finally, if promotion and tenure requirements include being recognized as a leader by colleagues in one's topic area, there are incentives for individuals to concentrate on specific topics and communicate with others of like interests. These factors suggest that academic fields will be broken down into topic-based *cohesive subgroups*, groups that communicate more intensely with themselves than with other groups (Wasserman and Faust 1994). Consistent with this, we are not aware of empirical evidence suggesting a cohesive whole in citation structures.

While a citation structure containing topic-based cohesive subgroups is highly likely, such a structure can take several forms; that is, it can take the form of a *normal academic field*, a *tribal*, a *small world*, or a *core/periphery* structure. In a core/periphery structure there is a single subgroup that dominates part of the field. The remainder of the field consists of isolated individuals who communicate toward the core but not with each other. The other types of structures have multiple subgroups, but they differ as to the bases for the subgroups, how close subgroups are to each other, and the extent of communication across subgroups.

The bases for the subgroups distinguish a normal academic field from tribal and small world structures. A *normal academic field* is one in which subgroups are formed solely on the basis of topic interests. Thus, marketing authors interested in online shopping behavior would communicate with other researchers who share this interest irrespective of the methods and theories they use. This is arguably the ideal academic structure, reflecting the intellectual interests of a field's members and allowing them to make greater advances than under other structures (Pratt 1964), but also allowing for their practical constraints (de Solla Price 1986; Crane 1969). A normal academic field, however, is less likely to occur than the other clustered structures because of the effect of social factors on researchers' experiences, values, and incentives, as described below. Further, we find little evidence suggesting this structure exists in other fields (only White, Wellman, and Nazer 2004 in interdisciplinary studies and McCain 1986b in genetics).

In *tribal* and *small world* structures, subgroups are formed not only on the basis of topics, but also on the basis of methods and theories. Subgroups in normal academic fields reflect researchers' interests, whereas subgroups in tribal or small world structures reflect both interests and (multifaceted) viewpoints.[8] This multifaceted clustering occurs because people are social beings who tend to prefer the company of, and communicating with, like-minded individuals (McPherson, Smith-Lovin, and Cook 2001); this phenomenon is called *homophily*. In particular, people often choose to communicate with others with whom they share two or three characteristics (Bernard, Killworth, Evans, McCarty, and

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7.   de Solla Price posits that people can keep up with only about 100 other researchers' work at any given time.

8.   *Clique* structures are formed on the bases of topics, methods, and theories as well but, strictly defined, contain subgroups that communicate only with themselves (Monge and Contractor 2003). These structures are so extreme that they likely do not exist in academia. Note, however, that Biehl, Kim, and Wade (2006) use the clique terminology to denote groups of journals that have only 10 percent of their ties to each other.

Shelley 1988). Because groups tend to enforce norms of behavior, fine-grade clustering suggests the perpetuation of a narrow set of norms. In academic research, subgroups would form on the basis of type of research, with "type" referring to research that is similar as to topics, methods, and theory bases. Such fine-grade clustering may occur even if researchers have broad experiences in their doctoral training because the social preference to communicate with like-minded individuals is strong. As mentioned earlier, this clustering is more likely to occur because researchers have had narrow experiences. To the extent that doctoral programs focus on a few types of research, researchers may feel comfortable communicating with persons like those with whom and by whom they were trained. Doctoral programs can become narrow because of the power-seeking behavior of academics who seek to control knowledge production (Bourdieu 1988). Rather than informally suggesting valued research topics to junior researchers, those in power legitimate their preferences by institutionalizing them in curricula and other settings such as privately controlled journals (Ennis 1992). This behavior creates incentives for less powerful researchers to continue clustering by topic/method/theory type.

While tribal structures and small worlds are similar regarding the bases for subgroups and the existence of more within-group communication than across-group communication, they differ in the extent of across-group communication because of the difficulty of traveling from group to group. In a research setting, travel difficulty is primarily a function of the citation distance between clusters of researchers. Specifically, when an academic field is tribal, it has an *archipelago* structure; that is, a string of islands (research groups). Because geography is a key determinant of homophily in social structures, residents of neighboring islands are likely to be more alike than residents of non-neighboring islands (Kossinets and Watts 2009; McPherson et al. 2001). Thus, researchers conducting psychology-based experimental studies on investor behavior might inhabit an island next to an island containing researchers conducting psychology-based experimental research on auditor behavior. Further, travel (reading and citing) in an archipelago structure is more likely to occur between adjacent pairs of islands (van der Leij and Goyal 2009). For example, consider a group of islands (research groups) A through E. The traveler (researcher) living on island A knows that island B exists, but may not know the existence of island E. In order to find out that E exists and what is there, s/he must travel from A to B by reading A's literature, which cites B's literature, then reading B's literature which cites C's literature, and so on. In other words, to move from island A's literature to that of island E, a researcher would have to read cites of cites of cites of cites. If researchers are able to publish in high-quality journals without such costly effort, there is a large disincentive to do so. This implies that the articles researchers are most likely to read and cite (other than those within their own group) will be written by authors who are closest in terms of citation distance, that is, those on an adjacent island. Consequently, researchers are most likely to read work that is similar to their own in many respects. Overall, in a *tribal* structure, the ratio of within-group communication to across-group communication is relatively high, and across-group communication is likely to be to similar (neighboring) research groups. The consequence is narrowly focused, self-perpetuating research.

In contrast, a *small world* structure is one in which there is less difficulty of communicating across groups. There may be less difficulty because between-group distances naturally are smaller (e.g., islands are arrayed in a circle rather than a string)[9] or because an

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9. In an academic field, having small natural distances means that pairs of clusters share two of three attributes on which they have formed (topic, method, or theory). For example, a research cluster studying the economics of auditing services using analytical methods would be close to a cluster studying the economics of auditing services using archival methods. For a small world to develop in this "natural" way, an entire field would have to be diverse on only one of these three dimensions. Thus, natural development of a small world seems unlikely.

external factor has reduced distances. When the difficulty of communicating across groups is reduced, there will be a higher incidence of across-group communication than in a tribal structure. In the context of citations, a short distance might mean that an author can move from one group to another by reading cites of cites.

The key factor that reduces distances and allows a small world structure to develop is the *hub*. Hubs increase the probability a researcher learns about other topics, methods, and theories easily by going "through" a hub; that is, by reading the hub's work (Carolan and Natriello 2005). For example, a researcher who may not have undertaken the reading and citation journey from island A to island E is more likely to do so if s/he can go directly from island A to island C and then from island C to island E. A researcher would be able to do this if there is a researcher on island A who has created a route to island C through his or her citations, and a researcher on island C who has created a route to island E through his or her citations. In essence, the reader can "change planes" on island C and bypass islands B and D. Hub researchers are similar to airline hubs in that they send and receive a large number of cites (flights) between various groups of authors (cities). Further, the groups of authors (cities) connected to hubs are far-flung and diverse. In other words, hub researchers attract communication from authors in multiple clusters and their articles build on, and cite, work from authors in multiple clusters.[10] As such, small world structures are better able than tribal structures to spread diverse information to a large and diverse set of recipients, possibly breaking the cycle of self-perpetuating research that occurs with tribalism. It is unclear why hubs develop or what determines their identity, but we speculate that individual researchers' experiences, values, and incentives play a role. Researchers who have broad training or who have worked with people using different theories or methods are more likely to develop as hubs. Similarly, researchers working in mature fields may have an incentive to reach out to diverse literatures to generate new ideas.

Consistent with the tendency of like-minded people to associate with each other, most studies present evidence suggesting either a small world or tribal structure, that is, they find clusters based on topic/method/theory combinations — in economics (McCain 1986b, 1984) and sociology (White 1983; White and Griffith 1982; Cole, Cole, and Dietrich 1974). Most of these studies do not examine whether clustered structures represent small worlds or tribalism. Studies by Newman (2001a, b, c), however, show clustered structures in physics, biology, and medicine to be small worlds, while those in computer science tend to be tribal.

The final structure is a *core/periphery* structure (Borgatti and Everett 1999). This structure differs from the others as it contains only one discernible cohesive subgroup: the *core*. The core consists of a small number of individuals that dominate the field and have extensive communication with each other. Persons in the periphery tend not to communicate with each other, although they do communicate extensively toward the core (i.e., they cite the core authors, but this citing is not reciprocated). Continuing with the geographic analogy, there is a single, dominant subgroup occupying one island; significant numbers of others in the field tend to be scattered and individually adrift at sea. Core/periphery structures arise through preferential attachment (Barabási, Jeong, Néda, Ravasz, Schubert, and Vicsek 2001), which means that new people entering a field are more likely to communicate with those who already have extensive communication. Those with extensive communication are more easily brought to mind and also are attractive to

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10. While, in a tribal structure, within-group communication should exceed the total communication to and from all other subgroups, a small world structure likely does not have this property. In a small world, a subgroup still communicates more with itself than with any other single group, but within-group communication can be less than total across-group communication.

communicate with since they are likely to be reviewers of papers. Consequently, these individuals continue to garner communication at a higher rate than do new entrants to the field. Further, because these people have extensive communication, they are more likely to communicate with other high communicators (van der Leij and Goyal 2009). It is not clear whether the core in this structure is formed on the basis of a topic, method, theory, or some combination of these factors. A few studies document core/periphery structures using data on co-authorships (Barabási et al. 2001; Goyal, van der Leij, and Moraga-González 2006; de Solla Price and Beaver 1966). We are not aware of any studies that document this structure using citations, or of any studies examining the impact of a core/periphery structure on field- or individual-level outcomes.

Prior evidence in accounting and research questions

Within accounting, there are three studies that examine the communication structure of research. Two examine citation patterns among journals (Wakefield 2008; Biehl et al. 2006), finding that *JAE*, *JAR*, and *TAR* are closely linked. *CAR* is somewhat related to these journals. *AOS* is distant from the other four, being related to management journals or accounting specialty-area journals. Because these studies do not examine the contents of the journals, it is unclear what type of communication structure is implied by these findings. Most closely related to our work is a study by Just, Schäffer, and Meyer 2009, who examine the co-citation structure of the 200 most-cited articles in *TAR*, *JAR*, *JAE*, *CAR*, and *AOS* for the period 1990–2007 using the 200 strongest co-citation relationships.[11] They find a relatively large number of subgroups that are based on topics, suggesting a normal academic field. However, because they focus on the most-cited articles and the strongest co-citation relationships, they tend to capture articles that are in the dominant area of research (economics-based archival financial accounting), and thus homogeneous as to theory and method. As such, their results regarding the presence of a normal academic field are inconclusive.

