http://www.ped.gu.se/ekeblad/writings/earli99/multdyn.html

The emergence and decay of multilogue on a scholarly mailinglist

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Abstract

Electronic communication media provide opportunities for the creation of new kinds of spaces for learning. One such space is the electronic discussionlist, a technical arrangement of computer mediated activity which has been cherished and explored from the first by scholarly communities, because of its potential as a channel for coordinating activity in scholarly networks widely distributed in geographic space and time. The scholarly mailinglist is one of the new virtual spaces where communicative practices develop according to patterns that mix features of earlier oral and written forms into something that is neither a monologue nor a dialogue but a multilogue (Shank, 1993). In spite of depending on voluntary participation, scholarly mailinglists may form sustainable virtual settings for communities of learners, where multilogical discussions form the center of collectively autodidactic activity.

This presentation is based on research into the electronic archives of 10 years of discussions on an assembly of scholarly mailinglists, the Xlists, a virtual setting which has sustained discussions over cultural-historical, sociocultural and activity-theoretical approaches to human learning, development, communication and work since the middle of the 80s. The Xlist archives offer ample material for examination of the spontaneous emergence and decay of multilogical episodes in a virtual community of learners.

The purpose of the paper is to investigate the temporal structure of the emergence and decay of multilogical events on a scholarly mailinglist. The patterns of rapidly developing coordination between distant players, converging on particular objects of joint attention, and the following phase of divergence and decoupling are examined by means of empirical material from the Xlist archives, notably three major multilogical episodes from different eras in list history, chosen for their particular interest. The link maps resulting from this analysis offer resources for the conceptual grounding of a model of the mailinglist as an ecology where time is the crucial limiting resource, which is being developed by Barowy (1999). In addition the temporal separation of the three episodes provides an opportunity to explore the changes in temporal dynamics of multilogue as the mailflow on a scholarly mailinglist increases, notably the way coordination and remembering plays out under different conditions of mailflow intensity. Finally, the implications of the self-organizing nature of mailinglist ecologies have been related, briefly, to one type of more planned activity on the Xlists: four case studies of episodes of joint reading.

The emergence and decay of multilogue on a scholarly mailinglist

The internal dynamics of multilogue

It is tempting to describe a scholarly mailinglist as a natural environment for learning, thus opposing it to more controlled and credit regulated course-based forms of electronic communication. Of course, the scholarly mailinglist is as much a cultural form as any other form of education. A successful mailinglist does, however, have some very attractive traits notably the potential to sustain a virtual community of learners, participating in the semiotic activity that Gary Shank (1993) has termed abductive multilogue. This phrase characterizes both the particular multi-voiced nature [1] of the written exchanges between a diverse mix of voluntary contributors in the staggered temporality of this electronic medium, and the abductive quality of collective grappling with issues of meaning and understanding. The way I have used the term multilogue (Ekeblad, 1998) it covers both of these aspects.

This presentation is based on research into the electronic archives of 10 years of discussions on an assembly of scholarly mailinglists, the Xlists [2], a setting which has sustained discussions over cultural-historical, sociocultural and activity-theoretical approaches to human learning, development, communication and work since the middle of the 80s. Some time in the early years of the 90s it became customary among Xlist participants to use the acronym CHAT: Cultural-historical Activity Theory for referring to this shared crossdisciplinary field. There has been considerable long-term thematic continuity in Xlist discussions, and there has also developed a tradition of local communicative practices conducive to learning.

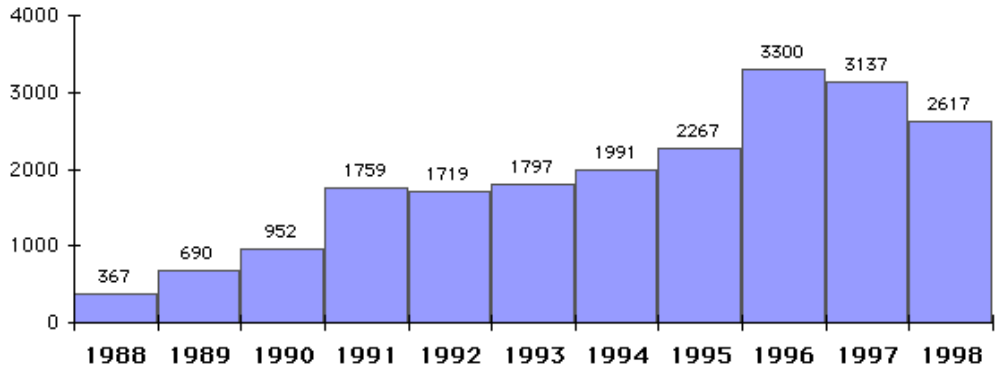

Fig. 1. The Xlist mailflow by year.

Through the years the Xlist culture has been generative of a spontaneous flow of multilogical discussions, as well as of a willingness to try various forms of more or less local organization of events. Conditions are favourable for the formation of a multiloguing community of learners when the shared interest in some particular intersection of scholarly topics and approaches produces what Alejandra Rojo (1995) describes as a dynamically balanced forum: subscribers join the forum at a moderate rate, which is in approximate balance with the

rate of leaving. There is also a relatively stable core of regular contributors, who volunteer to keep conversation going.

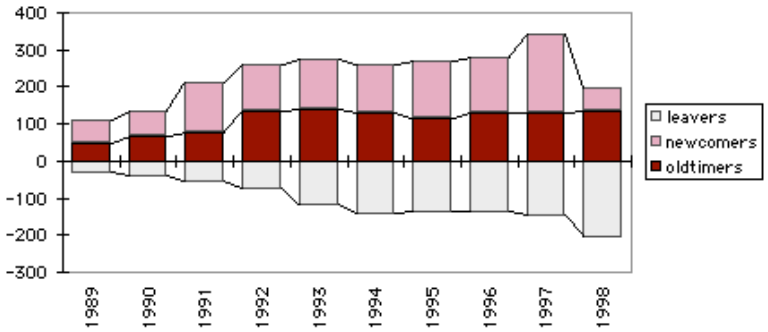

Fig. 2. Continuity on the Xlists.

Figs. 2 and 3 show the dynamic stability of the Xlists, in this respect. The category of oldtimers is in this context defined as contributors who also contributed to the list the previous year, whereas newcomers did not, although they may have been active at some even earlier time. There is a core of oldtimers, which has been fairly constant in size for many years. At the same time the number of new contributors has remained roughly equal to the number of last years contributors who have left or ceased posting to the list (with an overweight for the new contributors in the growing years of the mailinglist and some stagnation in the dynamics of the last year). The core of oldtimers changes at a slow rate on a timescale of several years as some of last years newcomers continue to be active (often increasing their activity), while others from the core drop out .

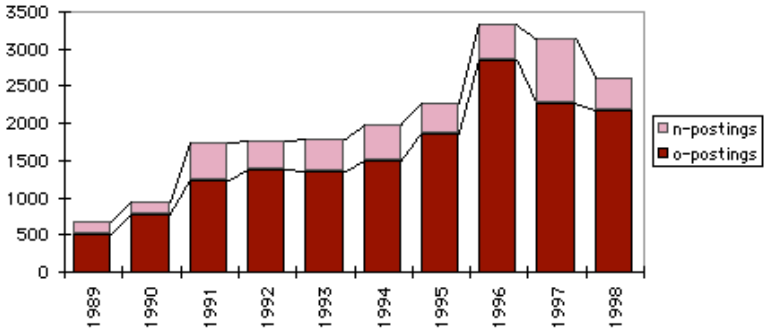

Fig. 3. Shares of the mailflow.

When there is, in this fashion, both a continuity in commitment and an openness to newcomers, room for innovation as well as for a tradition of local discussion culture, it is possible to maintain a shared communication space that is safe without being stifling. In a scholarly forum like this any fresh item floated into the intermedium of the mailinglist may start off a sequence of written interaction where any message may refer back to multiple previous postings and also evoke multiple responses, resulting in the web of interrelated texts (Gruber, 1998; Shank, 1993) a rich multilogue where the matter is tossed back and forth in diverse ways, producing clashes as well as harmonies. Participating actively (whether as a

reader or a writer) in multilogue on relevant topics can be an exciting as well as educational experience. A common way for Xlist contributors to enter the discussion is to start by telling others how "extremely generative and productive", "breathtakingly rich and stimulating", "wonderful" and "exciting" the conversation is[3]. As observed by Galegher et al. (1998) this is both a way of gaining legitimacy in online groups, and a way of maintaining the socially constructed sense of community in the group. However, without some truth in the perception, participants would soon cease to be willing to keep reproducing this collective image. It has also happened more than once in Xlist history that particular discussions have been so rewarding for the participants that there have been suggestions that the best parts should be edited for publication in at least one case there was also a work group putting considerable efforts into such an enterprise. Moreover, while the excitement of multilogue unfolding in real-time may be gone when the cyber-archeologist comes mining the electronic archives, I find myself constantly impressed by what I find. Not that all of the electronically sedimented multilogue is pure gold or any other kind of precious mineral when a scholarly mailinglist is the only channel connecting its subscriber collective this single channel will, apart from the multilogical discussion activities, have to accommodate activities serving to maintain the channel itself, and activities serving to anchor the virtual community in the traditional networks of academia (Ekeblad, 1998) but in the best of the conserved moments there is still an evocative educational quality remaining in the petrified text from the fluid multilogical circumstance of its production. The multiplicity of voices, mutually challenging, or complementing and reinforcing, does not just present a topic in a take-it-or-leave-it fashion, but also shows what the conceptual difficulties are and various ways to overcome them multilogues on a scholarly mailinglist fill much the same function as a seminar discussion, but do so in a medium where the products are easily preserved.

The typical pattern of emergence and decay of a multilogical episode, however, reveals an inherent tension between the advantages and the drawbacks of voluntary telematic activity. While new multilogues seem to emerge in an almost explosive fashion, with an initial expansive phase of intense and relatively focused exchange, they usually end by dissolving inconclusively, sometimes by the abrupt abandoning of a topic, sometimes by fading out or by associative movement away from the preceding focus. The phenomenon has been recognized for a long time and with dissatisfaction on the Xlists:

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A number of folk have commented, myself included, that in those periods when the
discussion gets hot, as it has at least once in each of the subconferences over the
last year, one begins to get a sense that a sort of Vygotskian "chaining" or
"thinking in complexes" takes place. At first the conceptual flow is exciting, but at
some point, one longs to lay out the messages side by side and get close to a
simultaneous/paradigmatic summary of the flow, e.g., to create a product that might
approximate what LSV calls true concepts.
(M.C. 89-04-04)
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So while multilogue stimulates and inspires list participants, its rambling nature also regularly provides occasion for disappointment. Over time another reason for being dissatisfied will also reveal itself, namely the instability of collective memory in the mailinglist activity system:

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[T]here is a heterogeneous but constrained set of topics which comes up once or
twice a year such that in some cases (zone of proximal development, context,
learning/development/play, Vygotsky vs Piaget, genetic methodologies, activity
centered instruction, etc.) have reappeared over a number of years. By itself this is
no problem. The discussions are always interesting. But I get the nagging sense that
it should be possible for the discussions of these key conceptions in socio-cultural-
historical-activity-centered theories to CUMULATE.
(M.C. 92-10-01)
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While much of the fresh and exciting quality of electronic multilogue stems from the unpredictability and intensity of the spontaneously emerging coordination between distant players, the frustratingly predictable decay without closure, so typical of multilogical episodes, has the same source: the self-organizing nature of the mailinglist activity system. In a similar fashion the limitations of collective memory are a natural consequence of the dynamic stability of the subscriber collective. While scholarly mailinglists are held

together by the constrained set of central themes that constitute them as an intersection between network participants, the fact that there is a turnover of active participants contributes, on the one hand, to keeping the discourse from stagnation and, on the other hand to "loss of memory".

