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Is "Serious Chat" an Oxymoron? Pedagogical vs. Social Uses of Internet Relay Chat

Susan C. Herring and Carole G. Nix
University of Texas at Arlington

Introduction

Recent years have seen a dramatic increase in interest in real-time computer-mediated communication, one popular form of which is Internet Relay Chat (IRC). Sometimes referred to simply as "chat," IRC is a multi-user system where people convene on "channels" roughly organized according to topic, and interact via typed text in real time. The real-time nature of IRC lends it an informal, conversational feel, and it is best known for its social uses (Reid 1991; Werry 1996). However, some educators assert that synchronous computer-mediated communication such as IRC also has pedagogical benefits for on-site and distance education.

Two main educational benefits have been attributed to CMC: enhanced intellectual processes, and more democratic student participation. Thus Bowen (1994) claims that CMC promotes the expression and organization of complex ideas, resulting in a more sophisticated use of language. Cooper & Selfe (1990), Kahn & Brookshire (1991), and others claim that relative anonymity of CMC reduces gender, racial, status, and other cues, leading to more democratic, non-hierarchical classroom participation. However, there has been little rigorous evaluation of educational CMC, and most of these benefits remain largely unsubstantiated other than by anecdotal report.

Indeed, what little empirical evidence is available suggests that these claims may not hold true. Ko (1996) analyzed InterChange, a synchronous chat protocol used in college-level writing classrooms, and concluded that the medium leads to a reduction in linguistic complexity, and thus is ill-suited to the expression of complex ideas. He found that the cognitive demands of real-time communication in combination with the physical demands of typing result in shorter sentences, more limited vocabulary, and a less complex overall structure than traditional forms of either writing or speaking. The democratization claim has also been challenged. Rather than equal participation among all participants, Herring (1993) found that a small minority of participants, usually male, dominates each computer-mediated discussion group she examined. Similarly, Selfe and Meyer (1991) report that high status participants in Internet discussion groups contribute and are responded to more often, even under conditions of anonymity. However, these studies did not control systematically for CMC type or purpose of interaction — some studied synchronous and others asynchronous CMC, some CMC was pedagogical and some was social, making it difficult to ascertain whether their findings are characteristic of a particular mode of CMC, or whether they are specific to certain contexts and uses.

In the present study, we compare two types of IRC discourse, one from a distance education course and one from a social chat channel, in order to determine the effects of purpose of communication — in this case, pedagogical as opposed to recreational — on how users communicate using IRC. In particular, we are interested in whether real-time chat can be used effectively for "serious" educational purposes. In order to address this question, we apply methods of spoken discourse analysis to reveal the organizational coherence of each type, as well as the distribution of participation across individuals. The results show that the purpose of the communication has a strong effect on the discourse

produced, with the distance education chat being more structured and coherent than the social chat, but also more hierarchical. These results suggest a refinement to previous claims regarding complexity and democracy in CMC: rather than CMC being both structured and democratic, there is a tension between the two qualities, such that teachers in computer-mediated classrooms may be forced to choose between them.

Data and methodology

Data

Our primary goal in selecting data was to hold the CMC mode constant, while varying the purpose of communication within that mode. Thus we analyzed three sessions from each of two IRC channels on the Internet: a continuing education course in pharmacy, and #Yakyak, a social gathering with no central topic or theme.[1] Both are relatively small groups by IRC standards — the pharmacy classes average 4-5 students plus a teacher; the #Yakyak sessions average 7-9 participants — and both are limited in their access to participants in the class, and friends of the #Yakyak group, respectively. Thus unlike in public-access IRC, the membership of the groups remains stable throughout the duration of the samples, with relatively little joining and leaving of the channel.

The pharmacy chats represent some of the early attempts at on-line, real-time continuing education courses offered by the School of Pharmacy at a United States university. The sessions are complete in the sense that each comprises one class, a guided discussion of pharmacy case studies. (The three sessions are referred to as P1.1, P1.2 and P2 in the examples below.) The Yakyak sessions are not complete from beginning to end, but comprise natural units as identified by group members. The sessions were selected for preservation by Yakyak participants as some of their "best" discussions, presumably because all three feature joking and language play (Herring, 1997). Each is more or less globally coherent, relating loosely to a single general topic: blow-up dolls, the birthday of one of the participants, and people who go on daytime talk shows. (These are referred to as YDoll, YBlot's BD, and YTalk show in the examples below.)

Table 1 shows the breakdown of number of messages from each session.

Table 1. Data

#Pharmacy		#Yakyak	
Session 1.1	387 turns	"Blow-up Doll"	208 turns
Session 1.2	572 turns	"Blot's Birthday"	82 turns
Session 2	581 turns	"Talk Show/Trailer Talk"	48 turns
Total	1540 turns	Total	338 turns

Methodology

No research methods yet exist that are uniquely designed for the study of synchronous computer-mediated communication. In this study, we take as our point of departure the observation that real-time chat is "conversation-like" in the rapidity and informality of its exchanges, and adapt methods of spoken discourse analysis to the electronic medium (for further justification and examples of this approach, see Herring 1999). Specifically, we analyze the two IRC samples for message type, exchange structure, topical development, and frequency of participation, as described below.

Message type

IRC systems make available to users different types of messages, which correspond to different kinds of communicative activity. Message types can be classified according to whether they are produced automatically by the system, or by individual users. Of the types produced by individual users, there is a distinction between direct utterances and reported activities and states.

