How Do You Get a Hundred Strangers to Agree:
Computer mediated communication and collaboration

Fay Sudweeks
Key Centre of Design Computing
University of Sydney, Australia
fays@arch.su.edu.au

and

Sheizaf Rafaeli
School of Business Administration
Hebrew University of Jerusalem, Israel
sheizafr@shum.cc.huji.ac.il

Abstract: This chapter is an introspective account of the formation and implementation experiences of a large international group of researchers who are using computer-mediated communication to study computer-mediated communication. We describe the genesis and ongoing development of the study, focusing on issues of consensus formation as guidelines were sought on the ethical implications of the study, and the integrity and autonomy of scientific enquiry. We critically examine the notions of global village, social presence, conversation as a universal ideal, and interactivity in a computer-mediated collaborative environment.

INTRODUCTION

Two heads are better than one, but what about a dozen? or a hundred? The notion of group brainstorming is an appealing technique but most studies have failed to support Osborn's (1953) claim that interacting groups generate more ideas than individuals working separately and pooling ideas (McGrath, 1984). Empirical evidence from laboratory studies of computer mediated brainstorming (electronic brainstorming) appears to be more encouraging (e.g. Nunamaker, Vogel and Konsynski, 1991; Valacich, Paranka, George and Nunamaker, 1993; Valacich, Dennis and Connolly, 1994). Does the effect differ outside the laboratory when interacting participants are strangers, widely dispersed and disparate in skills, knowledge, status and culture? Does the computer-mediated environment also enhance consensus formation? These are crucial questions as computer mediated collaborative work becomes both feasible and desirable in academia and industry.

In this chapter, the experiences of an ongoing computer-mediated collaboration of more than a hundred researchers who shared ideas and created a database of a representative sample of international, public

group, asynchronous computer-mediated communication (CMC) is described. The goal of the chapter is twofold:

1. to focus on product: describe the promises and pitfalls of carrying out research on group CMC; and
2. to focus on process: provide an introspective examination of our own group CMC

This chapter is about the cobbler not walking about barefoot: studying CMC, using CMC.

TEXT-BASED COMPUTER-MEDIATED COMMUNICATION

We need to know more about the changing nature of communication in a population-exploded cyberspace. Corporate and private use of electronic mail (email) systems such as MCI mail, CompuServe and Fido continue to expand and traditional forms of communication are substituted or complemented. Email is both instantaneous and asynchronous as it bridges spatial, temporal and societal gaps like no other medium prior to it (Rogers and Rafaeli, 1985).

In the networked organisation, the informality and interactive features of email encourage employees to cross social and organisational boundaries to share opinions and ideas (Sproull and Kiesler, 1991). The very boundaries of organisations are being redrawn or called into question. An interactive communication medium is of little value, however, unless there is a critical mass to communicate. Network use is approaching the saturation point at which the sheer mass of existing and potential users makes it economically and socially attractive to the remaining population (Gurbaxani, 1990).

Text-based CMC is commonly compared unfavourably with face-to-face interpersonal communication because we can't hear intonation that signals a joke, or see puzzled expressions that convey confusion. Face-to-face communication is hailed as the communication standard against which all others are found inferior. The ideal of face-to-face conversation, though, is precisely that: an ideal (Schudson, 1978). Is the stereotypical conversation that passes between a long-married couple at the breakfast table a standard, or the phatic communication that is typical when two strangers meet? In reality, face-to-face communication is not always a universal ideal nor universally idyllic.

The prescribed panacea for network ills is usually greater bandwidth to add more social cues and to approximate face-to-face communication. Adding video, audio and graphics is somehow expected to make the medium more "real". Mabry (1993a) challenges the implication that single-channel (text only) communication is less real:

... regardless of the medium--or media mixture--elected for transmitting messages, communicating IS vocabulary-language- and some form of "structure" of symbolic impressions derived from the active use of symbolic expressiveness. A "picture is worth a thousand words" only to those with a thousand words to appropriate for construing the pictorial image. It might only be worth ten words to some people or ten thousand words to some others. A message can only be text+sound+visualization+? because a message encoder can rationalize (a decidedly linguistic task) the assembly of its components into an explanation of planned message effects.

