
Disciplinary Structures on the Internet

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ABSTRACT

EARLY UTILIZATION AND IMPLEMENTATION of the Arpanet/Internet hinged largely on problem-centered research endeavors among established academic and scientific communities. Most of these early adopters had their roots in existing disciplinary structures. As a more diverse population gains access to the Internet, some of the underlying organizational devices used to structure discussion space have become increasingly flexible. In fact it might be described as a self-organizing system in some cases, imposing a more consensual definition of discipline to the discourse undertaken there.

INTRODUCTION

This study samples several threads from Internet discussion groups and attempts to inductively identify the disciplinary structures which provide the framework for the identity of the participants. Approaches to indexing and information organization strategies which can be employed to take advantage of the structures identified are offered.

In order to make sense of information, human beings exercise a variety of strategies. Librarians have always had a special interest in the categorization and classification of information. Those in the library profession who have made some of the most lasting reputations are those who have contributed significant advances in this area—e.g., Dewey, Bliss, and Sears. Central to the established methods of classification is the idea that knowledge can be divided into broad subject areas. These broad subject areas have been treated primarily in a hierarchical fashion ruled by the hegemony of disciplines.

If it can be assumed that, as Dogan and Pahre (1990) and a growing body of other scholars have suggested, knowledge is expanding at the interstices of the disciplines, the library profession must anticipate some changes in their traditional hierarchies of classification. If the vast literature on interdisciplinarity that has appeared in the last decade or two has not been a powerful enough indicator of change, the expansion of digital information on the Internet and other electronic media provides an even more undeniable sign.

This study examines changes in disciplinary identity demonstrated in the discourse of several usenet discussion groups and offers some suggestions for rethinking the way librarians approach the organization and classification of digital information.

THE CULTURE OF DISCIPLINE

The organization of knowledge by discipline has never been static. From the time of the early classicists, disciplinary structures can be observed. Aristotle, for example, reflects the disciplinary divisions of logic, physics, ethics, and rhetoric. Subsequent disciplinary structures reflect changes in the organization of the historical academy. Those structures are influenced by social and political change as well as by shifts in scientific and popular interest (Klein, 1990).

Contemporary academic disciplines are not so much a function of academic organizational structure as they are of the economics of funding (Dogan & Pahre, 1990). Knowledge and funding, however, do not necessarily vary in direct proportion. According to Boyer (1990), "what we have, on many campuses, is a climate that restricts creativity rather than sustains it" (p. xii).

Disciplinary work can be defined in other than economic terms, of course. Academic journals provide structure to traditional disciplinary work through an expectation of rigor, adherence to methodological standards, and application of the peer review process. Disciplinary structure provided by academic journals can reflect the identification of contributors more strongly than membership in a particular academic department in some cases.

The pursuit of knowledge, however, often leads across disciplinary boundaries. "The nature of [an interdisciplinary field] must be determined in the context of the questions and problems which give rise to that field" (Dogan & Pahre, 1990, p. 117). The opposite also applies; ways in which the global questions are constructed can provide the framework for the discipline. It has been noted earlier that disciplinary boundaries have never been static. A point is sometimes reached in which work across formerly recognizable disciplinary boundaries becomes institutionalized. Such shifts substitute the old canon with a new one (Lombardo, 1992). Freitas (1992) despairs of the viability of interdisciplinarity and

dynamic collaboration as the old canon becomes the new. She complains of "too much specialization, too much compartmentalization, not enough local collaboration" (p. 98) and cites overspecialization and the competition for funding as impediments to a wider, more creative, cultural experience and exchange.

Institutional barriers may not be the primary impediments to interdisciplinary initiatives. "The practitioners of the various disciplines show stereotypical differences over many things: lecturing style, design of curriculum, role of graduate students, and also political, social, and religious affiliations and beliefs" (Bauer, 1990, p. 105). Bauer highlights culture and the norms which govern the culture of discipline. These factors, once they become assimilated by a discipline, are indicators of an inevitable cultural shift—i.e., the movement from the old canon to the new. Connell and Franklin (1994) discuss the educational issues generated by the Internet as a learning environment in terms similar to Bauer: changing roles, unequal access, changes in curricula, and the need for improved learning tools.

