**Richard P. Smiraglia**
**Palmer School of Library and Information Science, College of Information and Computer Sciences, Long Island University, Brookville New York 11548 USA**

# *Two Kinds of Power*: Insight Into The Legacy Of Patrick Wilson

**Abstract:** Among Patrick Wilson's most influential books was *Two Kinds of Power*, which has influenced scholars in information science, and particularly in knowledge organization. Tools of domain analysis are used to analyze the corpus of literature that cites *Two kinds of power*. Aboutness and relevance are demonstrated keys to this specialization.

**Résumé :** Parmi les livres les plus influents de Patrick Wilson, on retrouve *Two kinds of power*, qui a influencé les disciples des sciences de l'information, particulièrement dans l'organisation des connaissances. Des outils de l'analyse de domaine sont utilisés pour analyser le corpus de littérature qui cite *Two kinds of power*. L'à-propos et la pertinence sont des clés manifestes de cette spécialisation.

## 1.0 *Two Kinds of Power*

In 2001 Patrick Wilson (1928-2003) received the American Society for Information Science & Technology's Award of Merit. One of his most influential books was *Two Kinds of Power: An Essay on Bibliographical Control*. First published in 1968, and reprinted in 1978, the book has influenced generations of scholars in information science, and particularly those in the sub-specialization of knowledge organization. Wilson's setting forth of the concept of exploitative power—the power of a scholar to make use of recorded knowledge—gave succeeding generations of researchers a means of measuring efficacy of systems for knowledge organization. Whatever enabled exploitative power was efficacious; whatever obfuscated exploitative power, and this was most of the bibliographical apparatus, was not efficacious.

Citations to Wilson's work are found frequently in the research literature of information science, and especially in papers in knowledge organization. This paper began with an intuitive observation that Wilson is cited ubiquitously in conference papers in both information science and knowledge organization. (One is willing to admit, however, that the reality is that Wilson is cited in the papers on sessions one attends.) Though not nearly so ubiquitous as Cutter's "Objects" (1876, 12), the frequency of references is clearly noticeable. In domain analysis the presence of frequently-cited texts signals a focal point within the domain. Such works represent a theoretical benchmark generally adhered to by researchers working with a common set of problems. An interesting question then arises: how can we characterize the authors who cite *Two Kinds of Power*?

This paper falls well within the conference theme of "Management, Analysis, and Organization of Information." Wilson's work influenced all three, and laid one of the most important foundation stones for information science theory. Beginning with papers located in the *Web of Science* that cite *Two Kinds of Power*, I will rely on some tools of domain analysis to describe the intellectual structure of the group of scholars that have this text as a focus.

**1.1 Domain Analysis or Domains, Discourse Communities, or Invisible Colleges?**
A subsidiary problem for the present paper is to define the group of authors for whom *Two Kinds of Power* seems to provide a focal text. That is, when we have identified the group, just what sort of group will we have identified? There is much discussion but little agreement in information science about the distinctions among and definitions of entities denominated variously as domains, discourse communities, and invisible colleges. All three constitute groups of scholars working on research problems that are in some way perceived to be similar. All three terms suggest some sort of social networking among participant scholars. Yet the functional parameters of the three are divergent. The concept of "domain" suggests intellectual boundaries, and the concept of "discourse community" suggests an active exchange of information; the term "invisible college" has been used to suggest both intellectual commonality and active discourse taking place in a socially-structured unit. For the purpose of this paper I will posit that the context falls exclusively into the discipline known as information science. Therefore, we clearly are dealing with one or more sub-units of information science. How then will we recognize the distinction among domains, discourse communities, and invisible colleges?

Hjørland and Albrechtsen (1995) describe a domain-analytic paradigm within information science that has as its focus the description of knowledge-domains, in which individuals are seen as members who might be participating in various ways. One means of such participation might be as part of a discourse community (p. 409). The purpose of Hjørland and Albrechtsen's paper is not to define these terms; rather their intent is to demonstrate the usefulness of domain-analysis for the study of hypotheses in information science. Thus we are left to infer a hierarchical relationship between a domain and a discourse community. Hjørland (2002) elaborates on the methodology of a domain-analytic approach to information science by enumerating eleven steps that can provide information about a domain. These steps include bibliographic and bibliometric studies, classification and indexing, and various empirical analyses focused on terminology and intellectual structures. Tennis (2003) describes the muddy boundaries of the definition of "domain," and provides two axes for the operationalization of a domain. These axes are 1) areas of modulation—definitions used by members of the domain, which modulate the domain by stating its extension; and, 2) degrees of specialization, including "focus" and "intersection"—which offer ways to qualify a domain by increasing its intension.

