Title:
New media/Internet research topics of the association of Internet researchers

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RESEARCH AGENDA OF THE 2003 AND 2004 CONFERENCES OF THE ASSOCIATION

OF INTERNET RESEARCHERS

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RESEARCH AGENDA OF THE 2003 AND 2004 CONFERENCES OF THE ASSOCIATION

OF INTERNET RESEARCHERS

Along with the rapid diffusion of the Internet, and the constant development of new

related technologies, applications and uses, social science and humanistic researchers have taken

up the challenge of trying to understand the social aspects of this communication and

information network. In particular, the Association of Internet Researchers has experienced

tremendous growth in membership, paper submission, and conference activities. In an attempt to

characterize the concerns of these Internet researchers at this juncture in the development of the

Association, this paper first provides some research context by summarizing prior relevant

reviews of new media and Internet research, and the use over time of the term "Internet" in

academic publications and online newsgroups. After describing the sample texts -- the session

titles and paper titles and abstracts from the 2003 and 2004 AoIR conferences -- and the semantic

network method, it then analyzes the primary issues and concept clusters of concern to this set of

Internet researchers. Note that this study is not a review of Internet research theories or results

(of which by now there are many). Rather, it attempts to indicate the current research agenda, at

the word and concept cluster level, of one primary interdisciplinary group of Internet researchers,

as a way to help identify the state of the field.

Coverage of New Media and Internet Research

Recent Trends in New Media Research

Lievrouw et al. (2001) analyzed the new media research focus of the Communication and

Technology division of the International Communication Association, such as the primary

theoretical approaches and major lines of research. (Lievrouw and Livingstone's edited

handbook (2002) surveys a broader, multi-disciplinary view of "new media.") They note that communication and technology research, as compared with mass media research or interpersonal/group/organizational research, emphasizes point-to-point or networked interactions, either for interpersonal or group communication, for selective purposes rather than the "production, transmission and reception of general interest via mass channels" (p. 271). More recent new media research has shifted from the prior emphasis on effects or impacts to a greater concern with how social groups and institutions adapt, structure, and shape the development and use of communication technologies. A parallel shift has occurred, from primary concerns with the technological, economic and behavioral aspects, to cultural and critical studies, social theory, and social history of communication technologies. The theoretical orientations of this work range from the macro to middle-range, to micro-levels of analysis. Primary macro-level theories are concerned generally with the information society, and policy and regulation of news media systems and institutions. Primary middle-range theories include diffusion of innovations, critical mass theory, social presence/media richness, social influence, adaptive structuration, social informatics, self-organizing systems, socio-technical systems. Primary micro-level theories deal with social-psychological aspects, either considering features of technology as a source of communication, or as a channel of communication.

Particularly promising directions of new media research, the authors suggest, include: the many contexts and applications of computer-mediated communication (such as group decision support, distance education, MUDs and MOOs, collaborative learning, virtual communities), globalization (intelligent networks and the range of new technologies from communication satellites to mobile/wireless communication, transborder data flows), equity and political implications (digital divide, knowledge and information gap, social access), popular culture and

use of technologies at home (domestication of technology, household and community adoption and use of new media), and mediated education (distance education, learning communities, technology-enhanced classrooms, multimedia content, peer interaction).

The Internet in Disciplinary Reference Databases, 1985-2003

Indeed, the field of communication is just one academic realm concerned with Internet. To provide a broader sense of the growth of Internet research, five major indexing and abstracting databases were searched for all documents with the word "Internet" in either the title or the abstract, from 1985 through 2003. (It takes some time for each year's entries to be collected, indexed, added, and made retrievable, and reference databases often retrospectively update their journal coverage, so searches on 2004 entries would not be valid until at least the middle of 2005, and would continue to change somewhat after that.) These were Business Source Premier (business and management), Library and Information Science, SOCIOFILE (sociology), CommAbs (communication journal abstracts), and Medline (biomedical publications). The keyword was combined with each subsequent year of publication to find the number of documents in that database that year. The number retrieved each year was divided by the total number of documents for the database across all years, to provide the relative coverage each year, allowing comparisons over time and across databases (which have very different numbers of documents).

--- Table 1 Goes About Here ---

Table 1 shows that the Library/Information Science and Business/Management fields showed the earliest concern with the Internet, which makes sense given the broad practical implications of the Internet for business and information management (especially library networking and organizational transactions). The biomedical field was a little later in developing

an interest in the Internet, with the more social science oriented sociology and communication fields even later. Though it's difficult to tell how the percentages for 2002 and 2003 will eventually stabilize with retrospective updates of the databases, it seems that relative interest in the Internet (specifically labeled) has declined in the more applied areas in the past two years.

Using a similar technique several years ago, Kim and Weaver (2002) searched for both 'internet' and 'World Wide Web' in Communication Abstracts from 1996 to 2000. They found a total of 561 articles in 86 communication-related journals and internet-related books, with the following percentages for each year: 2.3%, 5.0%, 7.2%, 8.4%, and 7.5%. (Note that even with the additional search term, these percentages are noticeably lower than the recent search results in Table One, indicating how the same database can generate different results at different times, due to added entries and journals.) They then coded each of these retrieved articles according to journal, publication year, research focus, development phase of research agenda, research method, and theoretical application. The most frequent research focus was law and policy (22.5%), followed by uses and perception (18.9%), economic (13.7%), and politics/democracy/development (10.2%). The articles revealed concern with all four phases of research development, but more with the first two phases (issues of the Internet itself, 33%, and Uses and users, 45%), than the last two (Effects, 12%, and Concerns about improving the Internet, 11%). Research methods used were primarily non-quantitative (72.9%). Only 17.1% referred to one or more specific communication theories: uses and gratifications, democratic theory, information processing, diffusion, and development/dependency.

The Internet in Newsgroups

Online Usenet Newsgroup names also indicate recent and pervasive interest in the Internet. Searching the MSR Netscan program with the term "Internet" provided the number of

newsgroups with the word "internet" in them, and the number of postings to each of those newsgroups, from 1999 on (http://netscan.research.microsoft.com/Static/Default.asp; search on November 30, 2004). The number of newsgroups, and the number of postings to those newsgroups, grew from 436/215,803 to newsgroups in 1999 to 878/ 998,001 in 2003, to 1040 newsgroups and 643,086 postings as of November 2004 (not a full year yet).