Dynamic balance in the mailflow

In the activity genre of scholarly mailinglists, where every message arrives into your personal mailbox there is a precarious balance between too much mail and too little. Too far between messages and subscribers forget that a list exists or at least there is nothing to respond to, so they don't. In either case the result is an extinction of the mailflow on the list. But also the opposite case, where the mailflow on a list is too intensive and time demanding, is commonly given as a reason for dropping out of a list (Rojo, 1995). The Xlists have their own share of subscribers asking for help to be removed because they are "drowning in print", or get "too much mail" while lacking "enough time to read it or do anything with it right now". On the other hand, it only takes a couple of days without mail over the Xlist channel before someone posts a message asking what has happened. A dynamically stable and successfully active list seems to settle into oscillation around a recognizable average mailflow, where the occasional references by list contributors to episodes of either "vast and dizzy silence" or a "fast and furious" "pace of conversation" are if not consensual or essential truths at least identifiable enough not to be contradicted by co-participants. On the Xlists, where the average mailflow has increased substantially since the late 80s these perceptions have calibrated along with the growing traffic. [4]

Much of the Xlist mailflow is produced by participants responding to earlier messages in this my research object is no different from the electronic fora studied by so many other researchers (Gruber, 1998; Galegher et al. 1998; Rafaeli & Sudweeks, 1996; Palme, 1989, 1995). The prevalent chaining of responses was what allowed Palme (1989, 1995) to construct a probabilistic model for calculating the lower size limit for a successful group (when the purpose is the exchange of experience). If each message evokes, on average, more than one message in reply, then a chain reaction arises that keeps the activity going. Given a certain probability for each participant (excepting the sender) to reply to a message, Palme shows that group size must be above a certain threshold if activity within the group is to be sustained. However, while a simple probabilistic model like this can describe moments of expanding mailflow (or conversation that never starts), it is too simple for explaining why the chain reaction once started does not proceed exponentially over time. Some kind of self-regulating mechanism is called for in order to produce the typical oscillations of mailinglist activity (Barowy, 1999).

The activity on a scholarly mailinglist is self-organizing in several senses. For one thing, participation is voluntary and the written conversation flows without central control. There is neither anybody with the formal authority to coerce Xlist participants into reading or writing Xlist mail, nor any formal credit for participating. There are also no cues for the coordination of simultaneous reading and writing between mailinglist participants, due to the distribution in time and space of when and where participants take actual part in the activity. In principle the only coordination between participants is provided by the messages circulating in the system, generating ever new potentialities for the semiotic process of reading and responding. The diversity of participation patterns the spatial and temporal distribution of readers and writers over a very fuzzy span of "present time" in the virtually shared space contributes to an overlap of message generations. Typically some messages will be remembered and responded to throughout the span of an episode, while others gain attention more ephemerally. This co-presence of several generations of messages in the system complicates the internal dynamics of the mailflow, and points to the semiotic nature of the activity the way multilogue develops in relation to shared objects of discussion. These objects of discussion, however contentious their definition, mediate the coordination of messages (Ekeblad, in preparation a).

On the Xlists the heterochronicity of the virtual setting is reinforced by a server lag of typically a couple of hours between the arrival of a message at the listserver and its dispatch to all subscribers [5]. This is not

necessarily a disadvantage. On the contrary, it may serve to broaden the diversity of postings submitted in response to the same message. Alton Becker (1988) observes how when descriptions of an event in his lecture are written down there are no two alike, whereas when descriptions are given orally under the same conditions:

> ... after about five or six [descriptions] people start saying "Well I said just what he said." The inventiveness of new versions, of new "takes" on this situation seems to dry up under the pressure of the oral situation. (Becker, 1988, p. 23)

The server lag undeniably expands the space where contributions are composed without being compared and seen as "redundant" or having "been dealt with previously" [6]. On the other hand, contributors do their best to make the spatiotemporal gaps in their shared setting invisible by addressing others as present in spirit if not in body, by explaining their absences from the shared virtual space due to travel or "end of term madness", by apologizing for "late" contributions, and other time-honoured practices for maintaining presence at a distance observed by researchers of pre-electronic letter writing (Decker, 1998). Thus, from the vantage point of a participant it makes sense to construe mailinglist activity as a continuity of its own, an internally coherent turn-taking sequence. Nevertheless, when looking at the system from the outside, the flow of messages on a mailinglist is evidently the resulting product of the aggregate behavior of many independent participants reacting in parallel to events within the system (cf Dooley & Van de Ven p. 19). So mailinglist activity is self-organizing in at least three senses: first in the sense of being a semiotic process, second in the social sense of being voluntary, with a distribution of authority throughout the community, and third in the technical sense that coordination is heterochronous and telematic, proceeding across the spatiotemporal gaps in the virtual setting, and with a certain amount of collective memory over the latest few generations of messages. These circumstances make it attractive to explore whether and to what extent a mailinglist ecology of readers, writers and texts (Syverson, 1994, 1999) can also be modelled as a self-organizing system in a mathematical sense (Barowy, 1999). The time available for subscribers to participate in the activity of reading and writing mailinglist contributions is a likely candidate for a simple self-regulating model: the more mail there is to read, the more there will be to respond to, but there will be a point where all the available time for mailinglist participation is consumed simply by reading the contributions of others. Then the next response will not be written which in turn means that others will have one message less to read and respond to, and so may have time to produce a message of their own, etc. An episode of intensifying mailflow may thus lead to its own collapse, but if there is enough stability in the community of list participants the ensuing period of mail sparsity prepares the ground (the screen) for a second growth. The present paper is written in dialogue with the model suggested by Barowy (1999), where the mailinglist is regarded as a consumer-producer ecology with the available time of list participants as the constraining, renewable resource.

A self-regulating model seems reasonable at least for the conversational, multilogical part of the mailflow the part of the activity where events within the system occur in response to earlier events within the system. As a scholarly mailinglist will typically be the channel not just for scholarly multilogues but also for networking activity in the scholarly community of its subscribers and for the maintenance of the communication channel itself (Ekeblad, 1998) there will always be a share of the mailflow that neither originates from the internal flow of events nor has any effect on the subsequent mailflow. Items of academic information value like conference calls and job announcements are usually floated into the mailstream according to external timetables and without spawning further activity over the mailinglist channel. The scattered input of academic and other information into the network will appear within the list at random intervals, being the output of processes external to the mailinglist. On the other hand, multilogical episodes once they get started will run their course as a process internal to the mailinglist ecology. They can thus be expected to follow a dynamics of self-organized criticality, which would result in contribution patterns much reminiscent of the avalanches caused by the single grain of sand dropped on to a sandpile in a state of criticality a macro-level episode is generated by a single micro-level event which, because of coupling, cascades its effect across many interrelated entities (Dooley & Van de Ven p. 16; Bak, 1996). If this is more than a superficial analogy, there are only very limited possibilities for predicting and controlling the self-organized flow of activity on a scholarly mailinglist.

Spontaneity and planning

Now, from the perspective of scholars, who voluntarily contribute their time to a virtual community, it would still be desirable to be able to combine the charm of multilogical spontaneity with a modicum of order. Although based on other electronic fora, Alejandra Rojo's suggestions summarize quite nicely the past explorations of the Xlist community in the direction of planning:

> Approaching the issue from another angle, but still within the framework of the community metaphor: periodical online events, significant for a particular research or educational community, could add a cultural/ritual dimension to the online activities of the community. In general, it can be useful to add planned communication situations, with a focus for the discussion, with a beginning and an end, and with selected audiences. (Rojo, 1995, 4.4.1.1.)

It would also be desirable to aid the collective long-term memory by the creation of suitable mediating artifacts, like FAQ files or searchable Web archives, however, this is a track that I will not follow in this paper – it is mentioned here only because the problem of establishing and maintaining focus and the problem of cumulativity have usually been twin driving forces of organizational experiments on the Xlists.

Through the Xlist history there has been a variety of attempts to organize thematically focused events and spaces. One example of the organizational effort to create dedicated spaces was the institution of a growing number of thematic subconferences from 1989 and up to the two reforms in 1994 – when the number of Xlists was substantially reduced – and 1995 when all Xlist communication was again channeled into a single list. There were Xlists for discussion of literacy, education, and activity theory (to mention the most active ones). In other cases one or the other of the Xlists has been used as a channel for collaboration between scholars running similar courses in different locations, or between seminar groups exchanging reports from their discussions, posting summaries of their readings, or asking questions to distant CHAT scholars. There has been at least one scheduled "online conference", and several more or less organized episodes of joint reading of some preselected paper or book. These episodes of more structured list activity have often been disappointing in comparison to the spontaneously emerging multilogues, either because they never got quite off the ground or because of succumbing to the typical decay without closure – the discussion may have been valuable, but, somehow, the social form of planned events seems to raise the expectations for a more definite endpoint than what a mailinglist multilogue typically affords.

The purpose of this paper is to investigate the temporal structure of the emergence and decay of multilogical events on a scholarly mailinglist. The patterns of rapidly developing coordination between distant players, converging on particular objects of joint attention, and the following phase of divergence and decoupling are examined by means of empirical material from the cyber-archaeology (Jones, 1997) of the Xlist archives, notably three major multilogical episodes from different eras in list history, chosen for their particular interest. The link maps resulting from this analysis offer resources for the conceptual grounding of a model of the mailinglist as an ecology where time is the crucial limiting resource, which is being developed by Barowy (1999). In addition the temporal separation of the three episodes provides an opportunity to explore the changes in temporal dynamics of multilogue as the mailflow on a scholarly mailinglist increases, notably the way coordination and remembering plays out under different conditions of mailflow intensity. Finally, the implications of the self-organizing nature of mailinglist ecologies have been studied in relation to one type of more planned activity on the Xlists: four case studies of episodes of joint reading.