... Granted, McLuhan [1964] was at least half right in asserting that the medium is the message in that without a medium there isn't going to be a message. But, a more compelling stance argues that meaning resides in people. In other words, the "reality" of a message is a matter of receiver perception and attribution and not sender encoding complexity. The ultimate reality of any phenomenon is its existence.

It may be, then, that more bandwidth does not necessarily mean more effective interaction. A presence, or even an awareness of a presence, may not be a mandatory ingredient of a stimulating and satisfying conversation. The concept of social presence has been discussed by various researchers (Rice and Associates, 1984; Short, Williams and Christie, 1976; Walther, 1992). The fewer channels or codes available within a medium, it is claimed, the less each participant is aware of others using the same

medium. Social presence is regarded as a property of the communication medium. CMC, with its lack of nonverbal and paucity of nontextual cues, is low in social presence and preferred for tasks low in interpersonal involvement. The concept, a subjective measure of the presence of others, is both intriguing and weakly defined. There is evidence that a high proportion of socio-emotional communication can be conveyed in CMC (Rice, 1987; Rice and Love, 1987). Interactivity itself proves to be a both measurable and meaningful quality of communication contexts (Rafaeli, 1988). In computer mediated discussion groups, there is the potential for much interactivity. This should lead to high involvement but perhaps longer, more complicated processes.

COMPUTER MEDIATED GROUP ACTIVITY

Much has been reported about computer mediated group behaviour, most of it relying on data from organisational case studies (Sproull and Kiesler, 1986; Zuboff, 1988), laboratory experiments (Dennis and Valacich, 1993; Dubrovsky, Kiesler and Sethna, 1991; Hill, 1982; Poole, Holmes, Watson and De Sanctis, 1993; Siegel, Dubrovsky, Kiesler and McGuire, 1986; Valacich et al., 1993; Valacich et al., 1994), surveys (Kiesler and Sproull, 1986; Schmitz and Fulk, 1991; Sproull, Kiesler and Zubrow, 1984) and educational settings (McInerney, 1994; Sudweeks et al., 1993). Other reports of computer mediated collaborative work derive from groups formed for a specific task, such as the CommonLISP development program (Steele, 1984), teams working on development projects (McCreary and Brochet, 1992), and a large group using a computer conferencing system (Hiltz, 1983). Less is known, however, about how spontaneous and heterogeneous electronic groups perform, how conflicts are resolved, and how consensus is achieved.

ProjectH, the research group described in this chapter, is grounded in common membership of a computer-networked discussion group and a common desire to understand more clearly the nature of communication, culture and community on the network. The research, from conception to consummation, has been entirely computer mediated, "on stage", and public. Records of all discussions, decisions, actions, tools and policies were (and are) available. This reflects the tradition of hard-sciences' laboratory manuals, and addresses one of the most poorly recorded aspects of groupwork: the initial concept, perhaps emerging from a hastily drawn sketch on the back of an envelope, or from a serendipitous conversation in a bar.

A characteristic of CMC groups is the democratic nature of the mode in which people interact. In the process of collecting a large representative database of CMC, a blend of democracy and "restrained" leadership evolved as an organisational structure. We qualify "leadership" because the coordinators should be regarded as "facilitiators" rather than leaders. The only restriction on people participating equally in generating ideas and developing policies and methodologies were self-imposed restraints such as time limitations, conflicting schedules, and degree of motivation. The coordinators (the authors of this chapter) were merely instrumental in facilitating a productive working environment. Collaboration, at times, appeared to be painstakingly slow, but the progress can be assessed by the efficacy of the process in devising and attaining a common goal.

THE PROJECTH STUDY

"Wouldn't this kind of study be relatively simple," said Jim Thomas (1992a). "It's something ... maybe a few of us could do by dividing up a few randomly chosen groups, whipping into SPSS format, and writing something up." Two years, and more than three thousand coordinating work hours later, we are "writing something up".

It began with an enthusiastic discussion on a Comserve hotline of the dynamics of group CMC which eventually focused on the nature and longevity of threads. A "straw man" outline of a quantitative study was proposed (Rafaeli, 1992a) and a small group of about thirty, coordinated by the authors, agreed to participate and code batches of messages. An interim distribution facility was provided by the University of Sydney and then the group moved to ProjectH, a specially created Comserve-sponsored hotline.