THE CULTURE OF THE INTERNET

The culture of "discipline" varies notably from what might be called the culture of the Internet. The roots of the Internet are in a U. S. Department of Defense project called Arpanet. The underlying idea for Arpanet was to implement a communication network with so much redundancy that it could not be put out of commission by any kind of enemy strike. As this network grew, the people using it developed an enormous variety of both practical and pleasurable tasks for its use. Examples include the World Wide Web, electronic mail, Gopher, usenet, and, of course, online games. Most of the early expansion of the Internet was effected at federal and state agencies. Much of the early culture of the Internet had as its basis the background of people working in universities and government agencies. This being the case, even a cursory observation reveals some overlap in the cultures of discipline and of the Internet.

The utility of a large interconnected communication network is apparent to many, and businesses inevitably wanted to connect their machines to the network. Numerous service providers now offer access to general individual users as well. As the demographic profile of Internet users changes, the culture of the Internet will also change. Usage has shifted from primarily research toward a balance between serious and recreational use.

There is evidence that the scholarly community detects qualitative differences among some of the services available on the Internet. For example, usenet and listserv are both services supporting topic-focused discussions, but their cultural differences may be related to their origins. The origins of listserv were on the academic bitnet network and it is still

perceived as more scholarly in nature (Cline, 1994). Part of the reason for this perception may be that listserv is offered as a service through a user-initiated request. In order to join the discussion, one must be aware of its existence. Specific groups of users may be targeted and invited to join such discussions. Sometimes subscriptions are restricted to this group, and messages sent to the group are screened by a moderator. Listserv postings are delivered directly into a subscriber's electronic mailbox.

Hahn and Stout (1994) define usenet as a large collection of topic-centered discussion groups involving millions of people from all over the world, but usenet has unique qualities which distinguish the delivery of the postings to interested participants. Message threads for all discussions are relayed to a central location where messages are available for browsing instead of on a subscription and individual delivery basis. This structure enables the casual reader to scan messages in any discussion group without making the same kind of commitment to the topic as is required by the listserv structure. Usenet discussions are structured into hierarchies identified through naming conventions that help identify the topical nature of the content in each of its over 5,000 groups. The most significant hierarchies and their broad topic coverage are listed in Figure 1.

NAME ELEMENT	COVERAGE
alt	alternative discussion topics
bionet	biological topics
bit	topics collected from various bitnet mailing lists
comp	computer topics
k12	elementary and secondary school issues
misc	miscellaneous topics
news	usenet in general
rec	recreational topics
sci	science topics
soc	discussion of social issues
talk	various controversial topics

Figure 1. Selection of Broad Usenet Hierarchies

The main difference between listserv and usenet is that usenet newsreaders allow users to scan the entire list of discussion topics and participate in any of them without becoming a permanent member of the discussion group. All users select the discussions in which they wish to participate. If there is no discussion group that is focused on a desired topic, a procedure exists for starting a new one. A typical listing of usenet discussion groups is provided in Figure 2. This becomes a kind of self-organizing system in which participants self-select the groups with which they most strongly identify based on their observation of what is discussed.

Group Selection

17	6174	comp.internet.net-happenings	Announcements of network happen
18		bit.listserv.arie-l	RLG Ariel Document Transmission
19		bit.listserv.asis-l	American Society of Information
20		bit.listserv.gutenberg	GUTNBERG Discussion List. (Mode
21	87	bit.listserv.novell	Novell LAN Interest Group.
22	956	bit.listserv.pacs-l	Public-Access Computer System F
23	3272	alt.tarot	Your destiny is in the cards.
24	102	alt.winsock.trumpet	
25	729	comp.os.ms-windows.win95.setup	Setup and Configuration of Wind
26	6	misc.news.internet.announce	News bulletins from the Interne
27		sci.med.prostate.cancer	Prostate cancer.
28		bionet.ecology.physiology	
29		sci.med.midwifery	The practice of obstetrics by m
30		sci.geo.rivers+lakes	Science of rivers and lakes.
31	4	rec.autos.sport.rally	Any type of interest in any for
32		soc.culture.intercultural	People of mixed "culture", "eth

<n>=set current to n, TAB=next unread, /=search pattern, c)atchup, g)oto, j=line down, k=line up, h)elp, m)ove, q)uit, r=toggle all/unread, s)ubscribe, S)ub pattern, u)nsubscribe, U)nsub pattern, y)ank in/out

Figure 2: Sample of groups as viewed through the tin newsreader.