Analyzing Topics of the Conference of the Association of Internet Researchers

Given both this broad developing interest in Internet research in a variety of disciplines and media over the past decade, and promising research areas in both communication and interdisciplinary studies, the Conference of Association of Internet Researchers provides a good context for identifying the current research agenda. Especially for a developing research field, a central, interdisciplinary conference is a valuable venue for presenting new research, often previewing what will appear in refereed journals in the coming year. Further, papers reviewed and accepted by interdisciplinary peers are to some extent evaluated as being both relevant and rigorous.

Sources and Sample

The initial motivations, participants, and organization of the Association of Internet Researchers is nicely described by Steve Jones (2004) in Consalvo et al.'s (2004) edited collection of top papers and keynote addresses from the first three AoIR conferences. He notes that even in the late 1990s, each separate academic discipline had not yet shown much interest in research about the Internet and the Web. And, the participants at a small conference in Des Moines in late 1998, where Jones first thought about such an association, came from a wide variety of disciplines, indicating that a separate, interdisciplinary association would not only be appropriate, but also necessary. He emphasized that the original and continuing mission of AoIR

reflected a "spirit of inclusiveness, curiosity, interdisciplinarity, and openness." Quickly, there were meetings at the National Communication Association, the development of the air-l distribution list (as of November 2004, there were more than 1400 subscribers), and the first AoIR conference at University of Kansas in September 2000, drawing more than 250 people from 20 countries. The second AoIR conference was in Minneapolis, the third in Maastricht the Netherlands, the fourth in Toronto Canada, and the fifth in Sheffield UK.

To portray a detailed profile of topics considered in the 2003 and the 2004 AoIR conferences, the session titles, and the titles and abstracts of the accepted papers (approximately 320 in both 2003 and 2004, not including panels that did not have separate papers) were analyzed to identify the most frequent terms, and the associated semantic clusters, representing research interests of the conference participants. In 2003, the conference organizers took all submitted abstracts (some in French) and produced shorter versions of nearly equal length, all in English, and posted those shorter paper abstracts and the paper titles on the AoIR website. In 2004, the conference organizers posted the authors' full-length abstracts and the paper titles on the AoIR website. By analyzing the session titles, paper titles and paper abstracts, we can obtain a multi-level view of AoIR research topics.

This use of the conference session titles, paper titles and paper abstracts makes a fairly reasonable assumption concerning "meaning" at different levels. Conference organizers group papers by similar topics, where possible, and develop labels for that group of papers, to use as the session titles. This represents an informal content analysis of the underlying themes of each set of papers. Paper titles represent an informal content analysis of research themes. It's reasonable to assume that authors attempt to choose both the title wording and the abstract wording to succinctly but validly reflect the main topic(s) of the paper. Other approaches are

possible, such as professional abstracting, or more formal content-analysis of the abstracts or even the full text. But each of those approaches is removed in one way or another from the author's original intent. It's reasonable to assume that authors are the best judge of what it is they want to convey through their titles and abstracts. Certainly conference attendees use the session titles and paper titles to make quick judgments as to which sessions they want to attend, and which papers they might want to obtain.

Semantic Network Analysis

The essence of semantic network analysis is rather straightforward (Danowski, 1988). Text is analyzed to determine some measure of the extent to which words are related, which indicates something about their meaning. One measure of this relationship is the extent to which word pairs co-occur within a given meaning unit. Then, this measure of relatedness across a set of words is used to group, cluster, or scale the words (or some subset, such as the more frequently used words). These clusters can be directly interpreted, or used to derive more quantitative measures for use in other analyses, or bases for formal content analysis.

Semantic network analysis has some useful benefits. First, it analyzes the natural text of respondents, rather than abstracted indicators such as *a priori* content categories. Second, it identifies emergent clusters of potential meaning. That is, it analyzes relations and distinctions among words rather than frequencies of individual words removed from their semantic context. Third, while it can be used on single texts, as can quantitative content analysis and qualitative approaches such as semiotic, rhetorical or hermeneutical methods, it can also be used to identify global structures across large samples of text. Fourth, in some manifestations, it can automate large portions of what would otherwise be a difficult text management problem. And fifth, it

allows the integration of qualitative (textual) and quantitative (numeric measures of usage or effects) approaches.

Network approaches have been applied to the study of semantic memory and association processes (Chang, 1986; Collins & Quillian, 1969; Flores-d'Arcais & Schreuder, 1987), information retrieval algorithms and systems (Savoy, 1992), citation analysis (Callon, Courtial, Turner, & Bauin, 1983; Danowski & Martin, 1979; Lievrouw, Rogers, Lowe, & Nadel, 1987; and Rice & Crawford, 1992), content analysis of traditional and CMC media (Cuilenburg, Kleinnijenhuis, & de Ridder, 1986; Danowski, 1982), and responses to open-ended survey questions (Carley & Palmquist, 1992; Rice & Danowski, 1993). Semantic network analysis using Catpac has been applied to understanding positioning of candidates and issues in presidential debates (Doerfel & Marsh, 2003), and the structure of interests in the International Communication Association (Doerfel & Barnett, 1999), among other topics. These and other prior studies provide the underlying arguments about representing cognition and meaning through content associations.

Semantic Network Analysis Approach

The CATPAC program (Woelfel, 1991) used for this analysis counts the number of times any word occurs within each "meaning unit," and the number of times any two words co-occur within a "meaning unit." Here, the meaning unit in each respective analysis was the session titles, the paper titles, or the paper abstracts. In the current data, these meaning units are identified by the CATPAC delimiter "–1" entered by the researcher (that is, the CATPAC default value of a 7-word wide sliding window was not used). From each of these datasets, the program produces a frequency list of the most frequent unique words (first, using the default maximum of 160 words, and then a smaller set designed for a more focused analysis). The program excludes

nonsubstantive "stop" words such as a, an, the, etc., and drops words that only occur once. The

frequency listing of each unique word in each complete file was then inspected for variations on

the same word and all variations were changed to a common form (i.e., "effect" and "effects",

"communication" and "communicate", "community" and "communities", etc.).