News of the study circulated on the network and more than 300 people contacted the coordinators. The initial ProjectH group quadrupled and eventually stabilised at about 100 members. Current participants represent fifteen countries, and numerous universities and commercial firms. Participants represent a wide range of age groups (early 20s to late 60s), academic positions (graduate students to professors), and disciplines (approximately 40% from the social sciences, 35% from the humanities and 25% from applied sciences. The study has been a novel approach to groupwork and the process itself is a rich source of data as the participants, and the coordinators, had never met. (For a detailed description of the methodology of the study, see Rafaeli, Sudweeks, Konstan and Mabry, 1994.)

What are we studying?

Decades ago, McLuhan (1964) foresaw a global network creating a global village. It turns out that the "global village" is neither global nor village. The organising principle is a loosely coupled entity or discussion group, which we will call "list". Each list is a virtual neighbourhood, defined by common interest not geography.

The depth of interactivity among discussion groups varies widely. Some groups are like cocktail parties with many conversations (threads) competing, rather like CB radio; some focus around specific topics ranging from postcard collecting to yacht design; some are like noticeboards in the local grocery store where messages are pinned and left for others to read and comment on; and some groups merely function as newspapers, disseminating electronic journals or computer programs, and advertising conferences or job vacancies (Sudweeks, Collins and December, 1995).

What do we know about the social dynamics, the patterns of communication, the emergence, longevity, and survival of topics and threads on lists? Where, when and why does "flaming" occur? What is the role of emoticons (graphic icons created from punctuation marks to indicate an emotion)? These questions about the communication qualities of lists and their participants shaped the rationale and design of the study.

The alternatives in studying group CMC are numerous. One can use quantitative or qualitative methods; one may study societies, organisations, groups, coalitions in groups, individuals, or single messages; one may study cross-sectionally, or across time. In our case, we perceived the greatest opportunity resided in three facts: (i) we are a large group of qualified researchers; (ii) one-shot, one-list studies have been done numerous times; and (iii) introspective reports of discussion groups still need validation from less obtrusive studies of the content. The aims of the study were:

1. to randomly sample a sizeable chunk of publicly available, archived computer mediated group discussions
2. to analyse the content of messages contained in the sample
3. to focus on the single message, authors, aggregate thread and the lists as units of analysis
4. to empirically test hypotheses of interest to participants
5. to collect descriptive data to document the state of the medium and the communication over it
6. to create a shared database to serve future cross-method, cross-media or historical analyses
7. to conduct research with a group of people diverse in interests, status, age, time, and location

Conceptualization

During the embryonic, conceptual stage of the study, we found electronic brainstorming to be particularly useful. Many ideas were generated about units of analyses, methodology, hypotheses, and coding. Learning from the diverse experiences and skills of the large number of participants, we chose the following:

1. a quantitative methodology because we viewed it as dovetailing the large number of experimental,

laboratory-based studies of CMC, and the plethora of nongeneralisable surveys of single groups (Fulk and Steinfield, 1989; Sproull and Kiesler, 1991);
2. an empirical content analysis method that is less sensitive to self-report;
3. a cross-list, cross-time account; and
4. an unlimited range of research questions and hypotheses that can be accommodated within the study.

Research questions of interest were many and varied, and included: what are the characteristics of longer and lasting theads? are `communities' formed on CMC lists? can social `density' be measured? how do `free' or `subsidised' lists compare with costly lists? how does metacommunication affect CMC? when and where does `flaming' occur? are there repeating patterns in the `life' of a group or thread? how is the expression of emotion handled?

Many of us chose one or more variables and described a method for measuring features of interest. The variables, with accompanying definition, extreme case examples, and measurement scale, were collated. A draft codebook was pretested, assessed for reliability of measures and ambiguity of definitions, and revised accordingly.