One of the primary ways that people are assimilated into a culture of any kind is through the medium of language. The Internet has developed a metalanguage of its own which is characterized by certain conventions and a large number of acronyms as shorthand for commonly used phrases (e.g., IMHO for "in my humble opinion" and ROTFL for "rolling on the floor laughing"). It can be disconcerting to newcomers to encounter such language until they have become acclimated. Different discussion groups may vary in the use of certain conventions and may contain some that are unique. They may contain references to shared past events. Signatures containing a favorite quote or a disclaimer are sometimes utilized to elucidate a writer's individual identity or their identity within the culture of a group.

Metalanguage also permeates the culture of discipline (Dogan & Pahre, 1990). One of Klein's (1990) central concerns for interdisciplinary

work is the problem of language. If a “metadiscourse” or a “rhetoric of inquiry” is lacking, effective communication is not possible. If the assumption can be made that the cultures of discipline, of interdiscipline, and of the Internet all strive to advance problem-focused, or at least topic-focused, discourse, a core body of shared terms within those cultures is essential.

METHOD

The sample for this study was drawn from eight usenet discussion groups. Not all hierarchies were sampled, only those that: (1) were likely to contain sustained topical discourse, (2) were likely to reflect an interdisciplinary approach to the exchanges, and (3) were not likely to be recreational in nature. The hierarchies alt, misc, news, and rec were intentionally deselected for these reasons (Figure 1). The bit hierarchy was not selected with the intention of preserving the distinction between usenet and listserv discussed earlier. The hierarchies selected for use were: bionet, talk, sci, and soc. Groups used from these hierarchies and the number of messages in each are described in Figure 3.

Within the hierarchies, specific discussions were selected if they suggested that the discourse would lend itself to interdisciplinary topic-centered discussion. Bionet provides some outstanding examples of discussion groups that contain key terms that are linked in ways that do not reflect traditional institutional department names—e.g., bionet.agroforestry, bionet.parasitology, bionet.cellbiol.cytonet, and bionet.biophysics.

Group	Number of Messages
sci.geo.rivers+lakes	10
sci.med.midwifery	3
bionet.ecology.physiology	3
sci.med.prostate.cancer	3
soc.culture.intercultural	31
talk.philosophy.misc	16
soc.culture.native	50
bionet.agroforestry	2

Figure 3: Instances from selected usenet discussions. *N*=118

All messages posted to the selected groups during the week of February 11, 1996 were included in the sample. The total number in the sample was 118. The textual and message heading information was analyzed. Where excerpts of text have been used, the group name is appended in parentheses.

ANALYSIS OF THE TEXT

Each computer directly attached to the Internet is assigned a domain name by Internic, the Internet Network Information Center. A domain

name usually has four segments which are separated by dots. The final element of the domain name reflects the organizational affiliation of the machine. Educational institutions, for example, contain the element "edu" in the final segment; "com" is the designation for commercial providers. Thus it is possible to determine the machine from which any given piece of information originates.

Of the total of 118 messages examined, 31.4 percent originated from edu domains and 68.6 percent originated from other sources. These numbers demonstrate the shift in demographic participation within usenet. Distributions of domains are shown in Figure 4.

Domain	Messages
edu	37
se	1
us	1
com	46
org	1
uk	2
net	12
ca	11
au	3
fr	2
gov	1
th	1

Figure 4. Number of messages by domain

In order to inductively discern trends within discourse, the content must be examined closely. The usenet texts reveal strong support for three separate findings. The first finding relates to the request for "expert" information from group participants. The occurrence of such requests is demonstrated in the following excerpts from unedited discussion postings. Much of the discourse on usenet centers on the give and take of such expert information. There is often a core group of experts who watch the discussion with interest and are generous in offering responses. The experts do not always concur with each other and heated conflict can ensue. The disparate positions of experts provide less knowledgeable members of the group with the opportunity to draw their own conclusions. Three of the requests sent during this period received responses during the same week the sample was taken. The other excerpts represent queries from postings made during the sample period for which no responses had yet been received.