In thus working with the puzzlements of the self-organizing nature of scholarly mailinglists – how to theorize them and how to deal with them in the most practically fruitful ways – I have been weaving back and forth between centered and de-centered stances of research, for the ultimate purpose of finding paths towards a re-centering where observations from an adopted perspective from outside the system are

brought back into the activity, so that prevalent metaphors may be disputed or used in creative ways and prevalent rules and approaches may be modified or corroborated (Raeithel, 1983, 1996). This note on the methods of the paper comes at a point where the reader will already have found me referring to the perceptions of mailinglist participants, including myself, in a voice where the experienced shifts in intensity of mailinglist activity are taken for granted, described as "silence" or a "wonderful explosion of interesting ideas", and dealt with accordingly, by centered, participatory problem-solving (Raeithel, 1992). The reader will also already have found me performing the de-centering move of employing mediating artifacts that produce and support a de-centered perspective on the mailinglist activity, as, for example, graphs representing aspects of the whole system over a timespan of years. The link maps introduced in what follows are another example of the de-centering tools I have used for placing myself as well as my readers outside the system, provided with an overview of certain aspects, allowing exploration of the possible relations between object-oriented activity and its counterprocess. This de-centering practice may then bring opportunities for a re-centering, taking the symbolic exploration back into the human reality production of scholarly mailinglists. As observed by Raeithel (1992), re-centering is a process of dialogue in the relevant community, where I as an individual participant may take my turn in producing the communal voice that makes the evaluation of possibilities and the options for choice public between participants in the symbolic self-regulation of the activity in question.

Three outstanding multilogues: Tools, Goals and Settings

In the expanding phase of a multilogue, when contributors are in the process of converging upon a fresh object of joint attention, the effect is one of rapid coordination of productive forces on the list. Perhaps the most exciting feature of mailinglist conversation is the way that a single message may trigger this chain reaction of responses.The Settings Multilogue in September 1997 was one such episode, occurring at a point in time when I had recently started into the archaeological excavations of the Xlist archives. This event caught my interest as a particularly vigourous specimen of multilogue, standing out from its surrounding both because the preceding weeks had been a period of relative quiet on the list and because of its clean emergence from the introduction of a single seed message, triggering an avalanche of interrelated postings over the next few days. Only at a relatively late stage there are messages in this cluster that connect it to other concurrent threads. Thematically the Settings Multilogue relates to concerns for the sustainability of educational change that have often been central in Xlist discussions. The immediate reason for the re-emergence of the theme on the mailinglist was the symposium in the summer issue of the Mind, Culture and Activity on Seymour Sarason and the creation and sustainability of settings for research and education (Cole, 1997; Sarason, 1997; Moll, 1997). The seed message of the Xlist multilogue was an external comment, forwarded to the list, and suggesting an optimal life-span of ten years for a setting. The ensuing discussion was only loosely connected to the journal articles. It was carried mostly by its own internal dynamics, producing altogether 68 postings over a period of 11 days, and containing contributions of theoretical elaboration of how to define, delimit and analyze settings for the purpose of research, as well as contributions of anecdotes from architecturally horrible classroom or lecture settings and counterstories of how teachers transform the use of apparently fixed spaces.

The other two multilogues, the 1988 Tools Multilogue and the 1993 Goals Multilogue, were chosen from among the celebrated episodes of multilogue that have been remembered for years in the list community, and brought back by long-term participants to collective attention as almost legendary events.

The Tools Multilogue of 1988 took place in the single-list phase of XLCHC, and was the first major archived Xlist discussion on the mediating role of tools in human psychological activity, a theme which returns in several later multilogues. Just like the Settings Multlogue, this episode emerged from a single seed message: a posting in the second week of October by a Japanese visiting scholar, reflecting on the nature of tools in modern society, as an afterthought to a UCSD seminar. Like the seed message of the Settings Multlogue this posting thus brings fresh external material into the mailinglist ecology. The development of the Tools Multilogue is considerably slower across calendar time than the Settings

Multilogue, corresponding to the fact that the nine years passing between the two episodes have brought with them an almost ninefold increase in the mailflow. The Tools Multilogue lasts through November and December, moving through three rounds, first introducing the theme of mediating tools in general, taking computers as one of the examples, the second round shifting the focus more towards computers as tools, and the third one moving into the related topic of the decontextualizing effects of computer mediation. There are all in all 74 postings over a period of 78 days, debating whether the power of computer tools is an illusion or a real benefit, celebrating the relation of the carpenter to his tools, and discussing the artifact mediated nature of human cognition.

The 1993 Goals Multilogue occurred in the complex situation of the middle years of Xlist history, when there were a number of subconferences with overlapping but far from identical subscriber collectives. Its topic is the activity-theoretical system of concepts centering around action-goal and activity-motive (originating with Leont'ev (1978, 1982)), which has been a regularly recurring object of abductive multilogue on the Xlists. The main multilogue took place in November on the XACT list the subconference designated to activity theory but there is a complex pre-history to this episode spanning over other parts of the Xlist space, illustrating Syverson's observation (1994, 1999) of how hard it can be to draw the line on where a discussion topic first is brought into the mailinglist ecology of readers, writers and texts. First, there were weekly summaries of CHAT readings posted to XACT through October by graduate students following a UCSD seminar on Activity, Mind and Communication. While these postings did not evoke many responses, they did bring Leont'ev and the theme of goals and agency into the shared space of the mailstream. Then, in the third week of October, a couple of new subscribers to the XLCHC ask for information about collaborative learning, which results in a discussion routed into the XCLASS subconference, where the question about learning strategies, and about who sets the goal for learning, comes up. A couple of postings take up the theme of goals or strategies on the XACT in the end of October. One of them is from a contributor asking for a non-circular definition of 'goals', the other a cross-posting between XACT and XCLASS on the topic of goals and strategies. It takes a few days, into the beginning of November, before there is a single long message in response. It is with these three messages that the collective of participants is coordinated into a full-blown multilogical episode it is from there that the sequence of responses starts expanding to a densely interrelated cluster, and it is these messages that are referred to later in the episode as the ones initiating the discussion. What ensues is perceived by participants as a multilogical event out of the ordinary "the best one I have ever seen in any 10 days that I can recall". Including a smaller spinoff cluster on the related topic of internalization there were 85 postings in the Goals Multilogue over a period of 34 days. Towards the end of this episode there were measures taken to prepare a collective publication. Unfortunately this edited discussion never made it to the press (Herrmann, 1995 contains some of the results of these efforts) the archived version although voluminous and rambling contains material that is a good example of the sedimentations of an online seminar that could have been trimmed into an FAQ for the list. There is both useful explanations of the central concepts of Leont'ev's activity theory (activity/ /motive, action/ /goal, and Object) given in response to questions from relative beginners, discussion of how to relate Leont'ev's treatment to other cultural-historical formulations, and attempts to develop the concepts further.

Clustering patterns

The descriptions of the three outstanding multilogues in the previous section run somewhat in advance of the actual analysis, as the multilogical clusters were not initially treated in separation from the total mailflow in which they occurred. Samples were chosen because of the target multilogues, but the boundaries of the multilogical clusters were established in the analysis. The coded samples of messages include at least twice as many messages and twice as many days as the multilogues in focus (the Goals sample includes only the XACT mail):

sample start	sample end	msgs	days	mult msgs	mult days	multilogue start

Tools	88-07-01	88-12-31	186	184	72	78	88-10-12
Goals	93-09-01	93-12-31	202	121	75	34	93-10-26
Settings	97-08-28	97-10-08	473	35	68	11	97-09-20

Table 1. Description of the coded samples.

As the messages distributed over a scholarly mailinglist are the sole means for coordinating the participants in the local ecology of readers, writers and texts (what Syverson (1994, 1999) terms an ecology of composition) an analysis of the pace and pattern of references between messages will inform our quest for the dynamics of multilogical self-organization.

Multitopicality of messages and multistrandedness of the mailflow are well-known characteristica of many forms of asynchronous electronic communication (Black et al., 1983; Levin et al. 1990; Gruber, 1998). Episodes of intense multilogue on the Xlists typically emerge in an unpredictable and ungovernable fashion from this more mundane background fabric of Internet troubleshooting, exchanges of academic information, greetings between participants and scattered offerings of discussion topics that generate few responses and no extended discussion [7]. Compared to this background of postings that do not touch many readers with the urges to "jump into the fray", "steal some time to write", "break" their self-imposed "e-mail rule" etc. episodes of multilogue tend to be subjectively perceived and socially constructed as more intense activity than usual. These jointly maintained (inter)subjective impressions of how "the pace of conversation has been fast and furious" or "the flow of postings is back to a pace where it is hard to keep up" have adapted themselves to the increasing mailflow over the years: when multilogues get going, participants regularly find it hard to keep up with the pace of arriving mail - whether the total harvest of the year is 370 postings, as in 1988, or 3300 as in 1996. A simple objective measure of the number of messages per day seems to confirm the subjective impression that it is the major episodes of densely interconnected multilogue that produce the above-average parts of the mailflow. This impression, however, does not provide enough support for telling a dynamics of self-organization apart from random fluctuations, overlayered on weekly cycles and the cycle of the acedemic year (Barowy, 1999). A firmer support must be built on analysis of references between messages. The production of a link map, i.e. a graphical representation of intermessage references (cf. Levin et al. 1990) has been an instructive part of this analytic process.

Links between messages cannot be coded just by trusting that contributors have correctly used the response function of the mailer software. It often happens that the response function is used merely as a convenience for getting the message addressed to the list, which can be totally misleading for the purpose of analyzing intermessage references. Thus neither an inherited subject line, nor the inclusion of the message responded to are reliable indicators of relations between messages. Similarly, when the collective activity is triggered by a single message, it's subject line may be inherited for many generations, so that it does not indicate which of several followups that a given message is responding to. The coding of reference links between messages also must allow for many-to-many relations: a posting may refer to several previous postings, as well as it may be referred to by several later postings. For these reasons my method for coding links has been holistic and interpretative: I have read messages carefully for their references to previous postings, then called up pairs of messages in parallel on the screen for simultaneous scrutiny, coding justified links by means of a checklist of confirmatory indications lack of any confirmation being the only counterindication of a link.

First, I have coded the relation between subject lines. The subject line of a responding message may be a recycling of the subject line of the target posting. It may also be more or less modified, but still recognizable. In some cases the subject line picks up some phrase from the targeted part of a previous posting. In other cases there is no obvius relation at all for example, when a message refers to more than one previous posting, the subject line may be related to one of them but not to the others.

Second, I have coded for naming of the sender/writer of a previous posting, or the direct quoting of material from a previous posting. I have indicated in the checklist whether naming and quoting are done by the automatic response functions or by other types of appellation or typographically marked quoting. The epistolary practice of opening a contribution by addressing one or more of the recipients has been

inherited by the new medium but as electronic communication is developing a mixed heritage, there are also practices more akin to oral turntaking, where the recipient is not invoked by name for every turn. It happens, for example, that the answer to a question is so elliptic that it is not intelligible without being read together with what it is responding to.