Then the program creates a co-occurrence matrix, where the value in each cell of the

matrix is the number of times each pair of words occurs together within the meaning unit (the

paper title or the paper abstract), summed across all units. The program then applies hierarchical

clustering (here, the default Ward's method was used) to the respective co-occurrence matrices

to identify clusters of words at any given clustering threshold in the resulting visual

representation of cluster differences, called a dendogram. Peaks in the dendogram represent

central clusters, while valleys between the peaks represent divisions between clustered words at

any given threshold. For this study, the cutoff thresholds were chosen based on the

interpretability of the resulting semantic clusters. When useful, both a specific and general

cutoff level was chosen, to reflect both specific research themes as well as more general ones.

The co-occurrence matrices involving a manageable number of words were also scaled and

plotted via multi-dimensional scaling, to visually show how clusters of words are more or less

"close" to each other in terms of the overall patterns of co-occurrence.

<div align="center">Results</div>

<u>Conference Themes</u>

To some unknown extent, each AoIR conference's advertised theme will influence that

conference's titles, content and orientation of submitted papers. The 2003 conference theme

(taken from the website, www.aoir.org) was *Broadening the Band*: "Though the Internet has

become an integral part of the daily existence of many cultures worldwide, we have only begun

to understand the ways in which it transforms our interactions, our knowledge, and our selves. Research on the Internet is a growing part of academic work, and it cuts across a wide variety of disciplines. AoIR was formed out of a recognition of the need to bring together people from diverse academic and cultural perspectives in order to advance collective understanding of the impact of this technology on contemporary life." The 2004 theme was *Ubiquity* "The internet seems to be at once everywhere and invisible but simultaneously it structures only a fraction of the communications of the total global community. It can facilitate greater interaction, understanding and political activism; being used at the same time to exclude, destroy and exploit. The much cited ubiquity of the internet needs to be examined in both the contexts in which it is accepted and those in which it is contested. …"

Session Titles - 2003

Table 2 lists the most frequently used words of the session titles for each conference. For the 2003 conference, organizers used quite detailed and descriptive session titles, each one attempting to capture the topics of its constituent papers. Based on the most frequent words, the 2003 AOIR conference emphasized the obvious topics: (a) internet and online network and media research; (b) community (real and virtual); (c) communication; (d) identity and self; (e) digital divide, access; (f) governance; (g) knowledge and learning; (h) health and policy. The session titles noted the specific "new" technology of blogs. Other topics receiving less specific use in session titles included a wide range of social and political issues such as (i) citizen, civic, democracy; (j) control and surveillance; (k) activism, resistance, dissent; (l) education, environment, politics; (m) gaming and collaboration; and (n) broadband and wireless.

-- Table 2 Goes About Here ---

Semantic clusters of the 160 most frequent words from the 2003 session titles include: (a) digital divide, access; (b) blog, communication critique; (c) e-government & e-health; (d) virtual community; (e) identity & learning; (f) research methods; (g) mediated networks, and (h) WWW policy and practice. A multi-dimensional scaling of these most frequent themes (along with the cluster dendograms, not shown for session title analyses, due to page limitations), indicates that access, digital divide, and educational aspects of internet/online networking represent one cohesive, distinct conference theme. Two other distinct themes were: network research and methods, and virtual community. The remaining themes were somewhat interrelated, ranging from policy/identity/performance, to health/governance/nation/world.

Paper Titles - 2003

Table 3 lists the most frequently used words of the paper titles, which emphasized many of the more general session title themes, while also identifying more specific themes. Additional emphases included discourse/participation, cyberspace/websites, distance education, design/art/performance, and home/group/work/roles.

--- Table 3 and Figure 1 Go About Here ---

Semantic clustering of the paper title words identifies a range of major themes. These include: (a) copyright law; (b) work movement; (c) infrastructure; (d) free resources; (e) assessing ict; (f) home history; (g) contexts & studies of gender, global, democracy, websites; (h) dialogue & coverage of science, medical, religious, resistance, foreign content; (i) games & roles; (j) surveillance; (k) blogs; (l) computer development & impacts; (m) mediated self; (n) learning (face & mediated); (o) network tools; (p) macro issues: social, divide, political, environment, education, participation, policy; (q) public issues (study & analysis of politics,

technology discourse, practice, virtual identity); and (r) the broad and general theme of Internet (research community, ethics, management, design, culture, media).

As an example of visually portraying the relationships among semantic clusters, Figure 1 shows a multidimensional scaling of the clusters from the 40 most frequent words. These include (a) politics and analysis; (b) discourse and knowledge; (c) education and gaming; (d) society and space; (e) computers and virtual development; (f) participation and the political world; (g) web and media communication; and (h) a larger cluster consisting of social networks/community/culture, research/design, and online/digital/Internet. The broad issue of research/constructing online/network/internet social/community is a cohesive and distinct AOIR theme. Participation/knowledge in politics/society/world, and gaming/education/information/technology were the primary areas in a more wide-ranging grouping of themes.

Paper Abstracts - 2003

Table 4 provides the most frequent words in the 2003 AOIR conference paper abstracts. The main conference themes from the sessions and paper titles are reinforced as well as elaborated through emphases on: (a) online, internet, network; (b) research, study, analysis; (c) community, social; (d) technology, web, media; (e) digital divide, access; (f) communication, culture, public; (g) practice, user, design, experience, process; (h) work, organization; and (i) people, relationship, identity, society.

-- Table 4 Goes About Here ---

Because the large number of words from all the abstracts makes it difficult to portray all the clusters, and any cutoff either clusters a large number of words or does not include a large number, the final clustering and scaling include only the most frequent words (those occurring

15 or more times). The primary semantic cluster from the content of the short abstracts includes: (a) social analysis/research of online/internet communication, community and information. At a slightly more general level, this primary cluster includes substantive issues of (b) access, individuals, groups, digital media, and culture. At the same general level appear two additional semantic clusters: (c) role & process in e-organizations; and world development. At the third level, a more general clustering includes (d) the web and (social) practices in the first cluster, combines the second and third cluster with (e) data, explore, and use and work experience, and adds (f) specific clusters of public/political sites, and knowledge design. The multidimensional scaling (not shown here) indicates a very clear distinction between the most general cluster of topics – research/analysis of online/internet/technology communication/community at the individual and cultural level – and the remaining topics, ranging from public/political/user to development/process/design/knowledge.

Session Titles - 2004

Compared to the 2003 session titles, the session titles from the 2004 AoIR conference were clearly worded by the organizers to be more succinct, shorter and general, with several session titles used multiple times, differentiated by a number (such as Blogs, Journals and Diaries, 1, 2, 3 and 4). Table 5 lists the 56 most frequent words from these session titles.

