

The Seeds of XLCHC

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I. Origin of the System: 1978-1987

The raison d'être of LCHC: how does culturally organized experience influence the development of human beings? According to my understanding of the methodological requirements for addressing this problem, cross-cultural research will be most powerful when well educated, highly motivated "natives" of different groups cooperate in comparative research under conditions of equality.

-Interim Carnegie Report

By 1984, two years into the Reagan-Bush era, we had lost virtually all of our minority group faculty, our research concerns were explicitly rejected by federal funding agencies, and were denied post-doctoral funds on the grounds that there was insufficient minority group faculty

-XLCHC Welcome Document

Structurally, electronic networks remove several of the obvious avenues for prejudice. Since the electronic message medium is currently restricted to text, the visual cues to race, [sex], gender, and age are absent.

-PS23 1/2/84

The Seeds of XLCHC Development

The Laboratory of Comparative Human Cognition (LCHC), as it was founded in 1971, is a program of research and training in cultural psychology. As such, one key function of LCHC is to act as a center for information exchange and cooperation across institutional barriers. As early as 1984, the information exchange program divided itself along the following lines: 1) Networking among institutionally separate groups, 2) Selected cross-national cooperation, and 3) Publication through the LCHC Newsletter (*Carnegie*, p. 41). Set against a backdrop of intra-office, intra-university, and inter-academic computer networking, XLCHC (the Extended Laboratory of Comparative Human Cognition) emerged as a natural extension of LCHC and its goals of mutual

collaboration. XLCHC evolved to meet the challenges that LCHC was facing.

Computer access allows XLCHC to transcend the barrier of geographic space to allow communication between institutionally separate and culturally diverse groups. The term "extended" serves as a reference to increased access by both new and old members of LCHC, the physical laboratory. "In the summer of 1983 we initiated XLCHC, a satellite-based message system through which various research groups which have been affiliated with LCHC in the past and share an interest in one or more of its on-going research projects could interact over problems of mutual interest" (*Carnegie*, p. 36). LCHC was already an existing and influential network of academics as described by a fellow:

The network provides tangible support for the growth that comes through keeping in touch with Lab scholars and others...It seems to me that much of the extraordinary influence that the lab has had over the years comes from the intense commitment to mutual-help; to a fluid shifting set of roles to which very little attention is given to the formal disciplinary and status concerns that impede education in general and interdisciplinary work in general (*Carnegie*, p. 32).

XLCHC formalizes this network by allowing perpetual and asynchronous participation by members regardless of ethnicity, location, or position. In the summer of 1983, an experiment connects school children in southern California and Fairbanks, Alaska via electronic messaging, UCSD and the University of Alaska.

Associated with LCHC, the Scollon connection illustrates the dual function of the evolving XLCHC. Scollon, a visitor to LCHC, returns to the University of Alaska where he conducts research on the use of micro-processors in education, thereby broadening the research base of a now expanding LCHC. Scollon's research foreshadows the

pending XLCHC culture:

Electronic mail systems are set up within universities, businesses, and governmental agencies on the assumption that it is *chronos* [clock governed time] governing their operation. They are valued for their speed and efficiency of operation. It is often the case, however, that these message systems become the culture for the growth of complex networks of highly informal *kairos* [geared to appropriateness]-timed communication both within the institutions and others who have somehow gained access (QNLCHC, July 1983, Vol.5, #3).

Time and space limitations transcended, the network is allowed to expand in other directions, evolving new properties and forms of interaction geared toward the needs of XLCHC participants. The success of this project is a pre-eminent example of this non-local type of cooperation, proving that coordinated education through microprocessors is not only possible in theory, but feasible in practice.

Changes in lab composition cement the need for extended non-local LCHC communication. A series of pernicious funding setbacks and ideological shifts undermine the lab's commitment to cultural diversity. The psychology department's decision to terminate a permanent Black colleague greatly undermines the program. "Although [Alonzo] Anderson stayed on to do excellent research, his lack of access to graduate students and the total lack of leadership for minority students in the department cut away from one element of our program" (*Carnegie*, p.39). The lab gets caught in a vicious circle. They are unable to obtain funding for multi-cultural projects without diversity and unable to obtain diversity without funding:

The net effect of these changes was to undermine the principle of division of authority which had underpinned LCHC since its founding. Minority group research faculty continued to analyze data and write, but they could no longer conduct field research which provided a training context for fellows. Only grant proposals that de-emphasized social factors in favor

of individual change, or which promoted new technologies in a culturally neutral way won support (*Carnegie*, p.40).

XLCHC, while unable to remedy funding issues, allows for continued communication and coordination among culturally diverse X-LCHC members. Heterogeneity is maintained, if only at a distance.

Expanding cross-cultural composition proves to be a less formidable obstacle for XLCHC than retaining inter-cultural diversity. Pre-existing connections coupled with advances in communication technologies pave the way for international computer links. The Japanese, for example, come on line with a "Welcome U. of Tokyo" message in June of 1984 via Bitnet.

Organizing and engaging in joint activities with our Japanese colleagues has been greatly improved because of XLCHC. Information may now be exchanged between LCHC and Japan in a matter of days. Previous to XLCHC, over a month was required for written exchanges between LCHC and Japan (*Carnegie*, p. 36).

Two weeks after the Japan connection, Italy comes on line. Denmark and Spain follow shortly thereafter. The following year yields links with Finland, Mexico and Russia [see timeline]. The result is transnational communication, expressed from the outset of the network:

At present there is ongoing discussion on the nature of cultural mediators and problems of power and access that includes people from several ethnic groups located in several parts of the world. XLCHC has provided us with a unique sort of multicultural forum (*Carnegie*, p. 36).

Forming "international working groups which have functioned effectively despite the impediments of distance, money and political conflict" (*Carnegie*, p. 41), XLCHC is a major area of success for LCHC.

XLCHC also supplements some of the limitations of the *Quarterly Newsletter of the Laboratory of Comparative Human Cognition (QNLCHC)*. In *A Note to Contributors, Readers, Journal Editors and Faculty Evaluation Committees*, the editors address some of the misconceptions and problems associated with the Newsletter:

We are a newsletter, not an official archival journal. We are a forum for trying out ideas that fall between the accepted ideals of a good deal of academic discourse on human cognitive processes... In many cases, we would be proud to have written materials that our colleagues have submitted. But we do not edit for standard canons of research and we do not view ourselves as appropriate gatekeepers of academic quality. In like manner, we do not view articles here as "last words," but rather as "first thoughts" that the writer wants to get some feedback on and which we judge to be of interest to the community defined by the thematic interests of the Newsletter. May all join in making the enterprise useful, not straitjacketing. *QNLCHC* (Oct. 1981, Vol.3, no.4 issue)

XLCHC as computer mediated dialogue is a direct response to the limitations of printed text in the exchange of information. The effect of electronic communication is to eliminate some of the constraints of printed text: lagtime in printing, difficulties of widespread distribution, lack of dialogue, and extreme formalization. In order to meet some of the fundamental criteria of information sharing, printed text must forego other fundamental elements. Basically because of distribution constraints on printed text, either time, distribution sites, or interactive discussions must be sacrificed. Because of delays in production and distribution of printed text, the medium becomes one of more formalized ideas rather than the pre-formed notions from which the formalization comes.

The creation of an informal, diverse, widespread, and timely forum appears unreachable in any other medium. Computer conferencing proves a useful tool for preparing materials for publication. The XNRC conference, for example, is one of

LCHC's electronic conferences which runs from December of 1984 to June of 1985. [this foreshadows the development of subgroups]. It runs over a commercial network, the Source, and allows for individuals to post messages for all to read and respond, the electronic analog of an infinitely large bulletin board to which all participants are allowed access. Dozens of academics from around the U.S. participate in the conference which ultimately results in the Publication of Contextual Factors in Education. Exchange of information becomes a powerful tool in and of itself, "creating nothing more than a set of new possibilities" (Lounsberry, p. 4) through the constant process of "re-mediation".

Re-mediation equivocates many on-going processes in XLCHC. Messages mediate between ideas while the computers function as tools to mediate between people. XLCHC operators organize the network system. In a collective message, E-mail mediators elaborate their role: "we rethink, replan, reschedule, etc." (ps19, 12/15/1985). XLCHC's virtue stems from its flexibility as a re-mediating system. Time and space limitations absolved, XLCHC serves as a perpetual re-mediator:

It seems to me that we would want XLCHC to offer different uses to different users at different times. It could provide descriptions of on-going projects, proposals, grants, interest groups, some history and image of the future. It should allow a user to come in and log into something he/she can understand, participant, modify, etc. [and] leave messages [that] would be directly copied, saved, and sent to the addresses (ps7 [Duranti], 08/30/1984).

While serving as a perpetual re-mediating device, tensions between centralization and distribution arise as XLCHC grows in size and activity.

Environment of Growth

XLCHC develops symbiotically with the rapidly changing environment of the Communication Department at the University of California at San Diego (UCSD). Crucial to this early development is the formulation of the Communications Department as an endeavor across disciplines:

Communications at UCSD is an interdisciplinary effort, drawing upon the strengths of the social sciences such as anthropology, linguistics, political science, psychology and sociology. In their courses, communications students will master theories, concepts, and methods for dealing with the study of interaction at the political, societal, group, and individual levels (Catalogue, *Carnegie* p.16).

This organizational framework necessitates good communication between departments:

Computer networking has been a basic mode of cooperation among LCHC members on the UCSD campus since the laboratory moved to UCSD because of the distributed office space assigned to us, our close relations with people in various departments, and the fact that many of us spent time in the field, making coordination difficult. With seed money from UCSD and cooperation from our colleagues in the Center For Human Information Processing (CHIP), this messaging activity expanded at a steady pace, spreading to homes and remote locations as communications software added to our microprocessors made remote messaging practical (*Carnegie*, p. 35).

XLCHC arises, not as an innovation, but as a product of the system's new awareness of its pre-existing potentialities.

Intricately linked with the expansion of XLCHC is the internal development of the communication department and its capabilities. The Winter of 1985 yields a new COM/HIP 175 class on computer networking. "One of the repeated positive comments about the class is that it teaches you to use human resources" (Class Evaluation, ACCESS, Cole 12/85). Plans for the following quarter included an EIES account to supplement the Source Account, a UNIX account, a 198 "big siblings" class, and a hired

media clerk. Of special importance is the established funding for the classes and the addition of a paid media clerk. These costs distributed, networking moves beyond the scope of LCHC. This early expansion yields many diverse products:

- A new INC (Informative Networks on Computers) publication lists links to Pitzer and to Charles Crook in England
- A live chat with the Soviets (2/7/86)
- a KIDS project (Kids from Lowell - w/Kids in NY)
- a CRTNET (Communications Research and Theory Network) project and a DEAFNET project (INC, Vol.1, Jan 24, 1986).
- Classrooms interaction with Pistoia and Tanzania over educational projects

In January, though, James Levin, an instrumental force in the development of these networking capabilities, leaves. Despite his departure, the program continues to grow and prosper, a testament to its strength and independence.

Networking at UCSD promotes new kinds of interaction and thought that lay the basis for XLCHC development:

Following the model for acquisition of basic literacy, we have come to treat the computer as a kind of prosthetic device for the acquisition of more complex higher psychological functions: improving systems of logical memory, inference, and problem solving...At the same time, artful arrangement of interactions **between** activity settings both amplify and serve as a conduit for new goals within activity systems. (*QNLCHC* . July 1989, Vol.11, #3, p.49). *Note: This Newsletter is, itself, a product of computer networking.

Another LCHC electronic conference, in July, 1986, the MOST Conference, exemplifies the kinds of new frontiers that networking explores. Built as a "bridge", literal translation of the word, MOST is a conference that was designed to invite participation between American and Soviet researchers on the topic of "Computers, Communication, and Education" over the Source. The MOST Conference begins as an allegorical

discussion about bridges/communication. Interestingly enough, MOST is the conversation that lays the foundation for a later series of Soviet-American projects over the Source involving the relation between computers, communication, and education . Here, theory and practice blur. From these early experiences, grows much of the philosophy and goals of the newly reflective XLCHC.

The Technology

Experimentation with different types of technologies characterizes the early development of the XLCHC. One of the main constraints at the time, though, involves affordability. XLCHC's goal of connecting a diverse group is reflected in an attempt to make technology a non-issue by making it affordable. As XLCHC expands, it tests the bounds of the technology. While providing more potential, this expansion proves to be increasingly expensive and trying. As a result, connectivity becomes less an issue of affordability and more an issue of reliability and accessibility. Communication between different countries and among different systems exacerbates the lack of standardization between different levels of networking technology. Critical to the development of XLCHC, then, are advances in communication applications.

The success of the Defense Advanced Research Projects Agency Network, ARPA Net, more than a decade prior to the development of XLCHC demonstrates the viability of computer network application and leads the way for inter-university communication. [Similarly, independent development of links between MIT and CUNY??? expand to

become the BITNET. Both ARPANET and the BITNET flourish becoming more powerful as their value and potential become recognized ...check bitnet] Ironically, the E-Mail that later characterizes these systems, initially appears as a mere adjunct. Wide area networks that connect universities and research sites across the nation are established to allow for mass data transfer, functions that evolve into ftp (file transfer) and telenet (remote login) features. Electronic messaging, however, is not considered as a valuable means of communication. It is only after the widespread use of the electronic messaging that e-mail is recognized as an essential element of networking.

As with the large scale development of most systems, a need for standardization soon arises. What were once wholly independent systems begin to connect and merge. As computer networks begin to proliferate and interconnect over the following ten years, TCP/IP, a universal communication protocol, evolves to meet the need for standardization and is officially adopted by Military Specs in 1983. With such an advance come vast developments in connectivity and world accessibility with the Internet. In a similar time frame, UNIX, an operating system for mainframe computer systems, is distributed and roots in most academic and research environments providing a competitive alternative to the older VMS operating system. Both the Berkeley developers of UNIX and Sun Microsystems bring the TCP/IP protocol into widespread use.

Meanwhile, as operating systems and communication protocol develop, LCHC begins to exploit the booming potential of computers. As LCHC relocates to UCSD in 1978, lab members are given access to the university mainframe computing facilities.

Lab members use the Hazeltine 'dumb' terminals to connect to the main computing center. While the mainframes offer many new opportunities, they are still somewhat difficult to work with; they are slow, frequented by 'down-time', and offer little better quality print than the typewriter. As LCHC begins to use its first micro-computers, Apple][s, the domains of the micro and mainframe computers are blurred. In the earliest stages, the benefits of the computing power of the mainframe is appealing for larger scaled work (statistical analysis, word processing, and e-mail). It is clear, however, that the micro-computer will become more significant as its abilities develop. With the development of UCSD Pascal, it becomes more efficient to use the local computers (Apple][s) to write documents. Electronic mail, however, remains the specific domain of the mainframe computers.