In this study, we coded for six types of messages specific to IRC: utterance, announcement, playback, behavior, emoticon, and reported state. *Utterances* are speech acts produced when participants type their message directly and then press "return". The utterances is displayed on the screen of all participants preceded by the participant's name (or nickname), as illustrated in example (1) below. *Announcements* and *playbacks* are generated by the system, the former automatically and the latter on command. System announcements are preceded by three asterisks in these data, whereas playbacks appear as utterances, and must be identified on the basis of their repeated content. Example (2) shows an announcement, and example (3) is a playback of a list of questions one of the pharmacy teachers (theilman) has recorded from the class discussion. *Behaviors* (example 4), *emoticons* (example 5), and *reported states* (example 6) all convey what corresponds to non-verbal communication in face-to-face discussion. Emoticons are prodeced in the same way as utterances, whereas behaviors and reported states require a special command (/me) which allows a message (written in the 3rd person, and typically in the present tense) to appear preceded by an asterisk. (For further discussion of message types in synchronous CMC, see Cherny 1995).

Utterance
(1) <Delta> brb [P2]

Announcement
(2) ***Delta has quit IRC (Leaving) [P2]

Playback
(3) <theilman> What are the adverse effects of drug therapy for ADHD?
<theilman> What are the kinetic properties (absorption, half-life, onset, duration of action, etc) of Ritalin?
<theilman> Would drug levels be appropriate to determine if drug absorption is occurring?
<theilman> How is Ritalin dosed (ie, how much do you start with and how do you titrate its effect)?
[P2]

Behavior
(4) *kingkong pours ice on blot [YDoll]

Emoticon
(5) <Doug> ;-) [P1-1]

Reported state
(6) * Rhap wishes she had a scanner... [YBlot's BD]

The frequency of different message types was calculated and compared for each channel.

Exchange structure

Discourse coherence was measured using two methods adapted from the analysis of face-to-face conversation. The first of these is the *exchange structure* analysis of Sinclair and Coulthard (1975), as modified for everyday conversation by Francis and Hunston (1992). Exchange structure refers to sequences of functional moves, or *speech acts* (question, answer, greeting, etc.), as they occur in conversation exchanges. Francis and

Hunston list thirty-two speech acts, to which we added the IRC-specific actions "join" and "leave" (the chat channel). Some messages contain more than one functional move, and thus received more than one act code. As a general rule of thumb, if a single move could plausibly be coded for more than one act, we opted for the most specific act applicable.

Examples 7 and 8 below illustrate some of the acts found in the IRC corpus. *Neutral proposals* are designed to elicit a "yes" or "no" answer, while *marked proposals* seek only agreement. A *framer* marks the boundary of a topic. A *direct* requests an action in response, and a *reject* communicates a refusal to respond in the expected manner. A *comment* elaborates on an immediately preceding utterance by the same speaker, and an *inform* introduces new information into the discourse. (For other act definitions, see Francis & Hunston, 1992.)

(7) 24 <Jellyroll> Win the lottery and get that doublewide the little woman always wanted [inform]
25 <inedoftlr> Oh JR im all yours! hehehe [inform/react]
26 <davec> :) [react]
27 <inedoftlr> im a triple wide kinda girl [inform]
28 <poosh> JR: the one with the phony fireplace? I'm THERE! [marked proposal/react]
29 <Jellyroll> not one, but TWO bathrooms - WOW! [inform/react]
30 <inedoftlr> oh yeah! [react]
31 <poosh> JR: both plastic, right???? [marked proposal]
32 <poosh> cool! [react]
33 <inedoftlr> with the fake jacuzzi tubs? [neutral proposal]
34 <blot> jelly!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!1 [react]
35 <Jellyroll> yup - simulated marble [confirm]
[YTalk show]

(8) 43 <theilman> Okay, I'm going to pass out the case. Connect your web browser to [...]
[framer/inform/direct]
44 <Alpha> back in a tick... i will try and give this term more columns [reject/comment]
45 *** _Alpha_ has quit IRC (Leaving) [leave]
46 <theilman> Take about five minutes, look over the case. Print it out if you want.
[direct/comment]
[P1-2]

We coded each message for the speech act(s) it contains, and identified recurrent sequences of conversation moves in each IRC sample.

Topic development

The second method employed to measure discourse coherence looks at the relation between an individual message and its preceding discourse context, as a means of measuring topic development or drift. Specifically, we were interested to determine whether IRC conversations remain on topic, and whether the degree of topical coherence varies according to the purpose of the chat.

Our method operationalizes categories of topic relations first identified by Hobbs (1990). According to Hobbs, subsequent discourse segments are either *on-topic* or shift the topic through parallelism, explanation, or metatalk. To this list, we added break. *Parallel* moves include the introduction of different entities with the same properties as those already mentioned, or other properties of the same entities (example 9). *Explanations* expand on the topic at hand by explaining a previous proposition (example 10). *Metatalk* serves to structure the discourse (example 11). *Breaks* change the topic

(example 12). In each example, the bolded message represents the move being illustrated.

Parallel move

(9) 1 *** Now talking in #pblgroup2
3 ***** Doug changes topic to "Pharmacy Continuing Education on the Internet"** [P1-1]

Explanation

(10) 75 <elkhound> why dont you give mr poosh a doll for his b-day? does wonders for a marriage
76 <happy1> poosh: really!
77 <poosh> hound: he's probably think it was me!
78 <poosh> no-
79 **<poosh> unless it came with a pc** [YDoll]

Metatalk

(11) 25 <Delta> I've got my web browser set to your pbl homepage - is this correct?
34 **<Doug> Here is the url for the case. Click on the url, read the case, take a few minutes, then come back and we will discuss.** [P1-1]

Break

(12) 13 <poosh> let's see - of the yaks here....spy,rhap, and happy have met me.
14 <poosh> but - I think you all have my pic now. :)
15 * I_spy doesn't consider a 5 minute intro much of a met!
16 * poosh hugs her scanner!
17 <poosh> spy: well - at least we met, right?
18 <happy> I_spy: It was longer than 5 minutes.
19 **<BLOT> WHY CANT BLONDES BE PHARMACISTS?** [YBlot's BD]