Elsewhere, Hjørland (2001, 777) describes what he means by "domain" within the context of a discussion of aboutness. As before, we do not have a direct, intentional definition of the term "domain." Rather we have a provisional definition of "domain" within another context. We are told that what constitutes a domain is empirical but likely reflects a social construction. In other words (and we derive this from the discussion of aboutness in the same paper, p. 776), the definition of any specific domain is dependent on the pragmatic considerations of its members. Discourses, theoretical assumptions, and intersubjective agreement are "higher," or we might say have a closer correlation, when they occur within a domain. Thus we might gather Hjørland proffers a definition of domain by pragmatic accordance of its members. To the extent that they agree on critical components, one can say that they constitute a domain. The closer the agreement the higher the degree of "domain" accordance; the more dispersed is their theoretical base, the less likely it is that we are looking at a true "domain."

Zuccala (2006) has brought forward a synthesis of what it means to be an invisible college. She suggests that (p. 155):

> An invisible college is a set of interacting scholars or scientists who share similar research interests concerning a subject specialty, who often produce publications relevant to this subject and who communicate both formally and informally with one another to work towards important goals in the subject, even though they may belong to geographically distant research affiliates.

Like a domain, an invisible college has as its focus the social interaction of a group of scholars who share similar research interests within a subject specialty. Like a discourse community, an invisible college is a group of what Zuccala calls "social actors" engaged in discourse both formal and informal. Important distinctions are Zuccala's suggestions that an invisible college is relatively young—that is, its activity is mostly quite recent—and that it becomes visible through a dedicated Website where members might share current research information (p. 157).

Bearing in mind the diffusion of definitions of domain, discourse-community, and invisible college, the methodology in the present study is based on Tennis' two axes. That is, content analysis of the titles of the papers of those who cite *Two Kinds of Power* is used to suggest the extension of this group (its axis, or axes, of modulation). Author co-citation analysis is used to suggest the intension of the group (the degrees of specialization). A limitation of this study is our reliance on ISI's *Web of Science* for data, which admittedly restricts the scope of citations (that is, evidence of what Zuccala calls "instantiation" of the specialization through production of documentary artifacts). Citations in monographs are not included, authors who are members of teams and therefore not listed as first authors are also not included. Conference papers are not included. And, of course, papers appearing in journals not indexed by ISI are not included.

## 2.0 Authors Who Cite *Two Kinds of Power*

ISI's *Web of Science* was consulted to generate the set of authors who have cited *Two Kinds of Power*. A search conducted on October 3, 2006 yielded 77 records by 54 authors. 67 papers were journal articles, 5 were review articles and 4 were book reviews. The majority of citing authors came from the United States (68%), with the second largest group identified as Danish (10%). 77 seems a relatively small number for an influential work, and this is likely due to reliance on ISI for source data. Nevertheless, as we shall see, the set of papers retrieved is rich and includes some of the most influential authors in information science.

Initial analysis was conducted using *Web of Science*'s analyze function. Analysis by year of publication data yields a distribution spread from 1973 to 2002, indicating the sustained influence of the text over time. Analysis of the journals bearing citing works shows that *Journal of Documentation* and *JASIST* predominate, but the upper tier can be characterized as those journals most influential in information science, of which knowledge organization is a substantial sub-discipline. Table 1 shows the most frequent citing authors.

| *AUTHOR* | *RECORD COUNT* | *% OF 77* |
|---|---|---|
| Andersen, J | 5 | 6.4935% |
| Bates, MJ | 4 | 5.1948% |
| Hjørland, B | 4 | 5.1948% |
| Buckland, MK | 3 | 3.8961% |
| Leimkuhl.FF | 3 | 3.8961% |
| Smiraglia, RP | 3 | 3.8961% |
| Swanson, DR | 3 | 3.8961% |
| Aguolu, CC | 2 | 2.5974% |
| Blair, DC | 2 | 2.5974% |
| Mai, JE | 2 | 2.5974% |

**Table 1. Authors citing *Two Kinds of Power* represented in *Web of Science***

Three overlapping research streams broadly defined emerge from this list. Andersen, Hjørland, Smiraglia, and Mai write in the area of knowledge organization. Bates, Hjørland, Buckland and Blair write broadly in library-and-information science. And Bates, Buckland, Blair, and Swanson write in information retrieval. (For the moment we note the overlap among these three streams; we will revisit this issue at the end of the paper.) It seems Wilson's book has had broad influence in information science at a meta-level and so can be said to have had wide impact on the international literature of the discipline. Further analyses below will conform to this initial observation.

