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* ESPECIALLY FOR THE DEAF *
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COMPUTERIZED CONFERENCING

for the

DEAF AND HANDICAPPED

by

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ABSTRACT

This summary paper briefly describes a unique and relatively new medium for human communication utilizing current computer and communication technology. However, emphasis is placed on the tremendous potential benefits that this form of communication can have for the deaf and physically handicapped since this form of communication eliminates restrictions on communication imposed by lack of mobility or transportation, lack of speech, and requirements of time coincidence among members of a discussion.

COMPUTERIZED CONFERENCING: WHAT IS IT?

Computerized Conferencing, made possible by today's computer technology, is a new form of communication among a group of people. Such a conferencing system is, in fact, based on rather simple concepts. Take a computer terminal (display or typewriter) and allow a person to talk to a group of individuals who are at other terminals by typing messages and reading what others are saying. This is, in essence, a written form of a conference telephone call. However, since the computer has so much more variety in its mode of operation than a telephone, so many new and interesting possibilities are introduced by its use particularly when compared to conference calls, or face-to-face meetings, that it becomes a unique communication form of its own. It would be much easier to demonstrate this added communication power by demonstrating on an actual terminal how such a communication system functions. Since such a demonstration is not possible, I shall attempt the same by highlighting some key properties of this kind of communication form.

1) The individuals no longer have to be coincident in time, as in telephone calls or face-to-face meeting, since the computer keeps a record of the discussion and a bookmark for every individual on what he has seen.

2) The system allows each individual to work at his own pace, taking as much or as little time as he wishes to read, contemplate and/or reply (i.e., a "self activating" form of communication).

3) The system provides many of the signals present in face-to-face communication, i.e., who is in the discussion at any particular instant, what everyone has seen or not seen, when they were last in the meeting, etc.

4) The system provides a host of unique features, i.e., private messages or whispering between individuals, items that can be voted on, specialized retrieval - key words, authors - to reorder the discussion, conditional messages, etc.

Because the communication bookkeeping is done by a computer, it now becomes possible to tailor special forms of computerized conferencing to reflect communication structures for special applications such as debating or educationally oriented discussion. In addition, specialized aids can be built-in to allow such items as automatic spelling correction or speed writing -- e.g., use of abbreviations filled in by the computer. Further details on the characteristics of these systems may be found in the references.

The real concern here is the design of these systems for use by the deaf and handicapped. It is the view of the author that this type of communication offers tremendous potential for improving the opportunity for these individuals to lead more rewarding lives and to decrease greatly the limitations often imposed upon their mental capacity by the presence of inhibiting physical disabilities. While I may sound overly enthusiastic, the need for conducting trials of this area because of the possible opportunities that may be opened up by computerized conferencing for the deaf and handicapped is obvious.

APPLICATIONS

As with any communication process between human beings, the range of application is as broad as the imagination and desires of those who would make use of it. In the following, I only summarize a few of the more obvious uses to which a computerized conferencing system may be put.

Peer Group Discussions

Given a group of individuals in similar circumstances faced with common problems, there are obvious benefits in regular or continuous group discussions. We assume the obvious benefit, that of one individual being able to gain from the collective wisdom or experience of the group. For the homebound handicapped a continuous discussion capability among such a group would potentially be of tremendous psychological benefit. For the deaf this facility of computerized conferencing would tremendously enhance the ability for group discussions because of the elimination of the need for coincidence in time and space and because a larger group can coordinate a give-and-take discussion that is not possible with sign language. The current use by a limited number of deaf people of teletypes is a written form of communication -- but limited to one-on-one and not group discussion.

Heterogeneous Groups

Of particular concern is the formation of groups with common interests which are composed of both handicapped and non-handicapped individuals. There is, of course, no way (unless the conferee chooses to provide the information) to identify whether an individual is handicapped or not. For that matter, bias parameters such as age, sex, face, etc., can also be eliminated by the use of pseudonyms. This would provide handicapped

individuals an opportunity to communicate with a group in an atmosphere where no psychological bias exists because of the individual's particular handicap.