--- Table 5 Goes About Here ---

Individual topics grouped together to identify more semantic session themes. Semantic clusters of the 56 most frequent words (occurring two or more times) included: (a) access to the Internet; (b) discourse and writing; (c) open source; (d) applications, searching, methodology, relationships, space, and education; (e) campaigns and politics; (f) policy; (g) social networks

and community; (h) conceptualizing the Internet; (i) Internet news; (j) blogs; (k) inter(national)

systems; and (l) online research.

<u>Paper Titles - 2004</u>

The most frequent words appearing in the 2004 paper titles (Table 6) included topics such

as: (a) internet, online, web, network, computer, technology, wireless, interactivity, email, ict,

website; (b) community, social, network, support; (c) research, analysis, science, survey; (d)

politics, democracy, elections, policy, power, participation, resistance; (e) self, identity, personal,

presentation, voices; (f) culture, context, comparison, society; (g) national, USA, UK, Europe,

world, global; (h) learning, education, faculty, university; (i) discourse; (j) gaming, play; (k)

women, gender; (l) health; (m) space; (n) access and adoption. As the 2003 conference

introduced blog research, the 2004 conference introduced wiki and sims research.

--- Table 6 and Figure 2 Go About Here ---

Clustering identified how those terms related semantically, but not as clearly as with the

2003 paper titles. Main clusters included: (a) community, communication and content; (b)

culture, cyberspace, education, information, exploration and gaming; (c) offline and

online/Internet learning and interactivity; (d) research in sites of public practice and politics; (e)

social and society, space and ubiquity; (f) analysis and context of personal (and possibly

national) cyber- identity; (g) democracy and elections, health support; (h) policies and

presentation relating to women. One possible explanation for the lack of as clearly meaningful

semantic clusters may be that while there are many different words, they seem to be more evenly

interrelated in 2004, implying a cross-diffusion of terms and concerns across specific research

interests. In particular, the most common terms -- Internet, online, community, web, ubiquity

(the theme of the conference, after all!), social, information and communication – seem to

pervade the paper titles, making it more difficult to identify distinct semantic clusters. Figure 2

presents the multidimensional scaling of relationships among these 72 most frequent words, with

"internet", "design, "digital" and "online" far to the right bottom outside the bounds of this

space. Note that there are few distinct clusters within this inner large cluster of terms.

Paper Abstracts – 2004

The 102 most frequent words in the abstracts reflect the most frequent words in the paper

titles (see Table 7): internet and online, social, community, information, research, user, web,

communication, network, culture, political, space, gaming, practice, system, society, self,

relationship, identity, learning, women, news, policy, blogs, discourse, gender, power, education,

government, health, participation, ubiquity. A few additional specific words appeared: group,

people, time, theory, life, knowledge, interviews, local, global, structure, players, human, sense.

Other frequent words appearing in the abstracts tended to be of a more general or adjectival

nature, such as question, form, project, important, part, related, approach, activities, various, etc.

--- Table 7 Goes About Here ---

The primary semantic clusters emerging from the relationships among the most frequent

words in the abstracts included: (a) accessing others and activities; (b) news and social issues

through online technology; (c) researching the role of the individual in communities; (d) internet,

networks and information; (e) user-based studies; (f) questions about communication, culture and

work; (g) use data and time; (h) forms of people and groups; (i) life and becoming; (j) practice;

(k) potential sites; (l) media, web, society and the world; (m) public relationships; (n) digital

games; (o) traditional content; (p) blogs, women, and search policy; (q) students learning through

local websites; (r) global and country-specific members and participants; (s) surveys; (t)

contexts; (u) email interviews; (v) knowledge and support; (w) experience and process; (x) self and identity; (y) computer system; (z) placing orders; and (aa) virtual space.

<center>Limitations</center>

Clearly, even a population of texts from two conferences of a major interdisciplinary association for Internet researchers can in no way be generalized to the research agenda of everyone conducting research on social aspects of the Internet. There is likely no way to do a completely "representative" analysis of what people are studying; and given the interdisciplinary nature of Internet research, it would be probably impossible to even identify all the possible sources. However, it's not unreasonable to argue that papers evaluated and accepted for the primary conference on socially-oriented Internet research are reasonable indicators.

This study considered research topics from two AoIR conferences at four levels: conference themes, session titles, paper titles, and paper abstracts. It might be suggested that each conference's main theme is a simple statement of the research agenda of that conference's presenters. There are many arguments against this however. First, such themes are determined usually by one or a few people a year or so before the conference, not based on what is actually submitted, accepted or presented. Second, the themes are quite succinct, and cannot possibly provide the range of topics included in even the session titles, much less the paper titles or abstracts. Further, few authors explicitly craft even their paper title to align with a conference theme. Because of submission deadlines, most researchers already have a study or paper in progress by the conference announcement. Finally, in fact the 2003 theme was not much reflected in the titles or abstracts, while the 2004 theme of "ubiquity", and words from the statement such as community, context, and politics, did appear. But, except for "ubiquity", those terms also appeared in the 2003 texts, and, of course, many other words and concepts appeared.

Of course, not all paper titles or all abstracts perfectly convey the primary theme or focus of the paper; nor would it always be a simple matter to identify just what that theme is. Some concepts in the 2003 abstracts are in unknown ways possibly over- or under-emphasized through the organizers' shortening of some of them to a generally similar length, especially for the French papers and papers that originally had much longer abstracts, though that approach does equally weight each abstract in the analysis. Alternatively, those 2004 abstracts that are noticeably longer than others may over-emphasize certain concepts in the overall dataset. And the organizers took different approaches to labeling the session titles for the 2003 and the 2004 conferences. However, considerable prior research has used and justified the analytical approach used here, and the full population of AoIR papers would seem sufficiently large to wash out idiosyncrasies of individual word choices. Further, there seems to be good correspondence between the main topics of the paper titles and their abstracts, indicating some reliability of the different sources. Given the origin of the text (conference organizers, or authors), and the results provided here (with little new added from analysis of the abstracts), it seems that paper titles (given enough of them to constitute the range of topics; and published articles could provide a more highly filtered sample) provide the best basis for identifying the agenda of a particular sample of researchers.