## 2.1 Thematic Coherence: Content Analysis

Content analysis applied to these 77 papers reveals thematic patterns that mirror information science at large in their divergence. The titles of the papers were entered into WordStat® for analysis. Ten major thematic groups emerged; these are:

| *THEME* | *%* | *AUTHORS AND RESEARCH STREAMS (PARTIAL LISTS)* |
|---|---|---|
| Subject [access] | 3.9 | Andersen, Bates, Hjørland, Mai, Svenonius |
| Informat* | 3.4 | IS: Bates, Blair, Cooper, Hjørland, Vickery<br>KO: Andersen, Rorvig;, Smiraglia, Wellisch |
| Bibliog* | 3.1 | Bates, Tillett, Weintraub, Wellisch, |
| Knowledge [organization] | 2.6 | Andersen, Smiraglia, Swanson |
| Theory | 2.4 | Hjørland, Selden, Smiraglia, Vickery |
| Indexing | 1.4 | Andersen, Bates, Mai, Svenonius |
| Library | 1.4 | Buckland, Leimkuhl, Swanson |
| Relevance | 1.4 | Bookstein, Buckland, Cooper, Hjørland, Mizzaro |
| Research | 1.2 | Buckland, Leimkuhl, Weintraub, Wilson |
| User. | 1.2 | Ercegovac, Rubens, Shineburne, Yee |

***Table 2. Co-Word Analysis of Core Papers***

Coherence within the group is interesting to note. Andersen, Bates, and Hjørland appear in four categories, and in some cases have authored more than one paper in each category. As a whole the papers cross the boundaries of these divisions, suggesting coherence at a meta-level. For instance, Vickery's 1997 "Metatheory and Information Science" or Hjørland's 1992 "The Concept of Subject in Information Science" both cross thematic boundaries and both represent contributions from the sub-discipline of knowledge organization to the broader discipline of information science.

But there is also diversity within the group, which is visible in the next tier of less-frequently appearing terms. This list includes terms such as: Concept, Document, Analysis, Catalogs, Communication, Digital, Domain, Online, Perspective, Social, and Systems. These terms were added to the terms above for co-word analysis. WordStat® uses multi-dimensional scaling based on word co-occurrence frequencies to produce

visual evidence. The three-dimensional map appears in Figure 1 below (stress = 0.23 RSQ = 0.86).