Additional evidence regarding the type of communication structure exhibited by accounting research is anecdotal or indirect. Anecdotally, a number of eminent scholars express concern that accounting research is tribal (Hopwood 2007; Demski 2007, 2001; Antle 1989), based on their observation that researchers cluster by topics, methods, and theories and communicate mostly within clusters. Note, however, that these scholars do not consider the possibility of a small world structure. Further, indirect empirical evidence suggests the existence of the fine-grade clustering element of either a tribal or small world structure in accounting. Bricker (1989), using citations among articles in six accounting journals, found clustering based on topic area and other factors such as theory base. Merchant, Van der Stede, and Zheng (2003) reach a similar conclusion regarding research on incentives.

Other evidence of tribal or small world structures in accounting includes studies showing that accounting researchers affiliated with particular elite institutions are disproportionately represented with regard to citations by other authors (e.g., Swanson, Wolfe, and Zardkoohi 2007; Williams, Jenkins, and Ingraham 2006; Brown 1996; Brown and Gardner 1985a, b; Williams 1985). If persons affiliated with these institutions tend to use similar methods and theories to address given topics (and anecdotes suggest that they do), then institutional clustering in citations could create a communication structure containing topic/method/theory clusters. Further, Kinney (2003) notes that there is evidence of narrow doctoral training in accounting in that the vast majority of Ph.D. students receive training about capital markets research, but many do not learn about other types of research (e.g., experimental work). Also, Schwartz, Williams, and Williams (2005) find that

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11. Co-citations are the co-occurrence of pairs of articles or authors in a reference list, as opposed to citations, which measure the occurrence of a single article or a single author in a reference list.

Ph.D. students at elite schools are familiar only with a narrow set of journals. Finally, there is evidence of power structures in accounting, which are one cause of narrow experiences (e.g., Swanson et al. 2007; Lee 1999, 1997; Williams and Rodgers 1995).

While the literature cited above suggests that tribal or small world structures may exist in accounting research, there also is evidence suggesting that a core/periphery structure may exist. Specifically, a number of studies document that financial accounting research using economic theories and archival data analysis has become dominant in the major U.S. journals over time (e.g., Oler, Oler, and Skousen 2010; Just et al. 2009; Wakefield 2008; Tuttle and Dillard 2007; Bonner, Hesford, Van der Stede, and Young 2006; Williams et al. 2006; Koonce and Mercer 2005), and thus, may form a core. Based on this conflicting evidence, we pose our first research question:

> RESEARCH QUESTION 1. *What is the structure of accounting research, as evidenced by citations among authors in the five major journals?*

Further, since scholars have expressed concern that tribalism exists and has grown more severe over time (Demski 2007), we pose our second research question:

> RESEARCH QUESTION 2. *How has the structure of accounting research, as evidenced by citations among authors in the five major journals, changed over time?*

3. Method

Data

Our primary goal is to describe the social structure of communication in accounting research. We use citations at the author level as our measure of communication. The 3,607 articles in our database over the 25-year period (1984–2008) in five accounting journals (*AOS*, *CAR*, *JAE*, *JAR*, and *TAR*) are authored by a total of 2,640 individuals.[12] We chose these five journals based on prior studies that consistently rank them as major journals in academic accounting (Bonner et al. 2006) and argue that authors who publish in these journals serve as tastemakers for ideas in the larger accounting research arena. We choose 1984 as the starting point because *CAR* was not published before then, and 2008 as the end point to allow for a 25-year period over which to examine the communication structure. We begin with the *Social Science Citation Index* (*SSCI*) database as our source of citations and supplement it due to missing data.[13] Not counting self-citations,[14] our authors have 121,012 citations to the articles in our database.[15] Thus, the average number of citations per *author* over our time period, not counting self-cites, is 45.8.[16]

Detecting communication structure

Our analysis of the type of communication structure exhibited by accounting research proceeds in two stages. First, using the mathematical algorithm detailed in Appendix 1, we

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12.   We exclude comments, discussions, editorial material, corrections, replies and book reviews.
13.   *SSCI* starts indexing *CAR* only in April 2002, beginning with Vol. 19 (No. 1), and three issues of other journals (*AOS* Vol. 17, Nos. 7 and 8, and the 1988 *JAR* Supplement) are not included in the *SSCI*.
14.   Specifically, we do not count a citation if an author of a citing article is an author of the cited article.
15.   Because we focus on uncovering the social structure of communication within these five journals, we do not count citations to journals outside accounting, citations to accounting journals other than these five, and citations to articles outside our date range. However, we use citations to other journals to classify bases for the clusters and to examine the citing behavior of possible hubs.
16.   To clarify, a citation from a triple co-authored article, for example, would provide three citations to an individual, one from each of the citing article's authors.

determine whether the field can be described as a cohesive whole, or instead contains cohesive subgroups representing a normal academic field, a tribal structure, a small world structure, a core/periphery structure, or some type of hybrid. Our algorithm assigns authors to clusters if there is substantially greater communication within clusters than between clusters.[17]

Second, if there is evidence of cohesive subgroups, we conduct a series of analyses aimed at distinguishing among the various forms a cohesive subgroup structure can take. First, to ascertain whether accounting research appears to be a normal academic field or a tribal or small world structure, we determine whether clusters are formed based on topics alone or, instead, based on topics, methods, and/or theories.[18] Research assistants coded each article as to functional area (to obtain a broad classification of topics) and method, and questions were resolved with the authors. Article-level functional area classifications include audit, financial, managerial, tax, and other (e.g., systems, accounting history). We classify each researcher to a functional area if a majority of their articles are in that area (for those with no majority area, we use the category *multiple areas*). We use a similar classification procedure for method, classifying methods as analytical modeling, archival data analysis, experiments, field and case studies, frameworks and reviews, surveys, and simulations. For individuals with no dominant method, we include a *multiple methods* category. We classify researchers' primary theory base by counting references to journals in: (i) economics, finance, law, and (ii) management/organizational behavior (OB), psychology, and sociology. We classify each researcher to one of these areas or to *multiple theories* if neither area dominates. Finally, we make finer classifications as to the specific topic areas covered by researchers once we derive clusters of those researchers.

Also, as part of the second stage of analysis, we calculate a number of descriptive statistics using social network analysis, a set of techniques used for analyzing social structures (e.g., Scott 2000; Wasserman and Faust 1994). Statistics are derived from the network's citation matrix. With 2,640 authors, the network is represented by a 2,640 × 2,640 matrix. Each cell in the matrix represents a tie between two authors. A tie exists if two authors have one or more citations between them.[19] Cells on the diagonal represent ties to oneself through self-citations, which are deleted prior to conducting the network analysis.

The descriptive statistics we examine are as follows. *Reachability* measures the percentage of pairs of individuals who can reach each other through citations. Thus, reachability within clusters is a measure of internal connectedness, while reachability across clusters indicates travel difficulty. *Path length* indicates the number of steps it takes for one author to reach another author through citations. *Mean path length* is the average number of path lengths for a specified group of authors (i.e., a single cluster or the overall network).[20] Thus, path length within clusters is another measure of internal connectedness, while path length across clusters is another measure of travel difficulty. *Degree* is a measure of an individual's centrality in a given network; it is operationalized as the number of direct ties an individual has with others in the network (Wasserman and Faust 1994). The degree measure can be divided into three submeasures: indegree, outdegree and undirected degree. For a given author, *A*, *indegree* measures the number of ties by other authors to author *A*, while *outdegree* measures the number of ties by author *A* to other authors. *Undirected degree* is the sum of unique authors connected to author *A*, and is less than or equal to

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17. If a field were a cohesive whole, the algorithm would result in one large cluster.

18. The literature does not speak to the composition of the core in a core/periphery structure, so we must use different types of analyses to determine if a core/periphery structure exists.

19. For example, assume $c_{ij} = 6$ and $c_{ji} = 1$, where c_{ij} is the number of citations from author i to author j in our citation matrix. The total number of citations between i and j is seven, but there are two ties (one in each direction).

20. Note that *mean path length* can be calculated only for researchers who are connected.

the sum of the author's indegree and outdegree measures. In other words, if author A cites author B and B cites A, then the connection is counted only once in the undirected degree calculation. Authors with a high indegree are influential, whereas individuals with a high outdegree are incorporating ideas from several other authors. Finally, *betweenness* is the number of paths between pairs of individuals on which the author of interest lies.[21] An author with a low degree may be on paths connecting many other authors. While that author's low degree suggests little influence, the fact that she connects parts of a network can make that author an important node in the network. We use degree and betweenness statistics to determine hubs.

We conduct the two stages of analysis, first for the entire 25-year period (1984–2008) and then for four subperiods (1984–1989, 1990–1995, 1996–2001, and 2002–2008).

4. Results

Communication structure for the overall data set

Table 1 presents the results of the first stage of analysis (the mathematical algorithm) for the entire set of citations from 1984–2008. The algorithm detects six clusters for this data set.[22,23] Consequently, the field of accounting research is neither a cohesive whole nor a core/periphery structure. After we present descriptive statistics, we present a series of analyses that distinguish among the remaining possible structures for the field. Descriptive statistics for each cluster taken separately and the field as a whole appear in Table 1. We also label each cluster by examining the cluster members' primary functional areas, theory bases, and methods (not tabulated), as well as the titles and abstracts of the articles written by the prominent researchers in each cluster. Readers can verify our labels by perusing the names of the top ten individuals in each cluster (defined as those with the largest total number of ties to other individuals).

Type of structure

We begin to distinguish among possible structures for a field with cohesive subgroups by examining the bases for the clusters. First, clusters in a normal academic field would be based solely on topic, and not segregated on methods or theories. There is some evidence of such clustering. In particular, cluster 2 includes researchers who study organizational incentives issues such as adverse selection, monitoring, incentive alignment, and incentive contracting (including financial accounting and other measures on which such contracting is based); these researchers are classified as being managerial or financial accounting researchers.[24] Researchers in this cluster also cover managerial accounting topics such as costing. They draw on agency theory from economics and various OB and psychology theories, and use many methods (specifically, analytical modeling, archival data analysis, experiments, and surveys).

Other clusters center on combinations of topics, methods, and theories, indicating that they possess either small world or tribal properties. First, cluster 1 researchers study issues

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21.   We calculate *betweenness* using the UCINET software package (Borgatti, Everett, and Freeman 2002). We calculate remaining measures with routines for Octave (Eaton 2002).

22.   To provide validity to the results of our algorithm, we examine the communication structure for the overall network using a graphical approach and find essentially the same results. The graph is available upon request.

23.   The first cluster for this overall period, not shown in the table or discussed further, consists of 60 individuals (called *isolates*) who have articles in one of the five journals during this time period but who have neither received citations to those articles nor cited other articles in the data set during this period.

24.   This cluster encompasses the economics-based literature on incentives discussed in reviews by Bushman and Smith 2001, Lambert 2001, and Ittner and Larcker 2001, as well as behavioral research on incentives not covered by these reviews (e.g., Bonner and Sprinkle 2002).