Because some topic shifts cover a larger semantic distance than others, we expanded Hobbs' system to include a measure for degree of distance, ranging from 0 to 4. On-topic messages always receive a score of 0, and metatalk messages were also considered to be on the same topic in certain cases. Breaks, in contrast, always receive a score of 4. Thus, the ranges for degree of distance are: on-topic (0), parallel move (1-3), explanation (1-3), metatalk (0-3), and break (4). The values for degrees of distance are defined as follows:

0 on-topic
1 closely related; part of the local frame
2 related; outside the local frame, but part of the established global frame
3 distantly related; outside the global frame, but related to at least one topic discussed thus far
4 unrelated; outside the global frame and unrelated to any topics discussed thus far

Parallel moves are the most common of the different types of moves that can shift a topic. Example 13 shows parallel moves of varying degrees of distance. In a Yakyak discussion about blow-up dolls, poosh in message 14 introduces the notion of hair, to which sigh responds with an on-topic react. Blot shifts the topic to introduce the notion of 'optionality' in association with hair, a closely-related parallel move with a distance of 1. In contrast, poosh's more distantly-related parallel shift in 20, which introduces the (fantasy) idea of a blow-up doll modeled after a famous bald person, was assigned a distance of 2, and sigh's jump to talking about pool balls was assigned the maximal distance for parallel moves of 3. Blot and poosh then play off the idea of a pool game, blot referring to his metaphorical position in relation to the 8 ball (a distance of 1), and

poosh shifting from 'metaphorical location in relation to pool balls' to 'physical location in relation to the pool table' (a distance of 2).

(13) 14 (poosh) do those things have hair? or do you supply a wig?
15 (sigh) *snicker*
16 (blot) hair optional!
19 (poosh) blot: cool!
20 (poosh) Sinead O'Connor blow up doll!
21 (blot) lol-poosh
22 (happy1) poosh: That one would gather dust on the shelf!
23 (sigh) 9 ball, side pocket!
27 * blot is behind 8 ball!
28 * poosh is under the table [YDoll]

One advantage of this method of coding topical distance is that it allows us to chart topic development over the course of a conversation graphically. The chart in Figure 1 below represents the sequence in (13). To produce this chart, each turn was numbered vertically, and distance from the previous functionally-related turn was plotted horizontally for each turn on a scale of zero to four. Note that distance is plotted cumulatively, such that turn 16, for example, is a distance of 1 away from turn 14, which is a distance of 3 away from the initial topic of the conversation. Thus turn 16 is plotted at a distance of 4 (3 + 1). As it happens, only on-topic and parallel moves are represented in this sample.

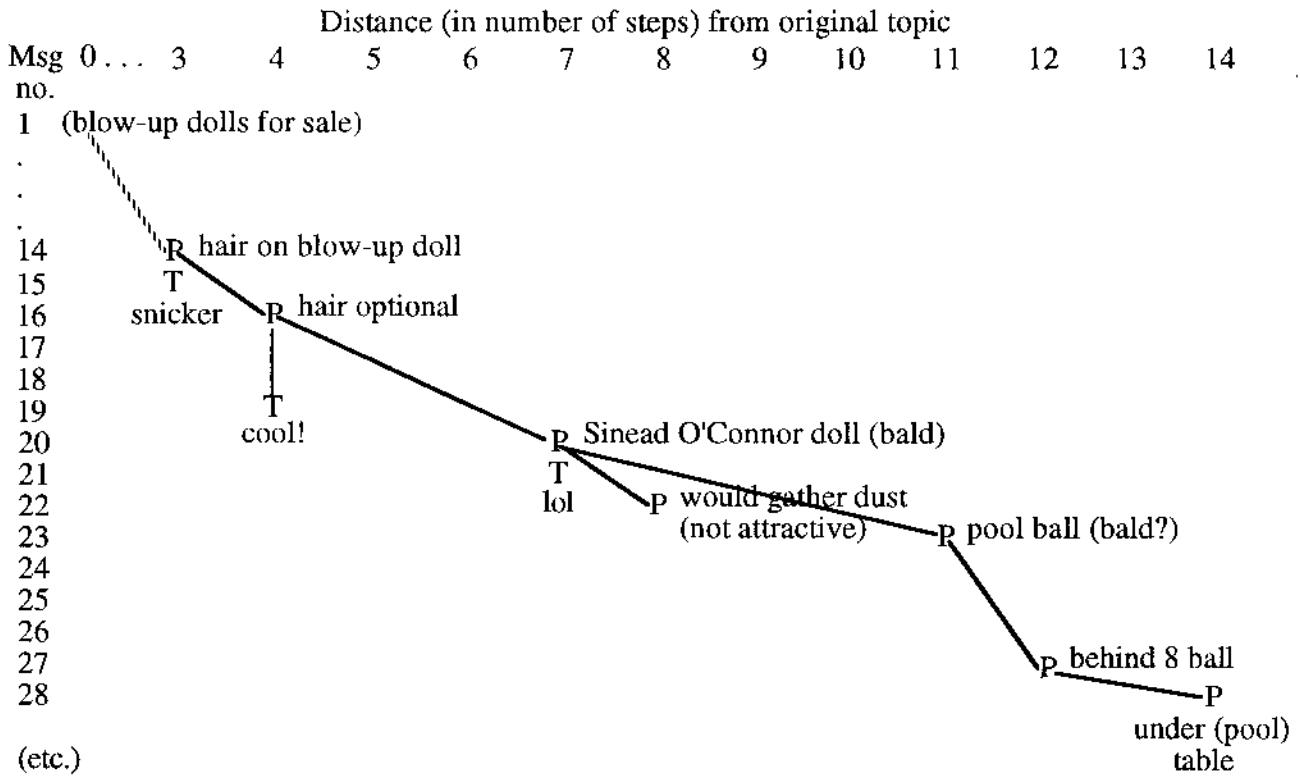


Figure 1. Topic drift chart of example (13)
(T='on topic'; P='parallel shift')

Each of the six sessions in the corpus was coded and charted separately for topic drift according to this method, and the frequencies of on-topic and off-topic messages were compared.