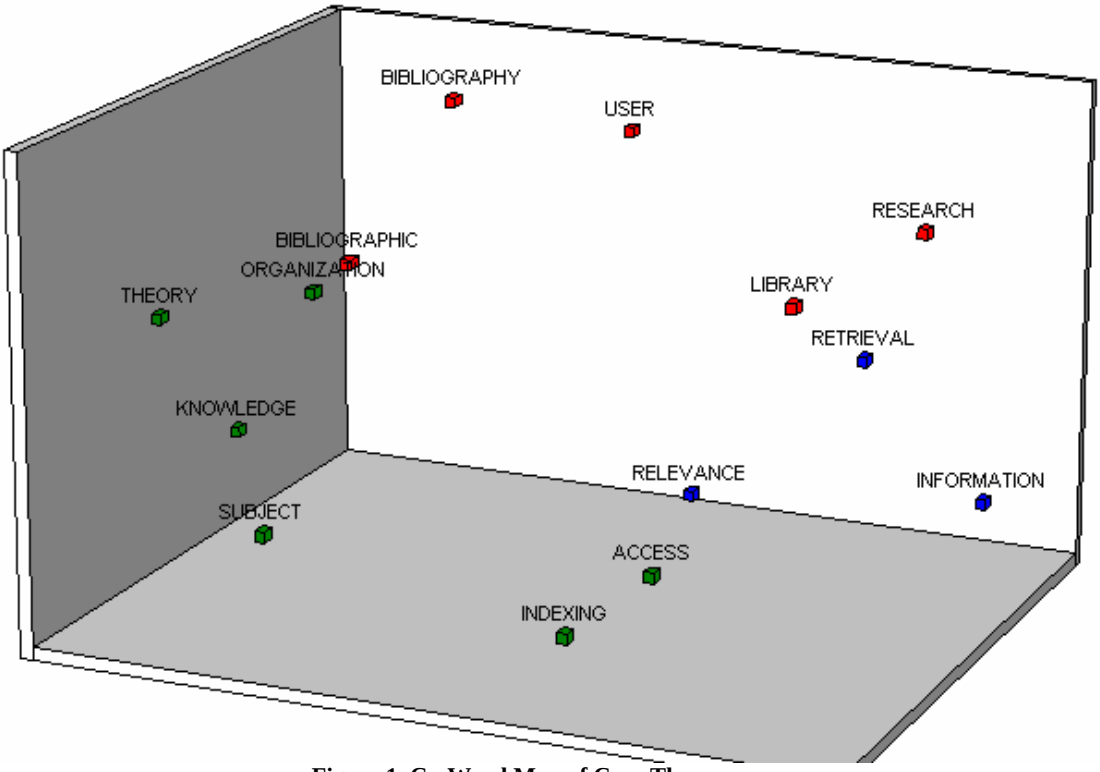


**Figure 1. Co-Word Map of Core Themes**

Here we have a visual interpretation of the three research streams we observed before. The knowledge organization cluster includes subject access and indexing as well as theory. The information retrieval cluster includes relevance, which interestingly borders the knowledge organization cluster. And the library and information science cluster displays meta-level terminology, including libraries and users. Note the proximity of "bibliographic" to the "organization" of the KO cluster. Stress factors and *R* Square are measures of goodness of fit; in this case the stress factor is high (McCain (1990) suggests 0.2 as an upper limit) indicating less than maximal dimensionality in the dataset. But *R* Square is high, and McCain (1990, 438) also indicates "a higher stress value … is considered an acceptable trade-off … if the *R* Square is high." I read this as an indication that the dataset is too small to provide a rich topical map, but we may have confidence in the plot itself.

### 3.0 Is this a Domain? Author Co-Citation Analysis

Author co-citation analysis can be used to create an empirical map of prominent authors in an area of scholarship. In such a map, the density of clustering indicates perceived similarity on some dimension. That is, co-citation of authors suggests that those who cite any given pair in common perceive there to be some similarity shared by the co-cited pair. The simple analyses above represent concepts in papers that cite *Two Kinds of Power.* Author co-citation analysis, applied to a larger body of authors whose work in this research area is connected through common citation networks, will show how this group of researchers perceives similarity in the research threads observed. Now we are working with authors who cite and are cited by the 54 authors in the initial group. Thus

the map we will draw not only demonstrates the presence of the research streams we have already noted, but it also represents the wider influence of Wilson's book.

McCain (1990, 433) suggests a diversified list of authors should be compiled when the purpose is to examine the overall intellectual structure of an area of scholarship, so to begin a core set of papers was formed. Thematic analysis (represented above) yielded a set of 18 papers by 14 authors. This list was compared to the list of 30 papers by the 10 authors identified as those most frequent citers of *Two Kinds of Power*. The two lists were merged to create the list seen in table 3 below.

| ***AUTHOR*** | ***TITLE*** | ***YEAR*** |
|---|---|---|
| Andersen, j | The role of subject literature in scholarly communication - an interpretation based on social epistemology | 2002 |
| Bates, MJ | Rigorous systematic bibliography | 1976 |
| Bates, MJ | Indexing and access for digital libraries and the internet: human, database, and domain factors | 1998 |
| Blair, DC | The management of information - basic distinctions | 1984 |
| Buckland, MK | Relatedness, relevance and responsiveness in retrieval systems | 1983 |
| Buckland, MK | Concepts of library goodness | 1982 |
| Cooper, WS | Definition of relevance for information retrieval | 1971 |
| Hjørland, B | Towards a theory of aboutness, subject, topicality, theme, domain, field, content ... And relevance | 2001 |
| Hjørland, B | The concept of subject in information-science | 1992 |
| Hjørland, B<br>Nicolaisen, J | Bradford's law of scattering: ambiguities in the concept of "subject" | 2005 |
| Leimkuhl.FF | Library operations-research - process of discovery and justification | 1972 |
| Mai, JE | The concept of subject in a semiotic light | 1997 |
| Mai, JE | Analysis in indexing: document and domain centered approaches | 2005 |
| Mizzaro, S | Relevance: the whole history | 1997 |
| Smiraglia, RP | Further progress toward theory in knowledge organization | 2001 |
| Smiraglia, RP | The progress of theory in knowledge organization | 2002 |
| Swanson, DR | Libraries and the growth of knowledge | 1979 |
| Swanson, DR | Libraries and the growth of knowledge | 1980 |
| Vickery, B | Metatheory and information science | 1997 |
| Weintraub, DK | Essentials or desiderata of the bibliographic record as discovered by research | 1979 |
| Wellisch, H | From information science to informatics - terminological investigation | 1972 |

***Table 3. Core papers***

All citations from these 21 papers were arrayed in an Excel® spreadsheet and then sorted for author productivity. Overall there were 796 citations to works by 74 authors. The works cited ranged in date from 1876 to the present; the mean age of cited works was 67 years. A typical Bradford-like distribution appeared among the cited authors, and the 26 names in the upper tier (table 4) were used for initial author co-citation analysis.