TABLE 1

Clusters detected in overall data set

Panel A: Descriptive statistics

	Cluster 1 – Econ/Archival/Audit	Cluster 2 – Econ, OB, Psych/All Methods/Organiz. Incentives and other Managerial Issues (Managerial, Financial)	Cluster 3 – Econ, OB/Field, Framework/ Critical Theory Perspectives (Other, Financial, Managerial)	Cluster 4 – Psych/ Experiment/ Audit, Financial	Cluster 5 – Econ/ Archival/Accounting Choice, Disclosure, Capital Markets, Value Relevance (Financial)	Overall Field
Number of authors	357	605	446	312	860	2,640[a]
Number of citations	6,837	14,995	7,578	7,816	48,806	121,012[b]
Reachability within cluster	67%	64%	52%	69%	75%	NA
Reachability to/from other clusters	63%–75%	62%–73%	61%–69%	61%–75%	69%–75%	70%
Mean path length within cluster	2.72	2.78	2.74	2.41	2.41	NA
Mean path length to/ from other clusters	2.58–3.20	2.72–3.10	2.93–3.20	2.63–3.08	2.58–2.93	2.96
Top 10 individuals in cluster (based on undirected degree)	M. DeFond	D. Larcker	M. Dirsmith	R. Libby	R. Sloan	R. Sloan
	Jere Francis	R. Verrecchia	D. Cooper	M. Nelson	S. Kothari	S. Kothari
	J. Jiambalvo	M. Shields	W. Chua	S. Bonner	P. Dechow	P. Dechow
	Z. Palmrose	G. Feltham	P. Miller	W. Kinney	P. Healy	P. Healy
	S. Teoh	J. Luft	K. Robson	M. Gibbins	A. Sweeney	A. Sweeney
	M. Johnson	R. Lambert	M. Covaleski	J. Pratt	T. Lys	T. Lys
	N. Dopuch	R. Bushman	T. O'Leary	H. Tan	Jennifer Francis	Jennifer Francis
	K. Gaver	A. Smith	A. Hopwood	I. Solomon	B. Lev	D. Larcker
	J. Gaver	J. Hughes	A. Richardson	L. Koonce	D. Collins	B. Lev
	F. Gul	R. Banker	T. Hopper	S. Salterio	M. Barth	D. Collins

(The table is continued on the next page.)

TABLE 1 (Continued)

Notes:

a   Includes 60 isolates.

b   Includes citations among clusters totaling 34,981.

Reachability measures the percentage of pairs of individuals who can reach each other through citations. While density shows the number of pairs of researchers who have cited each other directly, reachability also includes pairs of individuals who can reach each other indirectly, for example, by citing researchers who have cited the other member of the pair. The table shows reachability both *within clusters* as a measure of how tightly connected cluster members are to each other, as well as *across clusters* as a measure of the ability to communicate with other clusters. *Mean path length* indicates the average number of steps it takes for one author to reach another author through citations. Mean path length *within clusters* indicates how tightly connected clusters are internally, while mean path length *across clusters* shows the number of steps it takes to reach other groups of researchers, or the travel distance between groups. Note that mean path length can be calculated only for researchers who are connected. *Top ten individuals* in each cluster refers to the individuals with the largest total number of ties to other individuals. Finally, the labels for each cluster shown in the top row of the table were determined based on an examination of the cluster members' primary functional areas, theory bases and methods, the information for which is presented in Table 1, panels B through F.

Panel B: Percentage of citations within and across clusters[c]

From: / To:	Cluster 1 – Econ/ Archival/ Audit	Cluster 2 – Econ, OB, Psych/All Methods/ Organiz. Incentives and other Managerial Issues (Managerial, Financial)	Cluster 3 – Econ, OB/Field, Framework/ Critical Theory Perspectives (Other, Financial, Managerial)	Cluster 4 – Psych/ Experiment/ Audit, Financial	Cluster 5 – Econ/ Archival/Accounting Choice, Disclosure, Capital Markets, Value Relevance (Financial)
Cluster 1	**43.40%**	10.07%	1.95%	6.34%	38.24%
Cluster 2	4.49%	**66.13%**	4.20%	5.03%	20.15%
Cluster 3	2.77%	9.36%	**79.29%**	2.74%	5.84%
Cluster 4	9.69%	10.97%	2.32%	**56.96%**	20.06%
Cluster 5	6.54%	8.68%	0.79%	1.70%	**82.29%**

Notes:

c   Row sums are 100%. Values in boldface indicate the diagonal (cluster self-citations).

related to the economics of auditing firms, such as fees and litigation using archival data analysis. Cluster 4 researchers examine issues related to individual auditor behavior, and rely heavily on psychology theories and experiments. We do not characterize these two clusters as exhibiting normal academic field properties because they share certain topic interests, for example, the effects of expertise on various outcomes. As such, they appear to be segregated from each other based on theories and methods. Cluster 5 contains the vast majority of researchers who study financial accounting topics using archival methods and a variety of economics, finance, and accounting theories or models, including agency theory, positive accounting theory, the efficient markets hypothesis, and valuation models. Researchers in this cluster cover a wide array of topics including accounting choice, disclosure (and information asymmetry), capital markets (including valuation and market efficiency), and value relevance. There also are researchers in clusters 3 and 4, however, who address these types of financial accounting topics, but do so using different methods and theory bases.[25] Researchers in cluster 3, labeled critical theory perspectives, critique the use and meaning of accounting in organizations and society. These researchers use economics theories like researchers in cluster 5, but the specific theories are different.[26] Further, cluster 3 researchers also rely heavily on methods that seldom are represented in other clusters, in particular field methods such as direct observation and interviews, and discussion in the form of framework and review studies.[27] Researchers in cluster 4, as mentioned previously, study financial topics using psychology theories and experiments.

Overall, there is evidence of a normal academic field (the organizational incentives cluster based on topic alone) as well as evidence of either a tribal or small world structure (the other clusters that are based on some combination of topic, method, and theory base). However, the size of cluster 5 (EBAF researchers) and anecdotes about the dominance of these researchers suggest that the field may combine these properties with those of a core/periphery structure. As such, we conduct core/periphery analyses before moving on to distinguish between tribal and small world structures.

A core/periphery structure is generated by preferential attachment, so the distribution of undirected degree (total ties to and from a researcher) should follow a power law (Barabási et al. 2001). Our examination reveals that this is not the case (results not tabulated). Nevertheless, the distribution is highly skewed, so we conduct an additional analysis to uncover whether cluster 5 represents a core in a core/periphery structure. The analysis is described in Appendix 2. While the results are statistically significant ($p = 0.002$), they are not practically significant ($r = 0.01$). Therefore, cluster 5 does not appear to be a core.[28]

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25. For convenience, we use the categories of financial accounting research used by reviews in *JAE*. See Barth, Beaver, and Landsman 2001; Fields, Lys, and Vincent 2001; Healy and Palepu 2001; Holthausen and Watts 2001; Kothari 2001; and Verrecchia 2001.

26. Critical theorists may use Marxist economic theories or theories such as those of the Frankfurt School. See Littlejohn 1992 for a review. These also utilize OB theories to study management accounting issues like cluster 2 researchers but, again, they use different OB theories. Note that the vast majority of management accounting researchers belong to cluster 2.

27. Note that researchers in cluster 2 also have a large number of studies using the field study/survey method category in panel C of Table 1, but almost 60 percent of these are survey studies rather than field studies or framework/review studies.

28. We also conduct this analysis using the top 15 percent of the authors as the core because an untabulated analysis shows that the network becomes very disconnected once the top 15 percent of authors are removed. The results for this core/periphery test are somewhat stronger ($r = 0.105$, $p < 0.001$). However, members of the top 15 percent come from all five clusters, so this result also does not support the EBAF cluster being a core. Instead, these individuals are the *elite* of the profession as discussed by previous studies (e.g., Lee 1999).

Next, given that much of the clustering is based on combinations of topic, method, and theory, we must distinguish between tribal and small world structures. As described earlier, these structures differ in distance between clusters and the resulting extent of within-cluster and across-cluster communication. Specifically, tribal structures should exhibit more internal communication than that to all other groups combined. Reachability and path length data within clusters (presented in panel A of Table 1) speak to the extent of internal communication. For reachability, between 52 and 75 percent of subgroup member pairs can be connected by citations within their groups, meaning that tribalism is not immediately evident for all clusters. The EBAF cluster, with 75 percent of pairs of individuals being able to reach each other, has the most evidence of tribalism. For clusters with lower reachability, the figures could indicate either less tribalism or the presence of multiple tribes within clusters. The mean path length indicates the probability of communication within clusters. Clusters with lower path lengths are more likely to have high internal communication. Path length data parallel the reachability data. Specifically, tribalism is not evident because the averages exceed two (i.e., cites of cites, the point at which we hypothesize the average researcher stops reading). Nevertheless, the relative path lengths across clusters suggest that clusters 4 and 5 are more tribal than the others.

More important is the comparison of across-cluster communication to within-cluster communication. One factor that distinguishes between small world and tribal structures is whether within-group communication is more extensive than across-group communication. Examining reachability across clusters versus that within clusters is one way of addressing this issue. As shown in Table 1, with the exception of the EBAF cluster reachability across clusters often is greater than that within clusters, which is more suggestive of a small world for clusters 1 through 4.

In the case of citations, we have suggested that a path distance across clusters of about two would be relatively short, and thus consistent with a small world. The evidence here is equivocal with regard to whether there is a tribal or small world structure, given that across-cluster path lengths range from two to three, and that they sometimes are greater than within cluster path lengths.

Perhaps the most direct way of examining the extent of across- versus within-cluster communication is to examine total citations across and within clusters. As shown in panel B of Table 1, there is significant variation in the percentage of communication that is within group depending on the group that is involved. For example, cluster 1 (auditing economics) sends more of its citations in total to other clusters than to itself, consistent with a small world. Cluster 2 (managerial) sends the majority of its communication to itself, but this is to be expected since this cluster appears to represent a normal academic field. Further, it also receives a nontrivial percentage of other groups' cites. Cluster 4 (psychological experiments) sends only about half its citations to itself. These findings are more consistent with a small world structure. Using this analysis, however, clusters 3 and 5 appear to be more tribal. Indeed, cluster 3 (critical theory) sends and receives most of its citations within the group, indicating that it is isolated. Since analyses (untabulated) show that 80 percent of this cluster's work in our five journals is published in *AOS*, and *AOS* is linked more closely to specialty accounting journals than to the other journals in our set (Wakefield 2008; Biehl et al. 2006), its apparent tribalism instead probably reflects our choice of journals. If other accounting journals were included in our analysis, the communication structure of this group of researchers could differ.[29] Cluster 5 — containing the EBAF researchers — is tribal in that it sends most of its citations to itself; however, unlike cluster 3, it receives significant citations from other groups. Citations emanating from

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29.   Further, critical theory researchers are better able to reach other clusters than their fellow cluster 3 researchers.

other groups may reflect a search for legitimacy given the dominance of cluster 5.[30] But the pattern of citations sent does not reflect our choice of journals because EBAF researchers publish in all journals and dominate the field. Overall, cluster 5 is partially tribal. One factor that may have created this outcome is that cluster 5′s dominance gives its members little incentive to read and cite work done by members of other clusters.