Intra-campus electronic communication, as well as developing potential for inter-campus mail, merits strong ties between the micro and mainframe computers. This connection becomes integral to the workings of the lab. Electronic discussions begin as a useful replacement for informal memos and lab meeting summaries and evolve to provide a more efficient means of communication in a variety of areas. The use of alias lists and multiple addressees allow for a simple means of including a wide range of participants. An alias list allows a user to simplify the addressing procedure by storing an alias or nickname for frequently used addresses. Multiple address lists, in like fashion, provide a user with the ability to mail multiple persons (the same message) at once. In an unprecedented fashion, an individual may now contact hundreds (or thousands) of other users in a matter of moments. Many such 'memo' lists develop at

LCHC and UCSD: labsum (participants of the weekly lab meetings and a precursor to xlchc), lchc (members of the lchc community proper), ACCESS (students participating in the communications networking and independent projects), and xlchc. In fact, the lab. becomes so associated with electronic messaging that archiving of these various messaging lists begins. A rather cumbersome and time consuming process of archiving evolves into a more efficient and consistent process as the power of microcomputers increases. XLCHC begins a consistent recorded history as the Apple II's give way to Macintosh and IBM personal computers.

XLCHC expands, crucially dependent upon a variety of networks. The initial base of ARPA net, later melded into the Internet, is not sufficient to reach the wide range of participants of the eXtended Lab. of Comparative Human Cognition. An early avenue for international networking is the Source. Because of its satellite access, the Source is both far reaching and expensive. Communication with the Soviets is first made through the Source. Other networks such as IGC, and EIES prove to be useful in their ability to connect with diverse groups in a more cost efficient manner. Indeed, most connections with foreign participants begin with a commercial service such as the Source or EIES. However, domestic connections are almost exclusively through the Internet or Bitnet. National development of these two systems provide links to most all of the major American universities and research sites. As existing systems, supported by the government and institutional sponsors, the Internet and Bitnet provide a 'free-ride' for electronic communication. As the domains of the Internet/Bitnet and commercial systems overlap, the far more economical route of the Internet/Bitnet appeals. Because

most international academic and research institutions now have Internet or Bitnet access, XLCHC is solely comprised of participants on one of these two systems.

Central Mediation of Network Structure

XLCHC is to provide wide access to information. This may be achieved electronically in a variety of ways: listserver or reflecting account, direct mail, or conferencing/bulletin board system. All systems except for direct mail require a centralized hub or clearing house. A listserver or reflecting account requires that participants join the system, and send all correspondence to a central account which will, in turn, re-route the message to all individuals who have previously voiced interest in the network. Direct mail would require all individuals to message all interested parties in a public note. That is, any participant would directly mail all other participants interested in the said topic. This system, however, can only work on a small scale as it requires each participant to possess an up to date list of all network participants. Finally, a conference or bulletin board network, allows any participant to post messages that all other participants may see. This too requires a central location for the 'posting' of messages. The greatest difference with a bulletin board system is that it requires the participants to go to the messages rather than the messages going to the participants. XLCHC exercises the benefits of a centralized reflecting account; with relatively low upkeep at the central hub, individuals are required to do no more than read their electronic mail in order to participate on in the network.

The early non-standardized nature of computer networks coupled with the rise

of multiple address lists combine to intensify the need for a central mediator. LCHC becomes the natural hub of this activity. Without the support and mediation of a central host, XLCHC could never begin. All messages sent to XLCHC come into one account at UCSD, and are reflected out almost simultaneously to members of xlchc with accounts on the Internet. Since electronic 'gateways,' or transferring systems, between networks do not exist in the earlier years, access to other systems, such as the Source or EIES require manual transfer. In an activity that has come to be known as Portage, XLCHC communication over the Source and other commercial networks is mediated through LCHC where data is archived, transferred and forwarded. As early as September 1984, staff is assigned to archiving and operation of LCHC networks. As of 1987, archiving and operation of XLCHC becomes a permanent position of LCHC staff and budgeting. The creation of this X-operator enables centralization of the developing organizational duties of XLCHC to bring the hub/spoke communication system to fruition.

At present, XLCHC uses the Source mainly or exclusively as a mail box. Messages are received and sent. The people at UCSD who are part of XLCHC do not actually access the Source directly, but send messages to a particular account (Steve Black) and those messages are later copied and sent to the other XLCHC members through the Source.

The centralized hub does not consist of one, but up to four accounts on differing networks and some x-operator to mediate between these systems. XLCHC motivates a set of procedures for the x-operator that even acquire a physical position in the lab:

Here is the short form of the procedures. There will be printout versions in the portage desk drawers... The file is kept in the portage box on the disk named XLCHCFO (ps19, 12/15/1985).

Centralization paves the way for standardization and archiving.

Technical centralization marks the establishment of XLCHC as an independent entity. It is because of external funding that XLCHC can be considered distinct from the LCHC. While still reliant upon input from LCHC participants, XLCHC's organizational system differentiates itself. In addition to the creation of an x-operator, centralization promotes increased responsibility and division of labor. A call for organization and assistance from lab participants doles out responsibility:

There is a secret plan afoot. You are invited to be in on it on the ground floor! The plan has three goals: To spread some expertise. To spread around some work. To get XLCHC work done at a high level (ps19 message, 07/29/85).

Because of a technically diverse beginning, xlchc requires this very strong centralized support. Centralization of responsibility allows mediation to play a co-ordinating role in the distributed cognition of the network.

Both the technical specifications and the mediational factors of this electronic community imply and impose structural constraints to further define XLCHC. As described, the earlier highly technically centralized xlchc requires prominent mediation. With the development of the system and network technologies comes simplification. The Internet, Bitnet and commercial gateways, make it possible for xlchc to be reduced to a single account on the Internet. This accounts for the settling and simplification of the system. Once delayed and unreliable interaction becomes more efficient. No longer is there a need for an individual to transfer between messaging systems. This simplification arrives at some cost, however. The mode of XLCHC interaction is limited to those individuals who can somehow reach the Internet. While service is still not universal (AT+T mail just recently made one of their first connects to the Internet), it

is widespread allowing for communication between Alaska and Zambia. E-mail, though, is the only form of electronically mediated communication so widely supported on international computer networks. Means available on other networks, such as live chats, electronic conferences, or bulletin boards are lost. Nonetheless, the vast potential of the system remains to be explored and defined by its members.

Social Organization and Cognitive Distribution

Internal constraints and norms both help and limit XLCHC development. It would be impossible to carry on discussion without some agreement as to what constitutes the appropriate. Here, the concept of perpetual evolution clarifies XLCHC's role as cultural medium:

Our theories say that culture both constrains and enables, right? ... Let's assume that we are attempting to construct a cultural object with particular "tool-like" qualities... A possible "virtual goal" to create is a cultural "inter-medium" which [ferments] a process of interaction that is our joint learning/developing culture" (Cole message, 05/29/91).

XLCHC members structure the early usage of the network. An early message declares that "the set-up, including hardware and software, doesn't make networking, but people do. That is, there must be some need for networking..." (ps7, 06/23/1985). Another participant's questions outline the need for a social organization of XLCHC :

Shouldn't we help to develop software and [support] systems that would allow multiple users at the same time? What would this involve? Direct use of telenet? Getting out of the Source? Making a deal with some other network that would provide a special service, nation-wide, or internationally? Couldn't XLCHC then be part of something bigger? Aren't out there many people who want to do the things we want to do? People who want to promote access, communication, understanding, fun, social and cognitive development, democratic education? It seems we need

something more than a quicker mailing system (ps7[Duranti], 08/30/1984).

XLCHC awaits reflexive action.

The *Origins Myth* as it later appears on the network specifies the needs and goals of XLCHC members:

Welcome to XLCHC. These call letters (to borrow a convention from another medium) designate a very loosely organized computer discussion group consisting of a main node, XLCHC, and several subsidiary nodes devoted to special topics... XLCHC came into being in 1984 as a medium for discussion of research on learning and development with a general concern for issues of education in modern technological societies and a special concern about the ways in which educational systems are a source of socially engendered social inequality (*Welcome to XLCHC*, 02/20/1991).

The central issues of learning, development, education, and equality become the dominating themes that permeate network discussion to this day. The network evolves as a utopian discussion forum, generating new types of discourse.

Computer networking inspires new aspirations and concerns about mediated interaction that move beyond the scope of face-to-face interaction. In a revealing message, Levin writes about the possible social consequences of network information exchange:

Structurally, electronic networks remove several of the obvious avenues for prejudice. Since the electronic message medium is currently restricted to text, the visual cues to race, [sex], gender, and age are absent. Since messages in electronic networks tend to be less formal than print messages, it may be easier for people more oriented toward oral interaction to adapt to than those currently in the print power elite (PS23, 01/02/1984).

Much of the early network discussion about the social organization of XLCHC revolves around these early established goals of access, equality, and participation. Complementing this discussion of potential, other concerns address the possibility for

exploitation of the mediated experience:

Mediators in our experience virtually always become gatekeepers, power becomes centralized in the mediator/ gatekeepers, and things are worse than before(or at best, the same, just restructured) (Ps7, Scollon, 01/04/1984).

These concerns lay the foundation for a network designed to promote the distribution of power. That is to say, XLCHC is a network based on the distribution of and wide access to experts in a variety academic areas. Critical to this emphasis is how information and activity become organized for distribution and recollection.

It is only through criticism and debate, within the medium itself, that any sort of conventions about the use of the medium are established and enforced. The subject line emerges as a "simple" means of referencing ideas. Simple in theory, yes, but difficult in practice. The implementation of succinct, descriptive subject line implies simple cohesive topics. This, however, belies, an emergent capability of the network: multiple threads of discourse. Not only do topics reflect many subjects, but they respond to a multiplicity of voices, and reflect different themes:

The subject line very rarely constitutes a good "summary" of what messages contain...Furthermore, only one topic is usually mentioned, despite the fact that most messages are usually about more than one topic (QNLCHC, 4/86, vol.8, number 2.Duranti,p.69).

In an evaluation of the existing system, the welcome message articulates appropriate subject line usage as well as defining appropriate subject form:

One thing that everyone can do to help others deal with their mail volume is to use subject lines that actually refer to the content of the message...A general norm for the system is that messages are informal communications, what have sometimes referred to on XLCHC as "half-baked" messages, which it hoped, will be baked up into fine food for thought as a result of the interactions that occur subsequently (Welcome

message, 2/20/91).

Messages should conform to certain guidelines.

Message content, length and forwarding pose other dilemmas for E-mail etiquette. Messages must comply with socially determined guidelines. Content is socially reinforced. Personal announcements and proposals, for example, are not always treated with great respect. Regular criticism emerges over the long length of messages. Also problematic is the issue of message forwarding. The welcome message iterates that "it is perfectly acceptable to send to the individual who initiated the message alone if one does not intend the reply as part of the group discussion" (*Welcome Message*, 2/20/1990). Other voices, however, articulate that back-channelling deteriorates from the vitality of the system as a whole. Appropriateness varies between messages and individuals. Discussion of what constitutes an appropriate message, its length, and who it should go to, prompts XLCHCers to re-evaluate participation and address the possibility of network hierarchy. In this framework, XLCHC etiquette ought to be continually changing to meet the needs of its members. Network organization discussions, then, are merely a sign of a healthy entity reflecting upon itself.

Network etiquette, then, relies mainly on the subjective interpretation by individuals of what violates the social consensus. XLCHC has no laws governing behavior, only recommendations. *The Welcome document*, for example, gives "some hints for more efficient use of E-Mail" (11/91) where it describes the subject line, body of message, carbon copies, reading mail, replying to mail, mailer daemons, and citing XLCHC messages. The ultimate norm is explicitly an internal judgement call: "Be

considerate of one's colleagues"(Welcome document). The internalization of network norms makes policing of the network also an internal affair: "The convention of last resort, is that "All conventions can be changed at the will of the participants". Participants never kick anyone off the network, but XLCHCers leave on their own accord. Most policing includes constructive suggestions, like "please send vacation notices to X-family." Occasionally, though, network participants will publicly reprimand each other in an act of 'flaming,' or personal attack. While the Gulf War discussion provoked a particularly frustrated participant to suggest that XLCHC network be entirely shut down, most frustrations result in participants removing themselves from the network. Again, policing XLCHC relies upon individual internalization of XLCHC norms.

II.Development of the System: 1987-1992

Growth

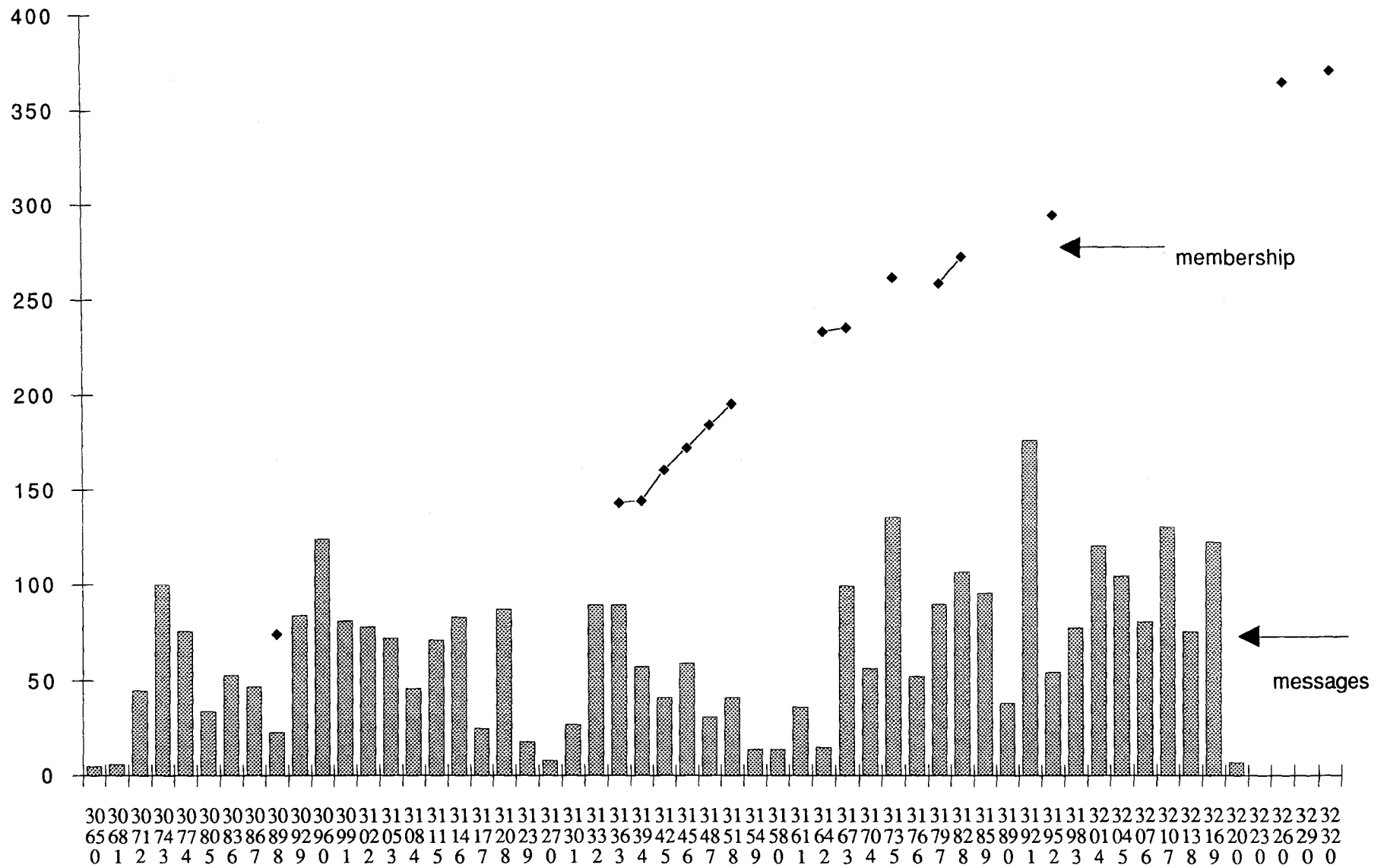
At or near its beginning, twelve people participate in the original organization of XLCHC [see xlchc distribution graph - GR 1]. In August of 1988, seventy-four people are registered on the distribution list. Membership includes individuals in Japan, Finland, Denmark and Germany. Little is known about the exact size of xlchc distribution between its origins and 1988. Presumably, however, membership grows at

a continuous moderate rate - in the range of 10-15 new members each year. In the next year, the system grows by as much as it had in the previous four. XLCHC's most dramatic growth in distribution occurs in the following nine months. By August 1990, over 225 individuals receive xlchc mail. In June of 1992, mail is received by 400 participants who represent nineteen countries and six continents [see world map graphic - GR 2].