There are many words that appear only once or twice, and they do reflect some unique perspectives, but the method used here generally ignores them. But the main point of this kind of research is to identify general trends or distribution means. Unique words can always be found from the online AoIR programs.

Finally, deciding on the appropriate dendogram cutoffs, and thus the resulting semantic clusters, is somewhat subjective. However, cutoffs were chosen to highlight major differences,

so that nearby choices would provide essentially the same results. Because of the nature of hierarchical clustering, however, considerably different cutoffs are always subsets of more general clusters, as presented in several of the tables. And, while the semantic network approach does identify frequent words and related clusters, more formal approaches such as a prior content analysis, close interpretations of selected abstracts, or co-citation analyses, could reveal more theoretically-derived categories, more nuanced narratives, or more persistent relations among papers. However, as noted above, for large sets of text, this approach seems quite useful, though it might be complemented by such other approaches.

Discussion

The clusterings of the most frequent words in the paper titles and abstracts seem to indicate two major dimensions of AoIR themes. On the one dimension is the traditional continuum from social science research (here, specifically on online/internet/technology, in information/communication and community realms) to specific applied sites, and on the other dimension a continuum from specific usage and content realms, to more general and abstract processes and concepts. Certainly the major dimension of research (whether social science or cultural analysis) on internet/online networks represents the primary identity of AOIR. And the second, less differentiated, dimension of practice, content and sites, from the more applied to the more conceptual, represents one of the primary missions of AoIR – a "spirit of inclusiveness, curiosity, interdisciplinarity, and openness."

The research agenda of the papers presented at these two AoIR conferences thus seems both more focused (emphasizing internet/online networks) as well as more general (emphasizing interdisciplinarity and broad realms of practice and concepts) than the area of new media research in one division of the International Communication, as summarized by Lievrouw et al.

(2001). But it also reflects the new research directions suggested by Lievrouw et al.: contexts and applications of Internet searching and communication, globalization, equity and political implications, popular culture and use of technologies at home and community, and mediated education.

The conceptual clusters identified from the paper titles and abstracts could be used to both guide authors of literature/research reviews. Certainly such reviews would want to be sure to include most of these main topics, as they are the predominate interests of this group of Internet researchers. Internet research courses or even textbooks could benefit from covering the primary concept clusters, with individual assignments or discussions of the less frequent topics. Alternatively, areas that are not represented by these clusters might be topics for new research projects, and considerations by review chapters of how new contexts might be related to these studied contexts.

The research agenda represented by the words and concept clusters in the session titles and paper titles and abstracts at these two conferences of the Association of Internet Researchers reflect and elaborate the growing trends in coverage of and research on the Internet.

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Table 1.

Percent of Titles and Abstracts Using the Word "Internet" in Five Disciplinary Databases, 1985-2003

Year	Business Source Premier	Library & Information science	SocioFile	Comm Abstracts	MedLine
1985	.0				
1986	.0				
1987	.0				
1988	.0	.0			
1989	.0	.0			
1990	.0	.1			
1991	.0	.2			.0
1992	.0	.4	.0		.0
1993	.2	1.4	.1		.2
1994	1.0	4.7	.6	3.4 / 3.2	.5
1995	4.1	7.8	1.8	1.4 / 1.3	1.3
1996	7.8	9.7	4.7	2.7 / 2.6	2.7
1997	9.7	10.4	6.8	7.4 / 7.4	4.2
1998	9.7	10.3	8.9	12.2 / 11.8	7.7
1999	13.7	13.1	9.4	12.2 / 11.6	14.0
2000	21.5	12.3	14.7	11.2/ 12.2	18.3
2001	14.0	12.5	16.7	19.2 / 19.5	18.0
2002	9.1	9.3	21.9	16.8 / 16.7	16.6
2003	9.3	7.8	14.4	13.4 / 13.7	16.4
Total	198000	17873	2048	582 / 621	17474

Note:

Search term = "Internet"; search fields = default, typically title and abstract (except abstract only for CommAbs), English language; search date = November 28, 2004. Values are yearly percent of total retrievals for that database. ".0" indicates some articles were retrieved, but less than .1% of Total.

Business Source Premier: 8,000 business, professional, trade sources

Library and Information Science: journals, conference proceedings, book reviews, research reports, unpublished research

SocioFile: 1700 sociology journals, and books, chapters, dissertations, book reviews

CommAbs: from CIOS database of communication journal, report and book abstracts; not all journals included from 1985 on. Second percents and total are for the search term "Internet and 'world wide web'" to correspond to Kim and Weaver's (2002) study

Medline: 4600 biomedical journals

Table 2.
Most Frequent Words, and Semantic Clusterings of 160 Most Frequent Words, in Session Titles from AOIR 2003 Conference

6 or more times (number and percent): internet (34, 9.3), online (12, 3.3), network (10, 2.7), research (10, 2.7), community (9, 2.5), identity (8, 2.2), digital (6, 1.6)
5 times (1.4% each): divide, governance, method, practice
4 times (1.1% each): access, blog, broadening, critique, health, investigation, knowledge, learning, media, nation, perspective, policy, self, web
3 times (.8% each): communication, information, mediated, regulating, theory, virtual, world

[digital access]
[[resistance] [business loyalty]]
[[blogs & anonymity] [broadband access & art] [commodification] [indigenous] [expanding boundaries] [copyright & ethics] [localism & democracy] [east Asian citizen] [foreign dialogue]]
[e-presence & freedom]
[[belonging/linking] [gender & culture histories]]
[[future events] [home] e-governance & e-health]]
[[click & mortar] [computer-based learning] [flows of information]]
[body & ideology]
[game (online) consumption]
[[ecology] [work environment]]
[[ethics] [machine]]
[regulation/law & liberty]
[[knowledge management] [cyberspace & dotcoms]]
[computer expertise & competence]
[surveillance]
[domestic & marriage politics]
[civic engagement]
[mediated self]
[[identity & media] [international perspective]]
[elections]
[research methods]
[virtual community]
[wireless elites]
[[disability policy] [www evolution]]

Note: Hierarchical semantic clusters are marked by brackets, at two cutoffs – more general [external brackets], and more specific [internal brackets]

Table 3.

