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Life on the Net

CHAOS AND COMMUNITY ON-LINE

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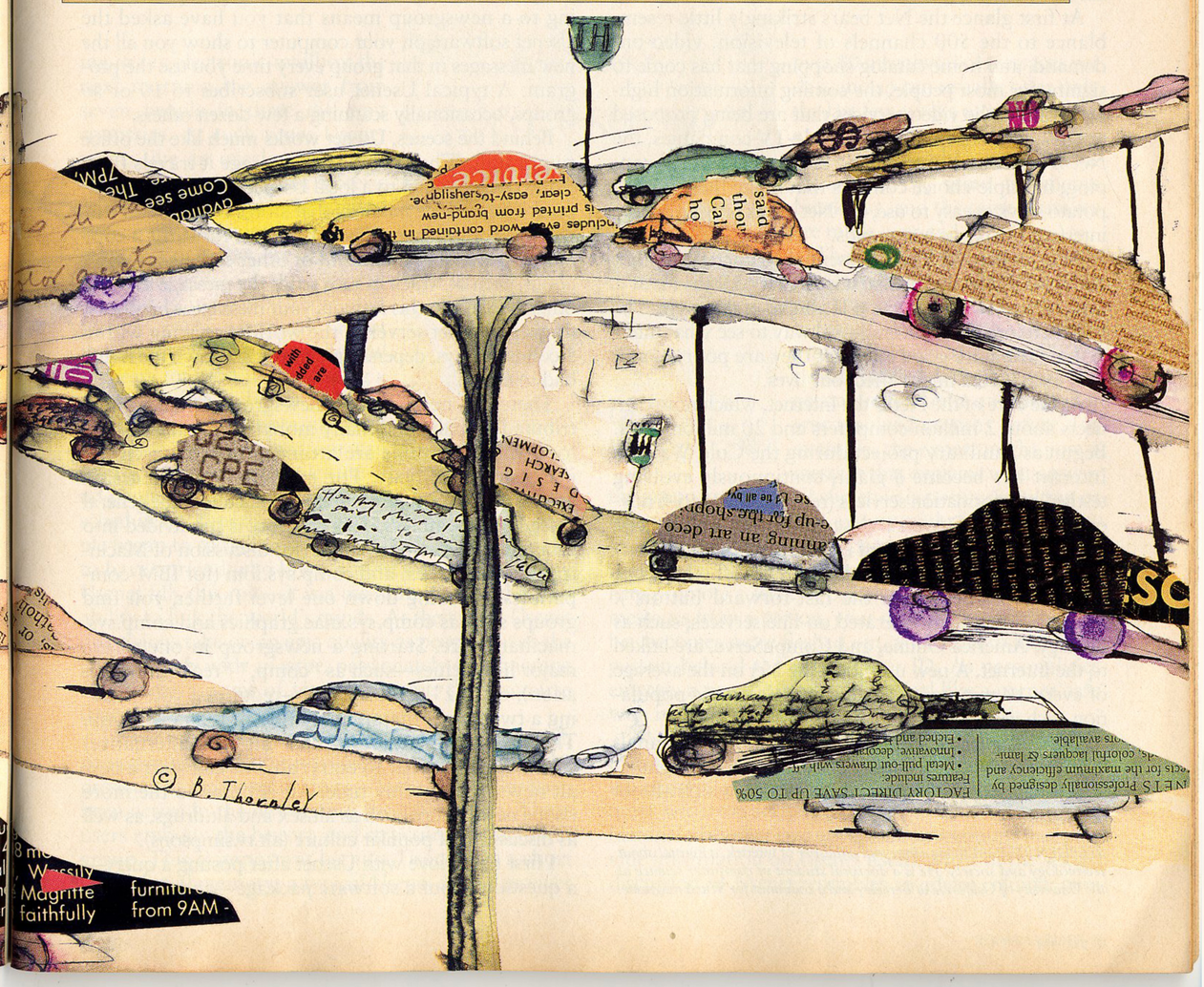
Travels on the Net

THE COMMUNITIES THAT HAVE SPRUNG UP ALONG COMPUTER NETWORKS LIKE THE INTERNET ARE LIVING EXAMPLES OF WHAT WORKS AND WHAT DOESN'T. PLANNERS OF AN INTERACTIVE INFORMATION HIGHWAY, TAKE NOTE.