In the modern era of xlchc, from December 1987 to the present, an analysis of message activity is fairly revealing of the network that develops. [See Graphic of Message activity - GR 3 and 4]. Most striking of the graphic are the cyclic patterns of messaging and the general increase in activity over time. Seemingly persistent, regardless of scale, cycles of activity and inactivity pervade both monthly and weekly counts of messages sent over xlchc. Average monthly counts over periods of six months describe a more subdued version of the system [see attached graphic: GR 5]. While cyclic patterns are flattened by averaging, they still appear. From this largest scale to the smallest, weekly, scale may be seen these cyclic patterns of growth in the development of network activity.

The size of xlchc distribution may be misleading to some. The power and success of xlchc rely upon the participants who actively participate on the system by posting messages. [See Graphic on Active Participation -- GR 6]. A system of 400 active participants would be unmanageable. During any given month, anywhere from five to fifty-five participants may contribute to xlchc. As with the count of messages themselves, the count of active participants follows a generally oscillating pattern. The

XLCHC ACTIVITY
 membership count
 message count



The XLCHC World

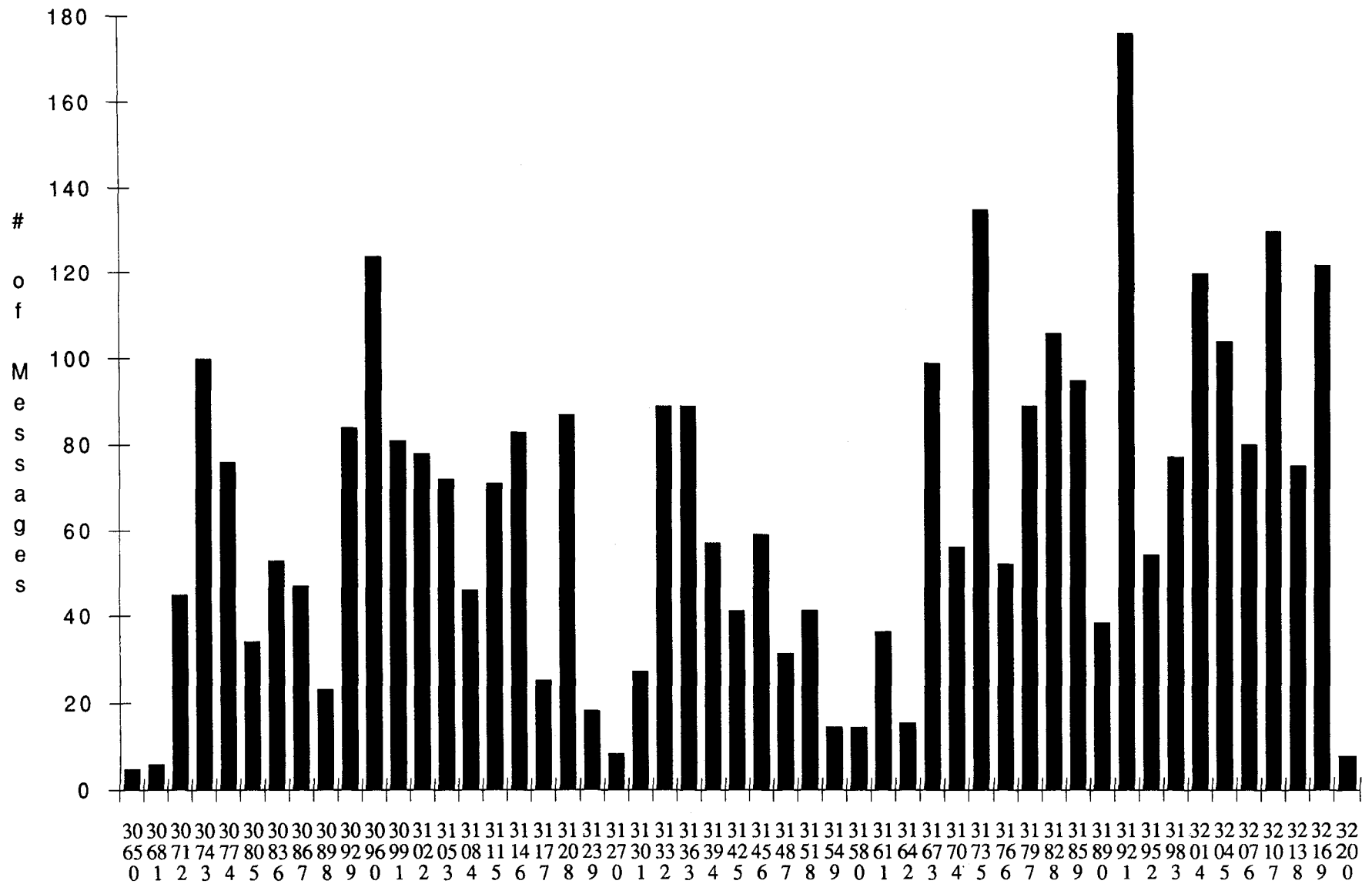


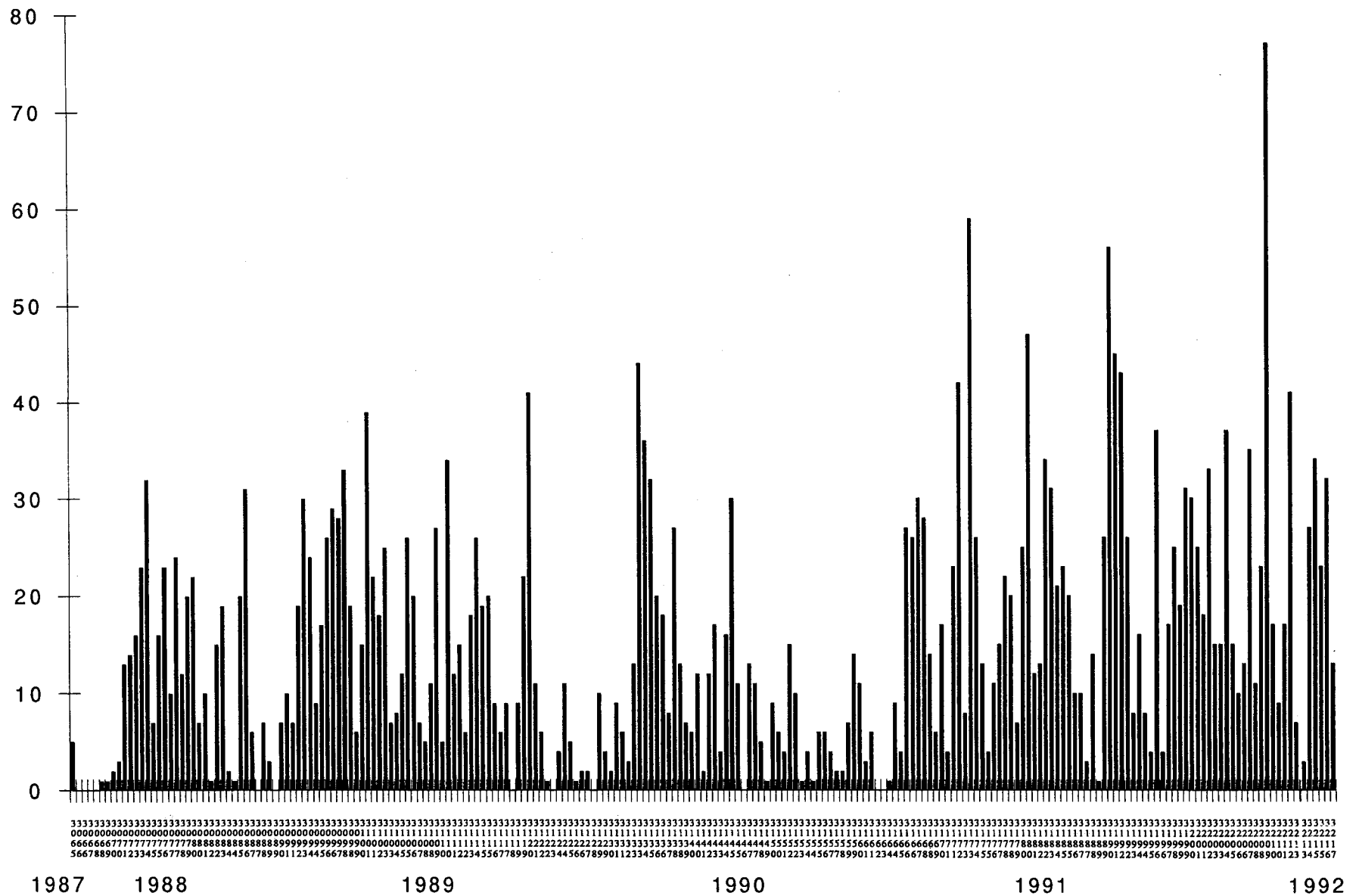
Austria	1
Australia	1
Brazil	1
Canada	20
Czechoslovakia	1
Denmark	8

Finland	18
Germany	4
Italy	3
Israel	2
Japan	14
Mexico	1

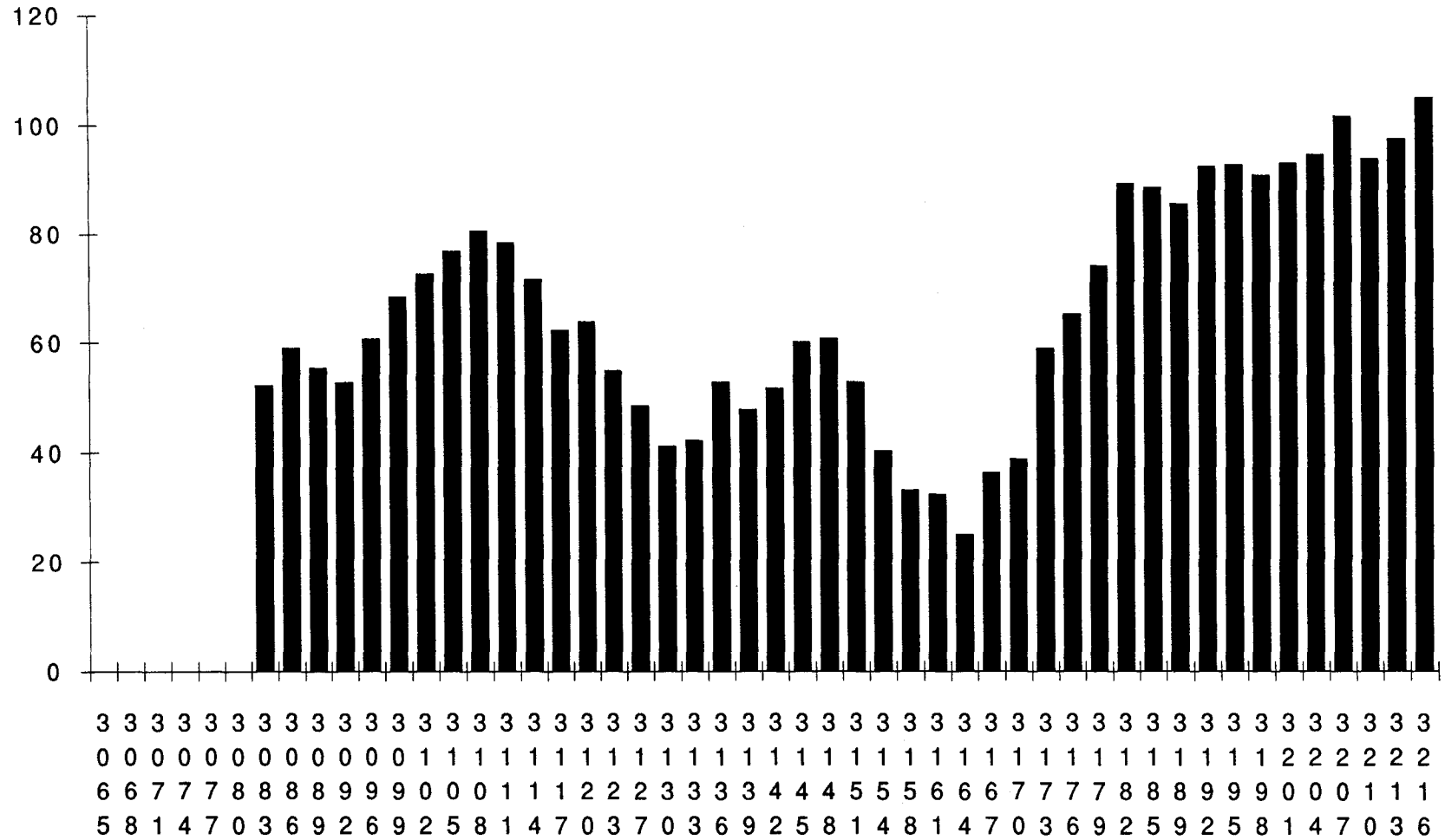
Netherlands	6
Russia	4
Sweden	6
Switzerland	2
United Kingdom	15
United States	263
Zambia	1