Educational and Counseling Services

There is, undoubtedly, no educational system with sufficient funds to provide an optimum amount of home tutoring for homebound handicapped. The introduction of computerized conferencing would not, in my opinion, reduce the need for such services. However, this new type of communication would greatly enhance the effectiveness of such home tutoring in a number of ways:

1) The ability to hold class discussions among a group of homebound handicapped.

2) Allowing the tutor to more effectively utilize his time on a person-to-person basis by dealing with items common to the group through the conferencing capability.

3) The ability of more than one tutor being able to interact with a given class or group.

All the above applies equally to counseling and social service people who must interact with homebound handicapped.

Therapy Sessions

Because of the elimination of psychological biases and the capability of participating in an anonymous mode, it is quite likely that initial barriers to discussions of real problems in therapy groups could be eliminated via this mode of communication. Also, it is quite evident that a good many individuals communicate better via a written mode of communication than by a verbal one. In addition, a great deal of emotional content can be conveyed via the written medium and some people are able to communicate more expressively in writing.

Employment Applications

It is quite evident with the use of this communication form that there is an increase in the opportunity for a deaf or mobility-limited person to become a more effective employee, particularly of the expected range if activities are not too unusual. Quite recently, the Non-Medical Use of Drugs Directorate of the Canadian Government has initiated the use of computerized conferencing for improving regional-national office communications. One of the conferees at the national office is wheel-chair bound. Although his is quite mobile 8 months of the year, the winter snows (even after street cleaning) considerably impair his mobility. He frequently uses a portable terminal at his home when weather conditions confine him to his residence. His ability to deal with the people in the region on a regular basis it seems on observation to be considerably enhanced.

Special Experiments

The employment area alone raises many questions and possibilities that deserve careful analyses as part of an experimental and developmental program. There are also a significant number of other potential areas in which deaf and mobility-restricted people may benefit from involvement in an ongoing carefully designed computer conference. For the purposes of this paper, one cogent example should suffice: a great many deaf people have never developed a comfortable competence in using the written word. It has been hypothesized that at a young age when first learning to write, they experience no real feeling for the usefulness of such a method of communication. If this is true, then the introduction of computerized conferencing into the homes of young deaf children might drastically alter their view of the written word. This is merely one example of many experiments that deserve execution.

STATUS AND COSTS

Computerized Conferencing was originally developed by the author at the Office of Emergency Preparedness in 1970. Today it is available on a number of time-sharing services, and internally in a number of public and private organizations. There are only a limited number of research and development programs at the moment. The one at the New Jersey Institute of Technology (formerly Newark College of Engineering), the only one at the moment in an academic institution, is concerned with the utilization of dedicated mini computers to support this type of application. Current commercial time-sharing costs for this service are about $20 per hour per user. The cost via dedicated mini systems would be about $2 per hour, making it comparable to normal telephone rates. There are also technical issues dealing with responsiveness and reliability, which further justify such an approach. The biggest cost factor at the moment is the need for computer terminals which currently cost about $1,000 per unit, and which might cost up to double that with special typing devices for some types of handicaps. However, by 1980 terminals are expected to cost

in the neighborhood of $300 which makes their purchase comparable, in terms of today's environment, to a color TV set. Therefore, these systems could be available for mass use by the handicapped by 1980 provided a careful evaluation, developmental and experimental program is launched to identify the areas of crucial application, and the optimum designs of conference structures for these areas.

Those of us at the New Jersey Institute of Technology concerned with developing this technology are very interested in talking with individuals and groups concerned with the problems of the handicapped and deaf about the possibilities in this area. Our own stumbling block at the moment is how to find a funding source for equipment to allow the set-up of a mini computer based system as a utility for testing applications. This equipment cost is in the neighborhood of two hundred thousand dollars. In actual fact this amount is considerably less than the cost of other alternative ways of dealing with the communication problem of the deaf and mobility-restricted, e.g., Two Way TV.