Ethical issues

A quantitative analysis of the aggregate of publicly available, archived content of large group discussions that occurred voluntarily is subject to fewer ethical concerns than other types of analyses. Nevertheless, ethical issues were raised: is there an ethical obligation to inform list owners and/or subscribers prior to sampling? is public discourse on CMC public? does the principle of "expectation of privacy" apply? Questions were also raised about intellectual ownership and copyright: who owns the messages that are sent to a discussion list? who holds the copyright? Ethical guidelines for the study were proposed:

We do NOT view the quantitative analysis of publicly posted or archived messages a violation of anyone's privacy. We will respect any request by list owners or participants to be excluded from the study. However, we will not seek permission. We view public discourse on CMC as just that: public. Analysis of such content, where individuals', institutions' and lists' identities are shielded, is not subject to "Human Subject" restraints. Such study is more akin to the study of tombstone epitaphs, graffiti, or letters to the editor. Personal? - yes. Private? - no. (Rafaeli, 1992b)

The implications of the proposed guidelines were hotly debated in a prolonged, scholarly discussion. The discussion revolved around three major issues:

1. Is public discourse on CMC public?

Some firmly believed that public posts should be treated like private letters. Regardless of widespread distribution and public access of the posts, there is an expectation of privacy. A post is sent to a list in the expectation that the audience is limited, definable and identifiable, and that the content is not redistributed and quantified. Some regarded public discourse as public domain, and supported the proposed guidelines.

2. Do authors of posts have any legal, ethical or moral rights?

Again, opinions were divergent. Some considered author permissions and citations should not even be optional--authors must be acknowledged and permission obtained if quotations are used. Some questioned the right to intrude in the lives and activities of others, regarding such intrusion as exploitation, particularly if listowners and/or subscribers are not consulted prior to browsing. Some expected that if copyright of public posts is surrendered on joining a list then this should be made clear to subscribers at the time of joining. Some considered use of posts should be governed by professional and academic guidelines, i.e. short excerpts can be quoted without author permission.

3. To what extent do the issues of informed consent, privacy and intellectual property apply to a quantitative study?

The need for different guidelines for qualitative and quantitative research became obvious. In the quantitative study proposed, the object of analysis is the communication that is openly posted and distributed, not the personalities involved. The purpose in using quotes is to illustrate a representative example from a randomly chosen sample of discourse, so it is not necessary to include attribution nor seek author permission. Some expressed concern about the implications of restrictive use and censorship on scientific enquiry: "If we reify ethical rules/principles (rather than adhere to the spirit and intent of those principles), we risk empirical catatonia" (Thomas, 1992b).

The group invested extraordinary effort in June and July, 1992 to compromise on a policy that all could accept as a framework for ethical and scholarly research. There were moments of light banter:

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AF:   As stupid as Jim Thomas is (and he knows it), I think he is
      right in this case. (Futrell, 1992)

JT:   As usual, Al's right (I know it), so shortly after this post,
      I fire-bombed his Porsche. (Thomas, 1992b)
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but the discussion turned hostile when rumours of the study spread to subscribers of a popular discussion list. One subscriber, confused about the nature and process of the quantitative research proposed, and fearful of being sampled and scrutinised, attacked the integrity of the study:

Unless these academo-dweebs get down and dirty with us ..., the study is bound to be bogus from the start ... I'm highly unimpressed. They remind me of Masters and Johnson. All observation, no participation. (no author, cross-posted by Maynor, 1992)

The prolonged discussion was having an effect on tone. Exchanges became irate:

KW: I should warn you, if you already haven't figured it out based on the agitation your study has caused: there are indeed people here. (Wolman, 1992a)

JD: We've figured it out. It is holding up work on the study ... as it should until we get these issued resolved ... If you have objections, express them in the context of the group ... working with us not pointing your damn finger, saying shame on us (me). (Downey, 1992)

KW: I thought that's what I was doing ... I was partially sympathetic to what I understood about the project. I'm no longer comfortable with it. And if I want to point my finger at you, sir, I will do so, and there isn't much you can do about it, is there? (Wolman, 1992b)

and contrite when informed:

KW: First ... I waded in here over the weekend, got into a barroom fight or two ... left, and was persuaded by Jim Thomas that I was not dealing with a crew of ogres, unemployed CIA operatives, and voyeurs. In the process of getting that peace made, I learned a great deal about the genesis of the PROJECTH study, discovered ... that I too might be able to derive some additional knowledge from what happens here. (Wolman, 1992c)

In the heat of the debate, people's credentials were questioned and some responded by posting vitas and listing degrees. The issues remained unresolved but the flames were doused with a humorous post:

Hi (or as they say around here: shalom - which also means peace): I think it's back to business time ... Am a bit offended that my credentials were not disputed. So, just in case anyone is interested: I have the longest, reddest, and prettiest beard in cyberspace ... Any challenges? (Rafaeli, 1992c)