XLCHC MESSAGE ACTIVITY
12/87 - 2/92
by month

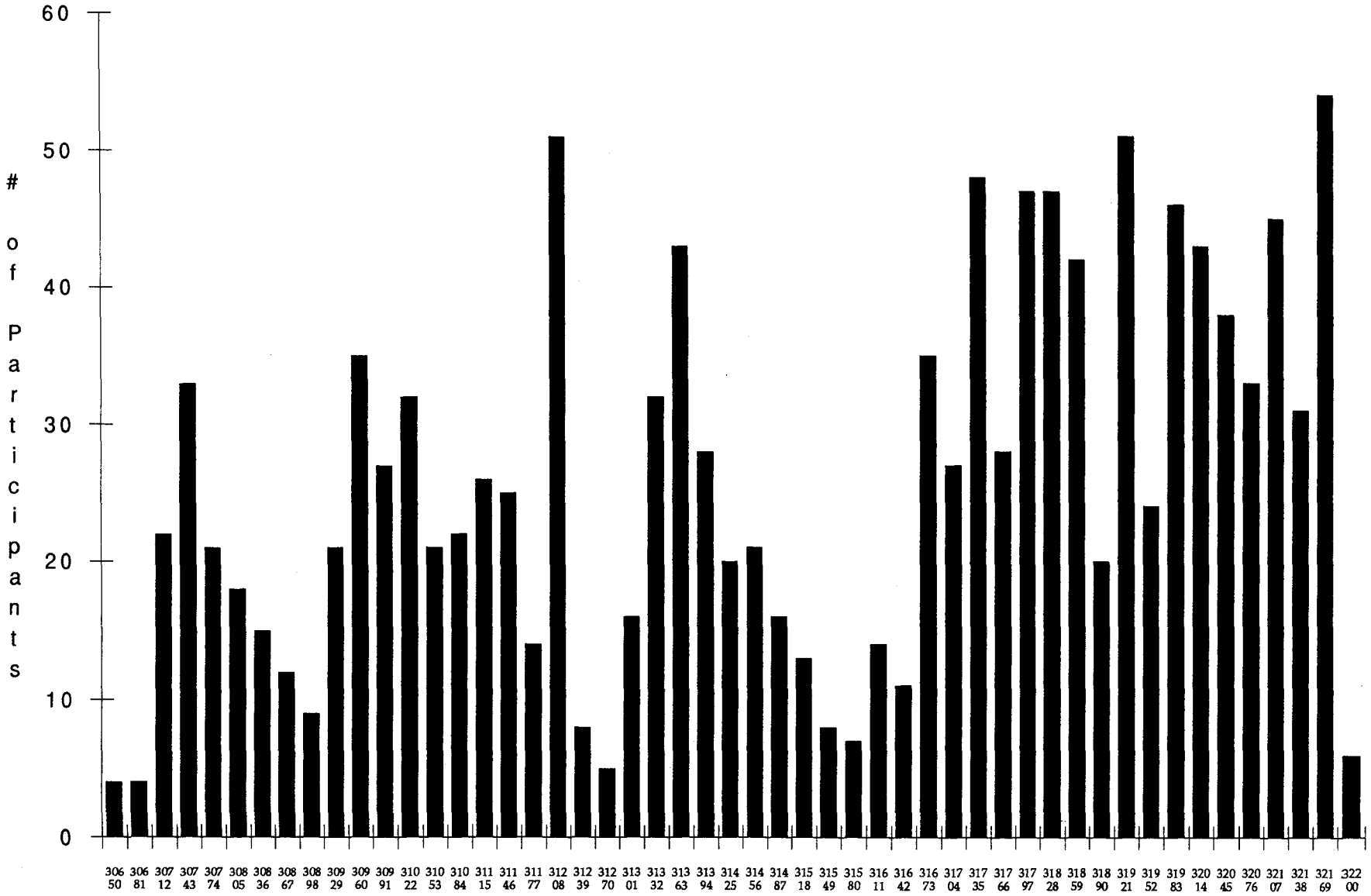




Counts of Ave # Messages per Month
over prior six months



Active Paticipation on XLCHC
by month

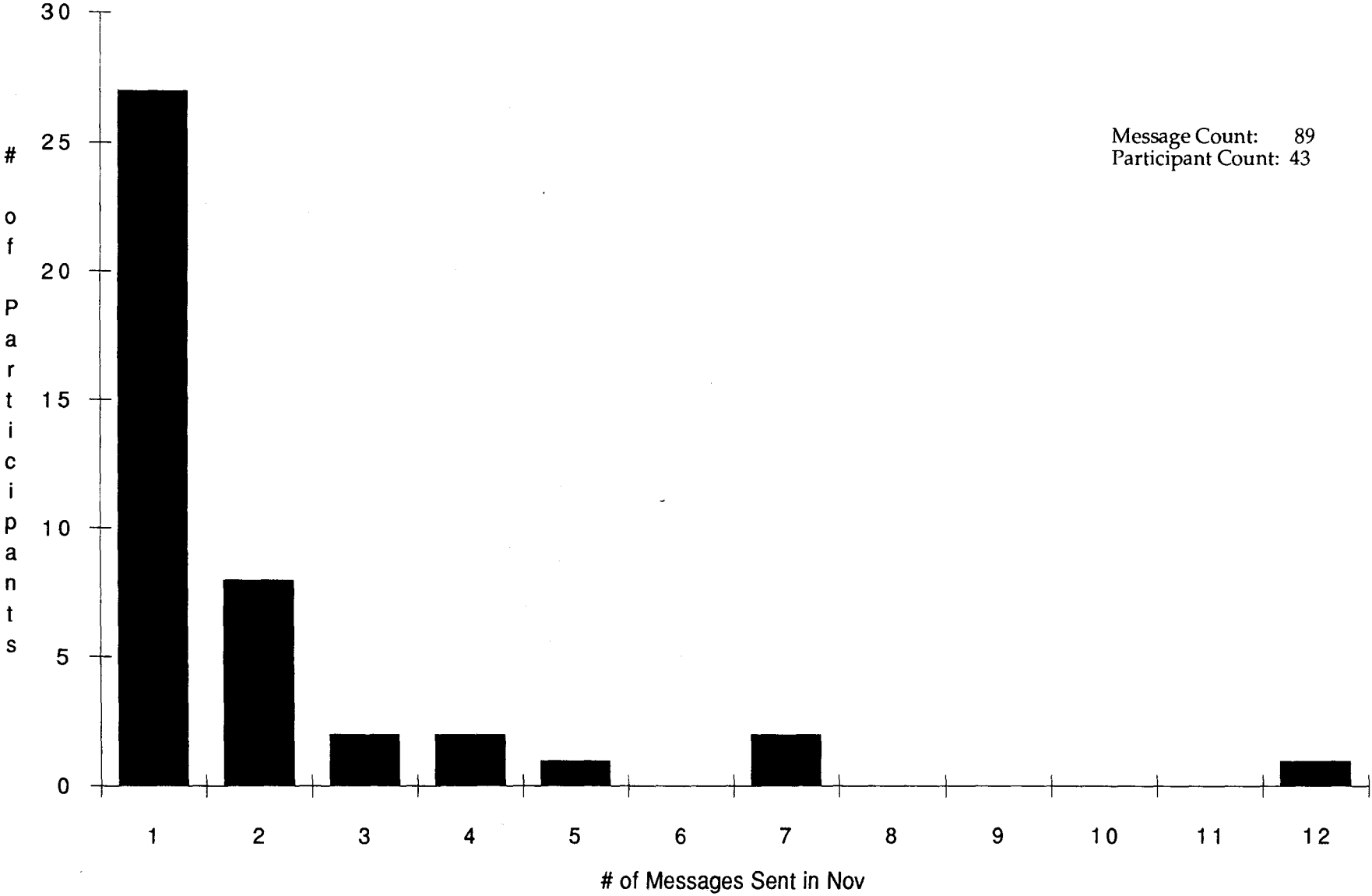


cyclic pattern closely matches that of the message activity in an understandable way. That is, it is only reasonable to assume that in a large forum the more messages you have, the more active participants you have. The compliment is true as well. Participation induces message traffic and message traffic induces participation.

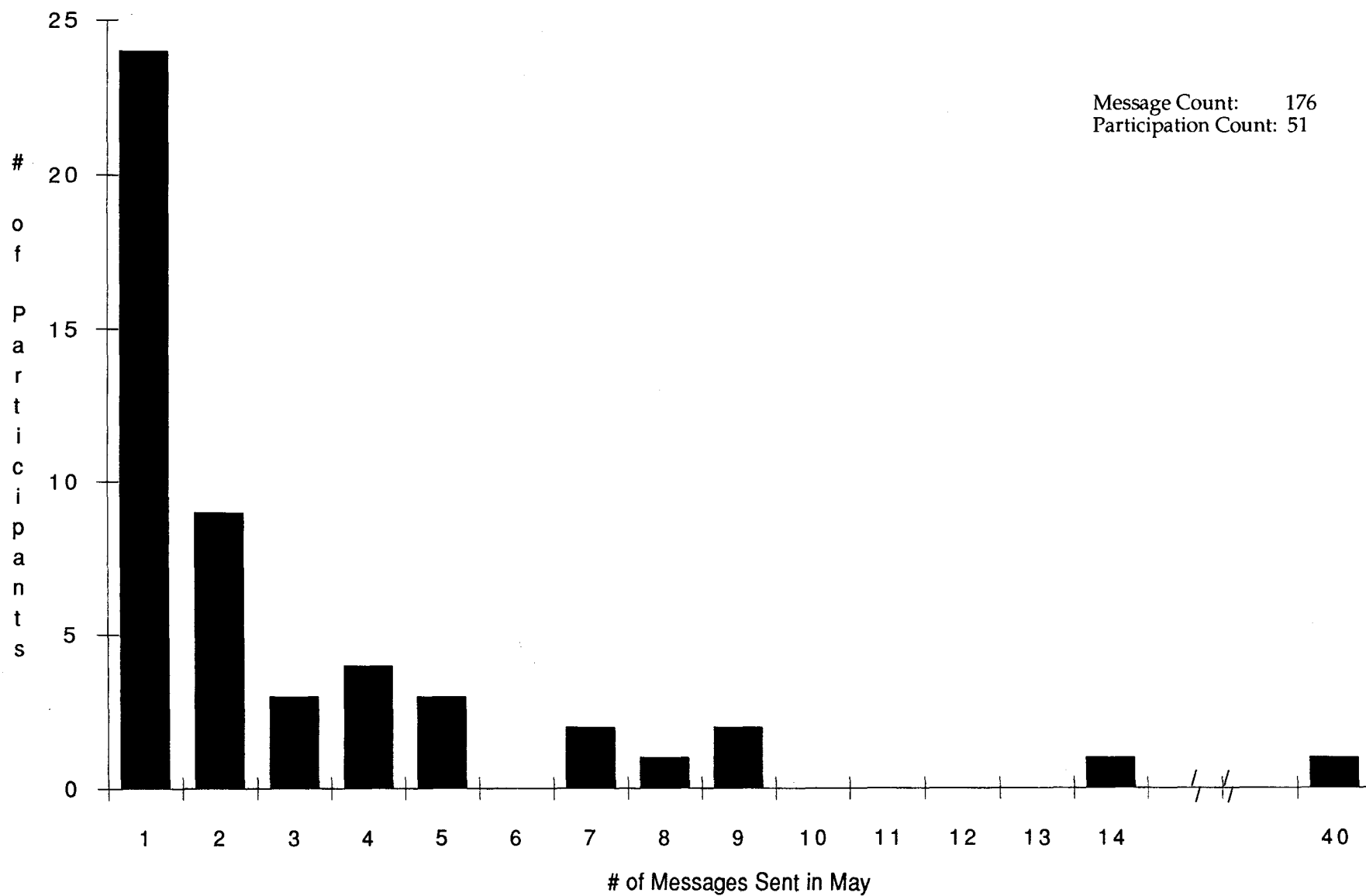
This induction does not have to be the case, but appears to be true in light of further examining the structure of participation in conversations. That is, the pattern of use by participants does not change as the number of participants or volume of messages change. [see graphics: GR 7 and 8]. In November of 1989, there are three discussions: tools, sub conferences, and language & e-mail. The majority of those participating on the system send only one message. In fact, of 43 participants that month, 27 send one message. A number of participants offer multiple messages, but the month is peaked by one individual sending 12 messages. Presumably, these 12 messages serve as a moderating and facilitating role to keep the conversation somewhat cohesive. A full year and a half later, May 1991, an almost duplicate graphic appears. Again, there are multiple conversations during the month: social constructionism, situated cognition, play and pragmatism. Of the 51 participants, 24 issue one message. Again a number of people send multiple messages, but there is clearly one individual who, in sending 40 messages alone, keeps the conversations cohesive.

What, then are the cause of these message and participation cycles? Many external events strongly influence the cycles of the xlhc network. In his discussion of cycles in educational electronic networks, Levin examines the effect of the school year calendar on the network. He notes how closely activity on the network mimics the

Distribution of Messages
by Participants
November 1989



Distribution of Messages
by Participants
May 1991



academic calendar.

The spring peak of activity is consistently higher than the fall peak because projects started in the fall carry over to the spring , but projects started in the spring only rarely survive summer vacation to the next fall. (Levin, *Activity Cycles*, P.4)

The academic calendar has profound influence on xlchc. Until 1991, summer is characterized by a dearth of activity on the net. Similar dips in activity may be seen during vacation times such as the latter parts of December. One of the real marks of the system establishing itself is when it is no longer so strongly bound to such yearly cycles. In the summer of 1991 some of the most active participation on the net takes place. While the net is still dependent upon academic participants, these sources of activity consider the network as increasingly independent of academic scheduling constraints.

Other external events continue to affect the activity of the system. Among these external influences are: the development of new technologies, individuals joining/leaving the system, world political events, and other unpredictable events that stir the collective conscious. New technologies allow for radical changes in network structure, and thus patterns of network use. Slight changes in the demographics of xlchc have the potential to highly influence the patterns of messages over the systems. In May 1991 one individual accounts for almost 25 percent of the message traffic. Clearly, individual action causes the network reaction. As for international news, the outbreak of the Gulf War nearly brings the network to an end. Message activity increases, focusses on the international situation, and some individuals call for the abandonment of the network, while many more voice discontent with the activities on the system. It is such events, that in reaching a large contingent of participants, are reacted to and reflected upon,

ultimately creating some of the fluctuations described.

An examination of the xlhc timeline [see figure GR 8] will further emphasize the nature and persistence of cycles. Conversations are seen to come in blocks initially blending from one to the next and eventually overlapping as the system becomes more developed. It must be recognized that the distinction between conversations is a difficult one because of blurred borders and segues. However, groups of conversations cluster together during peak activity, while space demonstrates lull in conversation. The thickness of conversation borders on the graphic further emphasizes the participation on the system. Visually, it may be considered, in crude fashion, as the darker the region the greater the activity on the network, due to multiple conversations or heavy participation in one conversation.

The question of what makes a conversation work is not a simple one. The impetus of conversation is still rather elusive. They vary from the internal: discussion and debate on structure of the system and off handed remarks such as 'you guys' to external: politics and political changes in NSF funding which may personally effect the participants of the system or the system itself. The direction of conversations is rarely known or held to from the start. Rather, it is the collective or distributed interest of the network that tends to guide conversation. The duration or intensity of a conversation can neither be predicted or simply controlled. They range from the short intense discussion of 'guys', to the long diffuse discussion on Piaget. Only those ideas that spur some sort of response on the system tend to live on in the system. [discussion of silence on the net?] What does appear as consistent among conversations are a few core

themes: tools, learning/zoped, microgenesis, literacy, philosophy of science, communication, and ideology. These are the conversations that pervade the net, and understandably so - they are of common interest to the participants of the system, a common pursuit of knowledge.