Participation

Last, we analyzed participation for each session and for each type of chat. This involved counting the number of messages contributed by each participant, and determining whether participation was roughly equally distributed across participants, or whether an individual or group of individuals contributed disproportionately more than others, thereby dominating the interaction. On the basis of this determination, the results for all of the above measures were broken down for dominant and non-dominant participants.

As additional measures of participant influence, we also calculated percentages of successful topics initiated by dominant and non-dominant participants, and number of times participants in each group were addressed directly by name. The results for all of these measures are presented in the following sections.

Results

Message Type

Most messages in both types of IRC are utterances; that is, the most popular activity is verbal exchange. However, while the pharmacy chat is almost all talk, the social chat contains a greater variety of activity types, including playful behavior and use of emoticons. This is consistent with the recreational nature of social chat. The breakdown of message types in the two channels is given in table 2.

	Pharmacy	**Yakyak**
Utterance	86.7%	71.0%
Announcement	6.2%	6.1%
Playback	5.0%	0
Behavior	1.2%	11.1%
Emoticon	0.9%	9.2%
Reported State	0	2.5%
Total	100%	100%

Table 2. Frequency of message types for each channel

Structural Coherence

Exchange structure

The analysis of speech acts reveals that 'informs' are the most frequent act in the corpus overall, regardless of IRC type. This is in part a reflection of the fact that the inform category as defined by Francis and Hunston (1992) is very broad, including answers to questions as well as informative initiations of various types. The former type of inform is more common in the pharmacy chat, and the latter is more common on Yakyak, where informs commonly take the form of humorous statements.

Other differences emerge between the two chat channels regarding the frequency of inquires, neutral proposals, receives, qualifies and prompts—which are common on pharmacy but not on Yakyak—and the frequency of reacts, confirms, behaves and greets, which are common on Yakyak but not on pharmacy. These differences reflect the typical activities taking place on the two channels—teacher-controlled question and answer sequences in the educational chat, and playful social interaction in the social chat. Table 3 shows the frequencies of the ten most frequent acts for each channel. (Bolded acts are those that appear in the top ten for both channels.)

Pharmacy		**Yakyak**	
inform	33.9%	**inform**	25.9%
inquire	13.7%	react	20.8%[2]
comment	7.9%	**comment**	7.4%
reformulate	4.0%	**marked proposal**	4.6%
neutral proposal	3.5%	confirm	4.3%
receive	3.3%[1]	**starter**	4.1%
starter	3.3%	behave	3.6%
marked proposal	3.1%	**reformulate**	3.3%
qualify	3.0%	greet	3.0%[3]
prompt	2.5%	inquire	2.8%
Total	77.9%	Total	79.7%

[1] Compare with 0.25% for Yakyak

[2] Compare with 1.17% for Pharmacy

[3] Compare with 0.74% for Pharmacy

Table 3. Ten most frequent acts for each channel

The most frequent exchange structure, or combination of acts into exchanges, on pharmacy is *inquire-inform-receive*, with the teacher performing the first and the third acts, and the students doing the informing. In contrast, the most frequent exchange structure on Yakyak is *inform-react*, and any participant may perform either act. Examples of typical exchanges on each channel are given in (14) and (15) below.

(14) 142 <Doug> "Okay, then what evidence is there of a UTA?" [inquire]
143 <Alpha> strong smell...amonia [inform]
144 <Doug> "Okay, good, what else?" [receive/endorse/inquire]
[P 1.1]

(15) 29 <Jellyroll> not one, but TWO bathrooms - WOW! [inform/react]
30 <inedoftrl> oh yeah! [react]
[Y talk show]

Topic drift

Most messages in both channels are on-topic in relation to the previous discourse context, although the percentages differ considerably for the two channels. Whereas over three-quarters of messages are strictly on-topic on pharmacy, this is true for only half of the Yakyak messages. The "off-topic" messages are mostly parallel shifts, but Yakyak also has a high percentage of breaks relative to pharmacy. When the distance of each message from the previous message is calculated, we find that Yakyak messages are more