For this reason I have also included an improvised categorization of the relation of response to target in my checklist, as a third type of justification. This is not an attempt at categorizing all the conversational relations between two messages. Mailinglist messages are typically multifunctional, and my purpose has not been to explore the subtility of movement between agreements in part and disagreements in part, the inclusion of other conversational acts like questions or the provision of additional information. It is no more than a means of documenting my reason for coding a link between two messages, and for this reason only the most obvious connection between two messages has been included. A relevant direct quote (one put to work in the message) ranks at the top of the hierarchy, with a paraphrasing of (part of) the content of the target message ranking next. Another category includes questions and their answers, mistakes and their correction, requests and their uptake i.e. several types of relatively simple adjacency pair relations, mostly between short messages. Then, a previous posting may also be just mentioned, without necessarily having a lot of its material appear in the referring message. This, nevertheless, must be counted as an intermessage reference. Last, in order to account for cases where a contributor refers to a thread in general, instead of responding to individual postings, or simply "chimes in" on a current topic which is a common behavior as a thread reaches maturity this has been coded as a link by association. In these cases the common object of association has always been entered into the record.

In the next step after links have been coded, graphical representations link maps have been constructed in a flowcharter. Messages are ordered sequentially from left to right, each message constituting a step in a system-internal temporality that compresses conventional calendar time in periods of low tide in the mailflow and expands it in periods of high tide. This may seem awkward, but, on the other hand it may be argued that it reflects the time that participants wrest away from other occupations to spend in the mailinglist ecology. In the sense that postings absorb a greater share of their daily activity from readers and writers when the mailflow is heavy, mailinglist time does swell. Fig. 4. shows how the flexible system-internal temporality relates to fixed calendar time.

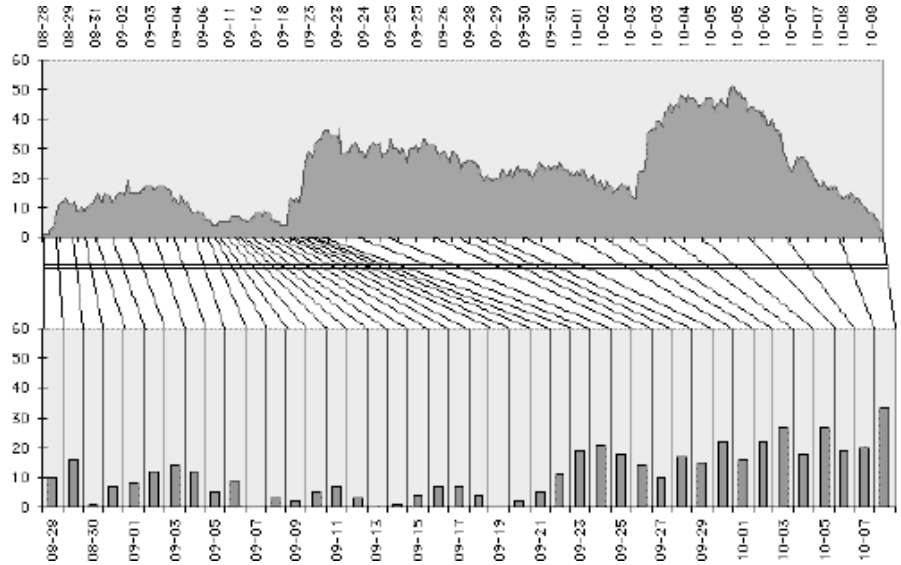

Fig. 4. The alignment between message-by-message temporality (top) and day-by-day temporality (bottom) in the1997 sample. The top graph shows the number of active links at each timestep, the bottom graph shows the number of messages per day.

Vertically the messages have been arranged in the link maps so as to disentangle clusters as much as possible. In large multilogues the links

between messages typically form a tangled web of densely interconnected messages, and while these clusters usually contain a few messages with links outside the cluster, the clusters of densely linked intermessage references will be separated by regions that are traversed only by a few stray links to other clusters.

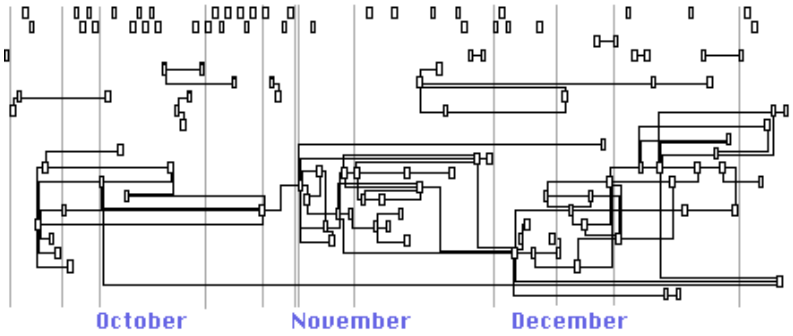

Fig. 5. The link map of the 1988 sample, including the Tools Multilogue

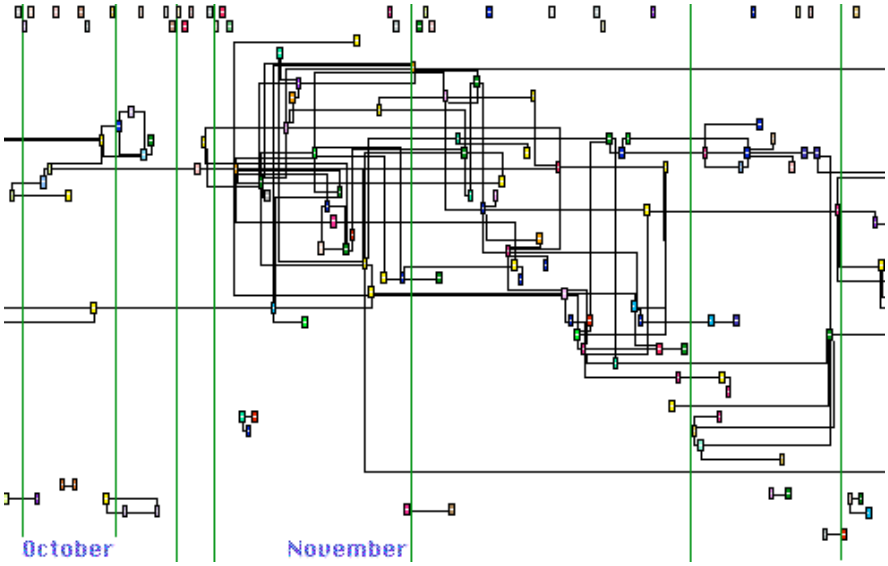

Fig. 6. The link map of the 1993 sample, including the Goals Multilogue

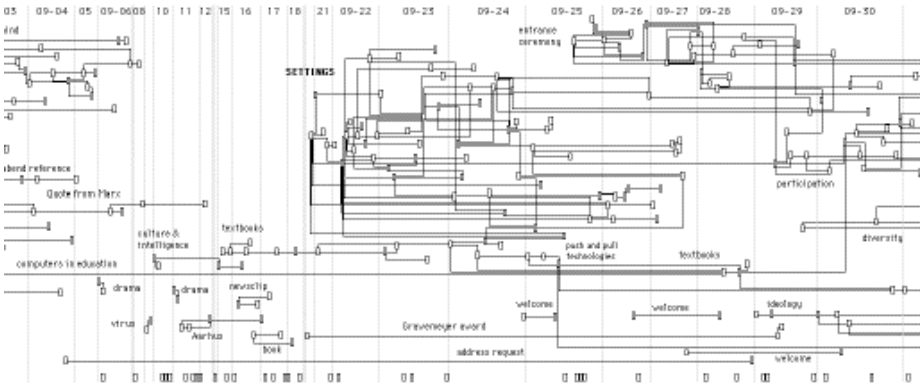

Fig. 7. The link map of the 1997 sample, including the Settings Multilogue.

The resulting link map provides a useful visualization of message relations, where different types of event may be discerned, and the development of specific episodes may be followed. In the figures below the link maps of the 1988 sample and the 1993 sample are articulated week by week, while the link map of the 1997 sample is articulated day by day. The link maps make visible both differences and similarities between the three samples. The main difference between the two older samples and the 1997 sample (apart from the substantial increase in the mailflow) is that the Tools Multilogue and the Goals Multilogue both stand out as the absolutely major event in the channel (or subchannel) for weeks and months, while the Settings Multilogue shares its virtual spacetime with several other clusters, even though it spans a much shorter period of calendar time. As for similarities, the three samples all contain a sprinkling of isolates messages that neither respond to another message nor get responded to and they all contain minor clusters, representing simple question-answer or topic-comment exchanges, in addition to the larger multilogical clusters. There is also a certain visual similarity between the maps of the different multilogues, showing the typical relations between generations of postings: how a cluster forms when a posting evokes more than one response, these in their turn evoke more than one follower each. The list-internal temporality expands to accommodate an increasing number of postings within a relatively short span of calendar time. Sooner or later a cluster starts getting tangled: when contributors post messages that refer back to more than one message and relationships get mixed over generations. Fig. 8. shows the cumulative link map of the Settings Multilogue as it develops over its first five days.

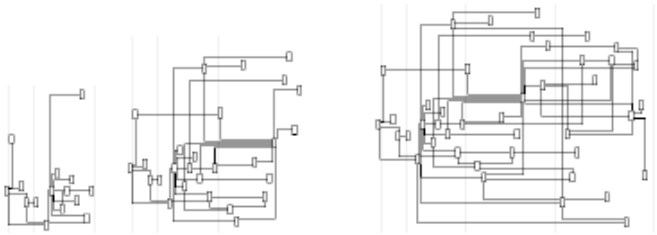

Fig. 8. The accumulation of messages and links first three days, first four days and first five days of the Settings Multilogue

Characteristically what makes for the emergence of a densely interconnected multilogue is when there are a number of postings that not only receive many quick responses, but also turn out to be remembered for a comparatively long time by contributors.

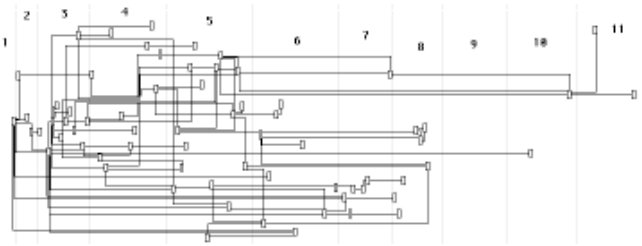

Fig. 9. The whole Settings Multilogue

Fig. 9. (compared to Fig 8.) shows, among other things, how a substantial part of the visual density of the Settings cluster is produced as contributors keep referring back to some of the early postings. Empirically, this remembering occurs both because these postings offer a powerful object for coordinating the reading and writing attention of many participants, and because of the tendency to collective self-observation when contributors start braiding metacomments into their text about how it all began. The number of ancestors to the batch of messages posted on the same day gives an indication of the density of intermessage reference links. As can be seen from Fig. 10 the Settings Multilogue does stand out in the conversational flow on behalf of its density. Several messages may have the same parent or parents, and for the purpose of measuring the density of interconnections each instance of parenthood is counted separately. The effect is amplified when dense messagechains are followed for several generations back.