Differentiation

One outcome of XLCHC's growth in size, is its growth in diversity. A marking point in the network's growth is its ability to reflect upon itself, its successes and shortcomings. In March of 1988, Engestrom sends a message called *Toward rearranging the network* where he outlines three practical steps toward "rearranging [xlchc] so that it will be more interactive, collectively more conscious of its goals, possible uses, and participating members". These steps include " 1) a new name for the network, 2) an agreement on some ground rules for the network, and 3) An up-to date comprehensive and cumulative annotated directory of participants" (Engestrom, 03/08/88). Little action is taken to alter the name of the network. However, Engestrom explicitly outlines how to use the subject lines. He suggests that XLCHCers use the name of a current discussion in the subject header. New topics will be so addressed in the first few lines of the message itself with a reflective subject line. In addition to comprising and sending a current mailing list, Engestrom also suggests that members introduce themselves on the net, sign their full names, and reference other members clearly with

dates included. However simple these suggestions might sound, their recycling nature¹, suggests that they are never implemented to satisfaction.

In a telling note on the subject of *re-mediation*, one XLCHC participant expresses his dismay as a response to participant input at the disheveled state of XLCHC relations:

Given that a major purpose of this discussion is to have a NON-dominating discussion among geographically institutionally distributed people who share certain intellectual interests, and perhaps certain values (so many people have joined that I am not at all certain of the latter, and perhaps I misjudge the former), it is unhappy to think that we are unwittingly recapitulating some of the same power structures we struggle against in our formally designated work lives (M.Cole, 04/04/89).

This tension between the idealized goals of XLCHC often conflicts with the reality. Despite its aims, conversation often remains dominated by a relative minority of participants. [See GR 7 and 8]. Nevertheless, it is the prolific few who continue to discuss how best to reorganize the network. XLCHC participants express concern about how to include the rest in the pursuit of utopian discourse, maximized access, and increased efficiency:

To accomplish that goal, we have to have a strategy for overcoming the various lines of domination that one could identify, various "binary" them-us relations that are REAL in our group. We cannot nor would we want to do that by achieving uniformity! Our great potential strength can only come from intelligent organizing of diversity. Ergo. We need to diversify, but we do not want to loose All commonality so that we conflict with each other uselessly" (Mike Cole, 4/2/89).

It is XLCHC's constant battle with its own limitations that proves to be its greatest resource. One attempt at increasing the practical accessibility of XLCHC involves the formation of subgroups.

¹ example of the recycling themes of subject line reorganization, etc.

A critical point in the XLCHC's development involves subgroup formation. By forming subgroups, XLCHC strives to increase the efficiency of the technological medium. A subgroup consists of a subset of the XLCHC participants who wish to discuss a more specific topic than the general forum of XLCHC. Both the technical and social organization of these subgroups are analogues of the parent distribution list. By urging everyone to create whatever subgroups they would want to send mail to, XLCHC strives to make participation in the technological milieu more feasible:

One concrete suggestion I would have at this point is that there needs to be at least [the] option for participants to zero in on more narrowly defined interest groups than [all] of the network. The danger in not doing so is the usual, and most important danger there is to networking. People will get tired of spending time on interesting, but marginally relevant issues. As a result, they will simply disappear from the network (James Wertsch, 3/10/1988).

Subgroup formation appears to address this early observation on the need to focus xlchc discussion into a more accessible locus. "Overlapping membership would be the strategy. And, to keep some common discourse, which might include some news from subgroups for general discussion" (Cole, 4/4/89). Unfortunately, subgroup formation, proves to be much more complicated than it might seem.

Despite XLCHC's differentiation into subgroups, participants periodically still feel the need to reorganize. Subconferencing, in fact sparks a perpetual juggling act of conversations between subconferences and the XLCHC parent conference. Neither fractionation nor diffusion appeal to XLCHC aspirations:

A few times during the past year, I have suggested that a discussion which started on xlchc "descend" into one of its subconferences or that a new sub-conference be opened. Those who expressed an opinion voted AGAINST such fractionation so discussions have stayed pretty much at the

uppermost level of the conferencing structure. This has the positive effect of making clear links between different topics, but the obvious effect of blowing out new users and those who must pay for storage, as well as casual participants (Mike Cole, 12/12/90)

The impact of this message excerpt includes the formation of XORG, the entity responsible for catalyzing the fermenting support for XLCHC reorganization:

I am not going to propose a solution, but I am proposing a procedure for a solution. I invite anyone interested to participate. In order to avoid overloading those who are not interested it will work as follows.(IBID)

X-ORG is formed as a "semi-corticate" entity to address the periodic need for improvement of XLCHC organization.

Out of the first official X-org discussion, comes a summary of etiquette suggestions aimed at reforming XLCHC in three categories: Mechanical/technical simplifications, organizational customs, and "more complex possibilities" (summary msg, 12/28/90). Technical suggestions include such things as keeping the bookkeeping off the system, using a ".mailrc" file to trim headers, and sending a "constitution" to members. Simple organizational improvements include compiling a weekly mailing list, using clearer subject headings, and keeping contributions short. More complex possibilities include "an ordered array of boards with differing goals" (Arne Raeithel, summary msg, 12/28/90), forums & subforums, getting experts to prepare summaries, emphasizing certain types of research, and coordinating sub/parent group connectivity. Again, that these suggestions repeat themselves² suggest that they are never fully brought to life in the collective consciousness.

² further examples of recycling reorganizational themes

XLCHC development can be split into three categories that follow a general mediational structure: 1) Network as object, 2) Mediational factors, and 3) Subjective relations [see mediation graphic]. The objective category consists mainly of the different kinds of technology whose inter-relation makes the net functional. It is the mediational factors that fall into the general category of institutional support and mediate between the network and its users. X-operators mediate between the technology and the users, but only in a structural fashion:

A message sent to an x-address is simply re-routed to all addresses with no filtering. A file containing all such mail traffic is stored at LCHC as a form of collective memory, but it is rarely consulted (which means that XLCHC is a sort of decorticate entity entity! (*Welcome Message*, 2/20/91).

With constrained technical centralization, the category of the subject reveals how the users and their uses structure the network. Cognition distributed, organization becomes a function of intra-communication and inter-communication over XLCHC. Object, mediator, and subject interact with each other to create a type of a "re-mediated triangle". Experimentation, changes, and development in each of the categories affect the overall growth of the network and the subsequent organizational differentiation.

III. Reflection: The Future in Terms of the Past

The simplest approach to prediction is to assume that the future will be like the past.

- Levin & Jacobsen, 1992

XLCHC & The Life Cycle

Just as XLCHC grows in a kind of life cycle, so do the activities that occur on the network. Levin, Waugh, Kim, & Miyake, 1990, propose that network activities possess "a life cycle of discrete and sequential developmental stages-- proposal, refinement, organization, pursuit, wrap-up and publication" (AERA, 1992). This can be applied to XLCHC, albeit abstractly. The life-cycle is designed to study networks with specific project-oriented goals, but serves as a useful tool for understanding XLCHC. During the proposal stage, the idea for an activity is proposed to the network community. An XLCHC member, for instance, may pose a question. The refinement stage modifies the original idea through an exchange of questions and requests for information. XLCHC members then coordinate the activity in the organization stage, exchanging ideas, times, places, articles, etc. Now a full-fledged network discussion, pursuit carries out the intent of the modified project. Wrap-up, then, concludes the activity, informing the group of the status of the activity. Participants express an interest in, or move on to, new discussions. Publication shares the results of the project. "The mediational role played by the writer of this message [is] to serve as coordinator for systematic information exchange. On XLCHC, publication *may* result in the publication of an article or in the recapitulation of the conversation in the form of a summary message.

Spirals

The lifecycle is an "ideal type": a useful paradigm for understanding XLCHC behavior, but limiting in that it imposes a definite beginning and end to XLCHC

activities. The value of the network as a communicative "tool", is that it transcends these linear time markers. Ideas proceed in an analog fashion, spiraling in and out of consciousness. They do not begin, nor end, but are continually reinterpreted and reapplied in a process of re-mediation. On the topic of recycling ideas, one XLCHC member recalls the reinvention of the wheel:

I remember a cartoon where some neanderthal-looking folk are standing around a stone with their hands outstretched over it. One person inquires of another. "Are you sure this thing is supposed to keep you warm and cook you food?"

Ideas, like tools fade in and out of consciousness. XLCHC conversations, while following the life cycle on a micro level, never really begin or end. The greatest task involves macro understanding of the larger processes. While memory occurs on the individual level, XLCHC members often lose access to ideas as they get distributed through the network and time.

Summaries mark a key point in the cycling of ideas. Askel Mortenson writes a provocative message that spurs a conversation on the spiraling of ideas:

The spiral model of development was ubiquitous in German Romanticism. It combines Time's arrow and Time's circle. It "bends only to rise". when it returns to its beginning the recovered unity is now higher, because it incorporates the intervening differentiations (Mortenson, 3/23/88).

Summaries, as they occur on XLCHC, mark "higher points" in the spiraling of ideas, incorporating differentiated ideas as they occur over the network. The *Tools* conversation begins with several summaries. This particular conversation starts in October of 1988 [see timeline]. The intensity of the discussion prompts participants to summarize their understanding, before responding:

Your comments on tools clarified what I should have said before. Before expressing what I should have said, let me summarize the points you raised, as I understand (Yutaka Sayeki to Kari Kuutti, 10/18/88).

The next month, it differentiates into a discussion of Macintoshes as Tools. A year later *Tools*, cycles again. It spirals in once more in May of 1991. Neither one of these later discussions includes summaries.

Summaries

Tools and the Flow of Information

XLCHC conversations, like *Tools*, occur precisely because tools exist to promote such discussion over the network. Jacobsen and Levin propose a "cognitively-based *distributed network learning framework* (DNLF)" which describes the "development and use of a new class of educationally-oriented network tools":

This framework consists of three main components: (a) *network mediators and the flow of information and knowledge*, (b) *networks and cognitive theories of learning*, and (c) the *human-network interface* (Jacobsen & Levin, Abstract, 04/13/1992).

The DNLF serves as a useful tool for understanding XLCHC behavior because it emphasizes the distribution of knowledge as part of the learning process.

a) Network Mediators and the flow of information and Knowledge

The actual practice of XLCHC activity occurs at the level of network mediators and the flow of information and knowledge. Critical to network function, learning, and

memory is the expected value of information:

Fundamental to our view of electronic networks which support learning activities is that there are a variety of mediators, both human and computer based, at the nodes on the network that control the flow of information to where it is needed (Levin & Jacobsen: 1992, p.2).

Mediators make decisions about the value of information as it appears at different nodes throughout the network.

Mediation becomes problematic as "the expected value depends on an estimate of the probability of needing the information again" (Levin & Jacobsen: 1992, p.3). Local storage as a mediated event depends on learning to judge what information will be needed in the future. "The simplest approach to prediction is to assume that the future will be like the past, and thus to predict that the likelihood of an event occurring in the future will be the same as the occurrence of the event in the past" (ibid). Local storage, then, depends largely on the individual experiences and value judgements of XLCHC users. Their heterogeneity forces great variance in both participation and archival methods of the flow of information and knowledge.

b.) Networks and cognitive theories of learning

Distribution of knowledge is as intricately connected to the distribution of power as it is to learning. Social learning theories show the intricate relationship between participation, memory, and learning. Local storage of information increases control and accessibility:

Each node in the network attempts to optimize its functioning by storing things that are likely to be used again... There would be a tendency to increase the judged probability of needing the information again, and thus the

probability would be raised that the mediator at the node would attempt to store or learn the information. This rule also suggests that there would be a graduate acquisition of expertise, as over time the local storage of information would also be expected to become increasingly richer and more organized. It is also possible that the optimizing functioning that occurs at each node could be analogous to the learning process of *accretion, tuning, and restructuring* (Rumelhart and Norman, 1978 in *DNLF*, p.4).

Network theory necessitates the distribution of power among network nodes. The diversity of these nodes relies upon the individuality of XLCHC members as they participate at each node. XLCHC's power as a network is a function of the heterogeneity of the nodes and the strength of the communication between them.

c) Networks and the Human Network Interface

Communication between nodes rests upon network organization. "Ease-of-access," determines the type of information to be entered at each XLCHC node. Logistical problems, like terminal location, terminal cost and terminal reliability can impose limitations on the frequency that xlchcers can access their node. "Ease-of-use" contributes greatly to the type of *human network interface* (Levin & Jacobsen: 1992, p.5). Human network interface consists of the transfer of linguistic information through the computer medium to electronic information. The process involves several steps and relies on the type of technologies used. The computer hardware, the mail delivery system, and the network application system affect the human network interface. Some mailing systems, for example, automatically save mail, while others require manual archival. The human network interface, at present though, remains an independent variable for XLCHC, as participants have different access to varying types of hardware,

message mailers, and network application systems. Yet, this is not to say the interface does not affect XLCHC. Individual's interactions with computers surface on the larger scale. Individuals who have limited or costly storage react strongly to length messages. Occasionally, the entire network will be forced account for the difficulties that a particular individual or node encounters.

Organic Solidarity

Coordinating XLCHC experience, as previously seen, requires a coordination of the XLCHC community. In *Building Electronic Communities: Success and Failure in Computer Networking*, Levin & Riel pinpoint critical factors in determining network viability. They compare network participant structures and ask the following questions to examine success and failure of the networks in their study:

Does the group already exist? Does this group have a need for telecommunications? Is there a shared goal or task with a specified outcome? Will the access to the technology be easy and efficient? Will all participants have regular patterns of mail access? Is there a person who will facilitate group planning and work? (Levin & Riel, p.163).

Does XLCHC already exist?

XLCHC has grown from its initial organization of twelve people to four hundred one addresses in nearly a decade. Even earlier, the academic coordination taking place through the Laboratory of Comparative Human Cognition is considered a valuable networking resource. Without question, the XLCHC community exists. [See graphic 1

for growth rate.]

Does XLCHC have a need for telecommunications?

The goal of XLCHC at its most basic level is the exchange of information. As members are geographically dispersed, regular communication necessitates the use of telecommunications to overcome time and space barriers. As described earlier, telecommunications appears to be the most suitable medium to reach this goal. [See graphic 2 for current xlchc world participation.]

Does XLCHC have a shared goal or task with specified outcome ?

The shared goals of XLCHC are what hold the network together. Created as a forum for discussion of "how culturally organized experience influences the development of human beings" (*Carnegie Interim Report*, 1984), participants still discuss "mind & society" issues nine years later. The timeline shows how themes like microgenesis, ZOPED, and tools get recycled and reinterpreted over network time. That learning, development, education, and equality are a premise to network belonging suggests their relevance. What the community lacks, however, are specific goals that resemble those of the short-term, often, non-inclusive projects conducted over the net. While individuals may envision specific outcomes, it seems that there is no specific consensus. In reorganization discussions, as previously shown, members differ as to who should be allowed to participate, for how long and about what topics. Clearly XLCHCers have different visions about what to include as "common goals".

Will the access to XLCHC technology be easy and efficient?

Access is a two pronged question: technical and social. First is the issue of technical access. Will desiring participants be able to afford the cost of the technology necessary for networking? Will their schedules afford them convenient and sufficient time to participate? Will language be a barrier to utilizing the resources of the network? XLCHC addresses all of these issues, attempting to promote far reaching accessibility.