A FALSE PROBLEM

Most of the researchers currently working to alleviate the problems of the handicapped are trying to maximize their mobility. The handicapped can become easily isolated from the rest of the world. Because of this, the initial reactions of individuals to the idea of computerized conferencing for the handicapped is a fear that this would lead to their greater isolation. I believe this fear is not warranted. Such a system could help a handicapped person to associate with a much larger number of people than he can now communicate with. People can even be brought together via a choice of discussion topics so that the range of people with which the handicapped could associate far transcends groups of other handicapped. By increasing the number of contacts a person has, the likelihood of forming strong friendships also increases. Increasing the number of personal relationships will eventually motivate more face-to-face contacts. I have seen a number of examples among the systems in use today where strong friendships are formed among individuals who have never met face-to-face. In any case, no one would suggest denying handicapped phones (although these are denied to deaf people) for fear of decreasing the incentive to be more mobile. I would hope the reader would see computerized conferencing as an additional communication option, similar to telephones and the mail. If a substitution process were to take place, it would not be with face-to-face meetings but with telephones and the mail. Because of the inherent ability of people utilizing computerized conferencing to conduct dialogues with much larger groups than is otherwise possible, the meaningfulness and frequency of subsequent face-to-face meetings is likely to be enhanced.

Some Recent References on Computerized Conferencing

The Delphi Method by Linstone and Turoff Addison-Wesley, Advanced Books, 1975

✓ Human Communication by Turoff, EKISTICS, Vol. 35, No 211, June 1973

Computerized Conferencing by Turoff, Proceedings of the International Conference on Computers and Communications in 1972 and 1974 (ICCC 72 and ICCC 74 available from IEEE Computer Society.)

APPENDIX

Editor's Note: We have taken the opportunity to add, as an Appendix, an example of a "conference" from another of Professor Turoff's papers as we feel it gives the flavor of his approach.

Example

"PARTY-LINE" operates very much like a conference telephone call. Group members wishing to hold a discussion go to their respective terminals at an agreed upon time and call up the system on the computer. If some are late in joining the conversation, they will receive first a copy of the discussion as it stands. A member of the conference call has only two basic modes of operation: (1) he can be typing in a message and when he signifies (by typing a plus sign) that he is finished, the computer adds his input to the end of the message list, assigns a unique message number to it and signs the author's name; (2) if the conference member is not writing, or waiting, then he is receiving any messages written by others that have been added to the list since he last received messages. This is similar to either talking or

listening on a telephone, with the one difference that everyone is asynchronous with the system, i.e., they could all be typing or receiving at the same time or any mix of the two. There are a number of convenience features, for example, a way of retrieving earlier messages, a way to cause the individual terminal to pause for a fixed length of time or until a new message is generated, and a choice of special text editing commands.

The system is perhaps best understood by observing the example discussion that follows. In this example the reader is in effect "looking over the shoulder" of a participant named Nancy Goldstein, who is interacting on the computer terminal. What Nancy Goldstein types in is presented in lower case, and always follows a question mark. Everything in upper case is typed out on the terminal by the computer. The reader will note that after Nancy Goldstein finishes putting in a message, she first receives any new messages completed by other participants (and therefore already assigned sequence numbers) before her own newly entered message appears. The example conversation presented is a slightly edited version of an actual conversation.

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DO YOU WISH AN EXPLANATION?      no

ARE YOU USING A CRT?      no

WHAT IS YOUR NAME?      Nancy Goldstein

CURRENTLY THE FOLLOWING GROUPS ARE TALKING:

GROUP #1
MURRAY TUROFF          ROD RENNER          RICHARD WILCOX

DO YOU WISH TO:

     JOIN ONE OF THESE GROUPS (1)
     START A NEW GROUP        (2)
     TERMINATE                (BYE)
CHOICE (1 OR 2 OR BYE)?                  1

WHICH GROUP NUMBER?                      1

#1 FROM MURRAY TUROFF:
THE PURPOSE OF THIS DISCUSSION IS TO SUMMARIZE SOME OF THE COMMENTS WE AND OTHERS HAVE MADE
ABOUT THE PARTY-LINE SYSTEM AND ITS UTILITY AND APPLICATION.  THIS IS NOT RESTRICTED TO JUST THE
APPLICATIONS IN OUR OWN ORGANIZATION.