| *CITED AUTHOR* | *FREQUENCY* |
|---|---|
| HJØRLAND B | 28 |
| WILSON P | 23 |
| BATES MJ | 20 |
| POPPER KR | 16 |
| SMIRAGLIA R | 14 |
| SARACEVIC T | 13 |
| COOPER WS | 9 |
| SWANSON DR | 9 |
| VICKERY A | 9 |
| BELKIN NJ | 8 |
| BRADFORD SC | 7 |
| REES AM | 7 |
| CUADRA CA | 6 |
| JANES JW | 6 |
| MAI JE | 6 |
| WHITE HD | 6 |
| BOOKSTEIN A | 5 |
| CHEN H & DHAR V | 5 |
| CUTTER CA | 5 |
| EISENBERG M | 5 |
| HUTCHINS WJ | 5 |
| LANGRIDGE DW | 5 |
| LEAZER GH | 5 |
| SHERA JH | 5 |
| SOERGEL D | 5 |
| SVENONIUS E | 5 |

**Table 4.** ***Top tier authors for ACA.***

It is important to acknowledge the symbolic role of the authors on this list. That is, we will see how they are co-cited by scholars (presumably in information science) in general. In particular, co-citation analysis will show how scholars in the subject area perceive similarities in their work.

Using *Web of Science*, co-citation counts for these 26 authors were retrieved, using as the only limit the 1968 publication date of *Two Kinds of Power*. These counts were entered in a typical co-citation matrix in SPSS® for analysis. After generating a correlation matrix, multi-dimensional scaling was used to create a map. The initial map appears in Figure 2 (stress = .06, RSQ = 0.99). Low stress and high *R* Square indicates that this model fits the data well.

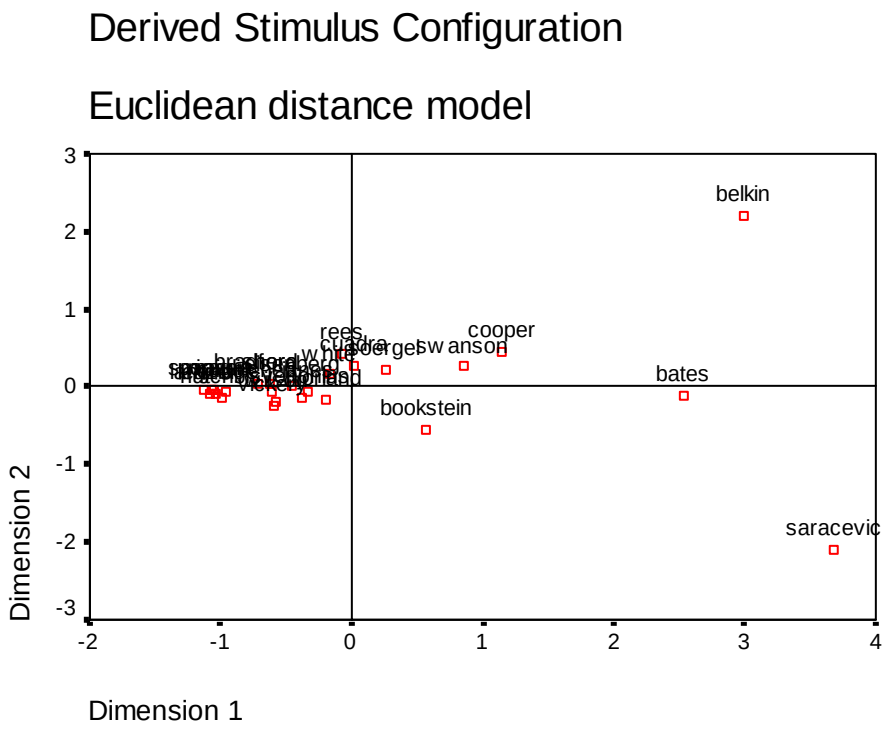


**Figure 2. Co-Citation of Core Authors**

Note the density of the cluster to the left, the prominence and distance from that cluster of Belkin, Bates, and Saracevic, and the grouping of Bookstein, Swanson and Cooper in the center. These groupings conform roughly to the research streams we observed in the content analysis described above. Bates seems to be anchoring the nested streams around library-and-information science and the loosely correlated stream for information retrieval that incorporates Saracevic and Belkin at the extreme. We can see even from this map that the dense cluster on the left includes Soergel and Hjørland and therefore likely incorporates knowledge organization. The immediate problem is to disambiguate that cluster.

Several approaches are available to reveal the structure of the dense cluster, ranging from stretching the display to redrawing the map. In fact, a number of iterations of the map were produced—too many to include in this presentation—all of them indicating Wilson's presence in the center of that cluster, but also revealing that the cluster overlaps information retrieval on a vector that passes through a number of authors en route to Vickery.