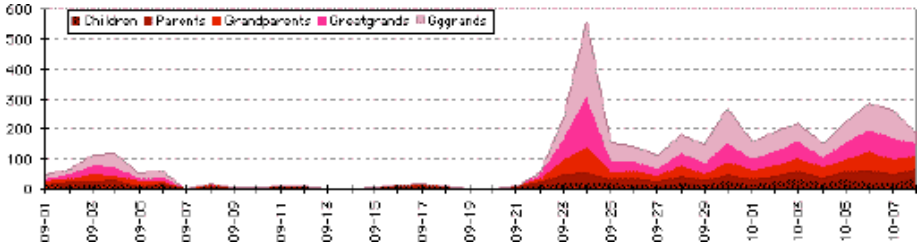

Fig. 10. The number of ancestors to the messages posted the same day in the 1997 sample.

The spatial metaphor of the link maps also illustrates how, with the accumulation of an increasing number of postings in a cluster, their representations necessarily cover more space. In time it is simply not possible for each contributor to explicitly take account of all previous postings in the cluster. The workload of maintaining an overview of the whole discussion grows past individual and collective capacity.

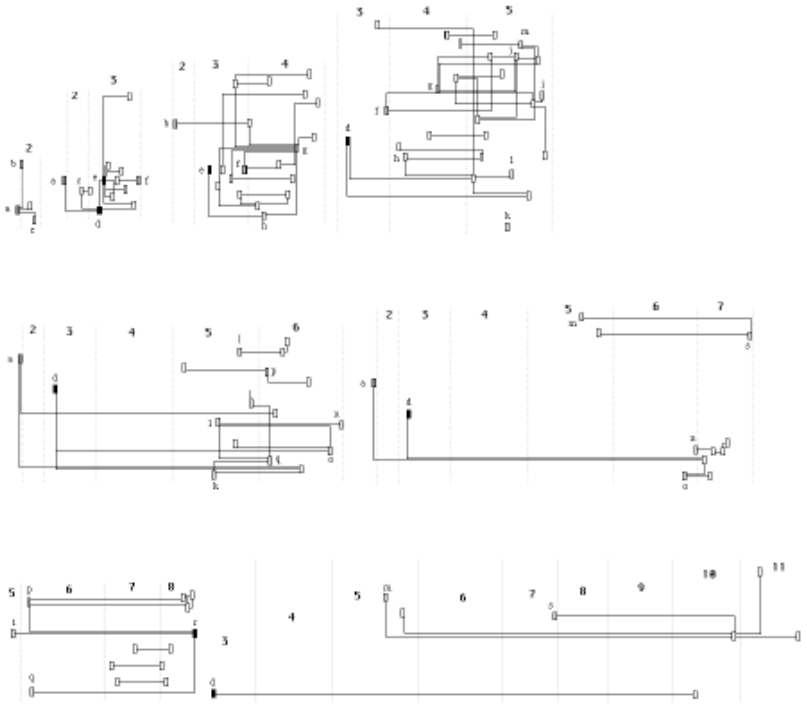

Fig. 11. New messages and their immediate ancestors. Partly erased maps for Settings Multilogue, days 2, 3, 4, 5, 6, 7, 8 and 10-11.

The spatial spreading (which is a metaphor of the semiotic divergence of strands) can be made more visible in the link map by looking at suitable subsets of messages. Fig 11. shows the day-to-day progression of the Settings Multilogue by showing, for each day, only new postings and those older postings explicitly referred to in the postings of the day: children and their links to parents, with grandparents and other distant ancestors excluded. It is not altogether easy to navigate by this map even with the lower-case letters to mark postings that are important for alignment of the different days many of the positionings of individual postings look illogical when the history has been erased. However the reduction illustrates quite nicely how the web of intermessage references stays closely connected in the phase of emerging multilogue, as well as how common origin may be forgotten in the semiotic process as a multilogical cluster starts to decay. The spatial drifting apart of branches in a cluster corresponds at least metaphorically with the way different strands of a multilogue take up different aspects of the topic and bring them in very different directions, in the fashion of Vygotsky's chains and complexes. However, there are usually postings even late in the life of a cluster, that cross over and tie together nodes widely apart in the net of past messages whether by seriously attempted integration, witty application of a phrase transported from one context to the other, or just a friendly wave across to the neighbours: there are many possibilities. It so happens that the exemplar in day 8 of the Settings Multilogue is of the not uncommon kind where a latecomer seriously attempts an integration and reformulation of questions without succeding in wresting further writing time away from the mailinglist contributors.

We can see how the network of links gets looser in the decay phase of a cluster. The frequency of posting goes down, the list-internal timeflow shrinks unless other clusters have started expanding. While there have certainly been

expiring branches throughout the development of a cluster, soon there is no other kind: each posting that responds to a message in the cluster remains without further offspring except for the occasional successful mutation that starts a fresh process of multilogical coordination around an object acting a minor part in the drama moving center stage, or an object transformed by degrees into something new. This is, of course, just a description in words of what the link map makes visible as the nature of cluster endings: in the final phase few postings evoke further response, and these final postings often have little connection with each other, which may be seen as a kind of validation of the subjective sense of dissolution. Moreover, the fairly common occurrence of messages that do connect the loose ends of a dissolving multilogical cluster while receiving no further response, often consists in an attempt to summarize and integrate in order to bring the discussion further. So while these postings appear to close the structure of the cluster, they often contribute questions left without answer, and challenges not taken up, thus potentially contributing to the store of collective frustration.

Quantifications: contributors and message lifetimes

Some quantitative measures will complement the structural description of the semiotic self-organization of written conversation on the Xlists. There are several aspects of the mailinglist ecology that approximately follow an inverse power law, thus serving as indicators of self-organizing criticality. So, for example, as observed by Syverson (1994, 1999) the distribution of messages by contributor roughly follows a power curve, with the most productive of the 36 contributors to the conflicted discussion over the Gulf War contributing 11 postings and 18 contributors posting no more than a single message. The three multilogical clusters targeted in this paper show similar patterns (involving 27 contributors producing 72 postings to the Tools cluster, 20/75 to the Goals cluster and 29/68 to the Settings cluster). A logarithmic plot of the raw messagecounts per contributor, sorted in falling order from the most prolific to the single-message writers, exhibits a negative slope. The slopes of my three clusters are very similar to the one obtained from Syverson's data as well as to the distribution of messages over contributors in the entire samples containing the three target clusters (involving 53, 42 and 103 contributors).

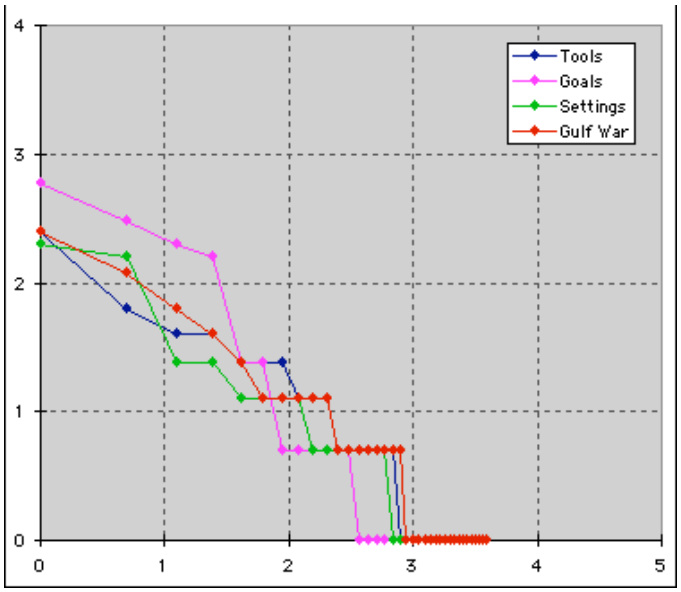

Fig. 12. Messages per contributor in four multilogical clusters. Logarithmic plot.

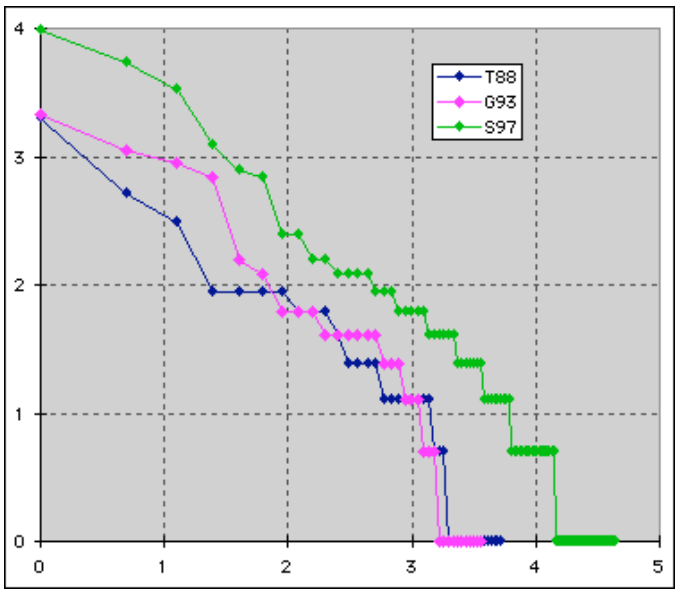

Fig. 13. Messages per contributor in the entire samples. Logarithmic plot.

The same pattern of a relatively small core of highly productive Xlist contributors, a wider pool of moderate contributors, and a large number of minor contributors recurs (with some variation) over the years, as can be seen from Figs. 14 and 15.