#2 FROM MURRAY TUROFF:
ROD, YOU HAVE USED THE SYSTEM QUITE A BIT, EVEN FOR TWO PEOPLE COMMUNICATION.  WHEN DO YOU
PREFER IT TO A TELEPHONE CALL.

THAT'S ALL THAT IS NEW AS OF TIME:  153839
ENTER A COMMENT (UP TO 8 LINES) OR A SPECIAL REQUEST
COMMAND:
L#1?  I used the party line to try to train new terminal operators in the
L#2?  IRS when we switched over EMISARI.  It would be a very good way
L#3?  to get together a group of people to educate them,
L#4?  make announcements, etc.  One possible problem is this:
L#5?  someone has to get onto party line 15-30 minutes ahead of the others
L#6?  to put in the main points to be covered, the explanations necessary,
L#7?  etc. otherwise, the discussion gets away from the leader, and it
L#8?  can never be retrieved.
THAT'S ALL THE LINES ALLOWED AT ONE TIME.
+ ASSUMED NOW.

#3 FROM MURRAY TUROFF:
TWO OBVIOUS POINTS MADE ABOUT THE PARTY-LINE HAVE BEEN THAT NO ONE GETS MISQUOTED AND
EVERYONE WALKS AWAY WITH A WRITTEN RECORD OF WHAT TOOK PLACE.

MORE PEOPLE HAVE NOW JOINED IN:
TOM HALL
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#4 FROM ROD RENNER:
MURRAY. I'VE CARRIED ON APPROXIMATELY 10 PARTY-LINE DISCUSSIONS-MOST RECENTLY WITH C.B. ATKINSON IN ATLANTA, GA. BEN WANTED TO SUGGEST CHANGES TO PART OF OUR EMISARI SYSTEM AND WE BOTH FELT COMMUNICATION WOULD BE BETTER IN WRITTEN FORM, SO WE AGREED ON A MUTUAL TIME FOR A PARTY-LINE. WE RESOLVED OUR DIFFERENCES AND EXCHANGED USEFUL IDEAS IN ABOUT AN HOURS WORTH OF TIME. WE HAD A "COPY" OF THE ENTIRE DISCUSSION. (TOTAL CPU^2 TIME=3 SECS.)

#5 FROM MURRAY TUROFF:
NANCY, YOU HAD AT LEAST ONE UNIQUE IDEA ON APPLICATIONS OF THE SYSTEM. I'D LIKE YOU TO BRING THAT UP AGAIN.

#6 FROM RICHARD WILCOX:
FROM AN OPERATIONAL STANDPOINT, PROBABLY THE MOST OBVIOUS UTILITY OF "PARTY-LINE" IS THE ABILITY TO CONDUCT A RELATIVELY INFORMAL DISCUSSION AMONG GEOGRAPHICALLY SEPARATED PEOPLE IN ORDER TO ATTACK (AND, HOPEFULLY, SOLVE) PROBLEMS OF MUTUAL CONCERN; THE ADVANTAGE OVER A TELEPHONE CONFERENCE CALL BEING, OBVIOUSLY, THAT A RECORD OF ALL COMMENTS EXISTS BOTH FOR IMMEDIATE REFERENCE (IN CONFERRING ON COMPLEX MATTERS EFFICIENTLY) AND FOR PERMANENT REFERENCE LATER.

#7 FROM NANCY GOLDSTEIN:
I USED THE PARTY LINE TO TRY TO TRAIN NEW TERMINAL OPERATORS IN THE IRS WHEN WE SWITCHED OVER EMISARI. IT WOULD BE A VERY GOOD WAY TO GET TOGETHER A GROUP OF PEOPLE TO EDUCATE THEM, MAKE ANNOUNCEMENTS, ETC. ONE POSSIBLE PROBLEM IS THIS: SOMEONE HAS TO GET ONTO PARTY LINE 15-30 MINUTES AHEAD OF THE OTHERS TO PUT IN THE MAIN POINTS TO BE COVERED, THE EXPLANATIONS NECESSARY, ETC. OTHERWISE, THE DISCUSSION GETS AWAY FROM THE LEADER, AND IT CAN NEVER BE RETRIEVED.