Hubs

The key feature that distinguishes small world from tribal structures is the existence of hubs: people who have frequent and versatile communication, both incoming and outgoing. Hubs reduce travel difficulty, making across-group communication more likely to occur. To identify specific individuals who may be hubs, we first rely on three statistics: *indegree* (incoming ties), *outdegree* (outgoing ties), and *betweenness* (the number of citation paths between pairs of individuals on which the researcher lies), which collectively inform us about the frequency of communication of specific individuals. We obtain a subset of 56 individuals who rank in the top 5 percent of the field on all three of these characteristics and thus are considered frequent communicators.[31] To identify individuals from among this set of 56 who also are versatile communicators, we calculate the percentage of individuals' incoming (outgoing) cites that originate from (are sent) outside their cluster, and focus on individuals for whom both these percentages exceed half of the maximum possible in or out citations. To obtain this maximum, we assume citations are spread across clusters proportional to their size, so that within-cluster citations will be, in percentage terms, equal to the size of the cluster divided by the size of the field. To illustrate, we assume that individuals in cluster 5 should receive and send 860/2,640, or about 33 percent of their citations from/to themselves. Thus, versatile communicators would be those who actually receive and send half or more of their possible outside-cluster communication (in the case of cluster 5, half of 100 minus 33, or 33.5 percent) from/to other clusters. Finally, to ensure that communicators are versatile in that they receive and send citations from a wide variety of places, we require that hubs have citations coming in and going out to all other clusters.

The following seven individuals meet all the criteria and thus are designated *major hubs*: M. DeFond, J. Jiambalvo, W. Kinney, D. Larcker, J. Luft, M. Shields, and R. Verrecchia. There also are 22 researchers who are *smaller hubs* in that they are frequent communicators but meet only one of the two versatility criteria: R. Banker, S. Bonner, L. Brown, R. Bushman, P. Dechow, J. Demski, G. Feltham, Jere Francis, R. Frankel, M. Gibbins, P. Healy, J. Hughes, C. Ittner, S. Kallapur, R. Libby, R. Lundholm, M. Nelson, Z. Palmrose, R. Sloan, K. Subramanyam, R. Watts, and J. Zimmerman. The existence of this many hubs is consistent with a small world structure.

Further, the distribution of major hubs across clusters appears to be related to the communication properties they exhibit. First, the organizational incentives cluster has four of the seven major hubs (D. Larcker, J. Luft, M. Shields, and R. Verrecchia), whereas only one or two would be expected by chance. Having so many major hubs within its own borders likely is one of the key factors that allow this cluster to exhibit normal academic field properties. In other words, the large organizational incentives area may have been united because of the presence of many hubs. Clusters 1 and 4, those exhibiting small world properties, each contain at least one major hub, and cluster 5, which exhibits more tribal properties, has no major hubs.

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30.   We can only speculate as to the causes of this dominance. For example, causes may include the tastes of the editors of *JAR* and *JAE*, and the process of institutional isomorphism as discussed by Tuttle and Dillard 2007.

31.   Specifically, they have indegree of at least 139; outdegree of at least 110; and betweenness of at least 17,000.

Summary

The evidence suggests that the communication structure of academic accounting, as represented by citations in five journals for a 25-year period, is part normal academic field (the organizational incentives cluster), part small world (the auditing economics and experimental clusters), and part tribal (the EBAF cluster). We are unable to draw strong conclusions regarding the properties of the critical theory cluster due in part to the limitations of our data set.

Changes in communication structure over time

While the evidence of tribalism for the entire 25-year period is not substantial, we address Research Question 2, which asks whether the structure of accounting research has changed over time, allowing us to explore whether tendencies toward tribalism exist in shorter time periods. This question is important because scholars who have discussed tribalism may have observed such behavior over a period shorter than 25 years. Additionally, the field may have been tribal earlier, but become less so over time, or vice-versa. To address this question, we divide our data set into four subperiods: 1984–1989, 1990–1995, 1996–2001, and 2002–2008. These periods include 811, 936, 746, and 1,329 authors, respectively.[32] Citations within each of these smaller data sets include those to and from articles published in our five journals for that time period only.

Period 1

Table 2 shows descriptive statistics and within- and across-cluster citations for the 1984–1989 period. The algorithm detects eight clusters for this period.[33] As was the case for the overall data set, the field is not a cohesive whole during this period.[34] In distinction to the overall data set, there is little evidence of a normal academic field in the bases for the clusters. For example, there are managerial researchers in clusters 1, 3, and 7 who study similar topics such as the effects of incentives, but with different theories and methods. There are capital markets researchers in clusters 4 and 8 who study similar issues (e.g., market efficiency) and who use the same theories and method. What differs between researchers in clusters 4 and 8 is that one group uses event studies while the other employs cross-sectional analyses. Further, there are capital markets researchers in cluster 2 who critique these types of methods. Additional evidence against a normal academic field is that there are audit researchers in clusters 3, 4, 5, and 6. Those in cluster 4 examine the effects of audit opinions on stock prices using event study methodology, and those in cluster 5 study the economics of auditing firms with archival data analysis. Auditing researchers in cluster 6 study statistical sampling issues with analytical modeling and simulations, while those in cluster 3 study individual auditor behavior using psychology and experiments. Clearly, there is potential overlap in topics at least between clusters 4 and 5, and between clusters 3 and 6. Thus, at the outset, the field appears to be either tribal or a small world. The size of the clusters hovers around 100 individuals, consistent with de Solla Price's (1986) contention about the size of the research community with which researchers can keep up.

To distinguish between tribalism and a small world, we turn to the characteristics analyzed for the overall network. Tribal structures would be characterized by extensive within-group communication, which would be shown by high reachability within clusters and relatively short path lengths. As shown in panel A of Table 2, reachability within

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32. These figures total more than 2,640 because many authors published in more than one of the subperiods.
33. 153 individuals are isolates; these individuals are distributed across the clusters.
34. We also examine whether each of the periods can be construed as having a core as part of a core/periphery structure. Consistent with the overall period, results indicate that they cannot.

TABLE 2
Clusters detected in Period 1 (1984–1989)

Panel A: Descriptive statistics

	Cluster 1 – Econ/Arch, Anal/ Organizational Incentives (Financial, Managerial)	Cluster 2 – Econ/Arch/ Disclosure, Capital Markets – Methods (Financial)	Cluster 3 – Psych/Exper/ Audit, Financial	Cluster 4 – Econ/Arch/ Capital Markets – Event Studies (Financial, Audit)	Cluster 5 – Econ/Arch/ Audit	Cluster 6 – Econ/Anal, Simulation/ Sampling (Audit)	Cluster 7 – OB, Econ/ Framework, Field, Survey/ Critical Theory Perspectives (Managerial, Other)	Cluster 8 – Econ/Arch/ Capital Markets – Cross-Sectional Studies (Financial)	Overall Field
Number of authors	255	82	145	48	31	29	118	103	811
Number of citations	473	265	384	194	97	104	651	1,118	4,402[a]
Reachability within cluster	4%	13%	11%	31%	33%	29%	17%	53%	NA
Reachability to/from clusters	3%–14%	6%–48%	3%–28%	9%–49%	4%–48%	4%–34%	6%–16%	14%–49%	21%
Mean path length within cluster	2.61	2.08	2.98	2.96	1.95	2.09	2.68	2.45	NA
Mean path length to/from clusters	2.85–3.94	2.08–3.88	2.85–4.26	2.72–3.94	2.01–3.58	2.01–3.20	2.53–4.26	2.44–4.22	4.30
Top 10 individuals in cluster (based on undirected degree)	P. Healy R. Lambert J. Demski	W. Ricks J. Hughes T. Dyckman	W. Felix W. Waller M. Gibbins	S. Penman A. Chambers N. Dopuch	Jere Francis Z. Palmrose S. Titman	W. Smieliauskas U. Menzefricke L. Dworin	A. Hopwood M. Covaleski D. Cooper	M. Zmijewski V. Bernard C. Olsen	M. Zmijewski S. Penman V. Bernard

TABLE 2 (Continued)

Cluster 1 – Econ/Arch, Anal/Organizational Incentives (Financial, Managerial)	Cluster 2 – Econ/Arch/Disclosure, Capital Markets – Methods (Financial)	Cluster 3 – Psych/Exper/Audit, Financial	Cluster 4 – Econ/Arch/Capital Markets – Event Studies (Financial, Audit)	Cluster 5 – Econ/Arch/Audit	Cluster 6 – Econ/Anal, Simulation/Sampling (Audit)	Cluster 7 – OB, Econ/Framework, Field, Survey/Critical Theory Perspectives (Managerial, Other)	Cluster 8 – Econ/Arch/Capital Markets – Cross-Sectional Studies (Financial)	Overall Field
M. Wolfson	G. Waymire	R. Libby	J. Thomas	E. Wilson	R. Grimlund	P. Bougen	L. Brown	C. Olsen
M. McNichols	B. Trueman	T. Kida	R. Holthausen	B. McDonald	J. Ham	R. Kaplan	J. Rayburn	A. Chambers
J. Patell	D. Philbrick	D. Snowball	W. Kinney	R. Beatty	D. Losell	T. Tinker	R. Atiase	P. Healy
R. Antle	J. Stephan	M. Shields	R. Leftwich	D. Simon	K. Rohrbach	T. Hopper	B. Lev	L. Brown
K. Murphy	R. Thompson	M. Bouwman	M. Marais	D. Holt	J. Godfrey	S. Burchell	A. Christie	J. Rayburn
D. Larcker	J. Wild	S. Biggs	L. Bamber	D. Stokes	J. Neter	C. Clubb	D. Collins	A. Christie
J. Zimmerman	R. Dye	P. Frishkoff	P. Dodd	P. Danos	J. McCray	W. Chua	R. Hagerman	R. Atiase

Notes:

[a] Includes citations among clusters totaling 1,355. Definitions of measures are in Table 1.