<u>Most Frequent Words, and Dendogram/Semantic Clusterings of 160 Most Frequent Words, in Paper Titles from AOIR 2003 Conference (Clusters marked by horizontal bars)</u>

<u>11 or more times (number and percent)</u>: internet (87, 7.7%), online (54, 4.8%), community (38, 3.4%), social (31, 2.7%), digital (24, 2.1%), network (23, 2.0%), communication (20, 1.8%), culture (20, 1.8%), web (19, 1.7%), media (16, 1.4%), new (16, 1.4%), information (15, 1.3%), public (15, 1.3%), research (15, 1.3%), technology (14, 1.2%), identity (13, 1.1%), based (12, 1.1%)

<u>11 times (1.0%)</u>: design, ethics, issues

<u>10 times (.9%)</u>: discourse, practice, society, space, study,

<u>9 times (.8%)</u>: analysis, case, constructing, education, environment, knowledge, politics, virtual

<u>8 times (.7%)</u>: computer, development, game, participation, political, world

<u>7 times (.6%)</u>: age, blog, com, cyberspace, divide, mediated, perspective, policy, users

<u>6 times (5%)</u> : assessing, distance, health, impact, learning, life, movement, role, software, trust

<u>5 times (.4%)</u>: art, chat, cross, effects, everyday, face, governance, government, home, japan, line, net, open, resources, self, sphere, surveillance, theoretical, uses

<u>4 times (.4%)</u>: accessibility, capital, citizen, control, data, democracy, domestic, global, group, implications, language, local, national, place, privacy, real, regimes, strategies, time, tool, towards, usage, websites, work

<u>3 times (.3%)</u>: agenda, american, applying, civil, code, collaboration, competence, content, context, copyright, counter, dialogue, economic, electronic, empirical, exploring, first, foreign, forum, free, gender, history, icann, ict, im, indymedia, infrastructure, international, law, look, management, meaning, medical, methods, mobile, mobilization, multiple, organization, patterns, peer, possibilities, post, process, quality, religious, resistance, rural, science, sense, sims, smart, socio, south, structure, surveys, technical, testing, tools (remaining words not displayed)

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A L T C S S F I U L G L N C J A A E P P M S C L R M I M W C D O I R U F T R A C I P
C O I R T U I C S A R O A I A G P L O R O I O A E E M O O O O R N U S R O E S A C O
C O M O R R R A A N O C T V P E P E S O B M P W A A . V R L M G F R E E O S S P T S
E K E S U V S N G G U A I I A N L C T C I S Y . L N . E K L E A R A S E L O E I . S
S . . S C E T N E U P L O L N D Y T . E L . R . . I . M . A S N A L . . S U S T . I
S . . . T Y . . . A . . N . . A I R . S E . I . . N . E . B T I S . . . . R S A . B
I . . . U S . . . G . . A . . . N O . S . . G . . G . N . O I Z T . . . . C I L . I
B . . . R . . . . E . L . . . G N . . . . H . . . . T . R C A R . . . . E N . . L
I . . . E . . . . . . . . . . . . I . . . . T . . . . . . A . T U . . . . S G . . I
L . . . . . . . . . . . . . . . . C . . . . . . . . . . . T . I C . . . . . . . . T
I . . . . . . . . . . . . . . . . . . . . . . . . . . . . I . O T . . . . . . . . Y
T . . . . . . . . . . . . . . . . . . . . . . . . . . . . O . N U . . . . . . . . .
Y . . . . . . . . . . . . . . . . . . . . . . . . . . . . N . . R . . . . . . . . .

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A H H C C P S M G G P E E W D E C T C I S M S Q R S S F M R D F T C A C G D R
M I O O O E M U E L A M X E E C O E O N C E O U E E O O O E I O E O R O A I O
E S M N U E A L N O T P P B M O D C M D I D C A L N U R B S A R S N T M M S L
R T E T N R R T D B T I L S O N E H P Y E I I L I S T U I I L E T T . . E T E
I O . E T . T I E A E R O I C O . N E M N C O I G E H M L S O I I E . . . A .
C R . X E . . P R L R I R T R M . I T E C A . T I . . . I T G G N N . . . N .
A Y . T R . . L . . N C I E A I . C E D E L . Y O . . . Z A U N G T . . . C .
N . . . . . . E . . S A N S C C . A N I . . . . U . . . A N E . . . . . . E .
. . . . . . . . . L G . Y . . L C A . . . . S . . . T C . . . . . . . . . .
. . . . . . . . . . . . . . . E . . . . . . . . . I E . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . O . . . . . . . . . . .

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P S S L B H C D I S M S T C M T G I P R C I C E S L E O F L G T N P T A C P K
E U P I L E O E M O E E O H E H O M R E I N O V T I F P A E O R E L O G A O N
R R H N O A M V P F D L W A T E V P I G T T N E R F F E C A V U T A O E S L O
S V E E G L P E A T I F A T H O E L V I I E T R A E E N E R E S . C L . E I W
P E R . . T U L C W A . R . O R R I A M Z R R Y T . C . . N R T . E . . . T L
E I E . . H T O T A T . D . D E N C C E E N O D E . T . . I N . . . . . . I E
C L . . . . E P . R E . S . S T M A Y S N A L A G . S . . N A . . . . . . C D
T L . . . . R M . E D . . . . I E T . . . T . Y I . . . . G N . . . . . . A G
I A . . . . . E . . . . . . . C N I . . . I . . E . . . . . C . . . . . . L E
V N . . . . . N . . . . . . . A T O . . . O . . S . . . . . E . . . . . . . .
E C . . . . . T . . . . . . . . . L . N . . . N . . . . . . . . . . . . . . .
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E S D C E C P W P U A P B N P I I T D P S S V C W C I O S D R I E M D D N C M
N O I O D Y A O O S N O A E U D N E I R P T I O E O N N O I E S T A E A E U E
V C V N U B R R L E A L S W B E F C S A A U R M B M T L C G S S H N S T T L D
I I I S C E T L I R L I E . L N O H C C C D T M . M E I I I E U I A I A W T I
R E D T A R I D C S Y T D . I T R N O T E Y U U . U R N A T A E C G G . O U A
O T E R T S C . Y . S I . . C I M O U I . . A N . N N E L A R S S E N . R R .
N Y . U I P I . . . I C . . . T A L R C . . L I . I E . . L C . . M . . K E .
M . . C O A P . . . S S . . . Y T O S E . . . C . T T . . . H . . E . . . . .
E . . T N C A . . . . . . . . . I G E . . . . A . Y . . . . . . N . . . . .
N . . I . E T . . . . . . . . . O Y . . . . . T . . . . . . . T . . . . .
T . N . . I . . . . . . . . . . . N . . . . . . I . . . . . . . . . . . . .
. . . G . . O . . . . . . . . . . . . . . . . . O . . . . . . . . . . . . .
. . . . . . N . . . . . . . . . . . . . . . . . N . . . . . . . . . . . . .
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Table 4.