THAT'S ALL THAT IS NEW AS OF TIME: 154339
ENTER A COMMENT (UP TO 8 LINES) OR A SPECIAL REQUEST
COMMAND:
L#1? If you mean by a unique idea my "blind dating" use of the
L#2? party line, there it is. In some instances it seems easier
L#3? to meet people via the party line than face-to-face. It
L#4? is also easy to meet the computer through the party line.
L#5? +

#8 FROM TOM HALL:
I PERSONALLY ALMOST NEVER PREFER A PARTY-LINE LIKE THIS TO A 2 PERSON DISCUSSION, BUT I CAN'T DRAW A DIVIDING LINE TO SAY HOW MANY PEOPLE MUST BE INVOLVED BEFORE THIS SYSTEM BECOMES PREFERABLE. CERTAINLY FOR MORE THAN 4 PEOPLE, THE NON-INTERRUPTABLE, SYNCHRONIZING FEATURES OF THE SYSTEM ARE PRETTY MUCH OF A REQUIREMENT.

#9 FROM NANCY GOLDSTEIN:
IF YOU MEAN BY A UNIQUE IDEA MY "BLIND DATING" USE OF THE PARTY LINE, THERE IT IS. IN SOME INSTANCES IT SEEMS EASIER TO MEET PEOPLE VIA THE PARTY LINE THAN FACE-TO-FACE. IT IS ALSO EASY TO MEET THE COMPUTER THROUGH THE PARTY LINE.

#10 FROM MURRAY TUROFF:
ALTHOUGH WE HAVEN'T USED IT MUCH AS YET, THE ABILITY FOR EVERYONE TO SIGN IN WITH A FAKE NAME ALLOWS FOR A DELPHI DISCUSSION TO TAKE PLACE. THIS FEATURE COULD BE QUITE USEFUL WHEN SOMEONE DESIRES AN UNINHIBITED EXPLORATION OF A TOUCHY ISSUE.

#11 FROM TOM HALL:
NOT ONLY DOES IT PROVIDE A RECORD OF THE COMMENTS TO LOOK BACK AT IN CASE OF UNCERTAINTY, BUT IT EVEN FACILITATES THIS "RECALL" OPERATION WITH THE +N TO M FEATURE FOR RETRIEVING EARLIER COMMENTS. ALSO HAVING THE COMMENTS NUMBERED ALLOWS ONE TO REFER BACK TO THEM EXPLICITLY RATHER THAN USING CIRCUMLOCUTIONS LIKE, "REGARDING WHAT YOU SAID ABOUT SO-AND-SO ABOUT 5 MINUTES AGO . . . "

THAT'S ALL THAT IS NEW AS OF TIME: 154952
ENTER A COMMENT (UP TO 8 LINES) OR A SPECIAL REQUEST
COMMAND:
L#1? +P

#12 FROM ROD RENNER:
I PROMISED MY WIFE I'D BE HOME ON TIME FOR A CHANGE-BYE ALL.

#13 FROM MURRAY TUROFF:
TOM, COULD YOU SUMMARIZE IN ONE COMMENT THE TECHNOLOGY ASSOCIATED WITH THIS SYSTEM FOR NON-COMPUTER TYPES.

SIGN OFF BY: ROD RENNER

#14 FROM RICHARD WILCOX:
WHEN THE GROUP IS LARGER, THERE IS UTILITY IN HAVING A PROTOCOL WHERE CERTAIN DISCUSSANTS MAY BE RESPONSIBLE FOR RESPONDING TO CERTAIN ISSUES. THIS TAKES FULL ADVANTAGE OF THE FACT THAT EVERYONE CAN, IN PRINCIPLE, BY TYPING AT THE SAME TIME.