ILLUSTRATIONS BY BLAIR THORNLEY

BY STEPHEN STEINBERG

I discovered the Net my first year of junior high school. It seemed to me then that this vast, global web of computer networks offered a peek into the future. In the torrent of words and wisdom that pulsed through the Net every day I saw the raw and ungainly beginnings of a world with unlimited possibilities for learning, communication, and entertainment—a world that kept me from sleeping that night. Since then I have used the Net to aid me in my graduate research, as a communication tool at work, and as place to relax. It has become my library, my telephone, and my local cafe. ❖ As a member of the Net community, I have watched its exponential growth with mounting excitement and a growing conviction that the Net and its tech-



nological successors will fundamentally alter how we work and play. Corporations and policymakers are now clearly reaching a similar conclusion: that interactive media—in the form of the much-touted information highway—is crucial to our development as a nation.

There has been little discussion, however, of exactly how the new media will affect our society. This is frightening because new forms of communication have historically changed the social fabric in profound and nonobvious ways. The shift from an oral society to a literate one, for example, lead to a type of linear and abstract thinking that was previously unknown. Communications theorist Neil Postman has argued that the advent of television has shaped how we think by forcing our discourse to resemble entertainment. In his book *Amusing Ourselves to Death*, Postman posed three questions about television: What kinds of conversations does it permit? What are the intellectual tendencies it encourages? And what sort of culture does it produce? I pose the same basic questions of the Net.

At first glance the Net bears strikingly little resemblance to the 500 channels of television, video-on-demand, and home catalog shopping that has come to signify, for most people, the coming information highway. Unlike the video services that are being proposed and tested by telephone and cable-TV companies, the Net is a medium of text. And unlike the channel-zapping, multiple-choice controls that make these couch-potato services easy to use, the Net offers only an arcane interface of cryptic commands.

And yet the Net has the essential characteristics that allow for interactive media: it is as easy to transmit as it is to receive, and interaction is almost in real time. The Net therefore offers an empirical way to see what interactive media are good at, what they are poor at, and how such media might affect our lives.

At the core of the Net is the Internet, which now connects about 2 million computers and 20 million users. Begun as a military project during the Cold War, the Internet has become a giant, continuously evolving testbed of information services (reminiscent of sci-fi novelist William Gibson's description of a futuristic Japanese city: "a deranged experiment in social Darwinism, designed by a bored researcher who kept one thumb permanently on the fast-forward button"). Many commercially operated on-line services, such as Prodigy, America Online, and CompuServe, are linked to the Internet. A new user joins the Net on the average of every 10 minutes, doubling this electronic population each year.

Other than electronic mail, which has become familiar, three uses predominate on the Net. One is a global electronic bulletin board, called Usenet, which allows people to post messages on any of thousands of topics. The second is real-time conversations—the computer-network equivalent of CB radio. The third application, which I believe is least important though it tends to dominate policy rhetoric, is the retrieval of information from electronic libraries and other databases.

Usenet's "Global Mind"