Another approach to disambiguation is to enlarge the author set. The next tier of 19 authors in the Bradford-like distribution was added and the analyses were run again. The additional authors are:

> Beghtol, Bruza, Ellis, Foskett, Harter, Hayek, Ingwersen, Johansen, Lalmas, Lancaster, Maron, Nie, Park, Ranganathan, Rorvig, Schamber, Taylor, Van Rijsbergen, Wiberley

(It is worth reminding the reader at this point that we are gathering authors who are cited by authors who cite *Two Kinds of Power*.) A quick glance at this list tells us that the research streams we have already observed are reinforced in this list, which includes

active current authors such as Beghtol and Taylor, as well as classic names such as Ranganathan, Van Rijsbergen, and Lancaster. Because the map was still too dense, authors with mean co-citation rates < 6 (Bradford, Bruza, Hayek, Johansen, Lalmas, Nie, and Popper) were removed for the final iteration. Figure 3 shows the map produced in this iteration (stress = .07, *R* Square = .98; again the model fits the data well).

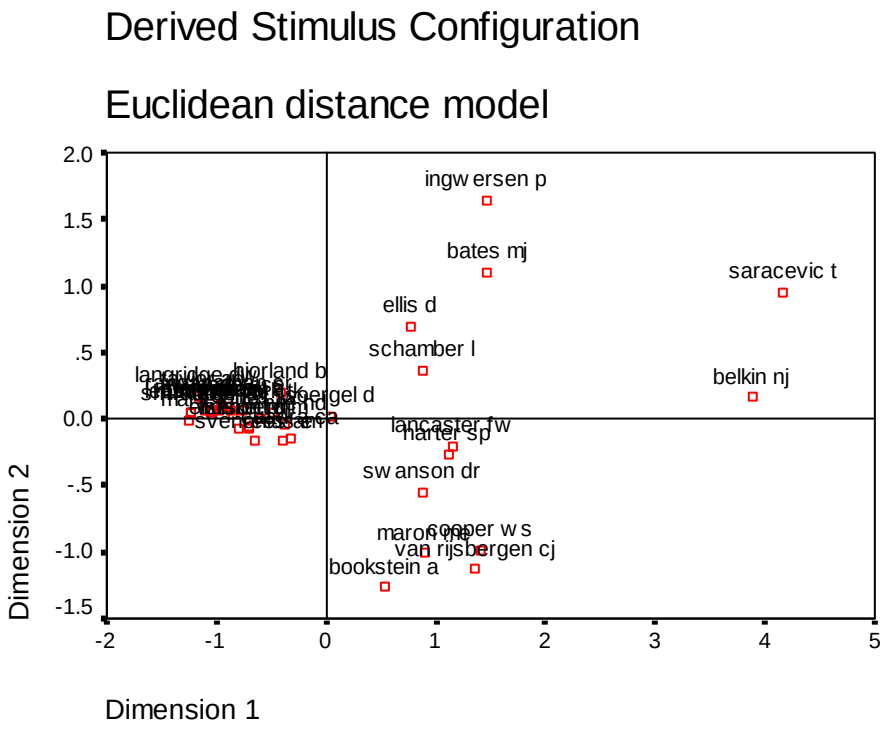


**Figure 3. Expanded Author Set**

As might have been expected we have the same general shape but with more information. The cluster to the left is still too dense to read but likely is predominantly the knowledge organization cluster. We have a definite information retrieval cluster with Belkin and Saracevic at the cutting edge, but with a large horizontal clustering from Bookstein to Ingwersen in the center. We will see below that this cluster actually runs clear to the left of the dense cluster as well. Bates overlaps everything; her work could be characterized in all three ways.

Finally, all of the authors visible to the right of the axis were removed to fully disambiguate the dense cluster to the left. That result is shown in Figure 4 (stress = .16, RSQ = .89; higher stress than before perhaps because of the small size of the matrix, but still a good fit).