Early in 1993, the issues were confronted again. The coordinators drafted an ethics policy and submitted it to the group for approval. Objections were raised. A second draft of the policy was submitted. And a third, and a fourth. The repeated iterations were straining the groups' patience. Some, earlier on, had suggested a voting mechanism. The coordinators were intransigent about trying for a consensus. When it appeared likely that the group would vote on holding a vote, the coordinators acquiesced. In lieu of consensus a vote on the fourth draft was called for. In summary, the policy states:

Members of ProjectH acknowledge and affirm the individual rights of informed consent, privacy, and intellectual property. Members are committed to reducing censorship and prior restraint, and believe the issue of informed consent of authors, moderators and/or archiving institutions does not apply to a quantitative content analysis in which only publicly available text is analysed. Public posts are public and their use is governed by professional and academic guidelines. All necessary measures are taken to separate names of authors and groups from the database. Individual authors and groups are identified by a number and members using the database must outline their procedure for maintaining confidentiality of authors and groups.

The policy (ProjectH, 1993) was ratified with a vote of 38:3 in favour. Not all participants voted. Some abstained, and asked that the abstention vote be recorded. With that hurdle overcome, the "field" work began.

Sampling

Selecting a random representative sample of discussion groups was an important phase of the study. Simple and straightforward? Not at all. It was a complicated task that involved reaching agreement on a rigorous empirical stance. We wanted to sample a wide range of groups to be able to draw conclusions about a wide range of CMC, but how is the universe of groups, so diverse in nature and purpose, defined? Do we weight groups by number of subscribers or volume of activity? How do we know which variables need to be controlled and which should be studied? Should we define samples by number of messages, length of messages, time period?

Initial discussions revealed divergent opinions on the virtues of random and stratified sampling. A committee, representing the spectrum of sampling persuasions within the group, considered two extreme proposals:

1. Complete random sampling--pooling all groups from all networks and randomly selecting a sample.

2. Heavy stratification--selecting a set of strata and sample from within each stratum.

Given limited human resources and availability of accurate information on list characteristics, membership, authorship and readership, we chose to stratify by network and randomly sampled over a restricted domain, excluding foreign language groups, groups on local networks, announcement groups, help/support groups for specific products, test and control groups, groups whose contents are only excerpts of other groups selected by moderators, and extremely low volume groups. An equal number of lists were randomly selected from BitNet, Usenet and CompuServe populations. If selected groups did not meet the set criteria we dipped into the population hat again (and again).

List traffic is dynamic. Some groups are highly active, generating in excess of 200 messages a day; other groups are almost dormant, generating far fewer than 200 messages a year; some groups maintain a

consistent volume of traffic; other groups experience high peaks and low troughs. Sampling an equal number of messages from selected groups has the advantage of capturing threads. Sampling over an equal time period has the advantage of typifying group activity. Rather than risk having to reject a high percentage of groups because we happened to sample during a quiet period we sampled 100 messages beginning on a randomly selected Monday.

Coding

Numerous universal systems for coding were considered and rejected as coders varied in technical expertise, access to technology and Internet resources, and working style. One member, using the catch phrase "if we build it will you come?", headed a subgroup to develop standard coding formats for different platforms--Hypercard stack for Macintosh, FileExpress database for DOS, and templates for text editors and wordprocessors.

Each batch of 100 messages downloaded from selected groups was prepared for coders. Programs were written to precode the first 6 of 46 variables and to compile a cumulative database of authors across all lists. Coders took modally, 20 hours to code a batch of 100 messages. After coding, the data was emailed to an account which was set up for automatic processing. The processor checked for errors and completeness, transferred accurate data to a database, and reported error and completion status to the coder and a coordinator.

Reliability

Reliability assesses the degree to which variations in data represent real phenomena rather than variations in the measurement process (Krippendorff, 1980). We considered two reliability measures:

1. Test-standard: This involves training all coders to a standard set by expert coders and accepting only those who code to the preset level of accuracy.
2. Test-test: This involves using at least two coders for the same data to establish the reproducibility of results.

Given the unprecedented nature of the project, the unavailability of an established standard, and the number of coders involved, we adopted a test-test design and assigned each list to two coders. Due to time constraints which prevented some from completing coding, one-third of 32 lists (batches of 100 messages) were double coded. List assignment was confidential and allocation was random to avoid individual bias. A threshold for an acceptable level of bi-coder agreement was set. In cases where this threshold was not reached, the data was marked as unreliable.