TABLE 2 (Continued)

Panel B: Percentage of citations within and across clusters[b]

From: / To:	Cluster 1 – Econ/Arch, Anal/Organizational Incentives (Financial, Managerial)	Cluster 2 – Econ/Arch/Disclosure, Capital Markets – Methods (Financial)	Cluster 3 – Psych/Exper/Audit, Financial	Cluster 4 – Econ/Arch/Capital Markets – Event Studies (Financial, Audit)	Cluster 5 – Econ/Arch/Audit	Cluster 6 – Econ/Anal, Simulation/Sampling (Audit)	Cluster 7 – OB, Econ/Framework, Field, Survey/Critical Theory Perspectives (Managerial, Other)	Cluster 8 – Econ/Arch/Capital Markets – Cross-Sectional Studies (Financial)
Cluster 1	**76.9%**	6.0%	1.0%	4.7%	0.8%	0.0%	1.8%	8.8%
Cluster 2	9.4%	**55.2%**	1.9%	8.5%	1.5%	0.0%	0.4%	23.1%
Cluster 3	1.2%	5.7%	**77.7%**	3.4%	1.2%	4.2%	3.2%	3.4%
Cluster 4	7.3%	3.6%	0.9%	**58.6%**	2.7%	2.7%	3.0%	21.1%
Cluster 5	5.1%	10.8%	5.1%	10.2%	**61.8%**	0.0%	3.2%	3.8%
Cluster 6	6.2%	1.6%	5.5%	2.3%	0.0%	**81.2%**	0.0%	3.1%
Cluster 7	3.7%	1.4%	2.5%	0.8%	1.0%	0.3%	**90.0%**	0.3%
Cluster 8	5.2%	8.6%	1.1%	8.3%	0.8%	0.1%	0.0%	**75.9%**

Notes:

[b] Row sums are 100%. Values in boldface indicate the diagonal (cluster self-citations).

clusters is very low during Period 1: the percentage of pairs of researchers who can reach other within groups ranges from 4 to 53 percent. Although these results are not consistent with tribalism, they may indicate multiple subtribes within groups. Path lengths within clusters hover between two and three, with several of the clusters having an average around two. For these clusters, tribalism seems apparent. Next, we examine whether within-cluster communication exceeds across-cluster communication. Inconsistent with tribalism, reachability across clusters often is greater than that within clusters, although these figures are not high overall (as low as 3 percent and never higher than 49 percent). Further, only 21 percent of the pairs of individuals in the entire field can reach each other by following citation trails, and most across-cluster path lengths average about three or four, consistent with a tribal structure. Our most direct method for examining within-group versus across-group communication (total citations) also indicates a tribal structure. As shown in panel B of Table 2, all of the clusters send over 50 percent of their citations to themselves, most well over. Our final criterion for distinguishing small world from tribal structures is whether there are hubs. There are no researchers who meet the criteria to be designated hubs during Period 1. Overall, then, most of the evidence suggests that Period 1 is tribal in nature, certainly more tribal than the field when examined over a 25-year period.

Period 2

Table 3 shows that the algorithm detects nine clusters, again most about 100 or less in size, for the 1990–1995 period.[35] While the bases for the clusters have changed somewhat from Period 1, they still do not indicate a normal academic field. For example, there are people studying the economics of auditing services in clusters 2 and 7; these individuals differ as to methods and focus. In cluster 2 the focus is on theory, while in cluster 7 the focus is more on issues driven by practice. Researchers studying individual auditing behavior (cluster 3) are segregated from other auditing researchers, although the separate cluster representing the study of audit sampling has disappeared. As another example, there are significant numbers of managerial researchers in clusters 2, 3, 4, and 9. These individuals differ as to theories and methods, but there is some topic overlap, for example, the effects of incentives. The group that comes closest to exhibiting a normal academic field is the financial accounting researchers, who now divide more along topic lines than they did in Period 1 with different clusters focused, respectively, on capital markets (splitting further based on the topics of information asymmetry and information intermediaries), disclosure, and accounting choice.

    Because the entire field cannot be characterized as a normal academic field in the 1990–1995 period, we turn to distinguishing between tribal and small world structures during this time period. In panel A of Table 3, within-cluster communication, indicated by reachability, continues to be low, inconsistent with the internal connectedness of a tribal structure (but more likely indicative of multiple tribes within clusters). Several of the within-cluster average path lengths are close to two, suggesting high internal communication (and tribalism) for at least some of the clusters. Next we look at the relative extent of cross-cluster communication using reachability across clusters and for the overall field. As in Period 1, reachability across groups often is higher than that within groups, but, again, reachability in absolute terms continues to be low, ranging from 3 to 53 percent for pairs of clusters. For the overall field, only 35 percent of the pairs of individuals can reach each other. These results are consistent with continued, but slightly lessened, tribalism. The distances between clusters, as represented by path lengths across clusters, have increased slightly since Period 1, with many at the level of four or greater. This is consistent with

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35.   Cluster 1 contains 110 isolates and 18 others whose work is described in panel A.

TABLE 3

Clusters detected in Period 2 (1990–1995)

Panel A: Descriptive statistics

	Cluster 1 – Isolates/Econ, Arch, Anal/ Banking (Financial), Tax	Cluster 2 – Econ/Anal, Arch/Info Economics, Agency Theory Issues (Financial, Managerial, Audit)	Cluster 3 – Econ, OB, Sociology/ Field, Framework/ Critical Theory Perspectives (Managerial, Other)	Cluster 4 – OB, Psych/ Survey, Experiment/ Managerial	Cluster 5 – Econ/Arch, Anal/ Disclosure, Capital Markets Info Asymmetry Issues (Financial)	Cluster 6 – Econ/Arch/ Accounting Choice (Financial)	Cluster 7 – Econ/Arch/ Disclosure, Capital Markets Info Intermediaries Issues (Financial, Audit)	Cluster 8 – Econ/Arch/ Capital Markets Valuation (Financial)	Cluster 9 – Psych/ Exper/ Audit	Overall Field
Number of authors	128	152	84	53	37	101	171	115	95	936
Number of citations	49	825	245	224	192	566	454	922	659	5,975[a]
Reachability within cluster	1%	42%	21%	16%	40%	32%	7%	54%	51%	NA
Reachability to/from clusters	3%–18%	18%–49%	3%–33%	3%–41%	4%–52%	11%–49%	3%–29%	16%–53%	12%–53%	35%
Mean path length within cluster	1.82	3.17	3.10	2.05	2.04	2.67	2.83	2.80	2.92	NA
Mean path length to/from clusters	2.73–3.84	3.28–4.02	2.85–4.50	2.73–3.96	2.75–2.94	2.98–4.69	2.83–4.18	2.87–3.97	3.13–4.69	4.41

TABLE 3 (Continued)

	Cluster 1 – Isolates/Econ, Arch, Anal/ Banking (Financial), Tax	Cluster 2 – Econ/Anal, Arch/Info Economics, Agency Theory Issues (Financial, Managerial, Audit)	Cluster 3 – Econ, OB, Sociology/ Field, Framework/ Critical Theory Perspectives (Managerial, Other)	Cluster 4 – Psych/ OB, Survey, Experiment/ Managerial	Cluster 5 – Econ/Arch, Anal/ Disclosure, Capital Markets Info Asymmetry Issues (Financial)	Cluster 6 – Econ/Arch/ Accounting Choice (Financial)	Cluster 7 – Econ/Arch/ Disclosure, Capital Markets Info Intermediaries Issues (Financial, Audit)	Cluster 8 – Econ/Arch/ Capital Markets Valuation (Financial)	Cluster 9 – Psych/ Exper/ Audit	Overall Field
Top 10 individuals in cluster (based on undirected degree)	S. Moyer	G. Feltham	M. Dirsmith	D. Larcker	R. Verrecchia	R. Watts	Jere Francis	J. Zimmerman	S. Bonner	J. Zimmerman
	J. Magliolo	J. Hughes	P. Miller	M. Shields	R. Holthausen	D. Skinner	D. Philbrick	R. Sloan	M. Gibbins	R. Watts
	J. Collins	S. Datar	M. Covaleski	C. Chow	R. Atiase	J. Weintrop	R. Bhushan	S. Kothari	R. Libby	R. Sloan
	D. Shackelford	S. Baiman	W. Chua	M. Hirst	O. Kim	E. Press	S. Kang	A. Ali	J. Luft	Jere Francis
	K. Petroni	R. Dye	T. O'Leary	J. Pratt	L. Bamber	H. Hunt	Jennifer Francis	T. Harris	D. Frederick	R. Verrecchia
	A. Beatty	G. Richardson	A. Preston	A. Dunk	O. Barron	A. Christie	J. Abarbanell	J. Ohlson	W. Messier	G. Feltham
	S. Chamberlain	K. Gaver	S. Ogden	P. Beaulieu	A. Dontoh	D. Shores	T. Lys	B. Lev	R. Tubbs	D. Philbrick
	P. Griffin	M. Darrough	D. Cooper	Y. Kato	W. Lanen	A. Sweeney	K. Sivaramakrishnan	J. Wild	S. Biggs	D. Skinner
	S. Wallach	F. Gigler	R. Coombs	J. Cooper	B. Ajinkya	J. Duke	T. Shevlin	M. Lang	J. Bedard	S. Kothari
	P. Beck	R. King	A. Bhimani	Y. Chan	M. Gift	I. Haw	J. Elliott	P. Easton	B. Lewis	A. Ali
	W. Jung			K. Haddad		S. Lilien				
				M. Young						

Notes:

[a] Includes citations among clusters totaling 2,582; Definitions of measures as in Table 1.

(The table is continued on the next page.)

TABLE 3 (Continued)

Panel B: Percentage of citations within and across clusters[b]

From: / To:	Cluster 1 – Isolates/ Econ, Arch, Anal/ Banking (Financial), Tax	Cluster 2 – Econ/Anal, Arch/Info Economics, Agency Theory Issues (Financial, Managerial, Audit)	Cluster 3 – Econ, OB, Sociology/ Field, Framework/ Critical Theory Perspectives (Managerial, Other)	Cluster 4 – OB, Psych/ Survey, Experiment/ Managerial	Cluster 5 – Econ/Arch, Anal/ Disclosure, Capital Markets Info Asymmetry Issues (Financial)	Cluster 6 – Econ/ Arch/ Accounting Choice (Financial)	Cluster 7 – Econ/Arch/ Disclosure, Capital Markets Info Intermediaries Issues (Financial, Audit)	Cluster 8 – Econ/Arch/ Capital Markets Valuation (Financial)	Cluster 9 – Psych/ Exper/ Audit
Cluster 1	**36.0%**	10.3%	0.0%	0.7%	0.7%	18.4%	3.0%	24.3%	6.6%
Cluster 2	0.6%	**70.8%**	0.5%	1.1%	3.9%	3.8%	10.6%	6.6%	2.1%
Cluster 3	0.0%	1.0%	**79.3%**	3.9%	0.6%	6.5%	3.9%	1.3%	3.6%
Cluster 4	0.3%	11.0%	2.0%	**74.7%**	0.6%	1.0%	3.0%	5.7%	1.7%
Cluster 5	0.1%	14.5%	0.0%	0.1%	**60.3%**	1.0%	14.5%	9.5%	0.0%
Cluster 6	2.0%	5.8%	1.6%	0.1%	0.5%	**64.7%**	5.8%	19.3%	0.2%
Cluster 7	0.5%	12.6%	2.2%	1.8%	7.2%	7.4%	**53.3%**	10.7%	4.3%
Cluster 8	3.2%	5.3%	0.0%	1.1%	4.3%	7.3%	5.8%	**73.0%**	0.0%
Cluster 9	1.3%	2.4%	0.8%	3.0%	0.0%	1.2%	2.2%	2.0%	**87.1%**

Notes:

[b] Row sums are 100%. Values in boldface indicate the diagonal (cluster self-citations).

greater tribalism. Additionally, as shown in panel B of Table 3, with the exception of cluster 1, the clusters continue to send far more than half of their total citations to themselves, consistent with tribalism. The final characteristic that distinguishes small world from tribal structures is the presence of hubs. During this period, there is only one smaller hub (D. Larcker). Overall, these results suggest the field continues to exhibit significant tribalism during Period 2.