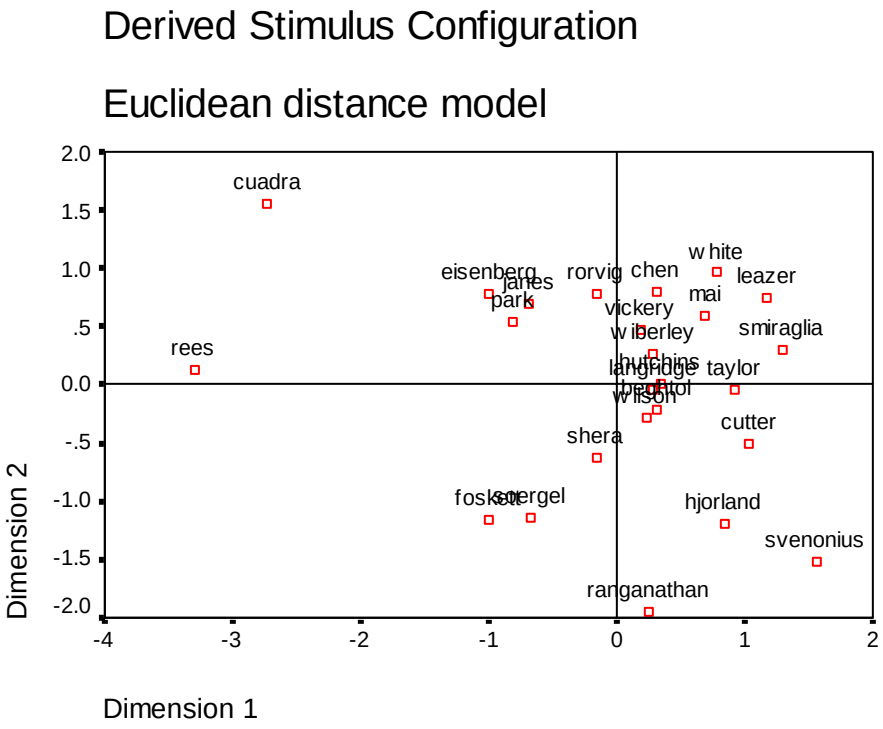


**Figure 4. The Dense Cluster Unambiguated**

To read this map, imagine it is rotated 90 degrees left, so that Soergel is at the center on the right and Hjørland is above; this now corresponds to the placement of the cluster in Figure 4 (Note that Wilson remains in the center). In this way we see that Cuadra and Rees lie some distance from the cluster, representing historic association, but other important historic figures, such as Cutter, Shera and Ranganathan, lie in the midst of the cluster, indicating continued relevance. We also see Janes, Eisenberg, Rorvig, and Park at the left of the cluster, indicating the farthest segment of the information retrieval cluster, which stretches clear to Saracevic and Belkin (see Figure 3). The rest of this cluster lies clearly within knowledge organization (the remaining obfuscation is caused by the proximity of Hutchins and Langridge to Taylor). The proximity of the two clusters (knowledge organization and information retrieval) in this map reflects the role of relevance as a core issue in both specialties; we saw that same proximity in the co-word analysis in Figure 1.

Finally, we can say that Figures 3 and 4 provide a means to affirm what we saw in Figure 2. That is, the smaller core group of authors in this area have focused work in three areas—library-and-information science, information retrieval, and knowledge organization. The prominence of Belkin, Bates, and Saracevic at the left of the initial map corresponds both to their very high co-citation counts and to their continuing leadership in the area in general. And the density of the cluster to the left indicates the intense interrelatedness of knowledge organization as an area of specialization.

## 4.0 Discussion: Axes of the Domain?

Taking our own advice above we have cut-and-pasted together parts of the maps from figures 3 and 4 to produce Figure 5 (below). And we have added the solid lines to delineate the two clusters Knowledge Organization and Information Retrieval; a dashed line surrounds the cluster we have been calling Library-and-Information Science. The

overlap is clearly demonstrated. In particular, what had appeared initially to be a third research stream in library-and-information science now seems clearly to be totally incorporated within the two other research streams. This suggests that rather than a third research stream, this represents a core set of authors who provide a value system at the meta-level in information science that is shared by the two research streams that are clearly prevalent. Bates remains central to all research streams in this map.