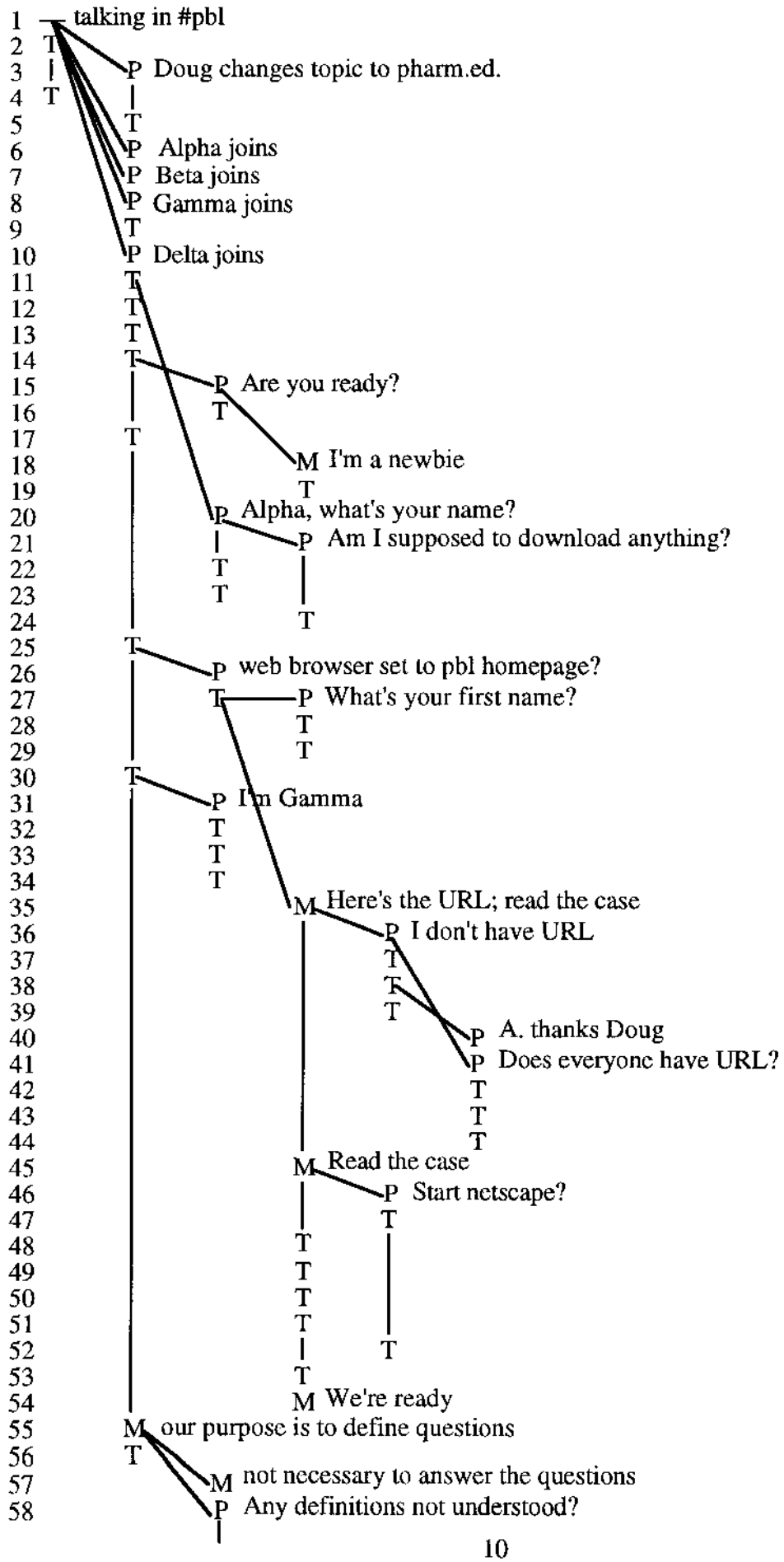
remotely related to their antecedents than Pharmacy messages by a ratio of 4 to 1, resulting in lesser topical coherence and more rapid topic decay. The quantitative results are presented in table 4.

	Pharmacy	**Yakyak**
on topic	77.6%	53.3%
parallel shift	17.4%	35.2%
metatalk	2.3%	3.5%
explanatory shift	2.0%	2.2%
break	0.7%	5.7%
Total	100% (N=304)	100% (N=227)
Avg. distance from previous topic	.2	.8

Table 4. Topical relation of turns to immediately preceding turn

The difference in topical coherence between the two chat types appears even more striking when topic drift is charted graphically. Figure 2 charts the topic relations for the first 58 messages of the first Pharmacy session. The topical progression in this sample, as in the other Pharmacy samples, is neat and vertical. This can be contrasted with the predominantly horizontal, disorderly topic progression in figure 3, which represents the full content of the Yakyak 'trailer park' session. (In these figures, T = on-topic, P = parallel shift, E = explanation, M = metatalk, and B = break.) The original text of each sample can be found in the Appendix.

The results thus far show that the educational chat is more structured than the social chat. The pharmacy distance education sessions make regular use of complete three-part exchange structures organized around question-answer sequences, contain many regulatory speech acts, and are topically coherent. These features would appear to make the pharmacy chat well suited to its educational purpose, in this case, organized problem solving. This finding is inconsistent with the claims of Ko (1996) and others (cf. Herring, 1999) that synchronous CMC is necessarily chaotic and linguistically impoverished. In contrast, activity on the social chat channel is mainly comprised of assertions by individuals which others may or may not react to, has a high incidence of phatic and playful speech acts, and is topically incoherent, in that messages tend to stray rapidly from the current topic. What accounts for these differences? In the next section, we propose that the presence or absence of a group leader—in the case of the present data, a teacher—is largely responsible for the degree of structure found in IRC interactions.


talking in #pbl
Doug changes topic to pharm.ed.
Alpha joins
Beta joins
Gamma joins
Delta joins
Are you ready?
I'm a newbie
Alpha, what's your name?
Am I supposed to download anything?
web browser set to pbl homepage?
What's your first name?
I'm Gamma
Here's the URL; read the case
I don't have URL
A. thanks Doug
Does everyone have URL?
Read the case
Start netscape?
We're ready
our purpose is to define questions
not necessary to answer the questions
Any definitions not understood?