Most Frequent Words, and Dendogram/Semantic Clusterings of 160 Most Frequent Words (those occurring 15 or more times), in Paper Abstracts from AOIR 2003 Conference (Clusters marked by horizontal bars)

Most frequent words (number and percent): internet (322, 5.5%), online (183, 3.1%), community (148, 2.5%), social (139, 2.4%), study (121, 2.1%), technology (114, 1.9%), research (104, 1.8%)
From 83 (1.4%) to 91 times (1.6%): information, new, communication, web, culture, media
From 60 (1%) to 71 times (1.2%): examine, based, network, result, public, digital, site
From 52 (.9%) to 59 time (1%): analysis, practice, user, political, group, issue, design, discuss
From 43 (.7%) to 49 times (.8%): explore, individual, knowledge, data, development, different, e, work, process, access, experience, organization
From 30 (.5%) to 39 times (.7%): world, role, environment, people, provide, argue, interaction, time, important, relationship, space, used, computer, content, context, form, identity, presentation, website, virtual, mediated, model, society, system
From 20 (.3%) to 29 times (.5%): case, present, project, implication, member, participant, self, software, learning, uses, approach, education, part, particular, critical, government, health, over, related, researcher, strategy, discourse, divide, focus, future, question, chat, construction, game, ict, open, survey, technical, terms, concept, impact, participation, privacy, suggest, support, attention, behavior, current, language, understand
From 15 (.3%) to 19 times (.3%): cyberspace, face, global, interview, local, means, number, offline, order, theory, traditional, com, economic, home, panel, recent, understanding, including, nature, place, possible, show, trust, control, countries, example, field, framework, human, key, life, literature, play, program, projects, theoretical, american, effects, empirical, national, net, non, notion, perspective, questions, set, specific, surveys, upon, various, weblogs

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A A C C I I R S O T S R E G I N N B M D I C W P D O R P E E W D W U P P S D K D D
C N O O N N E O N E T E X R S E E A E I N U E R A R O R X X O E O S O U I E N I I
C A M M F T S C L C U S A O S T W S D G D L B A T G L O P P R V R E L B T S O F S
E L M M O E E I I H D U M U U W . E I I I T . C A A E C L E K E L R I L E I W F C
S Y U U R R A A N N Y L I P E O . D A T V U . T . N . E O R . L D . T I . G L E U
S S N N M N R L E O . T N . . R . . . A I R . I . I . S R I . O . . I C . N E R S
. I I I A E C . . L . . E . . K . . . L D E . C . Z . S E E . P . . C . . . D E S
. S C T T H . . O . . . . . . . . . . . U . E . A . . . N . M . . A . . . G N .
. . A Y I . . . . G . . . . . . . . . . . A . . . T . . . C . E . L . . . E T .
. . T . O . . . . Y . . . . . . . . . . . L . . . I . . . E . N . . . . . . . . .
. . I . N . . . . . . . . . . . . . . . . . . . O . . . . T . . . . . . . . . . .
. . O . . . . . . . . . . . . . . . . . . . . . N . . . . . . . . . . . . . . . .
. . N . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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Table 5.

Most Frequent Words, and Semantic Clusterings of 56 Most Frequent Words (Occurring Two or More Times), in Session Titles from AOIR 2004 Conference

Most frequent words (number and percent): online (15, 6.2), internet (6, 2.8)
5 times (2.1% each): access, community, games, international, national, systems
4 times (1.7% each): adoption, blogs, collaboration, diaries, digital, divide, journals, politics, social, ubiquity
3 times (1.2% each): discourse, edemocracy, education, information, learning, metaphors, networks, space

[access digital divide adoption ubiquity]
[analysis of writing discourse wiki uses]
[open source collaboration]
[[applications (art, commerce, health, games), links & searching, methodology and ethics, relationships and self] [space geographies] [education learning]]
[[electronic campaigns] [politics and edemocracy]]
[information and net governmental policy]
[social networks and community]
[concepts, metaphors, philosophies]
[traditional and internet news, journalism, media]
[blogs, diaries, journals]
[national and international systems]
[online research]

Note: Hierarchical semantic clusters marked by brackets, at two cutoffs – more general [external brackets], and more specific [internal brackets]

Table 6.

Most Frequent Words, and Dendogram/Semantic Clusterings of 72 Most Frequent Words (those occurring 5 or more times), in Paper Titles from AOIR 2004 Conference (Clusters marked by horizontal bars)

Most frequent words (number and percent): internet (105, 12.9), online (77, 9.5%)

From 21 (2.6%) to 26 (3.2%): community, web, ubiquity, social, information

From 10 (1.2%) to 15 times (1.8%): digital, network, communication, politics, practice, research, study, virtual, site, cultural, game, context, self, comparison, computer, usa

From 8 (1% to 9 (1.1%): access, user, world, case, europe, group, identity, technology, uk

7 times (.9%): analysis, based, cyber, emerging, exploration, learning, life, media, perspective, public, support

6 times (.7%): age, democracy, education, ethics, gender, korea, offline, personal, policy, search, society, women

5 times (6%) : american, content, cyberspace, development, discourse, elections, global, health, interactivity, mobile, power, presentation, race, role, science, space, wireless

4 times (.4%): adoption, approach, children, ebay, economy, electronic, email, everyday, faculty, ict, line, mediated, national, participation, resistance, small, structure, surveillance, survey, time, university, voices, website

3 times (.3%): action, asian, assessment, audience, broadband, campaigning, challenges, citizens, club, code, construction, design, differences, different, disciplinary, divide, domestic, ecommerce, engines, environments, ethnography, evaluating, expectations, factors, fan, framing, gay, go, home, importance, interaction, international, livejournal, mapping, mass, men, multiple, net, people, play, post, presence, privacy, project, realities, researching, sense, strategies, systems, technologies, uses, value, young