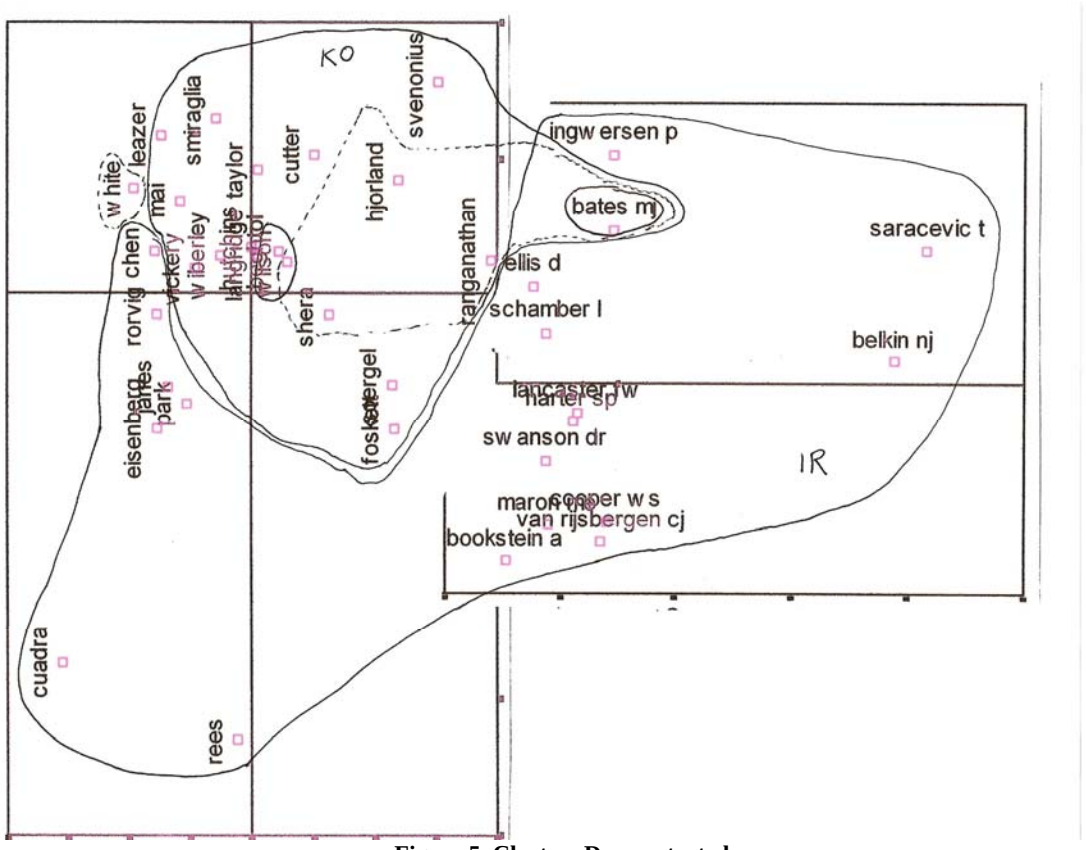


**Figure 5. Clusters Demonstrated**

Are there axes of modulation here? Clearly there are two modes present in these works influenced by *Two kinds of power*: information retrieval and knowledge organization. Clearly there are core values shared by the two communities at a meta-level. Are there degrees of specialization? Clearly there are. Knowledge organization here is principally the construct of subject access and relevance; information retrieval is principally the province of knowledge representation and relevance. Knowledge representation at the conceptual level is central to knowledge organization; knowledge representation at the application level is essential for information retrieval. Both are dependent on the concept of relevance. *Two kinds of power* presents relevance as a core mystery; a must-have of information retrieval (Wilson's descriptive domain), but as yet unarticulated by those for whom it is essential, the scholars operating in Wilson's exploitative domain. Still, by Tennis' measures, we can posit parameters of a domain surrounding this text.

Is this an invisible college? Probably not by Zuccala's requirements, because there are too many generations of authors present and there is no overt social activity. We can see clearly enough that the same authors who frequently cite *Two kinds of power* are those who are cited and co-cited by a wider circle of authors in knowledge organization and information retrieval, particularly as relevance and aboutness act as core conceptual problems for research.

But there is social activity present here in another dimension. White (2003) refers to related concepts of citation identity—the set of authors that an author usually cites—and citation image—the set of authors with whom one has been co-cited. Both citation image and citation identity are of interest here. White says citation image grows and changes over time as one's work finds acceptance among new groups of scholars (2003, 89). Citation image is determined by those who co-cite, and that is what we are seeing here. The authors in Figure 5 are those whose image is the scholarly projection of the larger group of scholars in the sub-specializations of information science that revolve around aboutness and relevance. And, White says that citation identity can reflect social networks (2003, 93). We can see here quite clearly networks revolving around the Graduate Library School at the University of Chicago, around the Royal School of Library Science in Copenhagen, and likely also around the School of Library and Information Science at the University of California at Berkeley.

## 5.0 No Conclusions are Possible! A Domain is a Social Construct

Is this a domain? The question cannot be answered satisfactorily. According to Tennis' requirements we have both modulation and extension. According to Hjørland's requirement, which we have termed "domain accordance," we can posit that *Two kinds of power* plays an influential role in one or more domains of which the evidence we have seen presents only a partial picture. According to White we have social networking among the authors represented here. And, although our co-citation analysis reveals only the perception of a wider community of scholars, it overlaps quite nicely with the actual evidence of domain accordance from the co-word analysis. Yet we cannot posit this as a proper domain without further research.

It seems clear that aboutness and relevance are critical theoretical components of some domain, and that *Two kinds of power* is an influential text for a particular set of core authors in that domain. We have had several glimpses of those core authors in this study.

But we have not seen an entire domain. Instead we have seen the result of the choice of a classic work as the basis for domain analysis. We are looking at one important corner of the wider domain of information science, one that incorporates management, analysis, and organization of information. Forty years on it is probably still too early to make definitive statements about the influence of *Two kinds of power,* because the tome is still being heavily cited (which means it is being assigned in major schools and read by new generations of scholars). Conference papers and monographs should both be plumbed for fuller comprehension of the influence of this text. What does this say about information science, knowledge management and organization? It helps us understand the dilemmas inherent in the pragmatic evaluation of domain accordance, even when we view what we consider to be empirical research. But it also demonstrates the value of such a birds-eye view.

## Acknowledgments

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