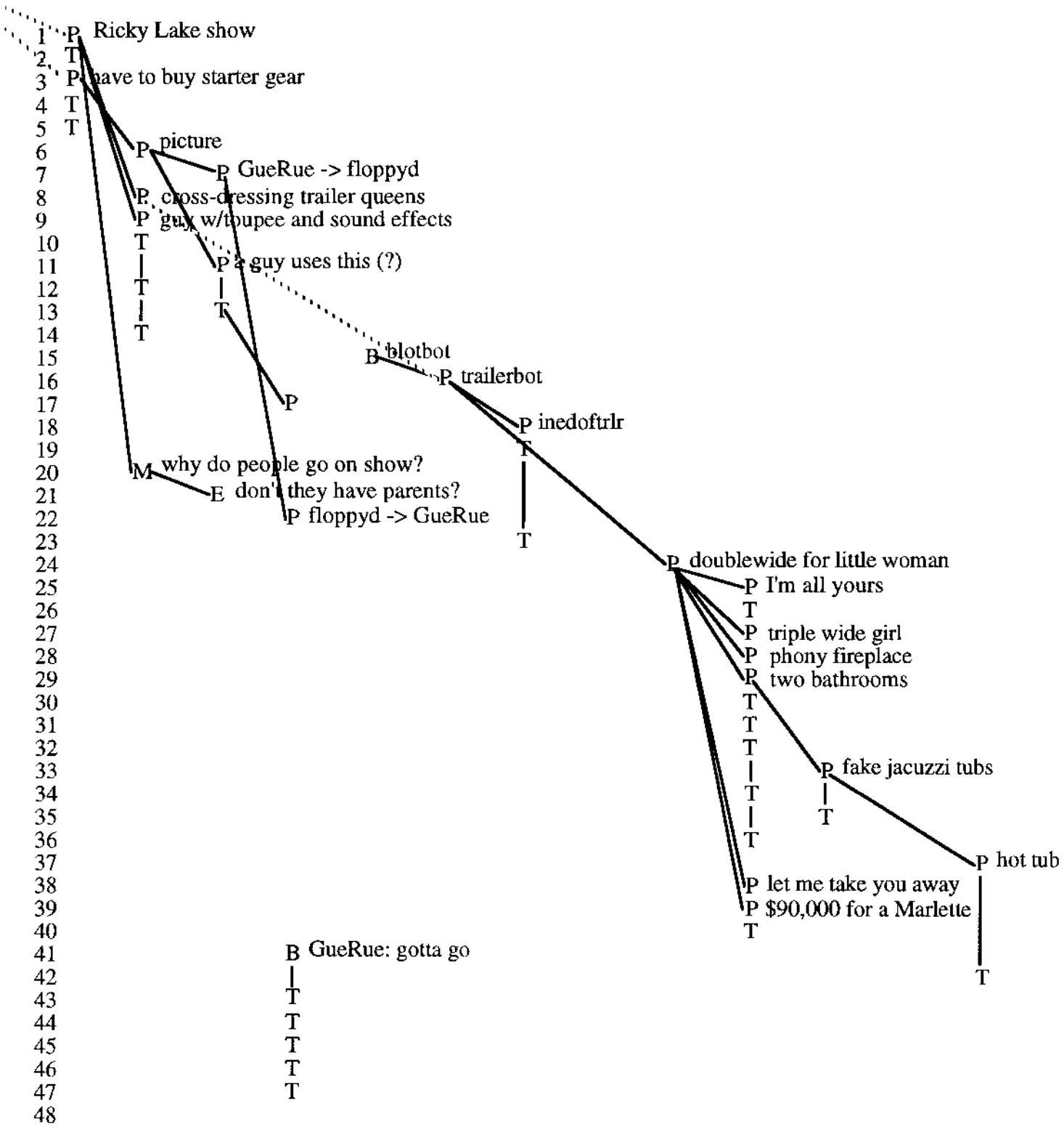


Figure 3. Topic drift in Yakyak 'talk show' sample

Participation and status

We turn now to the results that bear on the hypothesis that real-time chat is democratic, promoting egalitarian participation. In both chat groups, a small minority of participants contributes three times as many messages as other participants, as shown in Table 5. On Pharmacy, the dominant participant is always the male teacher, who, although only one person out of five,[2] contributed 41%, or close to half of the total messages on average. On Yakyak, two individuals, a male and a female, dominate discussion in two out of the three sessions, and the female is also quite active in the third session. Each contributed 24% of the messages on average; between the two of them, they contributed 48%, or almost half of the messages in the first two sessions.

	Pharm. dominant	Pharm. others	Yakyak dominant	Yakyak others
Avg. contributions	41.4%	13.5%	23.8%	7.5%
Avg. participants	1	4.3	2	7

Table 5. Amount of participation by dominant and non-dominant participants

The findings of a dominant minority of participants are similar to those reported in Herring (1993, 1996) for asynchronous e-mail groups on the Internet, and to descriptions by social psychologists of face-to-face interaction in small groups (Bales 1955).

We then became curious to know if the dominant participants were contributing *differently* from the non-dominant participants, in terms of speech acts, exchange patterns, and topic drift, and if so, whether the active participants on Yakyak resemble the pharmacy teachers in their discourse style. In order to test this, we reanalyzed the data presented in the previous sections, separating the dominant from the non-dominant participants on the basis of amount of participation.

The results show that the dominant participants, in addition to talking more, also exercise more control over the discourse, although this tendency is more pronounced in Pharmacy than in Yakyak. For example, consider what kinds of speech acts are performed, as shown in Table 6. Although the pharmacy teacher contributes less than half of the messages (41%), he is virtually the only participant to issue directives, prompt others to respond, and endorse the contributions of others; he also asks the majority of questions. Further, he exercises near-exclusive control over the flow of the discussion itself, issuing metastatements about what the group will do next, and declaring when they have finished. In contrast, the two dominant Yakyak participants don't tell others what to do or overtly attempt to steer the discussion. However, they do ask disproportionately more questions (neutral and marked proposals), offer more "information" (especially in the form of humorous observations), and react more to others than the non-dominant participants. Bolded acts in table 6 are those for which dominant participants are overrepresented in both samples.

	Pharm. dom.		Yak. dom.
prompt	96.9%	reformulate	59.7%
direct	88.3%	inform	59.1%
conclude	87.5%	**neutral proposal**	58.3%
metastatement	84.4%	**inquire**	58.3%
behave	73.5%	**marked proposal**	56.8%
endorse	71.7%	comment	56.2%
neutral proposal	70.8%	**react**	55.9%
inquire	70.4%	**receive**	50.0%
receive	69.1%	**framer**	50.0%
acquiesce	66.6%	**marker**	50.0%
summons	66.6%	engage	50.0%
return	59.2%		
marker	55.1%		
react	54.4%		
framer	54.1%		
marked proposal	46.8%		
reply to greeting	44.4%		
terminate	43.5%		

Table 6. Acts for which dominant participants are over-represented

The pharmacy teachers also dominate the *topics of discussion*. We counted the percentage of highly successful topics, defined as those that garnered more than 4 direct responses, or two extended chains of response.[3] Nearly 80% of successful topics were introduced by the teacher, as shown in Table 7. The two most frequent participants on Yakyak also introduced a disproportionate number of successful topics.