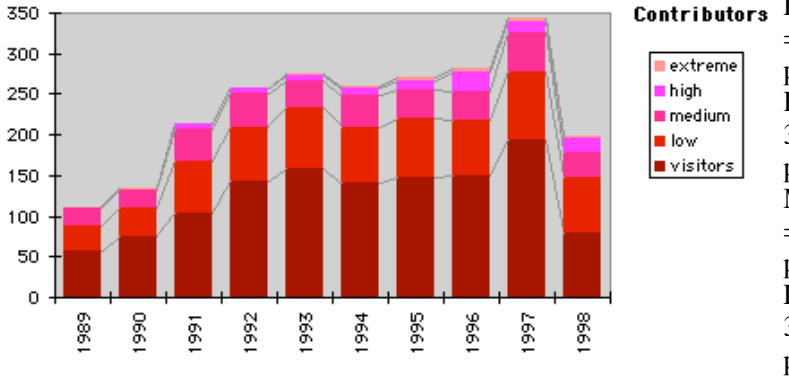

Fig. 14. Xlist contributor categories 1989-1998

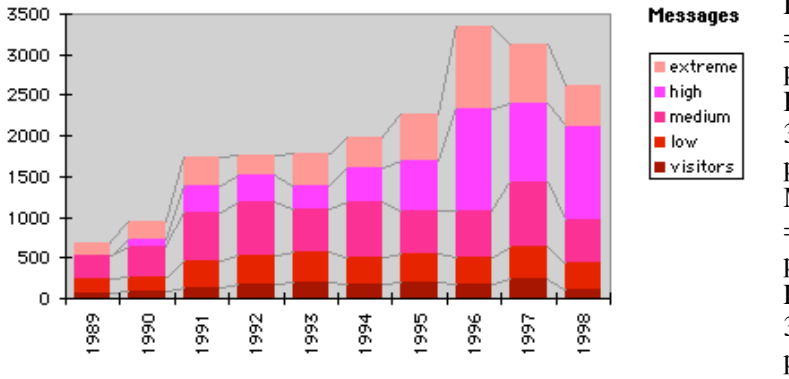

Fig. 15. Shares of the mailflow produced by the different contributor categories.

Extreme = 129+ postings
High = 33-128 postings
Medium = 9-32 postings
Low = 3-8 postings
Visitors = 1-2 postings

Extreme = 129+ postings
High = 33-128 postings
Medium = 9-32 postings
Low = 3-8 postings
Visitors = 1-2 postings

This power law pattern results largely from the dynamic stability in the subscriber collective. Over a timespan as long as a year it is mostly contributors who have been active in the mailinglist ecology across the whole period who fall within the most productive categories. Contributors who post very few messages in a year often make just this one transient appearance in the whole archive. Expressing the result of this dynamic stability in the distribution of activity over contributors in terms of percentages the cumulative share of the contributor pool who have produced the cumulative share of the total mailflow of the year we can see in Fig. 16. how similar the pattern is from year to year.

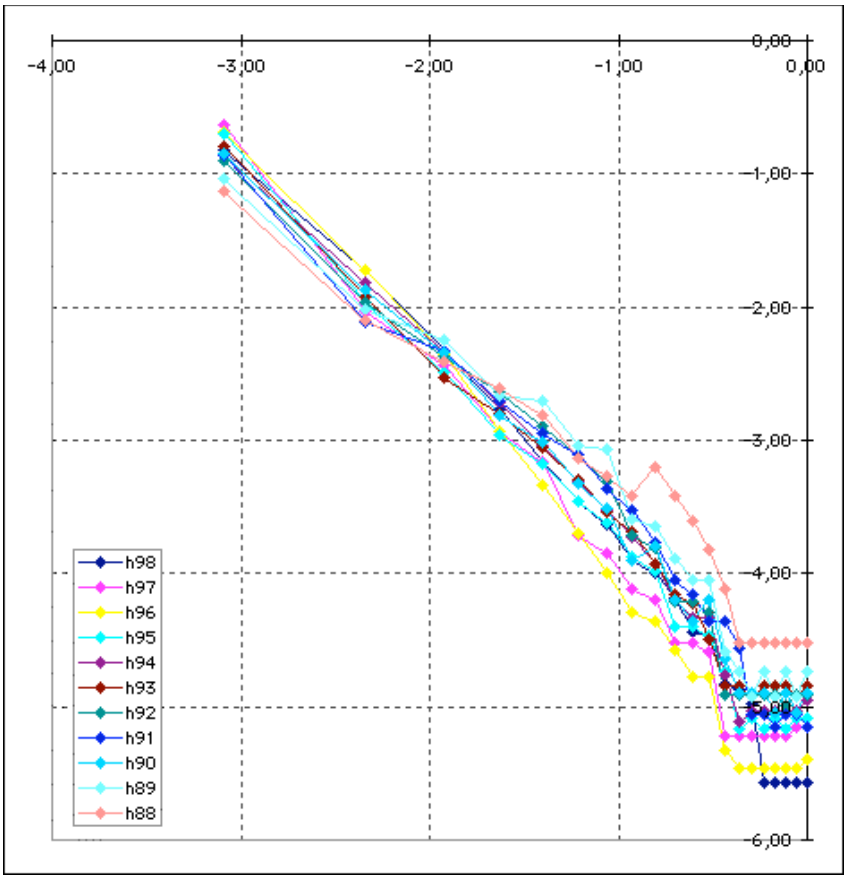

Fig. 16. Cumulative share of contributors producing a cumulative share of the messages. Logarithmic plot.

The plot shows the strength of the pattern i.e. how similar the negative slopes are, year by year. A corresponding description in more contextual terms is to say that the most active 5% of the contributors produce between 35% and 53% of the mailflow (average 44%), and when the most active 50% of the contributors are accounted for, between 90% and 95% of the mailflow will already have been produced. The activity of peripheral contributors would seem to be marginal, and quantitatively it is so this is where dynamic stability in the subscriber collective runs the risk of stagnating into an exclusive ingroup, unless the communicative practices are such as to encourage the participation of newcomers in spite of their quantitative disadvantage.

Another feature of the mailinglist ecology that tends to consistently exhibit an inverse power law distribution is the lifetime of messages. As is evident from the link maps, the chaining of responses does not proceed in cleanly separated generations the semiotic nature of mailinglist multilogue involves a certain amount of collective memory in the short term. While expansive message generation and collective memory of previous turns in the written conversation are necessary features of the process, it is just as necessary that messages expire, or else the mailinglist ecology would perish from congestion. Both emergence and decay of message clusters are the signs of viable mailinglist self-organization. So, how long do messages stay active in the mailinglist ecology? The conditions of the mailinglist setting do not allow us to actually see messages expire, but for the purpose of mailinglist activity in progress, a posting vanishes into obscurity (merges into the general past) when it no longer is explicitly referred to in new postings. Thus it is reasonable to regard messages as active in the system from the point in time where they are posted to the point where they are last cited. As long as the written conversation is still in progress, there is, of course, no knowing if and when a posting has been collectively forgotten. There is always the possibility that a contributor will respond to a message "waaay back" from a "discussion of ten days ago" (which is

"almost another era in list life"), or produce "a really late response to your interesting message" after the passing of four weeks. Indeed, the text as sedimented into the electronic archive at the listserver or on any number of other computer systems may always be picked up from its petrified state and rekindled into life on the list by being re-posted or drawn upon in discussions long after its original production. However, collective memory is usually fairly short, and it is a minority of the messages that are made present in the mailinglist ecology after weeks, months or years.

While all messages must be counted as active on the day they are posted, one half (or more) of all messages do not survive their first day. They either receive no further response (whether they are isolates or end points of a strand) or they are responded to only within the same day. On their third day only some 25% of the messages are still active. However, it appears from the the three coded samples that the collective memory of the Xlists has deteriorated over time. In 1988 messages quite frequently evoked responses ten days or a forthnight after being posted the estimate of ten days as the boundary of collective short-term memory returns more than once in Xlist metacommunicative discourse:

```
Things that aren't in the (say) ten-days-back stream of the xlchc exchanges that
moves incessantly forward at Californian pace (:-) are *collectively unconscious*.
(A.R. 95-03-26)
```

In the 1997 sample messages seem to exhaust their capacity for evoking responses after just a few days. In order to further investigate this impression of an overall decrease in message lifespan, batches of 90 postings were drawn from the three samples (leaving a margin of time/ /postings not used at the end of each sample).

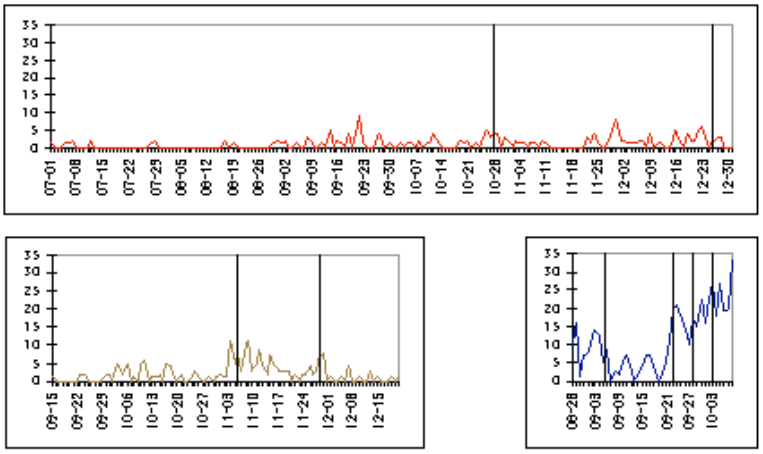

Fig. 17. Messages per day in the three samples (1988, 1993 and 1997), the graphs show the variation in the span of calendar time covered by 90-message batches at different times.

For each batch of 90 postings the number of messages still active on their second day, their third day etc. was calculated. After 30 days all messages in all the batches had expired. The steeper slope [8] of the logarithmic plots of the batches from the 1997 sample as compared to the slopes of the two older samples corresponds to a faster rate of decay in 1997, confirming the impression of a shorter collective "attention span" on the Xlists in later years.

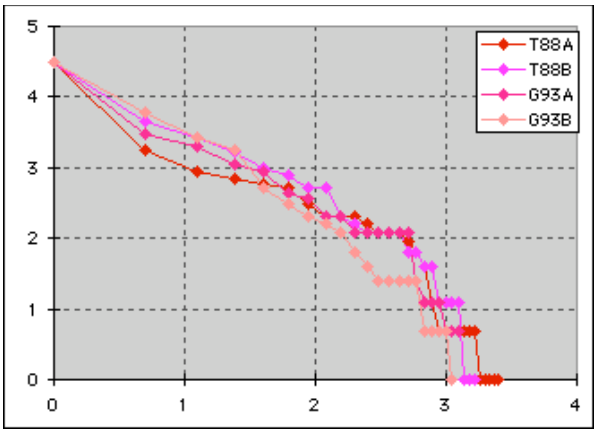

Fig. 18. Message decay over days. Logarithmic plot of the decay of batches of 90 messages each, two from the 1988 sample and two from the1993 sample.

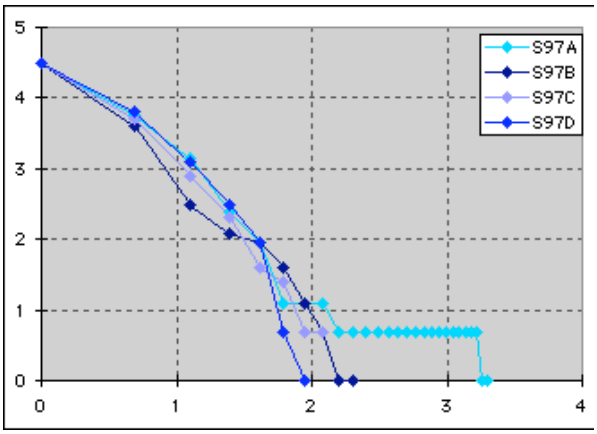

Fig. 19. Message decay over days. Logarithmic plot of the decay of four batches of 90 messages each from the 1997 sample.