Period 3

Table 4 presents the results for the 1996–2001 period. For this period, the algorithm detects seven clusters, with the first being a cluster of 148 isolates (and thus omitted from the table).[36] The bases for the clusters during this period are only somewhat consistent with tribalism. While managerial researchers studying incentives issues appear in clusters 2 and 4 (segregated based on theories and methods), managerial researchers who previously were classified in the critical theories cluster (along with most other persons in this cluster) now join the experimentalists in cluster 4. This reflects some movement toward a normal academic field. Auditing researchers appear in clusters 4 and 5, but those in cluster 5 are focused somewhat on the issue of earnings management, similar to many financial accounting researchers in that cluster. This also is consistent with a normal academic field. The remaining clusters mostly reflect various areas of EBAF, but the cluster segregation does not appear on the surface to reflect topic distinctions. Capital markets researchers appear in clusters 1, 5, and 6, and accounting choice researchers appear in clusters 3 and 5. Note that the review papers published by *JAE* in 2001 may drive much of this clustering. The authors of these papers appear among the individuals with the highest undirected degrees for the clusters that relate to the areas of financial accounting research they review and, thus, cite heavily. Further, the capital markets researchers in cluster 5 study issues that facilitate work on accounting choice (Kothari 2001); thus, it makes sense that they are grouped with accounting choice researchers. The accounting choice researchers in cluster 3 study tax issues that relate to accounting choice, and they are grouped with tax researchers. Again, this is consistent with a normal academic field. Overall, the bases for the clusters continue to reflect some fine-grade clustering, but also show movement toward a normal academic field, and more of this movement than was present during Period 2. What is strikingly different about this period's clusters is that the majority of them represent EBAF research. Thus, EBAF researchers may be separated more on topic areas than in previous periods' research and also have become much more dominant.

We next determine whether parts of the field that do not exhibit normal academic field properties continue to move away from a tribal structure and toward a small world structure. First, panel A of Table 4 suggests that within-cluster communication, as represented by reachability within clusters, is now higher than in Period 2. While this may suggest the coalescing of subtribes, path lengths within clusters are about the same as they were previously, suggesting a similar level of tribalism as in Period 2. Turning to the comparison of within- and between-cluster communication, reachability across clusters has increased somewhat since Period 2 and continues often to exceed within-cluster reachability, suggesting decreased tribalism.[37] Distances between clusters, as represented by path lengths, have decreased since Period 2, suggesting decreased tribalism. Further, while most clusters continue to cite themselves more than half the time (see panel B of Table 4), the percentages of self-citations have decreased since Period 2. Finally, our analysis of hubs now identifies 3 smaller hubs (S. Kothari, K. Subramanyam, and R. Verrecchia). On the surface, this

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36. With the exception of cluster 4, the clusters again are approximately 100 or less in size.
37. Reachability for the whole field, though, has decreased since Period 2. Now only 26 percent of the pairs of individuals can reach each other through citations.

TABLE 4
Clusters detected in Period 3 (1996–2001)

Panel A: Descriptive statistics

	Cluster 1 – Econ/Arch/ Capital Markets - Analysts, Investor Sophistication (Financial)	Cluster 2 – Econ/Anal, Arch/Organiz. Incentives (Managerial, Financial)	Cluster 3 – Econ/Arch/ Accounting Choice (Financial), Tax	Cluster 4 – Econ, Psych, OB/ Exper, Field/Audit, Financial, Managerial	Cluster 5 – Econ/Arch/ Capital Markets, Accounting Choice, Disclosure (Financial), Audit	Cluster 6 – Econ/Arch/ Capital Markets Valuation, Value Relevance	Overall Field
Number of authors	30	83	70	311	139	113	746
Number of citations	96	361	346	969	911	1,088	5,892[a]
Reachability within cluster	34%	26%	34%	9%	49%	57%	NA
Reachability to/from clusters	11%–59%	15%–50%	15%–51%	11%–22%	22%–58%	19%–59%	26%
Mean path length within cluster	2.22	2.37	2.64	3.16	2.95	2.63	NA
Mean path length to/from clusters	2.71–3.33	3.06–4.24	2.80–3.78	3.33–4.24	2.95–3.93	2.71–3.74	3.63

TABLE 4 (Continued)

	Cluster 1 – Econ/Arch/ Capital Markets - Analysts, Investor Sophistication (Financial)	Cluster 2 – Econ/Anal, Arch/Organiz. Incentives (Managerial, Financial)	Cluster 3 – Econ/Arch/ Accounting Choice (Financial), Tax	Cluster 4 – Econ, Psych, OB/ Exper, Field/Audit, Financial, Managerial	Cluster 5 – Econ/Arch/ Capital Markets, Accounting Choice, Disclosure (Financial), Audit	Cluster 6 – Econ/Arch/ Capital Markets Valuation, Value Relevance	Overall Field
Top 10 individuals in cluster (based on undirected degree)	T. Lys	C. Ittner	L. Vincent	R. Libby	R. Sloan	S. Kothari	S. Kothari
	R. Ball	D. Larcker	T. Fields	D. Hirst	A. Sweeney	M. Barth	M. Barth
	E. Bartov	R. Bushman	E. Maydew	M. Nelson	P. Dechow	R. Watts	T. Lys
	B. Walther	A. Smith	T. Shevlin	K. Hackenbrack	K. Subramanyam	W. Beaver	L. Vincent
	L. Brown	J. Gaver	D. Shackelford	M. Shields	Jere Francis	E. Amir	R. Sloan
	S. Das	J. Demski	M. Calegari	M. Peecher	R. Lundholm	R. Holthausen	T. Fields
	J. Hand	R. Lambert	D. Dhaliwal	L. Koonce	M. Lang	B. Lev	R. Watts
	M. Mikhail	M. Rajan	C. Cloyd	P. Hopkins	B. Bushee	D. Collins	A. Sweeney
	R. Willis	K. Gaver	D. Guenther	I. Solomon	M. DeFond	W. Landsman	P. Dechow
	L. Soffer	S. Matsunaga	J. Pratt	L. Maines	P. Healy	G. Clinch	K. Subramanyam
					K. Palepu		

Notes:

[a] Includes citations among clusters totaling 2,121. Definitions of measures are in Table 1.

TABLE 4 (Continued)

Panel B: Percentage of citations within and across clusters[b]

From: /To:	Cluster 1 – Econ/Arch/ Capital Markets - Analysts, Investor Sophistication (Financial)	Cluster 2 – Econ/Anal, Arch/Organiz. Incentives (Managerial, Financial)	Cluster 3 – Econ/Arch/ Accounting Choice (Financial), Tax	Cluster 4 – Econ, Psych,OB/Exper, Field/Audit, Financial, Managerial	Cluster 5 – Econ/Arch/ Capital Markets, Accounting Choice, Disclosure (Financial), Audit	Cluster 6 – Econ/Arch/ Capital Markets Valuation, Value Relevance
Cluster 1	**31.5%**	5.2%	11.8%	7.9%	22.0%	21.6%
Cluster 2	2.1%	**63.9%**	2.8%	6.4%	14.9%	9.9%
Cluster 3	3.0%	6.2%	**55.3%**	5.3%	11.2%	19.0%
Cluster 4	3.0%	3.5%	2.4%	**77.0%**	9.4%	4.8%
Cluster 5	7.6%	2.8%	2.8%	3.9%	**63.3%**	19.6%
Cluster 6	5.8%	2.3%	7.4%	2.9%	17.5	**64.1%**

Notes:

[b] Row sums are 100%.

finding suggests movement toward a small world. Note, though, that all of these individuals conduct economics-based financial accounting research, and two of the three wrote *JAE* review papers. Their serving as hubs may simply reflect attempts to link together the various clusters in which such research is represented (clusters 1, 3, 5, and 6) rather than attempting to link together more diverse groups. Additionally, hub status may derive from review papers. Overall, we conclude some clusters continue to exhibit tribalism during Period 3, but there is evidence of movement toward both a normal academic field and a small world. Also there is further movement toward dominance by financial accounting researchers.

Period 4

Finally, Table 5 presents the results for the 2002–2008 period. In this period, six clusters appear. Cluster 1 contains 98 isolates and also economics-based archival researchers who study auditing, corporate governance, and regulation. While not apparent from the listed individuals in the cluster, however, cluster 1 now contains several experimental auditing researchers who previously were grouped with individuals currently in cluster 3, suggesting some movement toward a normal academic field. Further, cluster 3 researchers now are predominantly studying financial topics, reflecting a shift in interests of experimental researchers. Nevertheless, these experimentalists remain segregated from EBAF researchers, who appear in four of the five remaining clusters. The divisions among the remaining financial clusters depend somewhat on topics. For example, cluster 5 researchers study disclosure and information asymmetry issues, while those in clusters 2 and 6 tend to study other topics. Researchers in clusters 2 and 6, though, study capital markets topics. Researchers in cluster 2 during this period have an intense focus on accruals; perhaps this explains their separation from others. This evidence suggests some continuing clustering based on topic, methods, and theories in the area of financial accounting. However, the emergence of cluster 4, the managerial cluster, provides strong evidence of a normal academic field. This cluster now includes individuals studying managerial issues (both incentives issues and other issues such as costing) using economics and analytical or archival methods, as well as individuals who use psychology and OB theories and methods including experiments, field studies, and surveys. Essentially, all types of managerial (and some financial) researchers band together to form this cluster, and critical theory researchers moved away from financial and auditing experimental researchers to join this managerial group. Overall, the clusters' bases suggest further movement toward a normal academic field during Period 4.