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A A B C C C C V W C C E E G I G I I K L O O R P P P R R S S U S S S S S U U A C
C G A O O O O I E U Y D X A N E N N O E F N A O R U E O I C K E O O P T B S M A
C E S M M M N R B L B U P M F N T T R A F L C L A B S L T I . A C C A U I A E S
E . E M M P T . T E C L E O D E E E R L I E I C L E E E E . R I I C D Q . R E
S . D U U A E . U R A O . R E R R A N I N . T T I A . . N . C A E E Y U . I .
S . . N N R N A . R S T R . M R A N . I N E . I I C R . . C . H L T . . I . C .
. . . I I I T L . A P I A . A . C E . N E . . C C . C . . E . . . Y . . T . A .
. . . C T S . . . L A O T . T . T T . G . . . S E . H . . . . . . . . . Y . N .
. . . A Y O . . . . C N I . I . I . . . . . . . . . . . . . . . . . . . . . . .
. . . T . N . . . . E . O . O . V . . . . . . . . . . . . . . . . . . . . . . .
. . . I . . . . . . . N . N . I . . . . . . . . . . . . . . . . . . . . . . . .
. . . O . . . . . . . . . . . T . . . . . . . . . . . . . . . . . . . . . . . .
. . . N . . . . . . . . . . . Y . . . . . . . . . . . . . . . . . . . . . . . .
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C D D L M N S T U W W D E G G M P A C C E I P P D E H S E P P W
O E I I O E E E S I O I M L R E E N O Y U D E O E L E U T O R O
M V S F B T L C E R R G E O O D R A N B R E R W M E A P H L E M
P E C E I W F H R E L I R B U I S L T E O N S E O C L P I I S E
U L O . L O . N . L D T G A P A P Y E R P T O R C T T O C C E N
T O U . E R . O . E . A I L . . E S X . E I N . R I H R S Y N .
E P R . . K . L . S . L N . . . C I T . . T A . A O . T . . T .
R M S . . . . O . S . . G . . . T S . . . Y L . C N . . . . A .
. E E . . . . . G . . . . . . . . I . . . . . . . Y S . . . . T .
. N . . . . . . Y . . . . . . . . V . . . . . . . . . . . . I .
. T . . . . . . . . . . . . . . . E . . . . . . . . . . . . O .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . N .
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Table 7.

Most Frequent Words, and Dendogram/Semantic Clusterings of 102 Most Frequent Words (those occurring 105 or more times), in Paper Abstracts from AOIR 2004 Conference (Clusters marked by horizontal bars)

Most frequent words (1.7%): internet (1874, 6.3%), online (822, 2.7%), social (763,2.6%), community (656, 2.2%), information (579, 1.9%), technology (552, 1.8%), research (550, 1.8%), user (530, 1.8%), web (513, 1.7%), paper (500, 1.7%)

From 289 (1.0%) to 431 (1.4%): site, communication, study, group, network, cultural, media, individual, political, analysis, people, based, different, space

From 196 (.7%) to 277 (.9%): game, question, time, data, access, understand, practice, form, virtual, world, used, studies, work, system, two, society, public, theory, self, computer, life

From 105 (.4%) to 1878 (.6%): relationship, first, survey, digital, project, identity, personal, development, content, important, learning, context, part, role, students, website, knowledge, ways, potential, email, issues, provide, members, number, results, specific, participants, interviews, order, search, usa, interaction, place, others, become, focus, support, traditional, process, example, experience, women, particular, countries, local, related, might, approach, news, policy, blogs, uses, activities, level, everyday, various, global

From 79 (.3%) to 104 (.3%): terms, case, discourse, structure, tools, discussion, second, findings, current, offline, factors, players, found, gender, line, researchers, aspects, general, nature, power, significant, home, several, education, examine, chat, design, means, technological, three, medium, model, services, themselves, years, economic, government, environment, impact, differences, health, changes, lives, academic, complex, interest, participation, physical, real, set, ubiquitous, help, need, human, implications, presentation, range, sense

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P O U D D B C R O B L E P T G E M V N A M O M L A A U C B U O S M R E G C A R L R
O . D E I . I L V L A O R E I S E E T D B G E I R R D A S N B U B T R H U . S A V
R . I R A . E D I I T R O R T . . L E I E S N C C N E L I T A L E I Y T S . O T E
T . E S . . T . D C I Y A A A . . . N T R . . Y H I N . T R L T R C D . . . N E Y
A . S T . . Y . E . O . C C L . . . T I . . . . . N T . E I . S S I A . . . A D .
N . . A . . . . . N . H T . . . . . O . . . . . G S . . E . . . P Y . . . L . .
T . . N . . . . . S . . I . . . . . N . . . . . . . . . . . . . S . . . A . . . .
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. . . . . . . . . . I . . N . . . . L . . . . . . . . . . . . . . . T . . . . . .
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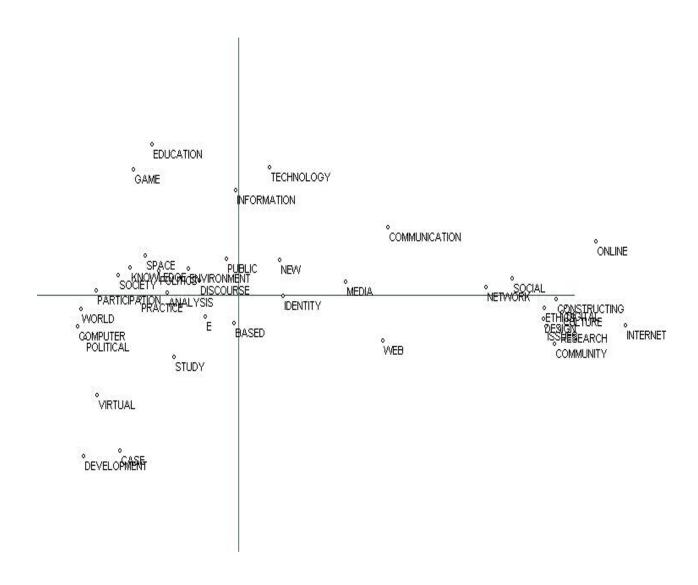
Figure 1.
Two-dimensional Scaling of 40 Most Frequent Words from 2003 Conference Paper Titles

Figure 2.
Two-dimensional Scaling of 72 Most Frequent Words from 2004 Conference Paper Titles