The difference can be illustrated in more concrete everyday terms by mentioning the point where a batch has decayed so that less that 10% of the messages are still active. In the four batches from the 1997 sample this occurs after 4, 3, 4 and 4 days, while in both batches from the 1988 sample it takes 10 days and in the two batches from the 1993 sample it takes 9 and 8 days respectively. However, it has to be remembered that the faster expiration of messages in 1997 compared to earlier years occurs together with a faster rate of message production, so while the resulting effect on participants' perceptions of the shared virtual setting may be one of an increasingly impatient communicative culture on the Xlists which might be a conceivable result from general changes in Internet access and mailing habits it is too early to attribute the shrinking attention span of the subscriber collective to a more frantic style of mailinglist participation in general. It is conceivable that there is some kind of fixed probability for messages to be inactivated by being buried under later postings, and with an increasing mailflow it simply takes fewer days for this to happen. So to the extent that the accelerating decay of mailinglist activity emerges as a collective effect of individual participants' adaptation to the demands of an increasing mailflow it might be more proper to study the decay in the system-internal temporality where each new posting constitutes a tick of the clock.

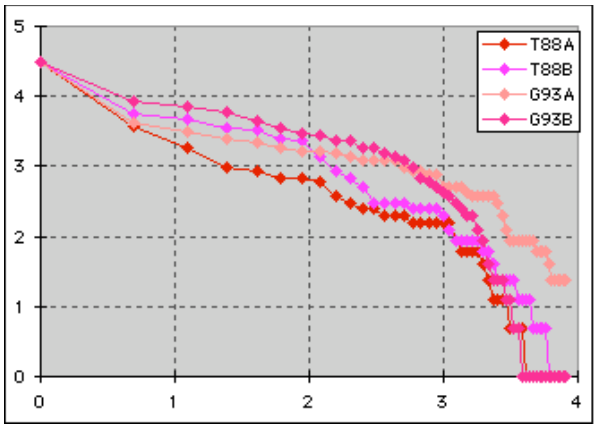

Fig. 20. Message decay over subsequent messages. Logarithmic plot of the decay of batches of 90 messages each, two from the 1988 sample and two from the1993 sample.

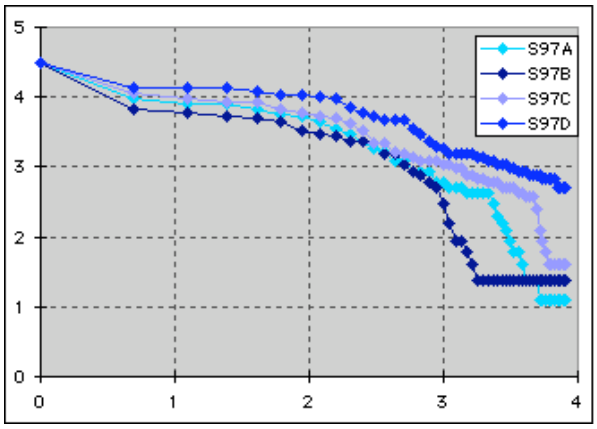

Fig. 10. Message decay over subsequent messages. Logarithmic plot of the decay of four batches of 90 messages each from the 1997 sample.

As we can see in Figs. 20 and 21. it is now the older samples that exhibit the steeper slope: Messages in 1997 typically survive over a larger number of subsequent messages than messages in 1993 or 1988. So the decreasing lifespan in calendar time is not just due to the faster occlusion of old messages by the increasing mailflow. The variation in how long it takes for 90% of the messages to expire in the four batches from the 1997 sample is rather suggestive of the opposite: it takes 31, 21, 40 and 74 succeeding messages for the batches to be reduced to 10% of their initial size, which corresponds quite well to what the result of a standard four-day span of collective attention would yield under the varying mailflow conditions prevailing in these four batches. The two batches from 1988 are very similar both over days and over intervening messages. It takes 20 or 21 subsequent postings (or 10 days) for the batches to be reduced to 10% of their initial size. In 1993 it takes 31 and 25 subsequent messages respectively (9 and 8 days) for 90% of the messages in a batch to expire.

Four episodes of joint paper reading: Lotman, Wells, Bateson and Engestrϕm

After the structural exploration of the patterns of spontaneous emergence and decay of multilogical clusters on the Xlists and the presentation of some quantitative indications to the presence of self-organizing criticality in the mailinglist ecology, I would like to return to the problem of harnessing the multilogical spontaneity of a scholarly

mailinglist. The Xlists have certainly provided a conducive space for the learning of individual participants, and contributed to the renewal of the community of practicioners of CHAT approaches. The forum has also served as a channel for crossfertilization of diverse discourses, brought to the virtual setting by participants from different disciplinary fields. Arguably the Xlist discussions have also been enriched by research collaborations between list participants here I am thinking particularly of the international project on Acting in Culture, proposed in 1992. However, a scholarly mailinglist is more suitable as a setting for learning than as an setting for actual collaborative research, the list community being too loosely structured to serve as a channel for collaborative production of a definite result (Lewenstein, 1995). As far as I know the few attempts at collective writing over the Xlists have foundered. This is the flip side of mailinglist self-organization in several senses of the term: socially, technically and as an emergent process.

Nevertheless, the concerns for cumulativity and development on the collective level have prompted core participants to explore a variety of ways of inserting more organized activities into the Xlist setting: exchanges between local seminar groups, Xlist channeling of communication between similar courses run at separate locations, setting up of special-purpose subconferences, joint readings of papers or entire books etc. there has been some kind of attempt at more organized activity at least once a year. Here I have chosen to briefly examine four episodes of joint reading of paper-size publications, all highly relevant to recurring concerns in the repertory of Xlist multilogues.

- The reading of Lotman (1988) in the autumn of 1990
- The reading of two pre-publication papers by Wells (Wells, 1993 and Wells & Chang, 1997) from a methodological perspective in the autumn of 1992
- The reading of Bateson (1972) in the winter quarter of 1993
- The reading of Engestrφm (1996) in the autumn of 1996

The paper selected for a joint reading in the autumn of 1990, Yuri Lotman's, "Text within Text" (Lotman, 1988) deals with theorizing the relation of stability and change, closure and open-endedness in language and in text.The paper is theoretically relevant to many recurring Xlist issues about intersubjectivity, communication, and relations between text and context. Lotman argues that text has the dual functions in a cultural system of on the one hand conveying meanings adequately and on the other hand creating new meanings. There is an irreducible tension between the univocal, transmissive function of text and its dialogical function as a "thinking device". The paper is aptly brought in as a target for joint reading in the context of a discussion of communication and miscommunication a multilogue taking place in the second week of September 1990. However, the coordination of the event turns out to take much more time and effort than was anticipated in the initial suggestion. The journal is not easy to get hold of, and a distribution of photocopies has to be arranged, so that instead of beginning within a week, it takes five weeks before a summary of the first part of the article is posted as a signal for the event to begin. By then the collective enthusiasm for written conversation has moved on to other objects issues about literacy, cross-cultural research, microgenetic studies, and, eventually, the ethics of videotaping as a method of collecting data. A few participants contribute to keeping Lotman in the mailflow, but the exchange is very sparse: there are all in all 13 Lotmanian discussion postings spread out over 36 days and with relatively few links between them. On the other hand, the event is one of the rare episodes that does have a beginning and an end the paper is summarized in three sections, and there is a final posting providing uptake and rounding off after the last summary. And there is evidence in the archives that the event made a mark in the community: there is at least one of the longterm Xlist participants who comes back to this paper more than once, and after months and years after having been among those who initially asked for the paper in public because of access problems. The Lotman episode provides an example of how the spontaneous flow of multilogue does not sustain the collective patience to hold a topic in suspension for weeks, while collective action is taken to provide it with coordinated grounding in the virtually simultaneous reading of external material.

The two pre-publication papers by Wells (Wells, 1993 and Wells & Chang, 1997) chosen for a joint reading in the autumn of 1992 both deal with the co-construction of meaning through discourse in the classroom, and the implications of classroom discourse for learning and development. These are educationally central questions that Xlist multilogues return to over and over again. However, in the case of this particular event of joint reading, the papers were not chosen as a target with the purpose of discussing the educational implications of their results, but for the purpose of providing a common ground for a suggested discussion of methodological issues of Activity Theory and data gathering methods like classroom observation. Issues of methodology and of ideological influence on research have been around in the mailstream throughout October 1992, when one contributor posts a request for literature on

the topic of research methodology, and also suggests a number of questions for discussion on the mailinglist. There are (naturally) a number of bibliographic references given over the next few days, and there are also a few postings that take up the issue of methodology in response to the questions. Then it is suggested that it would be a good idea to ground the discussion in particulars by using some research paper, preferably one with extended excerpts from classroom discourse so that the process of analysis can be made visible. The Wells papers are nominated (and agreement obtained from the authors), and there is an exchange of postings about how the event should be organized. It is decided that the discussion is to be channeled into the XCLASS, and the papers be distributed electronically for the asking. The initial questioner volunteers to serve as facilitator of the discussion. Like in the Lotman reading, this episode results in very little discussion of the intended nature after the putative start of the reading event the first week in November there are 11 postings that recognizably belong to this thread, 7 in the first week and another small batch of 4 postings after a gap of two weeks, when one contributor asks when the discussion is supposed to start. In this episode there are three times as many messages of an administrative character: discussion of the organization of the event, requests for the papers and for being subscribed to the XCLASS subconference. Of course there is no knowing how much of a multilogue on methodology there would have been without the reconstruction of the event into a joint reading, but the delay caused by having a paper distributed and perhaps the very process of organizing the event over the mailinglist channel, may have diverted the collectively available time. Limited time for reading the paper carefully enough to have opinions on its methodology will also have had its effect.