It is XLCHC practice, however, that reveals the most about how accessible the XLCHC project is perceived on a social level. In the open-ended discussions that occur over the network, a "half-baked" idea or a posted question, leaves open the potential for total participation. Evaluating Levin and Riel's participation structures, as they apply to XLCHC, require an analysis of how XLCHC meets its own communication goals. Such participation discussions are a perpetual goal of the differentiated XORGAN, and the subject of ongoing xreorg conversations on how to increase xlchc participant access. Implementing substantive access proves to be more difficult, though, than technological access to the network.

Will all XLCHC participants have regular patterns of mail access?

Participants have regular patterns of access, but they do not always express and co-ordinate these patterns with each other. Because the human network interface is so widely varied for participants so is participant access. In general, however, individuals regularly access electronic mail accounts. Mail access patterns are

intertwined deeply with two e-mail phenomena: breakdowns in the network and silence on the system.

Breakdowns on the network are characterized by an inability to distribute messages to all network participants. These are most often loops or bounces. Because of technical breakdowns or incompatibilities, messages occasionally 'loop' through the system. The effect of this is that some or all participants receive the same message or group of messages repeatedly. The network is rendered useless until the cycling of messages can be stopped. Less traumatic to the system are bounces. A message delivered to all participants of the system will occasionally be returned to sender, or bounced, because the addressee is unreachable. When participants forget to post change of address messages to the central XLCHC operator, xfamily, the distribution lists for the network become faulty. Further trouble comes from system crashes and downtime, which will temporarily remove participants from the network.

Not reaching someone on the network, because of delivery failure, is known. A silent response, a non-response, on the network is unknown. Silence may indicate any range of reactions or non-reactions. Either people are not able to respond, or they are able to respond but chose not to. In either event, the recipient of the non-message has no means of ascertaining what the intent is, if any. Silence is one of the well known and most troublesome attributes of electronic mail. [do we have any ref's on silence, since I don't wish to discuss it any further ... or maybe at all]

Is there a person who will facilitate group planning and work on XLCHC?

The equal distribution of power is one of the biggest aims of XLCHC. The question remains as to how to best promote this. Ideally, mediation would only occur at the technological level and not at the substantive level. Recall the original fear that central mediation would have a pernicious effect on the free flow of information:

Mediators in our experience virtually always become gatekeepers, power becomes centralized in the mediator/ gatekeepers, and things are worse than before(or at best, the same, just restructured) (Ps7 Scollon, 01/04/1984).

Levin and Riel find , though, in their study of the Summer Institute teachers' network, that "The role of coordinator and a focus on a topic seemed to be the critical features that contributed to the success of this [teaching] network" (Levin & Riel, p.157). XLCHC lacks anyone who explicitly performs this organizational function.

Caught between the opposition of centralized versus distributed responsibility, XLCHC has yet to completely resolve the issue of central mediation. Analysis of message traffic shows how reliant the network is on just a few individuals [see graphics: GR 7 and 8]. Though these few have promoted, carried and summarized past conversations, they are under no obligation to do so. Growth in size, number of messages, and number of participants, only exacerbate XLCHC's need for coordination. One attempt at organization, subgroup formation, only complicates issues of memory and coordination. XLCHCers hold topic specific conversations on the subgroup level and summaries are then supposed to be forwarded to XLCHC. This differentiation schema still requires conscientious mediation on the part of

subgroups. As memory fades, distinctions blur, and participants begin requesting old conversations, complaining of repeat conversations, and losing focus on current conversations. Critical to the success of distributed responsibility is the coordination of distributed memory.

Memory

Memory can be reconstructed through the individual recollections, through the participants and their local access to the network, and through the storage of shared network memory. These three types, individual, nodal and structural memory, supplement each other. Individual memory is highly selective and subject to distortion. Nodal memory is what allows participants to store information directly at each node in a manner that distributes memory throughout the network. In addition to individual and nodal memory, there is structural memory of XLCHC activity. At the hub of XLCHC in 1988, standard archiving begins. This records the bulk of XLCHC activity, unselectively. Structural memory offers a more complete history of public messaging than either the individual or nodal memories. XLCHC structural memory still relies on the mediated view of interpreters to reconstruct the past. The potential of network structure allows for the interchange of these three types of memory, paving the way for the possibility of total memory.

Individual memory hard to isolate on the network. Individual memory tends not to be a microcosm of the whole, but rather its own descriptive reality. Because it is based on subjective judgement, individual memory is highly selective and varies widely with subject and topic. One way of testing memory is to discover what is

forgotten. Reflection on earlier conversations is a means of examining forgetting in XLCHC. Recycled conversations engage different participants. Sometimes the ensuing dialogue appears novel. At other times, discussion has the verisimilitude of reminiscent topics. It is difficult to pinpoint what participants remember about these topics and whether they remember them at all. Moreover, it is impossible to generalize from the memories of just a few. Nevertheless, one example sheds light upon the interactive nature of remembering. After an ambiguous reference to the *Tools* conversation on XLCHC, one member requests that the *Tools* archive be retrieved for clarification. Upon excavation, that same member suggests that the discussion is incomplete. Further exploration yields several missing pieces of the *Tools* discussion. Clearly, individual memory is essential in the creation of a total memory system.

Nodal memory exists as a result of its expected value to those working at a particular node. When users expect that they will want easy access to information in the future, they store that information on a local machine. The value of having locally stored the information means that the mediator does not have to request it from elsewhere when needed, which may entail a monetary cost or a time delay or both (DNLF, p.3). This, of course, presumes that the information is accessible over the net! One of the difficulties of distributed nodal memory is that this is also selective and can scatter what is, in fact, a shared experience: "Individuals, groups, organizations, nations and societies do not have all possible materials available to them from which to construct a past" (Schudson, QNLCHC: 1/87, vol 9, #1, p.7).

Influencing the decision as to whether or not to store new information is the expected cost of storage which "involves both the direct cost of storage and the increased cost of accessing currently stored information" (DNLF, p.3). The accumulation of new information makes the retrieval of previously stored information increasingly difficult, inducing the probability of further mediation:

One consequence of higher costs of accessing an increasing body of information is that the human mediator could be motivated to *restructure* the stored information to optimize access and reduce storage costs" (DNLF, p.3).

Both storage and retrieval are highly subjective procedures at individual nodes of the network.

The structural memory of the network holds the promise of preserving the formative social interaction. Pulled from the archives, it is possible to reconstruct a conversation verbatim. Structural memory preserves how conversations differentiate and participants exchange ideas over time. In this way, it is possible to compare individual and nodal memory with the less mediated storage of XLCHC activity. The problem with structural memory, though, is that while archiving may be slightly mediated, retrieval is highly mediated. In the reconstruction of conversations, the failability of structural memory is evident. The inevitable omission of possibly integral pieces of the conversation demonstrates such fallibility. Total memory necessitates the interaction between individual, nodal and structural memory.

The three types of stored memory are both supplemented by and restricted by the social organization of memory as a process:

Not only are people's reconstructions of the past generally confined to

experiences of their own traditions, then, but they are further limited to those elements of traditions that have emerged, over time, as especially salient. There is what I will call a rhetorical structure to social organization that gives prominence to some facets of the past and not others (Shudson, QLNCHC 1/87:p.7).

As background to individual, nodal, and structural memory, social organization plays a dialogic role in influencing the way events are remembered. The Welcome Document, for example, reinforces the goals of XLCHC, its prevalent social norms and what it considers prominent moments its own history. In so doing, it de-emphasizes its shortcomings. Central to XLCHC, for example, is its tenet of cross-cultural research, and yet the network operates primarily in the English language. XLCHC memory favors certain topics over others for a reasons grounded in social behavior:

That something's meaning is in its use in the practical social life of the people concerned, the role that it plays in the various cultural practices with which it is connected. Its meaning is not solely in it (objectivism), nor sole in our heads (subjectivism), but in the social activities going on both between and within the people involved in its use" (QNLCHC, p.17).

Memory is a social process.

Memory, like the categorizational framework that defines it, is paradoxical. A "perfect" memory is a structural impossibility that is constrained in few dimensions: access, storage, and retrieval of information. *Tools* exists as an example of these bounds. The *Tools* conversation demonstrates the tremendous potential for a collective consciousness. It exists in the memory of a few individuals, some nodes in the network, and in structural memory. Some participants remember parts of this conversation or have heard it discussed and referenced. Other XLCHC members

have *Tools* stored in local memory. XLCHC archives contain virtually all conversations that have occurred over the network. Without individual or local memory traces, however, it is difficult to extract the entirety of this discussion. Moreover, as the network grows in size and complexity, this problem of retrieval will only escalate. Locating the *Tools* discussion in XLCHC archives was only feasible with the aid of individual memories and nodal documentation. Case in point, *Tools* shows how memory recapitulates the intricate relationship between subject, object and mediator found in the relation of individuals, context, and content. Complete memory relies upon XLCHC participants, XLCHC as a computer network, and XLCHC as an institution.

Development of an Institution

Everything has been said before, but since nobody listens, we have to keep going back and begin again [Goldenberg (9/28/91), quoting "Gide" in a response to "Cole", quoting Larry Cuban (1990), quoting Goethe, quoting ???...]

The key to complete memory is remembering what has been forgotten. Development of a supportive institutional framework promotes the interaction between different types of memory. Deleterious to this project is the problematic position of the very notion of a collective conscious. This is not a new problem. Its ancient lineage, in fact, suggests the pervasivity of the problem as it affects an entire history of, as well as current and future Western philosophic tradition:

The structure of available pasts and the rhetorical structure of social organization that makes some facets of the past more salient than others

will necessarily be powerful influences on how an individual or organization thinks and acts and constructs or reconstructs a history from which to act. (Schudson, *QNLCHC*, p.10).

Until the myth of the autonomous individual is collectively dispelled, and the issue of a collective consciousness addressed, institutions will continue to be plagued by their own shortsightedness. XLCHC is one such institution. It is bound by such social structures in accessing, storing, and recalling information. Held together by a common interest in "How culturally organized experience influences Human development," xlchc has not yet accessed one of its greatest resources, the history of its own development.

Without reflection on the tenets of XLCHC knowledge that form the basis of XLCHC behavior, little progress forward is possible. Ludwig Fleck, a sociological functionalist, questions the very notion of the "facts" with which institutional history is written:

Cognition is the most socially-conditioned activity of man, and knowledge is the paramount social creation. The very structure of language represents a compelling philosophy characteristic of that community, and even a single word can represent a complex theory (Douglas, p.12).

According to the guidelines set forth by Levin and Riel, XLCHC is a thought community. As such, it is constrained by its own past. Fleck suggests a version of a "self-sustaining functional loop":

The general structure of the thought collective entails that the communication of thoughts within a collective irrespective of content or logical justification, should lead for sociological reasons to the corroboration of the thought structure. (Douglas, p.18)

How do XLCHC participants learn, then if the system is caught in a functional loop?

Activity systems operate on the premise that activity at one level will instrumentally mediate activity at another level. Consider the following observation by Luria:

[Voluntary behaviorism] is the ability to create stimuli and to subordinate [oneself] to them; or in other words, to bring into being stimuli of a special order, directed at the organization of behavior (QNLCHC, p.50, 7/89).

In the pursuit of understanding the themes of learning, development, education, and equality, XLCHC can view these tenets of its initial organization in terms of own behavior. Recycling discussions involving microgenesis, tools, zoped learning, philosophy of science, literacy, communication, and ideology form the basis of XLCHC history. Examination and analysis of these conversations, in turn, reflect not only the development of particular themes, but the development of XLCHC participants, and the development of the network as a whole. A history of the mediating nature of these discussions forms the basis for a perpetual type of reflection on XLCHC's own cultural development. It is this reflection that insures that XLCHC moves not in a functional loop but a functional helix.

In the *Dialogic Imagination*, Bakhtin's notion of dialogism cements together both the practical and potential utility of network communication. The translator's glossary provides an operational definition of dialogism:

Everything means, is understood, as part of a greater whole--there is constant interaction between meanings, all of which have the potential for conditioning others. Which will affect the other, how it will do so and in what degree is actually settled at the moment of utterance (Bakhtin, p.426).

As a practical matter, structural memory facilitates the complete storage of these

moments of utterance. Not only does this allow for the recycling of old conversations, but it provides for a schematic look at how these particular moments interact with each other [see timeline]. A November 1989 tools conversation, for example, bleeds into a discussion about computers as tools later that month. December yields discussion about appropriate language over XLCHC and subconferencing. Context formed, a reflective conversation about the network and technology comes over a month and a half later. Detailed analysis of the dialogic nature of conversation paths allows for meta-thematic retrospection of XLCHC development as a network culture.

Michael Cole's concept of **prolepsis** in *Remembering the Future* rests on the notion of dialogic time to explain the intricate relationship between individual, topical and cultural development. **Prolepsis**, meaning "the representation of a future act or development as being presently existing" (*Webster's dictionary*) relates current activity to its socio-historical context. Cole, for example, quotes St. Augustine to illustrate the reciprocity between past and current ideas:

Expectation refers to the future, and memory to the past. On the other hand, the tension in an act belongs to the present: through it the future is transformed into the past. Hence, an act may contain something that refers to something that has not yet come to pass. [St. Augustine in Cole, *Prolepsis*]

The process of XLCHC development as a network can be traced through the narrative of its history as a system. Throughout seeds of origin, early growth, later differentiation, reorganization and subgroup formation, XLCHC reflects the hopes and fears of its participants. The history of these discussions awaits only further

reflection.

One way of understanding the proleptic nature of dialogic conversations that occur on XLCHC is through a Bakhtinian term, chronotope:

Literally, "time-space." A unit of analysis for studying texts according to the ratio and nature of the temporal and spacial categories represented. The distinctiveness of this concept as opposed to most other uses of time and space in literary analysis lies in the fact that neither category is privileged; they are utterly interdependent. the chronope is an optic for reading texts as x-rays of the forces at work in the culture system from which they spring. [Bakhtin, p. 425]

Network communication is founded on the notion of asynchronously timed communication to connect geographically and culturally dispersed individuals through barriers of time and space. The heterogeneity of network participants, the dialogic nature of discourse and chronoytopicity of network communication make the ideal medium for current reflection of the past in terms of the future. In discussing their views on such themes as microgenesis, zone of proximal development, and perfect communication, XLCHC participants are thereby contributing to the possibility that such theories will be put into practice. Perhaps, they already are ?