To the extent that the field is not characterized as normal, most of the evidence strongly suggests further movement toward a small world. While internal connectedness as indicated by reachability has increased, path distances within clusters are similar to those in Period 3. Second, the ability to move across clusters also has increased, as has reachability for the entire field. Whereas only 26 percent of pairs of individuals could reach each other in Period 3, now 45 percent can. Further, reachability between clusters continues often to exceed reachability within clusters, and path lengths between clusters and for the overall field have decreased, reflecting reduced across-cluster travel difficulty. Finally, panel B of Table 5 shows that the percentage of citations each cluster sends to itself has decreased, hovering around 50 percent for most clusters. This suggests a movement toward a small world structure. One exception to this is the managerial cluster that sends 74 percent of its citations to itself; however, it seems plausible that a cluster that covers a large topic area using all theories and all methods would reference mostly itself. The other exception is the information asymmetry (financial) cluster, which sends less than 50 percent of its references to itself. Finally, for Period 4, we detect five major hubs (P. Easton, D. Matsumoto, S. Rajgopal, K. Schipper, K. Subramanyam) and six smaller hubs

TABLE 5
Clusters detected in Period 4 (2002–2008)

Panel A: Descriptive statistics

	Cluster 1 – Isolates; Econ/Arch/ Audit, Corp Governance (Financial)	Cluster 2 – Econ/Arch/ Capital Markets (Financial)	Cluster 3 – Psych, Econ/ Exper/ Financial, Audit	Cluster 4 – Econ, OB, Psych/All Methods/ Managerial	Cluster 5 – Econ/Arch/ Disclosure, Capital Markets Info Asymmetry Issues (Financial)	Cluster 6 – Econ/Arch/ Value Relevance, Capital Markets (Financial)	Overall Field
Number of authors	271	177	105	470	129	177	1,329
Number of citations	1,818	2,106	980	2,593	1,052	2,422	18,885[a]
Reachability within cluster	18%	50%	55%	23%	50%	60%	NA
Reachability to/from clusters	24%–37%	33%–58%	31%–61%	24%–37%	30%–63%	37%–63%	45%
Mean path length within cluster	2.91	2.54	2.40	3.79	2.61	2.52	NA
Mean path length to/from clusters	2.89–4.18	2.62–4.04	2.91–3.93	3.87–4.18	2.70–4.14	2.62–3.87	3.46

(The table is continued on the next page.)

TABLE 5 (Continued)

	Cluster 1 – Isolates; Econ/Arch/ Audit, Corp Governance (Financial)	Cluster 2 – Econ/Arch/ Capital Markets (Financial)	Cluster 3 – Psych, Econ/ Exper/ Financial, Audit	Cluster 4 – Econ, OB, Psych/All Methods/ Managerial	Cluster 5 – Econ/Arch/ Disclosure, Capital Markets Info Asymmetry Issues (Financial)	Cluster 6 – Econ/Arch/ Value Relevance, Capital Markets (Financial)	Overall Field
Top 10 individuals in cluster (based on undirected degree)	R. Frankel	S. Rajgopal	M. Nelson	D. Larcker	D. Matsumoto	K. Schipper	K. Schipper
	M. DeFond	D. Collins	R. Libby	C. Ittner	B. Ke	Jennifer Francis	Jennifer Francis
	K. Nelson	S. Kothari	S. Teoh	M. Shields	G. Miller	R. LaFond	R. LaFond
	M. Johnson	A. Leone	H. Tan	J. Luft	S. McVay	P. Olsson	S. Rajgopal
	K. Raghunandan	P. Hribar	J. Hunton	D. Dhaliwal	C. Marquardt	K. Subramanyam	P. Olsson
	Jere Francis	C. Wasley	R. Bloomfield	R. Chenhall	B. Bushee	I. Dichev	D. Collins
	B. Mayhew	S. Richardson	J. Elliott	S. Salterio	K. Petroni	R. Ball	D. Matsumoto
	W. Kinney	E. Bartov	R. Tarpley	K. Towry	P. Wysocki	L. Shivakumar	S. Kothari
	I. Khurana	D. Givoly	K. Kadous	S. Bonner	Y. Zhang	C. Leuz	R. Frankel
	A. Klein	C. Hayn	J. Frederickson	R. Banker	R. Bowen	P. Dechow	A. Leone

Notes:

[a] Includes 7,914 citations across clusters. Definitions of measures as in Table 1.

TABLE 5 (Continued)

Panel B: Percentage of citations within and across clusters[b]

From: /To:	Cluster 1 – Isolates; Econ/ Arch/Audit, Corp Governance (Financial)	Cluster 2 – Econ/Arch/ Capital Markets (Financial)	Cluster 3 – Psych, Econ/ Exper/ Financial, Audit	Cluster 4 – Econ, OB, Psych/All Methods/ Managerial	Cluster 5 – Econ/Arch/ Disclosure, Capital Markets Info Asymmetry Issues (Financial)	Cluster 6 – Econ/Arch/ Value Relevance, Capital Markets (Financial)
Cluster 1	**56.3%**	13.1%	4.5%	2.9%	3.7%	19.5%
Cluster 2	7.0%	**54.3%**	3.8%	4.6%	11.6%	18.7%
Cluster 3	5.9%	12.0%	**59.5%**	7.4%	7.0%	8.2%
Cluster 4	2.6%	8.9%	4.7%	**74.3%**	2.4%	7.1%
Cluster 5	4.7%	20.4%	6.1%	6.2%	**43.1%**	19.4%
Cluster 6	9.0%	15.4%	3.4%	4.9%	9.7%	**57.6%**

Notes:

[b] Row sums are 100%. Values in boldface indicate the diagonal (cluster self-citations).

(Jennifer Francis, B. Ke, R. LaFond, A. Leone, R. Libby, and S. Richardson). Because almost all of these individuals are EBAF researchers, this could reflect a linking of (similar) EBAF topics rather than a linking of diverse groups. Nevertheless, the results support further movement toward both a normal academic field and a small world.

Summary

Looking across time, Periods 1 and 2 show marked evidence of tribalism, whereas Periods 3 and 4 show some tribalism, but also movement toward both a normal academic field and a small world. These findings suggest that scholars' anecdotes about tribalism may have reflected a (natural) focus on a relatively short time period (or a fixation on beliefs formed during the earlier time periods).

Changes in the composition of the field over time also can explain some of the changes in its communication structure and the types of clusters that we observe. Results (untabulated) indicate that EBAF researchers have increased from comprising 28 percent of the overall field to comprising 38 percent. In total, economics-based archival researchers (across all areas) have increased from comprising 34 percent to 50 percent of the field. The area that has decreased at the same time is analytical research, beginning with 12 percent of the field and ending with 8 percent in the most recent period. We conjecture that many of these authors may have fled to the *Review of Accounting Studies* (*RAST*). Indeed, in the period 2003–2008, approximately 24 percent of *RAST*'s articles were analytical. Thus, some of the changes over time in the composition of clusters, and thus communication among them, occur because of changes in the distribution of people working in various areas, but these changes do not appear to be sufficient to create a situation in which the majority of the clusters represent EBAF research. Therefore, there must be other forces at work, such as institutional isomorphism (Tuttle and Dillard 2007; see also Oler et al. 2010), to explain these changes.

5. Discussion and directions for future research

This paper provides the first comprehensive study of the social structure of communication in top accounting research journals. First we introduce the major types of communication structures that have been discussed in a wide variety of literatures, and examine the patterns of citations among authors who published articles in five major journals for the period 1984–2008 to determine which structures best characterize academic accounting research. Second, to study trends, we examine changes in this communication structure over time by breaking the overall data set into four subperiods (1984–1989, 1990–1995, 1996–2001, and 2002–2008). We introduce a series of analyses that can be used to distinguish among various types of communication structures, and also posit a general process of citation behavior that is affected by individuals' experiences, values, and incentives.

For the overall 25-year time period we find that the structure of communication in accounting research can be described as part normal academic field, part small world, and part tribal. Researchers who study incentives and other topics traditionally belonging to managerial accounting have created the normal academic field portion of the overall structure. Auditing researchers of all types and financial experimental researchers can be characterized as exhibiting small world properties, being clustered somewhat by topic, method, and theory, but being easily able to reach other clusters. The remainder of the field (critical theorists and EBAF researchers) shows evidence of tribalism. For the overall period, critical theory researchers send and receive citations mostly to and from themselves. However, the results for the subperiods indicate that these researchers recently appear to be gravitating toward the organizational incentives cluster perhaps to achieve greater integration within accounting. Our findings regarding this cluster may be an artifact of our use of only five journals because critical theory work tends to be published mostly in other

accounting journals. EBAF researchers are a partially tribal group in that they do not send many citations to other groups, despite receiving significant citations from others. Finally, with the exception of EBAF researchers, the field appears to have become less tribal over time, with movement toward normal academic field and small world properties beginning in Period 3 (1996–2001).

Our findings that tribalism is not as rampant as previously thought are surprising, given the statements of prominent scholars who have suggested the existence of, and recent increases in, tribalism in academic accounting. These findings also are encouraging since work in other fields suggests that normal academic fields and small worlds promote better idea transmission and greater innovation and creativity than do tribal structures (see below). Our results that the EBAF cluster has become more dominant and partially tribal are consistent with those of prior studies and common wisdom (e.g., Oler et al. 2010; Just et al. 2009; Wakefield 2008; Tuttle and Dillard 2007; Bonner et al. 2006; Williams et al. 2006; Koonce and Mercer 2005). We document that the EBAF cluster's pattern of sending the vast majority of references to itself has not decreased over time, and that other clusters have increased their references to EBAF, perhaps in a search of greater legitimacy.

What changes would need to occur for the EBAF cluster to become less insular? The first step would be different and broader training among members of the cluster. Kothari (2001) suggests that new EBAF researchers study behavioral theories as well as economics since economics and finance researchers have incorporated behavioral theories into their work. Training in methods other than archival analysis also would broaden research efforts. Studying review papers that discuss the relevance of psychology theories for EBAF research (e.g., Koonce and Mercer 2005) or that discuss the results of both behaviorally-based and economics-based research (e.g., Maines and Wahlen 2006) also would provide greater insight.[38] Editors should be encouraged to publish more of these types of review papers. While training is important, it is not sufficient since incentives and values also must change. Perhaps a strong incentive will exist when EBAF research matures to a point where its practitioners must read other types of accounting research, as well as research in areas other than finance and economics, to generate new research topics. Such a change will be slow, similar to the evolution of behavioral finance into the mainstream of finance (Thaler 1999), because people tend to resist change (Kuhn 1970).[39] Perhaps further research on the reasons underlying the increasing dominance of the EBAF cluster (e.g., Tuttle and Dillard 2007) could lead to empirically supported insights regarding how to effect change.

Further, although the remaining clusters have properties of a normal academic field and a small world, it is unclear whether findings from other fields regarding the positive consequences of these structures can be generalized. Early research (e.g., Pratt 1964) suggested that the normal academic field is best for promoting innovation, while more recent research focuses instead on the small world, perhaps because the sheer size of research domains has made the creation and maintenance of a normal academic field difficult (e.g., Steen et al. 2010). Notably, group size is a determinant of creativity in research, with smaller groups being more effective than larger ones (Heinze, Shapira, Rogers, and Senker 2009). Thus, striving for a normal academic field in areas that have become unwieldy may be counterproductive. Indeed, recent studies indicate that many fields appear to be small worlds (Watts 2003), and small world structures are associated with positive field-level

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38. The University of Texas also recently held a conference entitled *The Intersection of Economics and Psychology in Accounting*.