I am looking for literature and Internet sources on stream foam. Searches in Georef, a geological literature database and in w.w.w. by Alta Vista gave very little more than a hint that the phenomenon may be dealt with by hydrobiologists.

The foam I am interested in is dense, firm, it persists for days, piles up to several tens of centimetres in height and it supports "cappings" of clay and fine organic debris. It occurs in pristine mountain streams in an area with low level of pollution in the atmosphere, in watersheds lying completely within a national park.

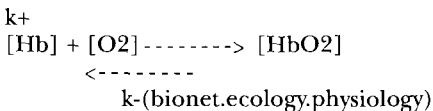
I have recently seen a foam like this in a film on Travel channel in cable TV. The film told the story of an expedition to the elevated rocky "mesas" in Venezuela. The text was in Italian; I understood only that the expedition sampled the foam for a laboratory study. (sci.geo.rivers+lakes)

>B) Exactly how much expertise is required to give these injections?
>It sounds like a major intervention, (but I agree, probably not
>so much as an epidural)

I gave the injections myself and from the conference, a physician (from Vancouver B.C.-teaching hospital) said that he and the nurses on the OB unit gave them. Realize that the amount of sterile water is only 0.1 ml injected subdermally (like a PPD). It is quite easy to give the injections and nothing as involved as an epidural. I don't think of this as a "major intervention" but as another option. I see it as a very viable option when there is intense back labor, a woman screaming for relief and a fetal heart tracing that is worrisome. I am not saying that everyone with back labor should have this but it's there if needed. It does have a very remarkable but brief period of intense sting. But...there is relief from back pain. Has anyone else heard of this method or have tried it? (sci.med.midwifery)

I am seeking information that will help me with my research project. At this stage I am intending to study characteristics of leaf area, leaf dimensions, leaf inclination, and canopy architecture and hoping to find functional relationships to the growth/ biomass of 16 cabinet wood trees being grown in a mixed species agroforestry plantation. The species are 5 years old and for unapparent reasons have shown differential growth. If anyone can help or knows where I can get Info I would Much appreciate it. (bionet.ecology.physiology)

I'm looking for some experimental data on the hemoglobin-bound oxygen reaction :



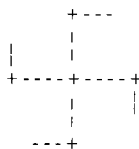
I am a journalism student at Ohio University and I am interested in finding any information available on any aspect of tropical rivers. I am specifically researching the broad scope of effects (social, environmental, ecological, economic and cultural) that humankind has had on the Amazon River region in the 20th century. Any information pertaining to any of these topics is greatly appreciated. (sci.geo.rivers+lakes)

How many trees would have to be destroyed to produce 563,000 sheets of copy paper? This question was presented in our employee

newsletter by our director... who by the way does not recycle...hopefully the answer will shock him into changing his ways. (bionet.agroforestry)

> What is a PSA test? What do the results mean? Please, will someone respond? I'm not a medical professional but I understand that the PSA threshold of concern increases with age. So a person at 65 with a PSA of 4.5 might be fine but a person aged 45 with that PSA reading should be concerned. (sci.med.prostate.cancer)

Can anyone tell me the history of this sign as it relates to the Native American? How about some research direction so that I can find out myself? This symbol appeared on an Old Town canoe from the 1920s. I believe it is a Native American good luck symbol, perhaps Penobscot, but I'm trying to find more information than that before I put the photograph on my web site (along with the 50+ other Old Town designs that are already there).



I know it's controversial, but I would like to include it for historical correctness, and fully explain the origin if I can. (soc.culture.native)

The second finding demonstrated in the sample is the use of the discussion group to announce an event or to extend an invitation for participation at an event. This type of posting is sometimes in the form of an electronic newsletter. Because of this characteristic, usenet discussion groups are also sometimes known as newsgroups. The excerpts that follow demonstrate the perception of posters that they are targeting people with a focus on a particular topical interest or expertise.