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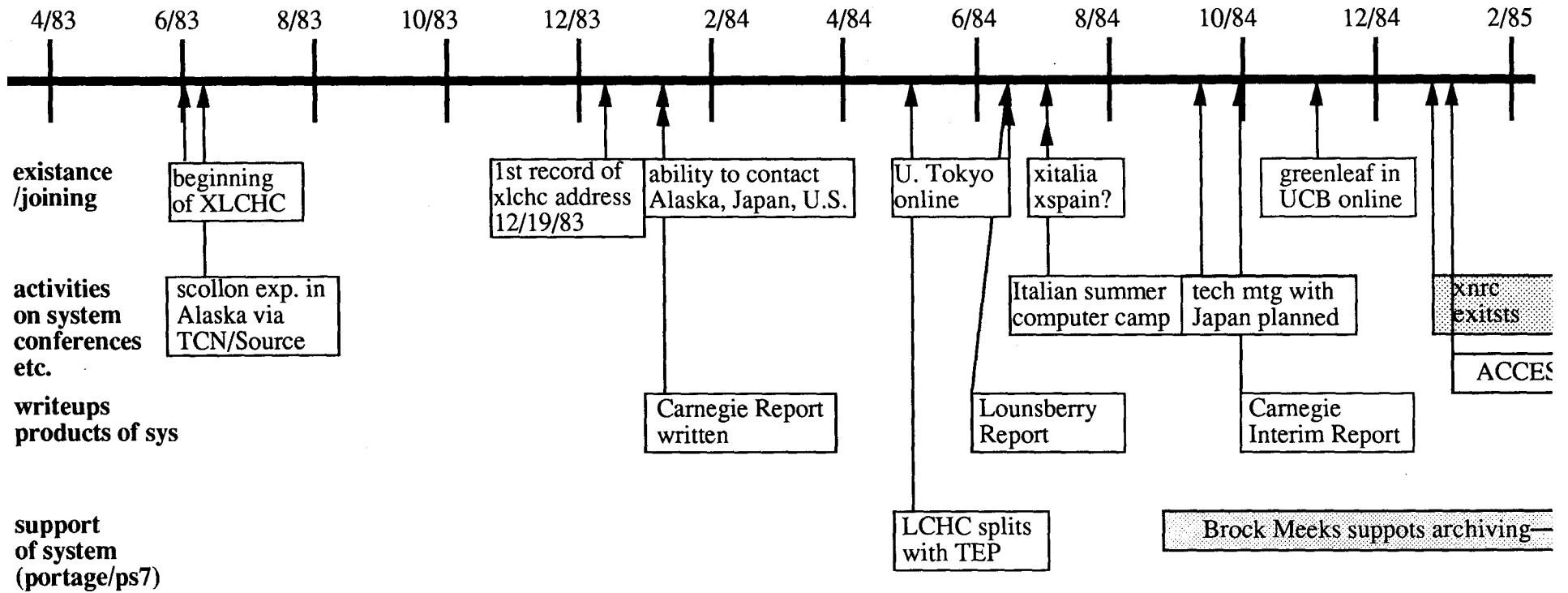
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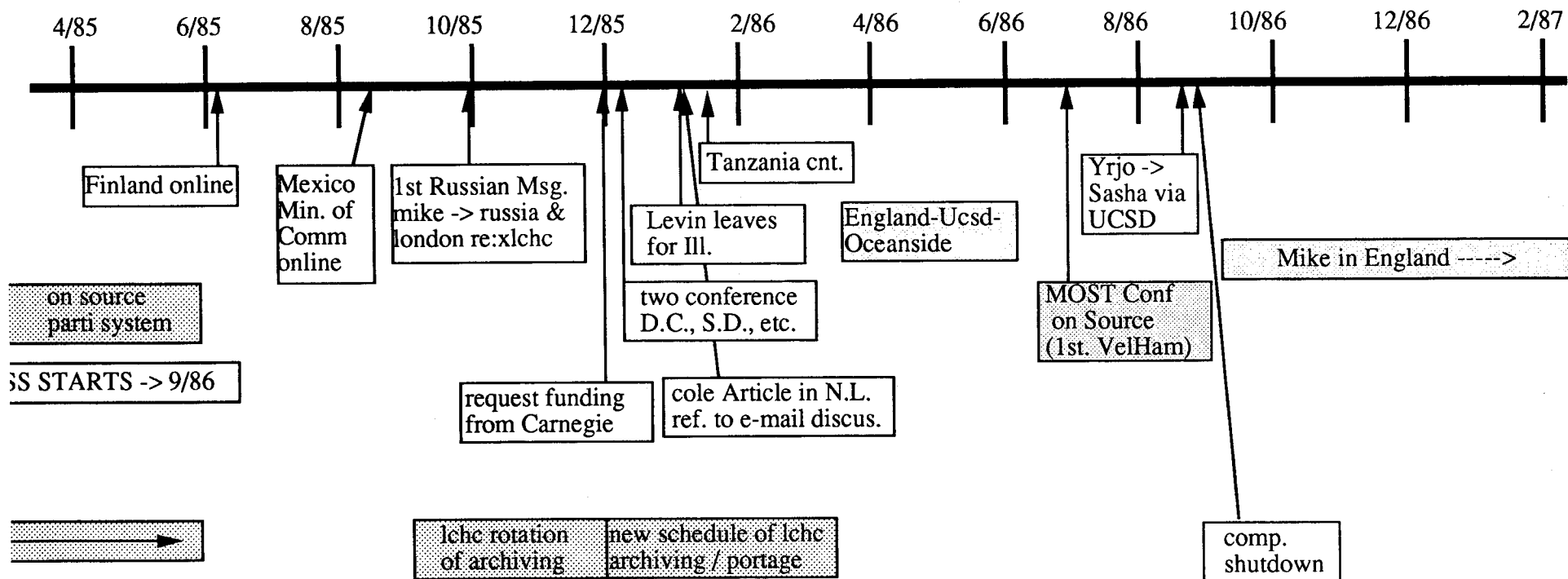
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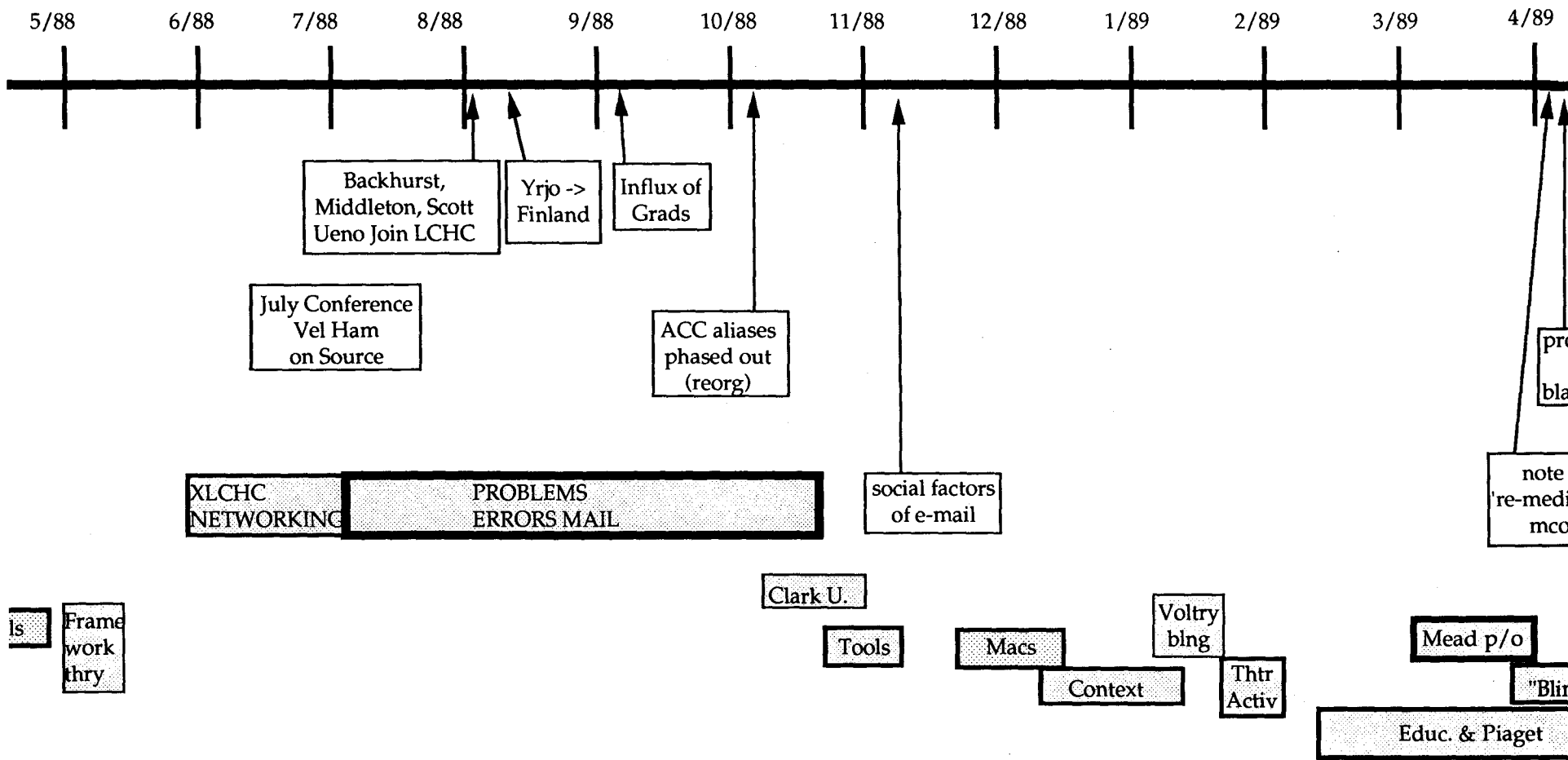
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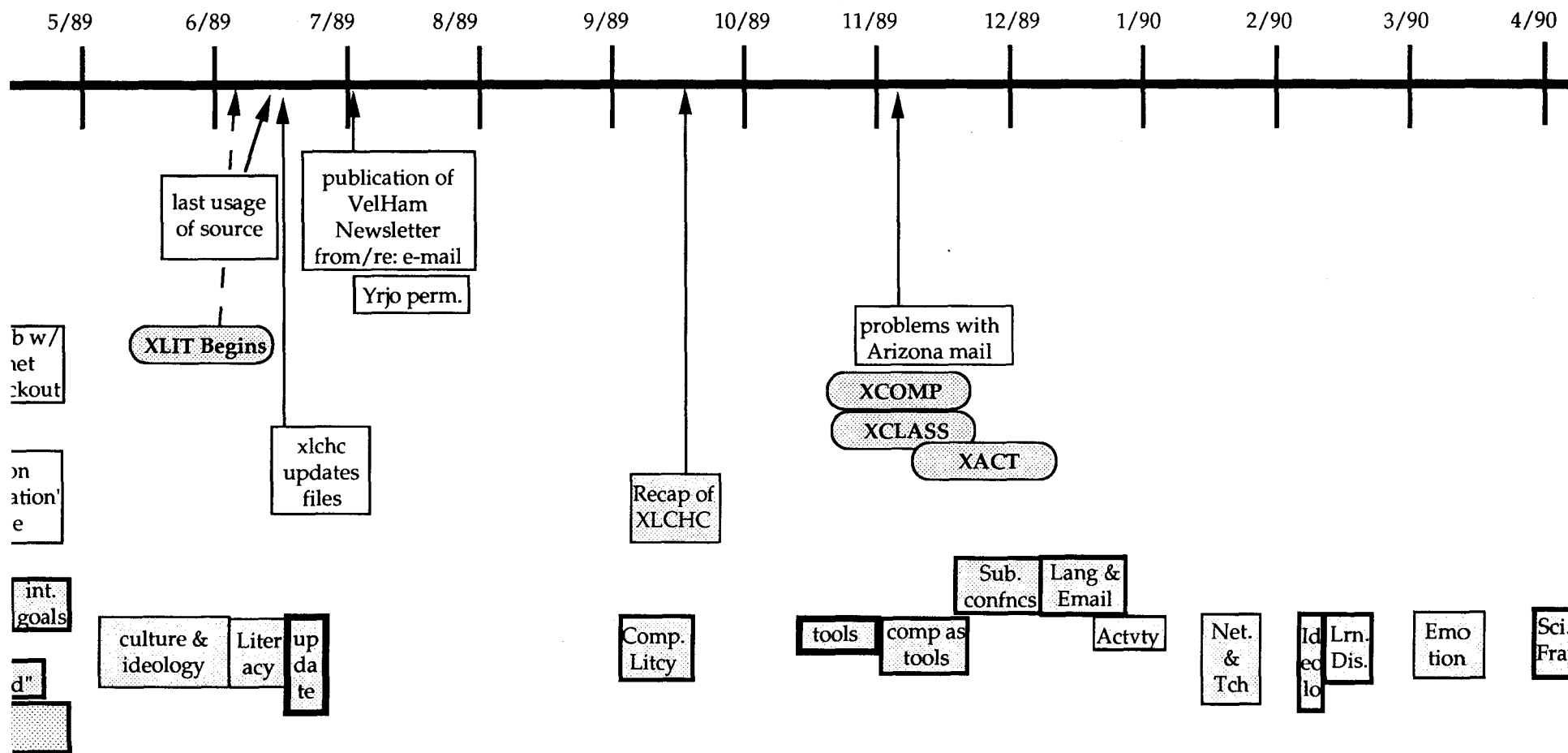
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Summer 83	reputed beginning of xlchc	carnegie
Summer 83	Scollon computer use in Alaska	news/notes/carneg
12/19/83	first record of xlchc in archives	notes
	announcing conference	
Jan 1984	Carnegie report	carnegie
	announces connects with Japan, US, Alaska	
May 1984	LCHC splits from TEP	karen
6/14/84	welcom U.Tokyo msg	notes
6/14/84	Lounsberry report	karen
6/30/84	xitalia to start up/summer camp 7/2	notes p.g.
summer 84	xspain to start up (? confirmation ?)	??
Sept 84	planned meeting w/Japan re: technology	carnegie
9/84 - 6/85	Brock Meekes to pursue portage/archives	karen/notes
Oct 84	Carnegie Interim Report	carnegie
10/31/84	Greenleaf online from Berkeley	notes
12/31/84-6/85	xnrc conference on Source parti system	carneg/notes
	request for removal 9/85 (multiple probs)	
	physical conference 12/11/84	
1/85-9/86	Access(started by B.J., end w/ Marti)	
Spring 85	Finland online connection made (198 class)	scott w.
8/26/85	Mex. Ministry of communication headquat. on source	notes
9/85-12/85	lchc archiving rotation started	notes
Oct. 85	1st. Russian message from Mike on trip	note
	on way to London (Charles Crook) re:xlchc	
12/5/85	request for funding from Carnegie	notes
12/7/85	two conference (xlchc writeup 12/9/85)	note
12/15/85-3/2/86	new lchc archiving rotations	note
Jan 86	Levin leaves for Ill.	note
Jan 86	cole article on computer educ. - explicit ref to	lchc newsl
	discussing further on e-mail	
Jan 86	Tanzania connection	
2/86-4/86	David Middleton @ LCHC ?	
Spring 86	Oceanside-UCSD-Crook England class disc.	Swoodbri
6/21/86 - 8/22	Most-Conference - first Vel-Ham conf. on soucre	newl.
8/24/86	Announc. of Computer shutdown (3 days)	Message
8/26/86	Yrjo intro to Sasha via UCSD email	note
9/86 - 7/87	Mike in England	