The essay by Bateson, "Form, Substance, and Difference", included in Steps to an Ecology of Mind (1972), was chosen for a joint reading in the winter quarter of 1993. Bateson argues for the theorizing of the simplest unit of mind as an elementary cybernetic system with its messages in circuit, where the transform of a difference traveling in the circuit is the elementary unit of ideas. This paper contains two illustrative examples of such systemic circuits mind extending outside the boundary of the skin that have been recurring objects for Xlist discussion: the blind man with his stick and the man cutting down a tree with an axe. It is one of these Batesonian occasions that prompts the suggestion for a joint reading: Bateson has been invoked several times in the Xlist mailstream of December 1992, when a joint reading of this particular paper is suggested. The suggestion is taken up by other participants, but the matter of organization is quickly channeled outside the public forum, directly to the contributor who initiated the topic, and who has volunteered to facilitate the discussion. The second week of January 1993 this participant announces that the Bateson reading will start on February first, with the first pages of the essay but it is not until a few days later that he starts the discussion by forwarding a commentary on the essay from an external contributor, who soon thereafter joins the list. After a delay of almost a week, a multilogue does get off the ground: an initial round of roughly a week, with several participants and quick responses, followed by a three-week "panel" discussion in slow but steady pace between three skilled and knowledgeable contributors, posting long and reflective messages, which often meticulously respond not to the latest message, but to the last issue left dangling. A file of the accumulated text from this multilogue has been circulated on the Xlists on at least one later occasion where Batesonian questions were in the mailstream. One week into March the facilitator opens the discussion of the final part of the essay, expressing hopes that the content of this section will appeal to a wider range of contributors. The next posting praises this invitation, but also turns out to be the final posting in the episode the Bateson reading is alluded to as unfinished business a month afterwards. Nevertheless, in this episode of joint reading there is not just a larger number of discussion postings than in the two previous ones (28 in all), but these postings also form an interconnected multilogical cluster, which cannot be said about the two events described previously. The successful character of the Bateson episode is presumably formed by the concise planning of the event, the ample time given for preparatory reading (or re-reading) of a classical and easily available essay, and the presence of a "special guest contributor".

In the fourth case, the Engestrϕm paper, "Development as breaking away and opening up" (Engestrϕm, 1996), chosen for joint reading in the autumn of 1996, the initial phases of the joint reading event develop more rapidly than in any of the other cases: the episode passes from proposal to discussion in four days. The paper is selected for joint reading just a little over a week after being presented at the Second Conference for Sociocultural Research, held in Geneva, September 11-15, 1996. Some of the Xlist participants who were not going to the Geneva had expressed their interest in post-conference discussion on the list even before the conference, and the intention was to take up other papers after the first one had been treated. Engestrϕm's paper argues against theories of development that look only to the peaceful and stepwise individual progress along a universal, pre-established developmental path. It suggests that individual transformation may depend on collective transformation, that development may be viewed as partially destructive rejection of the old, rather than simply as benign achievement of mastery, and that instead of just being a movement across vertical levels, development may also involve movement across horizontal borders. The theoretical arguments of the paper are illustrated by means of examples from Peter Hψeg's novel "The Borderliners" (1994), and

its re-formulations of the Vygotskian Zone of Proximal Development are well in line with Xlist debates over the years. When the paper is first suggested for joint reading there is briefly some organisational discussion: other papers are mentioned, the author posts his agreement, and, following a suggestion that it would be a good idea to make the target paper available over the MCA Website, there is discussion about the best procedures for putting papers on the Web. However, on the third day after the initial suggestion an electronic copy of the paper is sent over the list, and the next day there are already responses from contributors who have read it. This event is different from the earlier occasions of joint reading in being a lot less pre-planned and in having no explicit facilitator. The discussion part of it contains a larger number of contributions than any of the other three joint reading episodes 53 postings in the course of three weeks and there are many crossreferences between strands, although late in the episode an independent cluster on the use of fiction as data develops, which is related to the paper, but not to the other strands of the multilogue. When the multlogue is far into its phase of decay there is an announcement that the paper is now available through the Web page. One of the two last postings in the multilogical clusters that arrive after this point is an attempt to bring together some of the issues brought up and formulate new questions. There is,however, no uptake to this. The only difference between this episode of joint reading and a spontaneously emerging multilogue is the fact that the discussion takes off from the reading of the Engestrφm paper and keeps returning to it. Evidently the strategy of broadcasting the paper on very short notice worked well as a way of riding the waves of a self-organizing system. On the other hand, as with other attempts at initiating a new multilogue by introducing external material, this strategy is a gamble although probably less so when the paper is requested by list participants than when it is first offered up by the author. (There are many instances of this in the Xlist archives, and, especially in the early years, paper-length texts sent over the list were likely to be taken as insults by at least some subscribers, and responded to accordingly. However, with increasing Internet access, the floating of bulky material is less commonly seen as an offense.)

The two cases of successfully carried out joint reading shared the characteristic lack of closure with spontaneously emerging multilogues. Trying to rekindle a topic that has started to decay may be no more feasible than leaving the popcorn in the microwave until every single corn has popped. When the pops get few and far between, the late contributor might win the day by rhetorically tying up loose ends it would seem as if the wily writer could produce a fair simulacrum of consensus with no great risk of being gainsaid. Perhaps the Xlist custom of leaving always some questions in the air is to be preferred, even to the price of the frustration that may arise from the lack of closure.

Concluding remarks: tuning in to mailinglist dynamics

The voluntary nature of participation on a scholarly mailinglist, the distributed character of both the subscriber pool and the technical facilities coordinating their communicative activity, and not least the nature of the activity as a semiotic process all merit the description of mailinglist activity as a self-organizing system. This paper has explored a number of avenues towards conceptualizing and analyzing the ways in which the scholarly mailinglist can also be modelled as self-organizing in a mathematical sense, pointing, among other things, to some aspects which exhibit the inverse power law relationships that indicate a probabilistic system in a state of self-organizing criticality. The work of generating a viable conceptual approach has involved a repeated movement back and forth between the experience of active participation on a scholarly mailinglist, and the external perspective mediated by representations of the mailinglist ecology that serve to maintain distance and provide overviews of parts or aspects of the mailinglist activity system and its products.

Graphical link maps of intermessage references were introduced as a tool and used for making the temporal structure of multilogical events and the relations between messages visible. Three fairly large samples chosen because of containing interesting multilogical episodes were presented, and graphically represented by link maps, bridging between the perceptions of subscribers participating in multilogical activity in its expanding and dissipating phases and an analytical perspective on the events. The perception of accelerating intensity in the written conversation that characterizes the emergence of a multilogical cluster corresponds to an expansion of the system-internal temporality - when the discussion gets hot the mailinglist takes more reading and writing time from its active participants each time they visit the virtual setting and at the same time there is an increasing density of interlinkage between postings. However, the expansion contains the seed of its own dissolution, as with an increasing number of active messages in the system (relevant postings, old and new) the collective capacity of participants to hold together the whole semiotic

complexity of the multilogue will reach its limit. The perception of thematic chaining and dissolution into unrelated branches of conversation correspond to a spatial drifting apart and loss of connections in the link map. What has been presented here from this conceptually generative phase of research naturally demands further testing of its viability.

However, my observations of the several ways in which the activity on a scholarly mailinglist can be said to be self-organizing warrant some concluding remarks in the direction of application. For those of us who wish to capture the learning potential of written conversation in the mailinglist medium it is important to be well aware of the self-organizing nature of scholarly mailinglists, in all senses of the word. If nothing else it may spare us from some disappointments: a self-organizing system is not really amenable to control or planned change but it is, nevertheless, possible to get in tune with the internal dynamics of a mailinglist, and learn to recognize the moments when small interventions have a fair chance of triggering noticeable effects. The four case studies of more or less planned and successful events of joint reading on the Xlists illustrate both how plans may go wrong in this distributed and loosely coordinated medium, and how organized episodes may be carried through, with the right timing in relation to the current dynamics in the activity system. The success of a scholarly mailinglist as a multilogical activity system, then, depends on the apt performance of semiotic self-regulation in the subscriber community, involving for each and every responsible participant a coordination of the moments of centered participation with a certain amount of de-centering towards a view of the emergent states of the mailinglist ecology. On the Xlists these kinds of facilitation skills have always been regarded as a collective responsibility for maintenance of the cultural practices of multilogical discussion (Ekeblad, in preparation b). The combination of the centered, participatory appropriation of these practices with occasional de-centered knowledge-building about the emergent nature of mailinglist dynamics at a systemic level would seem to me a promising road towards maintaining practices of mailinglist re-centering.

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Endnotes

1 The first appearence of the term multilogue in the Xlist archives is in a message by Arne Raeithel from 1989, where it appears in a paper abstract (Title: Figurations and Communicative Activity: How Collective Subjects Form Themselves) for the 1990 conference on Activity Theory in Lahti, Finland:

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Starting with central insights from the figurational sociology of Norbert Elias
(TCS 1987) the paper will present and extend the theory of collective re-centering
(Raeithel 1983). The most important new element in this conceptual endeavor will be
the use of the notion of a "multi-logue of different voices" (Bakhtin 1981, Wertsch
1985) to develop a model of the mediational means of re-centered reflection.
(89-12-22: Two abstracts and a Happy New Year from Arne)
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Going to the source - Wertsch writing about Baktin in 1985 - we find that while the concept was certainly there, the word "multilogue" wasn't. Wertsch (1985) wrote instead "multivoicedness" and was referring to Bakhtin's concept of "heteroglossia".

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2 This has been internally used as a nickname of this cyber-settlement, especially in the years from 1989 to 1995, when discussions were channeled over a number of separate but closely related lists, an experimental phase which was abandoned in 1995 when discussions were re-channeled over a single address. Ffor historical and witty reasons there has always been a signature X in the successive names of the forum and in the names of all parallel branches.

The first appearance of the collective nickname Xlists in the archives is, again, in a message by Arne Raeithel:

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Date: 91-04-17 10:00:31 MEZ
From: PO61170%DHHUNI4.BITNET@CUNYVM.CUNY.EDU
Subject: Mail loss: 12 messages down the drain
To: xact@ucsd.edu

Dear friends, if you sent me a note directly, it may have been lost this morning
when 12 messages somehow disappeared from my mail box. Most of them might have been
from an Xlist, though. Please resend any message of yours from yesterday (Tue 17 Apr)
or today until 8 hours GMT.
Arne.
P.S. Please do not re-send over Xlists on my behalf, this would be a bother to everybody else...
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3 The quoted idioms are among those employed by mailinglist contributors, going about their business of producing coherent written conversation.

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4 What was referred to as a "fast and furious" pace in 1988 was a mailflow averaging 1,7 msgs/day over two weeks. The same phrase was recently used in a context where the preceding week had an average of 9,7 msgs/day - the average of the first half of 1999 being 8,3 msgs/day

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5 On mailinglists that are moderated in the sense that each message is approved by a person with special rights and responsibilities the typical lag may be even longer (moderators have to sleep!), but unmoderated lists are usually faster than the Xlists.

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6 Contributors occasionally orient to these possibilities by apologizing in advance.

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7 This is not to say that it is only the scholarly multilogue on a list that generates self-organizing clusters of postings: items from the activity systems of channel maintenance and community building (Ekeblad, 1998) may also provide objects coordinating the actions of list participants in the same fashion. So, for example, the Big Xlist Brownout of November 1998 was an event of channel failure that triggered an avalanche of troubleshooting, which in its turn spawned an outburst of community-building self-presentations. My preference for investigating specimen of scholarly multilogue stems from my educational research interest.

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8 Slopes for the first and most nearly linear part of the plots range from -0,9 to -1,2 for the older samples and from -1,8 to -2,2 for the 1997 sample

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