Economic Development for Canadian Aboriginal Women (EDCAW) announces its upcoming National Symposium:
 "Forging New Linkages"
 Aboriginal Women and Business
 March 19-21, 1996
 Delta Chelsea Inn, Toronto, Canada (soc.culture.native)

WHO: The Totem Pole Group (The first Native Am. AA group in Seattle.)

WHAT: 28th Anniversary Celebration (The group began in March 1968.)

WHERE: Pilgrim's Congregational Church, 509 10th Avenue E. (Broadway & Republican)**

WHEN: March 16th, 1996 from 12 noon to 12 midnight.

HOW: Bingo, Giveaway, AA Mtgs, Honoring Ceremony, Potluck, Door prizes, & Laughter. (soc.culture.native)

Master's programme in Applied Environmental Measurement Techniques Chalmers University of Technology will give an international MSc programme in Applied Environmental Measurement Techniques. The programme starts in September 1996 and ends in May 1997. A thesis that will take about 3-4 months to accomplish follows. The whole programme will be given in English using the method PBL, Problem-Based Learning. At least 15 of the 30 students should be from foreign countries. The four main themes are 1. Aquatic Environment 2. Geohydrology and Geochemistry 3. Air quality and 4. Global Environmental problems and Biogeochemical Cycles. Three additional themes will be integrated into the main themes: Environmental Statistics, Environmental Databases and Environmental Legislation. (sci.geo.rivers+lakes)

Am inviting all to visit the following web site:

<http://www.pobox.com/~jsd/index.html>

so as to review and comment on a Narragansett History presently in progress. (soc.culture.native)

University of Pennsylvania offers several summer study programs in Europe and Asia

- 1) Penn-in-Prague, Czech Republic (July 8-Aug. 16)
Courses in Czech language and civilization, political science and Jewish studies. Some internships can be arranged.
- 2) Penn-in-London, England (June 29-Aug. 2)
Courses in literature and theater
- 3) Penn-in-Bordeaux, France (June 17-July 4)
Anthropology course on human origins
- 4) Penn-in-Compiègne, France (May 28-July 4 or May 28-July 20)
Courses in business French and European economics, family stays, possibility of internships
- 5) Penn-in-Tours, France (May 27-July 10)
Courses in language, civilization and art history. Family stays.
- 6) Penn-in-Freiburg, Germany (July 15-Aug. 21)
Course in Intermediate German
- 7) Penn-in-India (June 28-Aug. 9)
Courses in religion, music, economics, art, history and ayurvedic medicine. Instruction in major languages available. Family stays, community projects, some internships
- 8) Penn/Bryn Mawr-in-Florence, Italy (June 3-July 12)
Courses in language, civilization, literature and art history
- 9) Penn-in-Seoul, Korea (June 14-Aug. 17)
Courses in economics and history. Internships with Korean and American firms.
- 10) Penn-in-Warsaw, Poland (June 21-July 30)
Courses in political science, economics and survival Polish. Internships with American businesses
- 11) Penn-in-Alicante, Spain (June 25-July 26)
Courses in language, literature, civilization. Family stays.
(soc.culture.intercultural)

The third finding of this study reveals a large number of texts in which questions are referred out of the discussion to another resource as

shown in the following excerpts. Libraries and printed texts are often mentioned as sources of further information or as more authoritative sources. Experts with complementary viewpoints can identify one another through the process of discourse. Offers of collaboration on formal publication projects can sometimes result.

Look in the scientific literature under Rich Merritt or check your library for books on the subject of using dead bacteria to kill black-flies. (sci.geo.rivers+lakes)

[To find other articles about this issue, go to the Apache Survival Coalition's Home Page at URL:<http://www.teleport.com/~amt/planetpeace/>]
(soc.culture.native)

It's nice to know that you're still out there! I was wondering if you might be interested in working together on a journal article for one of the anthropology/sociology/criminology/native studies journals? I was impressed with your discussion in the past. My time is a bit limited as I'm trying to finish my dissertation, teach an undergraduate class, write a paper for a conference in two weeks, BUT I would be able to contribute something in the near future. Take Care.
(soc.culture.native)