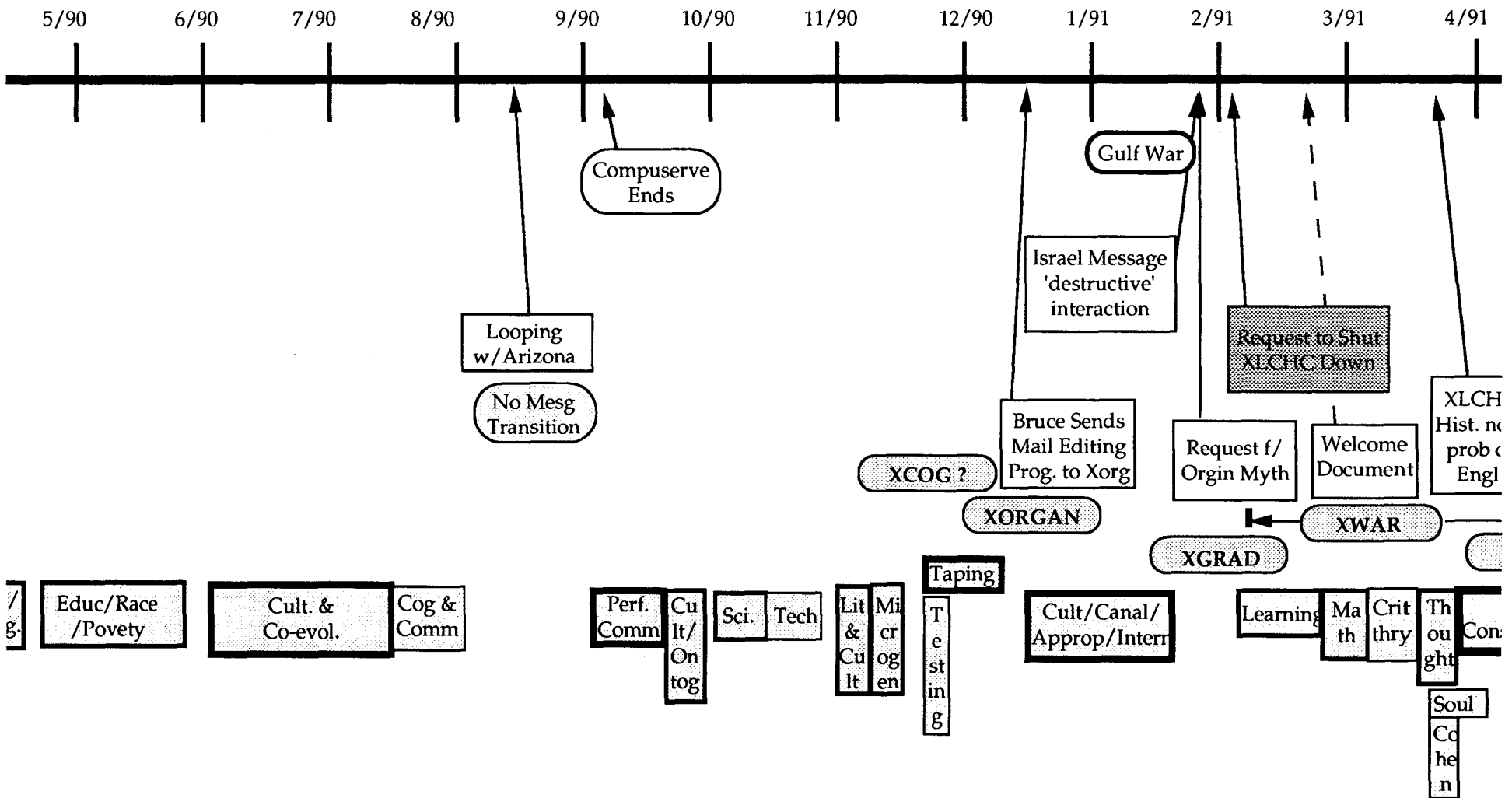
XLCHC TIMELINE I

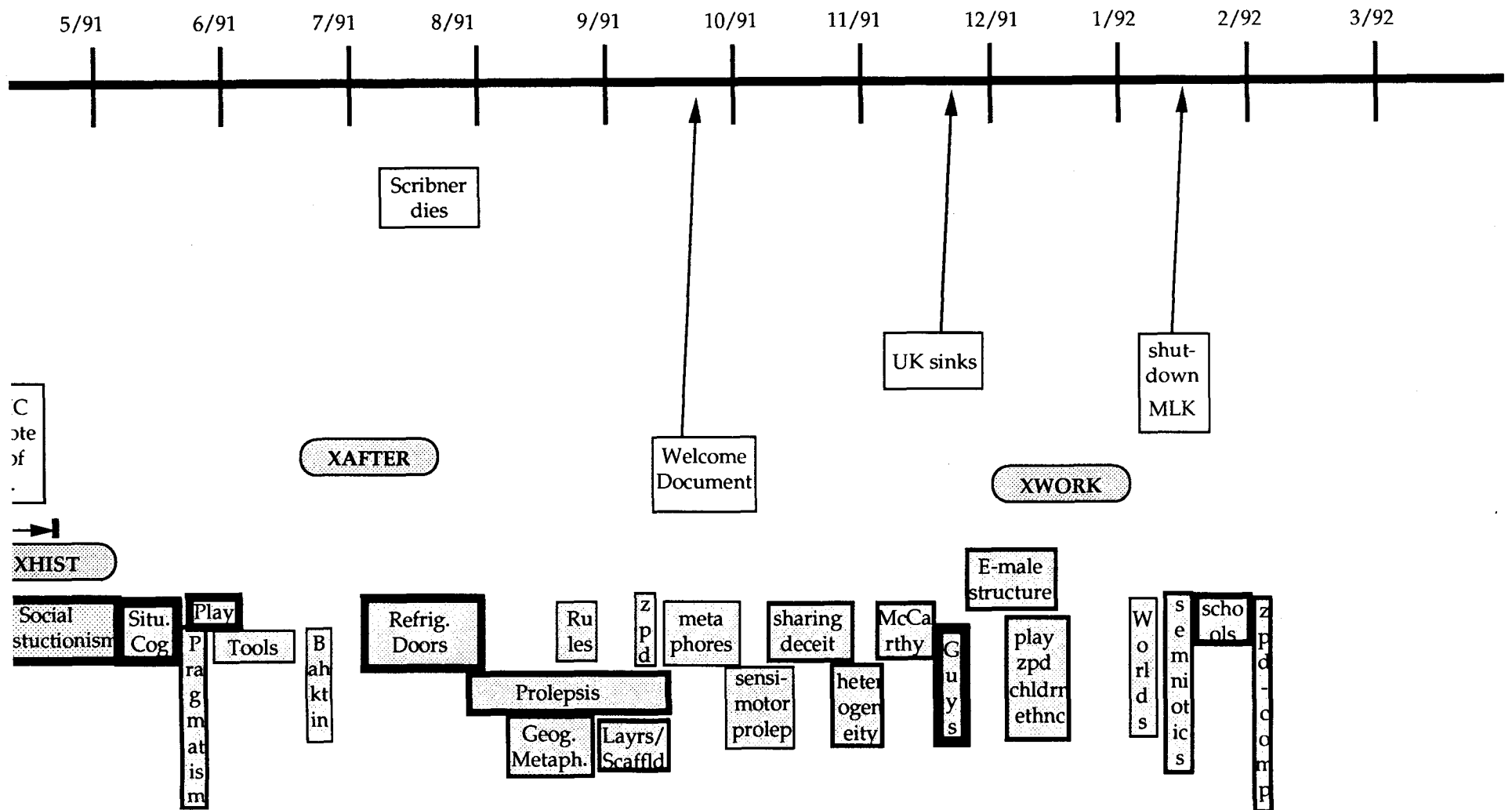




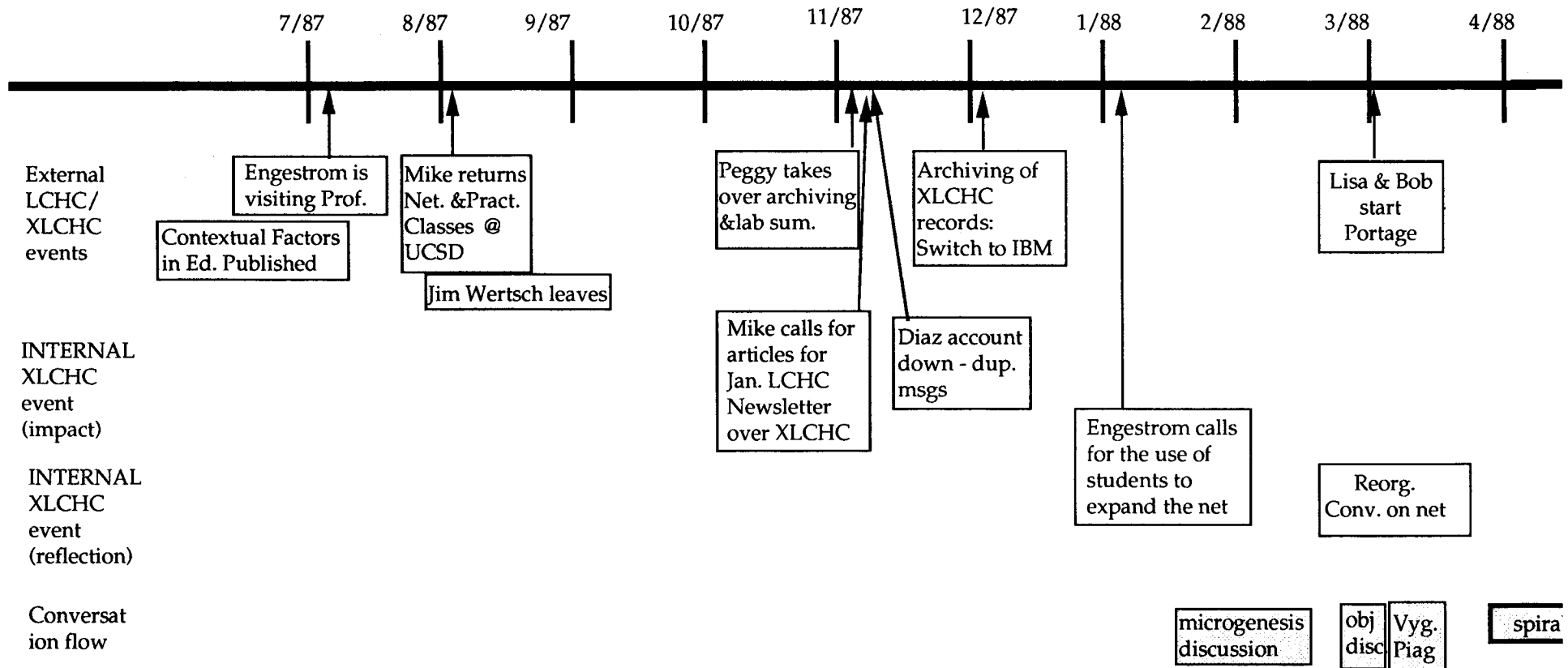








XLCHC TIMELINE II



XLCHC TIMELINE II: THE NETWORK

<u>DATE</u>	<u>EVENT</u>	<u>SOURCE</u>
1987	Context.Factors in Ed. published	Book
07/87	Engestrom is visiting Prof. @ UCSD	Visit File
08/87	Mike Returns: Net. and Practicum classes	Records
08/87	Jim Wertsch leaves	
11/87	Diaz account down: duplicate messages	
11/87	Peggy takes over archiving & Lab summaries	Message
11/87	Mike calls for articles for Jan.Newsletter	Message
12/87	Archiving XLCHC records- Switch to IBM	Data
01/88	Yrjo's message to use students to expand Net	Message
01/88	Microgenesis disc.	
02/88	Objects disc.	
03/88	Lisa and Bob take over port. from Nadrina	Lisa
03/88	Reorganisation conversation over Net	Messages
06/88	Continued reorg conversations	Messages
07/88	July conference on Vel-Ham	Lchc NL
08/88	Bakhurst, Middleton, Scott, Ueno join LCHC/ XLCHC & Yrjo Engestrom leaves to Finland	Message/ Visit File
09/88	Influx of visiting Grad students	Visit File
09/88	Reorgan. /Etiquette Discussion	Messages
10/88	Tools discussion begins	Messages
10/88	Phase out of ACC aliases	
10/88	Clark U. discussions begin	
11/88	Social factors of E-mail note	Message
11/88	Macintosh disc.	
12/15	Architext suggestions	
12/88	Context disc.	
01/89	Theater/ Activity disc.	
02/89	Education/Piaget disc.	
03/89	Mead: Phylogeny/Ontology disc.	
04/89	Mike's re-mediation message	
04/89	Problems with Net/local blackout	Messages
04/89	Interaction goals disc.	
06/89	Xlit	

06/89	XLCHC updates files	Messages
06/89	Last Source usage	Receipt
07/89	Newsletter conferenceing publication	Newsletter
07/89	Yrjo engestrom becomes permanent	Records
09/89	Reacap of XLCHC/goals & history	
10/89	Tools disc. again	
10/89	Computer as tool disc.	
11/89	Problems w/Arizona mail	
11/89	Xcomp	Data
11/89	Xclass	
11/89	Xact	
11/89	Subconferencing disc.	
12/89	Language & E-mail disc.	
01/90	Networking & teaching disc.	
03/90	Learning disabilities disc.	
04/90	Education, Race, & Poverty disc.	
05/90	Culture & Co-evolution disc.	
08/90	No messages over net: transition	Message
08/90	Looping w/Arizona again	
09/90	Compuserve ends	Receipt
09/90	Perfect com. disc.	
09/90	Culture/ Ontology disc. again	
10/90	Science disc.	
11/90	XCOG ??? first archived record	
11/90	Literacy/Culture disc. again	
11/90	Microgenesis disc. again	
11/90	Taping disc.	
12/90	Xorg	Data
12/90	Bruce sends mailx editor to xorg	
12/90	Appropriation/internalization disc.	
01/91	Crisis in the Middle East	
01/91	Request for "Origin Myths"	
01/91	War message triggers explosive reactions	
02/91	Request to shut down XLCHC	Message
02/91	Xgrad	
02/91	Xwar	Data

02/91	Learning disc.	
02/91	Welcome document	
03/91	Thought community disc.	
03/91	Soul disc.	
03/91	Social constructivism disc.	
03/91	Xlhc history note: the problem of English	Message
04/91	Xhistory	
05/91	Situated cognition/ behaviorism disc.	
05/91	Play disc.	
06/91	Xafter	
07/91	Refrigerator doors disc.	
07/91	Sylvia Scribner dies	message
07/91	Prolepsis disc. begins	
08/91	Geological metaphor disc.	
09/91	Layers/scaffolding disc.	
09/91	Metaphor disc.	
09/91	Welcome document recirculates	
10/91	Sharing/deceit disc.	
10/91	Heterogeneity disc.	
11/91	McCarthy disc.	
11/91	Language problem : "Guy" disc.	
11/91	Email structure disc: 1) lang 2) subgroups	
11/91	Uk sinks	
11/91	Welcome message revision	Copy
12/91	Xwork	Data
12/91	Children/ethnicity disc.	
01/92	Semiotics disc.	
01/92	School disc.	
01/92	Shutdown for M.L. King Day	
01/92	Zoped & computer disc.	