39. However, there are preliminary signs of that the field is reaching a point of pressure to change. Increasing numbers of papers on the effects, for example, of geography (e.g., Engelberg, Ozoguz, and Wang 2010), social ties and other social factors (e.g., Hwang and Kim 2011), and even religion (e.g., Dyreng, Mayew, and Williams 2010) are appearing as part of EBAF research.

outcomes such as software project success (Singh 2010), financial and artistic success of musicals (Uzzi and Spiro 2005), and innovation as measured by patents (Schilling and Phelps 2007). Other studies, though, indicate that the positive effects of small world structures obtain only up to a point. When there is too much clustering, outcomes start to turn negative (e.g., Uzzi 2008). Additionally, beyond the effects of the structure, the quality and heterogeneity of the available knowledge may be important to innovation (e.g., Rodan and Galunic 2004). Thus, it is unclear what circumstances must exist for a normal academic field or a small world to be preferable, especially in regards to innovation.

Given that a complete examination of the consequences related to communication structures in accounting research is beyond the scope of this paper, we offer the following preliminary evidence. Specifically, we measure innovation as (i) the extent to which research cites accounting studies versus studies in disciplines outside of accounting and (ii) the average age of accounting and nonaccounting citations. We find substantial differences across clusters on these measures. If the normal academic field is the ideal structure, we would expect the managerial cluster to be the most innovative, that is to have the largest percentage of cites outside accounting, and also to have cites that are of the lowest average age. Our analyses (untabulated) show that the managerial cluster has about 59 percent of its citations outside accounting, and the average age of these cites is 12.3 years. The only cluster with a higher percentage of cites outside accounting (70 percent) is the critical theory cluster. However, all the other clusters (except for the critical theory cluster) have lower average ages for cites, inconsistent with the idea that the managerial cluster is the most innovative. The experimental cluster, which is classified as a small world, has the next highest percentage of cites outside accounting (54 percent), and these cites are, on average, 11.9 years old. The other small world–like cluster (economics-based auditing) has the youngest cites outside accounting (10.2 years), but also the smallest percentage of cites outside accounting (45 percent). These results are not entirely consistent with normal academic fields and small worlds being best for innovation. Because there are many factors that can affect the percentage of citations outside accounting and the average age of citations, these results should be interpreted with caution. Future research could employ finer measures of innovation such as ratings by top scholars, and also examine individual-level consequences of communication structures. Research indicates that individuals also benefit from small world structures, and serving as a hub may lead to increased publications (Singh 2007).

Another research avenue could be to explore the factors that have led to the current structure in accounting by testing our hypotheses about the effects of individual researchers' experiences, values, and incentives on the resulting aggregate structure. Specifically, studies could investigate the effects of formal and informal training and co-authoring relationships and also could examine the effects of field-, school-, and journal-level factors such as the organization of AAA activities, the frequency and types of conferences, publication standards, changes in editors, promotion and tenure policies, and idiosyncrasies of particular types of research. We note that the management accounting cluster may have become a normal academic field due to various factors including academic conferences such as the Global Management Accounting Symposium and the Management Accounting Section Mid-Year Meeting, both of which bring together managerial researchers with diverse theory and method interests; the presence of a greater than chance number of major hubs within this cluster; and the fact that data are more difficult to obtain, creating the need for training in and use of a wider array of methods than archival data analysis. Additionally, because management accounting is not affected by country-specific regulations, it may be easier to reference and build upon work by scholars in multiple countries, leading to greater diversity in the theory bases and methods to which researchers are exposed. Another research path would be to explore the factors that lead to the

micro-elements of the communication structure, such as how being physically located close to someone or of having *kinship* ties (e.g., student to advisor or vice-versa) affect individual communication relationships and the overall structure. Research indicates that these factors generally lead to clustered communication structures (e.g., McPherson et al. 2001), but it is unclear why these structures sometimes become normal fields or small worlds rather than becoming tribal.

The paramount importance of hubs in converting tribal structures to small world structures also creates avenues for future research. Studies could explore what experiences, values, and incentives cause certain individuals to receive and send both extensive and diverse communication and, thus, become hubs. To understand some of the common characteristics that might lead individuals to serve as bridges from one literature to another literature, we scrutinized the vitas and articles of the 29 hubs we identified earlier to gather data on: (a) the breadth of their educational backgrounds (e.g., whether they have studied subjects outside business); (b) the breadth of their work backgrounds (e.g., whether they have worked at schools that have faculties with diverse research interests and viewpoints); (c) whether they have used more than one method; (d) whether they have referenced a variety of types of theories; (e) whether they have worked with researchers from other clusters; and (f) whether they have published a review paper in our data set (results not tabulated).

Because our intended definition of hubs is people who provide a shorter path from one literature to another than otherwise would exist, we also attempted to gather data on factors that may make people appear to be hubs using our approach when they do not necessarily bridge disparate literatures. First, researchers may appear to be hubs if they have had significant editorial responsibilities (editors or associate editors of one or more of our five journals), as there are incentives to cite them and they are exposed to the work of a large number of authors. Thus, we record editorial activities. Additionally, people may appear to be hubs because they have worked in multiple areas of research. Our algorithm classifies individuals to only one cluster. If someone has done financial accounting, auditing, and managerial accounting research, s/he may appear to be a hub because each of the different types of studies are cited by individuals in each of the relevant clusters. This kind of individual author, though, is not a hub, but rather an *island hopper*. Because we coded the functional areas of individuals' articles, we are able to examine this possibility.

Of the seven individuals who are major hubs, four possess all six of the characteristics that we believe may lead people to bridge literatures. One possesses five of the characteristics and two possess three. While all of the major hubs have had significant editorial responsibilities, the individuals with fewer bridging characteristics also have worked in multiple areas and thus may have been designated hubs as an artifact of our analysis technique. An example of a model hub (someone possessing all the bridging characteristics) is D. Larcker, who has explored a broad array of topics; referenced a variety of literatures including economics, marketing, psychology, and statistics; and used multiple methods. The 22 smaller hubs, on average, possess 3.9 of the six bridging characteristics, with a range of one to six. Four of the smaller hubs possess all six characteristics; two of these also have had major editorial positions. The smaller hub possessing only one of the characteristics has been the editor of a major journal since its inception. The other smaller hubs with below-average bridging characteristics have worked in multiple areas. Again, then, these individuals' designation as hubs may be artifacts of our analysis.

Our study has several limitations. First, we characterize the communication structure of accounting using citations as our proxy for communication. It is conceivable that different measures (such as co-authorships) would modify or temper our results. Second, we examine citations using only five major journals. While it can be argued that these journals

are the tastemakers and play a significant role in advancing academic accounting, our results might be different using a broader set of journals. Third, we examine citations at the level of the author and assume that authors who serve as hubs tend to have similar citations across all their papers, thus allowing individuals who read hubs' work to be connected to disparate literatures through any of the hub's articles. This assumption most likely is not true, suggesting that further work on the specific mechanisms through which hubs bridge literatures is important. Fourth, we are unable to directly examine how important the experiences, values, and incentives of individuals are in developing the communication structure that currently exists. Rather, we are able only to suggest that these factors contribute to variation in communication structures. Finally, we do not examine the factors that have played a significant role in the evolution of the field toward its current structure.

Appendix 1

Clustering algorithm

Our algorithm is a modified version of Newman's 2006 algorithm, which detects community structure by optimizing a measure called *modularity*. Modularity is defined as:

$$Q = \text{(number of ties within clusters)} - \text{(expected number of ties)} \qquad (1),$$

$$Q = (1/2m) \sum [A_{ij} - P_{ij}] \delta(g_i, g_j) \qquad (2),$$

where m is the number of ties in a network; A_{ij} is the actual number of ties (citations) between a pair (i, j) of authors; P_{ij} is the expected number of ties between i and j; g_i represents the cluster to which author i belongs; and $\delta(g_i, g_j) = 1$ if $r = s$ and 0 otherwise. The expected number of ties in Newman's model is equal to the actual degree of the corresponding author in the real network. When (2) is rewritten in matrix form, we obtain a *modularity matrix* that is a global measure of the quality of clustering. As authors are assigned to clusters by the algorithm, a positive modularity indicates that the number of ties observed *within* clusters exceeds the expected number of ties if those ties were to have been randomly distributed throughout the network. In other words, Newman's algorithm assigns authors to clusters to maximize *within*-cluster ties while also reducing ties across clusters. If multiple clusters are detected, the algorithm restricts author assignment to one of p clusters; after all assignments are complete, modularity is calculated. The algorithm is run for different values of p and the optimal solution is that which maximizes the modularity index.[40,41]

As described, Newman's 2006 method poses two problems. First, locally optimized cluster assignment may not lead to globally optimized clustering. We overcome this through the use of a *relaxation process*: after a cluster has been established and author vectors calculated, our algorithm iteratively reassigns authors to other clusters in a locally optimal fashion. Iterations continue until no change in cluster assignments for any author will improve the modularity. Convergence is certain because cluster changes are made only if modularity is improved, and there exists some optimal cluster that maximizes modularity. A second, more significant, problem arises in Newman's original formulation because every cluster vector initially is zero (i.e., it contains no authors). It is possible, in early stages of cluster assignments, to populate every cluster such that all vectors span only a proper subspace of the restricted eigenvector space of the modularity matrix. This means

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40.   This is analogous to extracting a set number of factors in factor analysis and the modularity index is equivalent to a goodness-of-fit measurement.

41.   For additional technical details on the algorithm, please contact the authors.

that the space spanned by the cluster vectors may have lower dimensionality than the space spanned by the author vectors. In this case, there may exist authors that cannot be added to any established cluster without decreasing overall modularity. The algorithm fails because the number of permitted established clusters is finite. We overcome this problem by seeding cluster vectors in the first iteration of the relaxation process such that they form an orthogonal basis for the entire restricted eigenvector space. This is equivalent to initializing each cluster with a *ghost* (nonexistent) author that is strongly independent from all other ghosts. After the first iteration ends, and all authors have been assigned, seed (ghost) authors are eliminated and the relaxation process continues.

Appendix 2

Core/periphery analysis

Our tests for a core/periphery structure use a procedure developed by Borgatti and Everett (1999). First, we compute a matrix, **S**, that has as its elements $s_{ij} = \max(c_{ij}, c_{ji})$, where c_{ij} is the number of citations from author i to author j. Each element in **S**, then, is a proxy for the overall strength of communication between two authors. We then construct a matrix **P** that contains elements reflecting an *idealized* (or most extreme) core/periphery structure. An element in **P** is 1 if at least one of the pair of authors is a *core* author and zero otherwise. A field has a core/periphery structure if **S** and **P** are positively correlated. The correlation is simply the Pearson correlation of the elements of the two matrices. However, since elements of the matrices **S** and **P** are not independent random samples, we use the quadratic assignment procedure (QAP) to assess statistical significance (Hubert and Schultz 1976). For each test of a core/periphery structure, we assign a group of authors to be members of the core (as discussed in the text), while all remaining authors are assigned to the periphery.

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