As far as i can tell the people reading this would also be ones that practice responsible techniques where and when ever possible. So who are these people that keep posting reasons why an agricultural crop that was grown up until the 1920's (and temporarily re-instated during times of war) couldn't be grown now? (If you want to look up the history of Hemp—All you people who keep writing "Where did these facts come from?" can go to the library and find out that Farmers in Canada are now growing it again because agriculture Canada is interested in it's potential. I suggest getting to a good library and check out HISTORY and AGRICULTURE not HEMP. If you look up hemp as a topic all you get is the drug mumbo-jumbo and nothing about the industrial crop. Once you have found stuff like the war-time movie put out by the US gov't called "Hemp for Victory" (encouraging American farmers to grow hemp) you can post back on here and let us all in on where you got your info. (bionet.agroforestry)

this foam may be analogous to the sea surface microlayer, which was the (focus of a fair amount of research in the 70's and 80's. a lot of the work was done at the university of Rhode island. there was a review article in scientific American by ferrin macintyre (sp?). this layer (sci.geo.rivers+lakes)

DISCUSSION AND SUGGESTIONS FOR FUTURE STUDY

" The three findings from this selected set of texts yields several insights into ways in which the culture of the Internet is challenging epistemological tenets. Knowledge is requested and negotiated over networks without regard to educational credentials, formal or physical settings, or disciplinary affiliation. The nature of the discussions, while not necessarily

scholarly, is often supported in rhetorically credible ways through the citation of authoritative sources. The study of electronic discourse is a valid method for research if it yields understanding of the ways in which knowledge can potentially be generated and shared.

Traditional disciplinary structures do not have the flexibility to address information needs in exactly the same way. Interdisciplinary frameworks within traditional academic architecture have tried to address some of the deficits but, as they have matured, they have become part of the new canon that has been growing since the time of Aristotle. The strictures of such factors as economics, time, and place conspire to impede access to knowledge in this model. Even the evolution of the framework of disciplinary structures addresses neither the creative nor information needs of large groups of people. Large numbers of individuals have made the effort to understand the culture and avail themselves of the opportunities they have found in Internet discussion groups.

If the assumption can be made that valuable dialectical exchanges are made in the discourse of the Internet, the questions of storing and retrieving this knowledge are implicit. This is the work for which librarians have been trained. Historians have long been cognizant of the problems inherent in analyzing vast amounts of written and oral texts, time and place as organizing principles, and relating concrete data with generalization and interpretation (McCrank, 1992). Raitt (1994) believes the library community is asking the wrong questions when they worry about the future of libraries and the profession. The findings of this study support his position. He asks:

Does one ask the same question about schools and teachers? Will teachers still be around in thirty years? There are now all kinds of new educational technologies—distance learning, educational games, and interactive learning—and all kinds of teach yourself this or that on CDROM or diskette or tape. But I haven't come across many debates about whether all schools should be closed and whether there is a need for teachers because of it. (p. 275)

New electronic arenas for the generation of information increase the need for meaningful access to that information—increase the need for information professionals and retrieval systems. When the *Bibliographic Classification* by Bliss was first published in the United States, it was “a time when real doubt and some severe disillusionment concerning classification systems was evident” (Maltby & Gill, 1979, p. 11). Librarians seem to be reliving the same experience of doubt today as they face the complexities of organizing digital information sources, perhaps with some underlying legitimacy. A study of indexing adequacy and interdisciplinary journals (Gerhard et al., 1993) demonstrates that current practices are inadequate in 60 percent of the cases examined.

Several scholars have suggested possible approaches and argued over the desirability of links, indexes, and classification systems (Marchionini, 1994; Liebscher, 1994). Digital information raises questions about more

than just the scenario of online discourse. Images, hypertext, audio, and video texts raise complex issues of storage and retrieval. Keister (1994) has done interesting work on image retrieval utilizing the analysis of user queries. Marchionini (1994) suggests an interdisciplinary approach which involves system designers, indexers, and information scientists. The object-oriented model for networked information (Tsai, 1995; Heaney, 1995) also promises to yield new advances in the organization and retrieval of digital information.

The complexities of digital storage and retrieval problems offer the opportunity for interdisciplinary collaboration. Librarians, information scientists, computer programmers, and other specialists have not been able to offer the solutions independently, but perhaps we can all work together to develop the tools needed to organize and more fully realize the potential of the new knowledge being born in the delivery rooms of the Internet.

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