	Pharm. dominant	Yakyak dominant
% successful topics introduced	78.8%	53.8%
over-represented by a factor of	4.2	2.4

Table 7. Introduction of successful topics by dominant participants

As a final measure, we looked at the number of times a participant is *addressed by name* in our data samples, as a measure of how participants are responded to by others. In his study of linguistic features of IRC, Werry (1996:52) claims that 'addressivity', or prefacing one's turn with a direct form of address, has become "entirely conventional" in IRC because of the need to avoid ambiguity and discontinuity in structures of exchange or turn-taking. However, we found that not everyone is addressed equally often. We calculated the ratio of addresses received as a percentage of turns taken, in order to normalize differences in overall amount of participation. Dominant participants received *fewer* addresses overall than non-dominant participants, as shown in the last row of Table 8. The reason for this is that dominant participants talk proportionately more than they

receive responses. A similar result was found in a study of participation and response patterns in asynchronous discussion lists on the Internet (Herring 1996). The one exception here is that the dominant female Yakyak participant received more responses than other female participants. However, this is due to the fact that females receive fewer average addresses than males in both groups, especially in Yakyak. Had female Yakyak others been addressed as often as male Yakyak others, the ratio would have exceeded the ratio for the single dominant Yakyak female, consistent with the overall trend (compare 11.76% with 43.85%).

	Pharm. dominant	Pharm. others	Yakyak dominant	Yakyak others
Male avg.	7.33%	12.89%	26.67%	43.85%
Female avg.	n/a	8.14%	35.14%	11.76%
Overall avg.	7.33%	12.08%	31.34%	40.14%

Table 8. Direct addresses received as a percentage of turns by dominant and non-dominant participants

Thus rather than being "entirely conventional", addressivity on IRC appears to be sensitive to the status and gender of the participants addressed. Interestingly, these differences are smaller in the on-line pharmacy class than in the social chat.

Addressivity in the pharmacy chat correlates with equality of participation by students. The amount of addressivity by the teacher to the students decreases over the three pharmacy sessions, in part because the second teacher, Theilman, starts using preprogrammed turns which don't name individual students (such as "Theilman looks around the table expectantly" and "What do the rest of you think?"). Accordingly, student participation becomes increasingly uneven—the four students contributed roughly equally to the first session, but by the third session, the most active student exceeds the participation of the least active student by a factor of seven. This result suggests that addressivity is an important factor to consider in discussions of computer-mediated participation, and that group leaders can distribute speaking turns more equally by addressing participants by name.

Discussion

We return now to the questions raised at the outset, and consider what the present study contributes towards answering them. The first question concerns the suitability of computer chat for the expression and organization of complex ideas, a fundamental goal of higher education. We found that on the exchange structure level, the predominant sequence in the pharmacy chat was a question-answer pair, with the teacher asking, and the student answering. This is no different from discourse in traditional classrooms, and as long as the teacher is well-prepared and can guide the students to a deeper understanding, the IRC chat seems as adequate in this regard as face-to-face instruction. On the level of topical coherence as well, the pharmacy chat was found to be organized and on-topic, as though the teacher had prepared an outline of the lesson in advance, and stuck closely to it. As a consequence, the pharmacy chat stayed focused, and the class was able to diagnose and prescribe treatment for one or two patients in each session.

Pharmacy chat achieves its focus and structure, however, at the expense of democracy. The second question we asked concerned the implications of computer chat

for democratic, non-hierarchical participation. Contrary to the reports of some teachers of computer networks creating a "student-centered", rather than a "teacher-centered" learning environment, the on-line pharmacy classes were controlled at every level by the teacher, who in addition to doing most of the talking, unilaterally directed the students' behavior, evaluated their responses, introduced official topics, and structured the flow of discussion. These observations pose a dilemma—current pedagogical theories advocate breaking down hierarchy in the classroom in favor of more participatory student-directed learning, yet focus and analytical rigor are also important intellectual skills that education seeks to develop.

If the pharmacy chat participants had adopted a non-hierarchical approach—if the role of the teacher had been replaced with student facilitators, for example, and if the process of diagnosis had been collaborative and exploratory rather than guided, it is probable that the sessions would have been less efficient, and the outcomes less reliable. If the Yakyak sessions are any indication, leaderless IRC drifts (and sometimes leaps) from topic to topic, such that the sessions lack overall coherence. Moreover, leaderlessness does not guarantee equal participation; rather, a small minority of active participants tends to dominate discussions.

Ironically, the hierarchically-controlled pharmacy chats have the most even participation, if the teacher is excluded from the calculations. This is especially true when the teacher makes it a point to address each student frequently by name, the analog of calling on students to answer questions in the traditional classroom. Paradoxically, control in this sense fosters equality, whereas complete freedom or lack of control fosters advantage for one group at the expense of others. Computer-mediated communication is celebrated as being both free (the Internet has been described as "a glorious anarchy") and egalitarian, as if there were a necessary connection between the two. Our comparison of two kinds of on-line chat, one structured and the other unstructured, suggests that freedom and equality are at some level fundamentally incompatible concepts. To the extent that equality is viewed as a desirable end, on-line group leaders may need to exercise control to ensure that less confident participants are not marginalized by more confident, aggressive contributors. Conversely, if a higher value is placed on freedom, the price may be disorganization and anarchy, with *de facto* unofficial hierarchies replacing official ones. This paradox is not characteristic only of electronic group dynamics, but it presents a special challenge for educators interested in offering classes on-line, especially if their goal is to foster interaction that is both structured and egalitarian.