To eliminate a possible source of invalid (inflated) reliability, coders were discouraged from discussing coding problems among themselves or within the group. Coder queries were directed, instead, to an advisory committee of twelve members. Each advisor ("oracle"), fielded questions on a section of the codebook, responding in a non-directive, analytical manner. The more complicated questions were discussed among the oracles and the leader (the "Commish") summarised the discussions, responded to the enquirer, and posted recommendations on potentially universal problems to the group.

Who owns the processed data set?

The processed data, compiled from archived group discussions, is the result of considerable effort, particularly from members who contributed substantially to the development of the codebook, to policy formation, and to actual coding. Given the public nature of the data, we are committed to conducting the study publicly and making the data available to all. The processed data is the intellectual property of members participating in the work and the ProjectH Research Group holds the copyright. Access to and use

of the data set is on a staggered basis according to contribution rates. After a two-year exclusive access period by ProjectH members, the data set will be released to the public.

WORKING TOGETHER

The project began with the perception of an opportunity and a few researchers agreeing to share efforts to produce an body of data. As the scope of the project expanded, invitations to participate were periodically circulated to lists and newsgroups. Our membership quadrupled, and a large-scale project became viable.

Time differences were a problem, but a problem that was turned to an asset. Given that participants are from 15 countries and from 5 continents, and the coordinators are impaired with an 8 hour time difference, and another 8 hours are between each of them and the major contingent of participants in North America, we like to think that the sun always sets on at least one part of ProjectH but work never ceases.

Working with a large group of strangers is not easy; working with a large group of strangers, with whom continued contact depends on mutual (and at times unfounded) understanding and the whims of temperamental networked machines, can be frustrating. In most instances, an email address is the only available means of contacting other participants. There are few cues to recognise if non-response is due to illness, travel, work commitments, disinterest or simply network problems. Many weeks were wasted while waiting for reactions to open-ended suggestions and proposals. This problem was eventually overcome by setting a time limit to respond, e.g. "If we don't get a response within 3 days, we'll assume you agree and will go ahead with the proposed action."

Online group decisions, claim Sproull and Kiesler (1991), are unpredictable, unconventional, democratic, and less constrained by high-status members. In the absence of modifying nonverbal and nonvocal cues, individual influence on group processes is more equitable. One participant, for example, had no hesitation in expressing disapproval when she considered one of the coordinators out of line:

CM: Sorry, Sheizaf, I consider this to be a flame. Maybe these questions are irrelevant to you, and maybe they're not the main focus of study right now on ProjectH, but they're pretty relevant to me, and evidently of some interest to others on this list. (Marmell, 1993a)

SR: So why are your opinions a `qualitative discussion', even if they involve me personally and critically, while my opinions, naming no names, are a flame? (Rafaeli, 1993)

CM: It's not my opinion that's qualitative per se, it was the discussion generated on the list ... I had a real visceral reaction to your comments, and thought you needed to hear what they sounded like. (Marmell, 1993b)

There is less emotional and social cost when face-to-face confrontation is remote or non-existent. The consequence of uninhibited behaviour is not necessarily negative; in fact, we found the equalising effect beneficial:

There is a sense of cohesiveness with ProjectH exchanges that I don't apprehend on lists. A primary difference comes in not feeling the need to engage in self-credentialing (this-is-who-I-am) statements ... ProjectH's goals clarify members' purposiveness and contribute structure (vis-a-vis expectations, ongoing tasks, etc.) to their relationship in ways that less well defined groups may not achieve. (Mabry, 1993b)

... our interactions have created a group culture, complete with norms and values. As a group, we seem to value collegiality, mutual respect, and a sense of humor, while devaluing flaming and argumentativeness. For me, at least, that makes ProjectH a very comfortable place to pursue some interesting questions. (Penkoff, 1993)

Perceived social presence of other members did not appear to have diminished with restricted bandwidth. One response to a proposal for a face-to-face workshop to meet colleagues was revealing:

Fay: I understand the curiosity, but doesn't it strike you as significant that you want to "meet the people (you) will have been working with for two years. . . ?" Haven't we already met? Is there something unreal or artificial about the lack of F2F contact? (Mills, 1993)

The absence of social presence is almost an assumed quality of CMC. To compensate, many people engage in speculating about perceived and real differences between in-person and online impressions. However, the relative poverty of bandwidth afforded by CMC will be the first characteristic of CMC to disappear. Technological advances, virtual reality, and even current in-use technology (voice-mail, picture phones, videoconferencing) are rendering moot the bandwidth issue. More interesting and relevant questions are: who do we get to meet or stay in touch with now that we wouldn't have otherwise? what is missing from CMC interactions apart from the fact that we are apart? what can we do to improve such interactions?