#15 FROM TOM HALL:
BASICALLY ALL THAT IS INVOLVED IS THAT THE VARIOUS PEOPLE ON THE PARTY-LINE ARE ALL WRITING THEIR COMMENTS INTO A COMMON AREA OF STORAGE, WHILE THE PROGRAM TAKES THE RESPONSIBILITY FOR KEEPING THEIR DATA IN ORDER BY THE USE OF "LOCKING" AND "UNLOCKING" OF A CERTAIN LIST OF DATA. THEN EACH USER'S PROGRAM READS THIS COMMON AREA TO SEE WHAT EVERYONE ELSE HAS WRITTEN AND PASSES THAT INFORMATION ON TO THE USERS.

THAT'S ALL THAT IS NEW AS OF TIME: 155346
ENTER A COMMENT (UP TO 8 LINES) OR A SPECIAL REQUEST
COMMAND:
L#1? I've seen people who were nervous about using the computer
L#2? completely forget their fears after a short time on the party-
L#3? line. If you want to capitalize on anonymity to get a sensitivity
L#4? discussion started, maybe, but it would be difficult if the
L#5? participants cannot type

#17 FROM TOM HALL:
MURRAY, RE: #16. WE ARE OF THE OPINION THAT THIS SYSTEM IS THE ANTITHESIS OF A SENSITIVITY SESSION, BEING DRAINED OF ALL POSSIBLE NONVERBAL AND EMOTIONAL FACTORS.

#18 FROM NANCY GOLDSTEIN:
I'VE SEEN PEOPLE WHO WERE NERVOUS ABOUT USING THE COMPUTER COMPLETELY FORGET THEIR FEARS AFTER A SHORT TIME ON THE PARTY-LINE. IF YOU WANT TO CAPITALIZE ON ANONYMITY TO GET A SENSITIVITY DISCUSSION STARTED, MAYBE, BUT IT WOULD BE DIFFICULT IF THE PARTICIPANTS CANNOT TYPE.

#19 FROM MURRAY TUROFF:
THIS FORM OF COMMUNICATION, AS A STARTING MODE, FOR A SENSITIVITY GROUP MIGHT SHORTEN THE LONG PERIOD USUALLY NEEDED TO START UP EFFECTIVE COMMUNICATION. I THINK THE ABOVE IS SUFFICIENT AS A DEMONSTRATION, THANK YOU AND GOODNIGHT.

When everyone has signed off, the file of messages that has been stored in the computer disappears and only the individual terminal printouts remain as records. It is in this property that the "DISCUSSION" system differs from PARTY-LINE. Where PARTY-LINE requires the group to coincide in time, the DISCUSSION version does not. The DISCUSSION file stays in the computer until the moderator (the one who started the particular discussion) decides to delete it. The members of the discussion may get on the terminal whenever they wish to observe what comments have been added and to enter additional comments. The DISCUSSION system may then be used to discuss a topic over days or weeks. The moderator of the discussion also has the ability to shape the list of comments into a more compact set by either editing or deleting items. With code names or pseudonyms it may also be used for a Delphi type discussion. The DISCUSSION system is, in essence, a nonvoting version of the DELPHI CONFERENCE system that has also been implemented at the Office of Emergency Preparedness.

This latter system allows voting scales to be associated with comments so that the group may vote on various issues. The computer tallies and displays to the conference group the voting results on a specific issue. An individual may go back and change his vote at any time if he has been so influenced by the discussion. It has been observed that vote change rates tend to be much higher when using the anonymous format provided by the computer.

The seemingly straightforward concept of automating the conference call on a modern time-shared computer system offers a unique ability to allow effective communication within larger groups than would normally be possible in a telephone conference call. While the current version is arbitrarily set at a limit of 15 individuals per conference, it is feasible to include 30 to 50 people in such a conversation. The problem that may exist for those who do not type may be overcome by utilizing secretaries in a dictation mode. The system has mainly been used on terminals operating at 30 characters per second. This is far more desirable than the normal teletype speed of 10 characters per second, since it is closer to

reading speed for most people, as is shown in the next section. A group of 10 to 15 people on 30 character per second terminals can exchange a great deal more information in a given time span than would be possible in a verbal discussion. The additional psychological advantage of allowing each conferee to interact with the group at his own speed is also a significant factor in fostering an effective exchange of information.

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