Conclusion

A comparison of educational and social chat using methods of conversation analysis has revealed a number of differences between the two types, despite the fact that the identical IRC technology is involved. These differences revolve around the purpose of the groups—instruction and problem-solving, as opposed to phatic social interaction—and the presence or absence of a recognized leader. In order to assess more fully the significance of each of these dimensions, we hope in future research to apply similar methods of analysis to leaderless problem-solving groups, and to educational contexts with less controlling leaders, such as on-line undergraduate composition and rhetoric classes, where the academic culture is more likely to downplay the authority of the teacher, and value exploratory discussion over strict linear problem solving. If the findings from pharmacy chat and Yakyak are any indication, we expect to find a correlation between degree of direction offered by a leader, and the overall coherence and

efficiency of the group. To the extent that this is true, on-line teachers face the age-old problem, clothed in new electronic garb, of how to maximize coherence while still allowing for the free play of expression that gives rise to creative ideas.

Notes

* An earlier version of this paper was presented at the annual conference of the American Association of Applied Linguistics, Orlando, Florida, March 11, 1997.

[1] The interactions of both channels were downloaded for analysis from Internet archives.

[2] The average pharmacy session included four students, with a range of from three to five students in individual sessions. There was one teacher in each session; the teacher in the second and third sessions was the same individual.

[3] A chain of response was considered to be three or more messages in response to a single message, as determined by the topic drift charts. An example of a chain of response in figure 3 is that triggered by the message introducing 'double-wide trailers'.

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Appendix

Pharmacy Sample (Session 1.1)

(Note: Doug is the teacher. Alpha, Beta, Gamma and Delta are pseudonyms for the names of the students.)

35 <Doug> Here is the url for the case. Click on the url, read the case, take a few minutes, then come back and we will discuss.
36 <Gamma> me neither
37 <Beta> I don't either
38 <Doug> http://www.olemiss.edu/courses/pbl/case1.htm
39 <Alpha> thank you
40 <Doug> Does everyone have the url?
41 <Beta> I have it.
42 <Gamma> yes
43 <Delta> got it
45 <Doug> Okay, read the case. Let me know when you are back in chat.
46 <Beta> You want us to start netscape, point to this url.
47 <Doug> Right, Beta.
48 <Delta> back in chat
49 <Doug> Okay, Delta. We'll wait for the others to re-join us.
50 <Alpha> back as well
51 <Beta> I am back
54 <Doug> All right, guess we are ready.
55 <Doug> Now, one thing that I want to remind you all of, is that our purpose is to define what areas of the case for which your current knowledge is insufficient.
56 <Beta> That would be most areas for me.
57 <Doug> It isn't necessary for us to _answer_ the questions for the case right now, but to properly define the questions we need to ask to _answer_ the case.
58 <Doug> Okay, so the first question is, are there any definitions that anyone did not understand?
59 <Alpha> yes. one that states he has "DOE" with minimal exert.
60 <Alpha> what is DOE?
61 <Gamma> dyspnea on exertion
62 <Doug> Excellent. What does dyspnea on exertion mean?
63 <Beta> Difficulty breathing
64 <Alpha> shortness of breath on exertion
65 <Doug> Any other problems with abbreviations?

Yakyak Sample (Talk Show/Trailer Talk)

1 [GueRue] Ricky Ricky Ricky
2 "[SuperPac] poosh: that and I'd have to have a new nickname or something... like, um...""Dino"", or ""G"", or something... and I'd have to start buying huge amounts of Starter gear. ;)"
3 [poosh] super: LOL
4 [davec] huh? :)
5 [GueRue] super: How about.....^?
6 *** GueRue is now known as floppyd
7 [Jellyroll] Cross dressing trailer queens who want to be in the priesthood - more on Ricky Lake
8 [inedofhlp]the guy with the toupee and the really wierd sound effects like mooing when a fat lady comes on stage?
9 [poosh] heheheheheheh
10 [floppyd] I know a guy who uses this
11 [floppyd] I have to imagine?
12 [floppyd] Sound like a rap star
13 [floppyd] could be a personal problem
14 [inedofhlp] so Blot when is blot bot going to be killed?
15 *** blotbot is now known as trailrbot
16 [SuperPac] that's me... homey de Pac
17 *** inedofhlp is now known as inedoftlr
18 [inedoftlr] dont even think about it blot.....
19 [poosh] I just don't understand how those people have the nerve to go on those shows!
20 [poosh] Don't they have PARENTS?
21 *** floppyd is now known as GueRue
22 [trailrbot] wat ya say inedoftlr
23 [Jellyroll] Win the lottery and get that doublewide the little woman always wanted
24 [inedoftlr] Oh JR im all yours! hehehe
25 [davec] :)
26 [inedoftlr] im a triple wide kinda girl
27 [poosh] JR: the one with the phony fireplace? I'm THERE!
28 "[Jellyroll] not one, but TWO bathrooms - WOW!"
29 [inedoftlr] oh yeah!
30 "[poosh] JR: both plastic, right????"
31 [poosh] cool!
32 [inedoftlr] with the fake jacuzzi tubs?
33 [blot] jelly!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!1
34 [Jellyroll] yup - simulated marble
35 [Jellyroll] blot!!!!!
36 [trailrbot] i got a hottub in sunken livin room....wanna see?
37 "[Jellyroll] Jolene, let me take you away from all this!!"
38 "[inedoftlr] you know its 90,000 for a double wide 96 marlette out here ouch!"
39 "[Jellyroll] oh, yes, please do"
40 [GueRue] Gotta Run Gotta Go Gotta Split
41 "[inedoftlr] the hot tub, the living room, or you?"
42 [poosh] see ya gue - take care!
43 [GueRue] Niters All!!!
44 [inedoftlr] nite Rue
45 [blot] cya gue
46 [davec] so long gue!
47 *** Signoff: GueRue (Blood stains on my hands and I don't know where I've been.)