The protracted and heated debate on ethics was stimulating but inefficient. The discussions generated more than 300 messages over a period of eight months yet consensus still eluded us. From this we learned an essential lesson, and developed a process for optimizing group consensus.

A political metaphor can be used to categorise collaborative systems (Condon, 1993): the "fascist" system in which one person is in control; the "communist" system in which the system itself is in control; and the "anarchist" system in which there is no control. Our collaborative process has a blend of democracy and anarchy (see Figure 1). The coordinators lead, volunteer committee members recommend, but no individual or group has control, so in that sense there is more structure than an anarchist system.
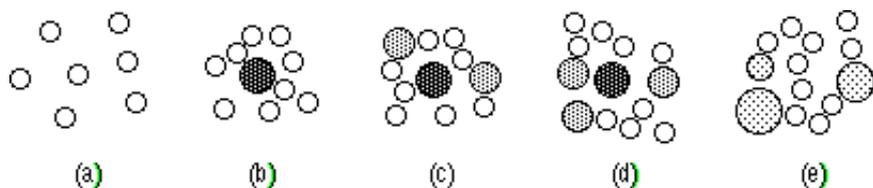

Figure 1. ProjectH collaborative process.

(a) an amorphous group of individuals; (b) a small group of people, led by the coordinators (dark grey), share ideas; (c) the group expands and small committees (light grey) representing diverse persuasions draft proposals for the group; (d) more committees are formed for different phases; (e) individuals and small groups work on different projects using the shared database.

Blending democracy and anarchy worked like this: Each phase of the project began with preliminary discussions among the group. Many and varied opinions were expressed and, if necessary, the coordinators focused and summarised the issues. If it was obvious that all issues had been raised and consensus unlikely, a committee of 3-10 volunteers representing divergent opinions of the group, drafted a compromise proposal for the group. Committee proposals, summarising the advantages and disadvantages of options considered and the rationale for choosing one over others, were posted to the whole group for further discussion or fine-tuning. Finally, a time frame (usually a week) was specified for further objections and if there were none the policy was adopted. Using this method, committee consensus took 20-100 messages and list traffic was reduced to a minimum.

In an environment in which the coordinators and most participants had never met before, either on or off the net, different modes of communication for brainstorming were employed with varying degrees of success, e.g. synchronous media (Unix Talk and Internet Relay Chat), specially tailored distribution lists,

telephone, regular mail and some face to face. The coordinators used the Talk program extensively as it was the most conducive medium for stimulating novel ideas and overcoming thorny obstacles.

CONCLUSION

The goal of this chapter was to highlight the products and processes of group CMC by describing the experiences of our own collaboration. The results can be summarised as follows.

Products

The data set compiled by ProjectH, a cross-sectional, representative account of computer-mediated discussions, is being used for research as varied as the ProjectH constituency. The results from these studies are encouraging and enlightening despite the obvious limitations of the unidimensional nature of the data.

The focus of one study is an attempt to measure interactivity, the degree to which communication transcends reaction. Rafaeli and Sudweeks (1996) demonstrate that those messages defined as `interactive' are more opinionated, more humorous, more self-disclosing, more personal, and more likely to express agreement than non-interactive or reactive messages. In contrast to statistical analyses of interactivity, Berthold, Sudweeks, Newton, and Coyne (1996) use an autoassociative neural network to construct sets of features which are typical of messages that initiate or contribute to longer lasting threads. Some of the distinguishing features identified in `referenced' messages are medium length, factual, no questions or requests or emoticons, and addresses another person(s).

Subsets of the data have been used for various studies. Penkoff and Katzman (1996), for example, explore the use of graphic accents (emotional, artistic and directional devices) as indicators of author gender. The authors found that only a small proportion of network communicators include graphic accents to express emotion in their discourse but the users of these devices are primarily women. Focusing on the effects of flames on electronic conversations, Mabry (1996) found support for a consistent relationship between strategic structuring (techniques and tactics such as quoting or recounting) and conciliatory and emotional content: as emotional involvement increases, message structure declines. Zenhausern and Wong (1996) use ProjectH data from BitNet lists to examine the personality of lists. Three dimensions -- activity, participation and dissemination -- were found capable of distinguishing individual list differences.

These eclectic research papers, among others, will be published as a comprehensive book (Sudweeks, McLaughlin and Rafaeli, 1996). Our study supports, if only in case study form, the effectiveness of electronic brainstorming. In addition to the collective book, ProjectH is providing the wider network community with a shared annotated bibliography of more than 300 entries on CMC, and a questionnaire survey of coders. ProjectH also was a catalyst in the development of an electronic journal edited by McLaughlin and Rafaeli, *JCMC* (the Journal of Computer-Mediated Communication). JCMC is a refereed journal, based on world-wide web distribution. It carries scientific papers, online and interactive bibliographies, and book reviews. It is available as http://shum.huji.ac.il/jcmc/jcmc.html from the Hebrew University of Jerusalem, or as http://cwis.usc.edu/dept/annenberg/announce.html from the University of Southern California.

Some factors contributing to productivity in the ProjectH experience are:

- a common interest in mediated communication
- effective structuring mechanisms, e.g. oracles, committees, time limits on discussions
- a democratic styructure facilitated by the coordinators
- the ability to manipulate social awareness of others, e.g. suppressing awareness to focus on work needs and raising awareness to fulfil social needs.

Processes

Are there any misconceptions about group CMC that we can contradict or discount?

The culture of online groups is typified, particularly in the popular press and magazines, as young, elitist, deviant and preoccupied with introspective and self-disclosing conversations. As a mature, eclectic, normative and task-oriented group, we suggest that the popular conception of group CMC culture is by no means universal.

Does the volume and frequency of messages inhibit online collaborative work?

The early stages of the project certainly demonstrated that excessive traffic can create difficulties, however the organisational structure that evolved reduced traffic to approximately one-tenth of the initial volume. Given that our group CMC is asynchronous and can be processed at each participant's convenience, the time commitment for the later stages is comparable, if not less, than that required for a similar-sized group relying solely on face-to-face communication.

Can a large computer-mediated group of strangers agree?

The ethics discussion illuminated the tenuous concept of consensus. Despite diverging opinions expressed emphatically over a lengthy period, only one-third of the group recorded a vote in favour of the proposed ethics policy. What of the remaining two-thirds? Were they persuaded? Were they unmotivated? Complete consensus is elusive and not even desirable in a group that values each others' expertise and experience. We feel the approximate consensus adopted is a reasonable solution for a large online group working towards a common goal.

Further Research

Communication technologies and common research interests facilitated the formation of a new community that cut across social, cultural and geographic boundaries. We believe the subjective, non-scientific results of the case study reported in this chapter can be replicated. Future studies will benefit from the knowledge that researchers are willing to engage voluntarily in collaborative groupwork. However, we remind those intending to embark on similar studies that an extensive coordinating overhead is necessary to resolve conflict and foster cooperation. Our experience and the ongoing results of our collaboration have shown that strangers are able to work together apart.

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Biographical Information and Acknowledgements

Fay Sudweeks is a researcher at the Key Centre for Design Computing, University of Sydney, Australia and a doctoral candidate in collaborative design at the University of Sydney. Her research area is in computer-mediated communication and her current interests are in interactivity, identifying typicality using associative neural network techniques, and social and linguistic aspects of computer-supported collaborative work. She has co-edited books on artificial intelligence, design and creativity, and co-authored papers on mediated group dynamics, Internet resources, CMC, neural networks and categorization.

Sheizaf Rafaeli is a senior lecturer (Associate Professor) at the School of Business Administration, Hebrew University of Jerusalem, Israel, where he has been head of the Information Systems area since 1986. His interests are in computers as media. He has published on this topic in journals such as Behavior and Information Technology, Communication Research, and Computers and the Social Sciences. He authored a book electronic spreadsheets, and is currently completing a book on information systems for the Open University.