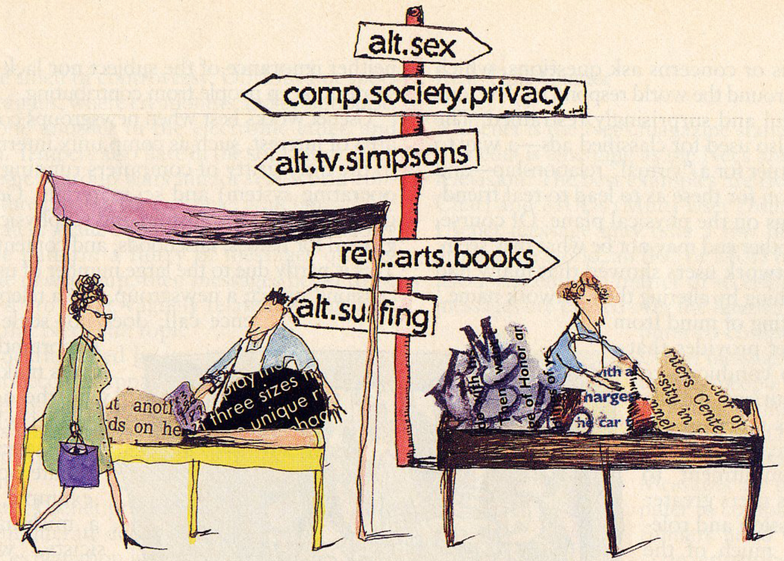
Seven million people participate in the Net's vast array of on-line discussion groups, or "newsgroups," known collectively as Usenet. On a typical day, people throughout the world post 40,000 messages. Some types of discussion groups work better than others, and analysis of these electronic societies should give some insight into how future messaging systems should be designed and used.

Each Usenet newsgroup is devoted to a specific subject, and users can post messages that will be seen by everyone else who "subscribes" to that group. Subscribing to a newsgroup means that you have asked the Usenet software on your computer to show you all the new messages in that group every time you use the program. A typical Usenet user subscribes to 10 or so groups, occasionally scanning a few dozen others.

Behind the scenes, Usenet works much like the office rumor mill. When you post a message it travels from your computer first to a local Usenet "server"—a computer with a large memory that stores copies of all current Usenet messages. The server then forwards a copy of the message to a handful of other servers it knows about, each of which in turn sends the message to a few other systems. In this fashion, your message is broadcast to every Usenet server in the world—arriving within seconds or days, depending on how far down the tree it had to travel.

There are nearly 2,000 newsgroups that are distributed globally and many more that are distributed locally. Newsgroups are arranged in a hierarchy of increasing specificity. For example, the discussion groups about computer systems all fall under the general category of comp.sys. This category is subdivided into groups such as comp.sys.mac (for discussion of Macintosh-related issues) and comp.sys.ibm (for IBM-compatibles). Moving down one level further, you find groups such as comp.sys.mac.graphics and comp.sys.mac.hardware. Starting a newsgroup in one of the major hierarchies—such as "comp," "rec" (for recreation), or "biz" (for business)—requires a vote showing a two-thirds majority in favor of the new group. There is also a hierarchy called "alt" (for alternative) with no such barrier to entry: anyone can start a new alt newsgroup at any time. Alt is home to the more risqué newsgroups such as alt.sex and alt.drugs, as well as discussion of popular culture (alt.tv.simpsons).

I first fell in love with Usenet after posting a query—a question about a software package—and then finding in my electronic mailbox the next morning the answer from seven people in three different countries. At such times Usenet seems like an oracle capable of answering even the most esoteric question. People take the time to answer my questions even though they do not know me and have nothing to gain.



EACH DAY, PEOPLE THROUGHOUT THE WORLD POST 40,000 MESSAGES ON USENET'S 2,000 TOPICAL 'NEWSGROUPS.'

What is it about Usenet that fosters such altruism? Most important is that being helpful is cheap: for most users, sending a message is free and takes less than a minute. Furthermore, users of this asynchronous medium can read and respond at their leisure—no phone calls at inconvenient times owing to differing schedules or time zones. In an earlier age, before people began to specialize in narrow fields, it was possible to have a friend who knew almost everything. Today Usenet fills this role—it is a medium unrivaled for its ability to link the world's minds. At their best, Usenet discussions take on an epic quality as people across the globe wrestle with an issue, passionately championing an idea or a point of view. At worst, the discourse degenerates into incoherent name-calling.

I have found the most reliable indicator of which newsgroups will foster intelligent discussion to be the presence of a core set of users—"experts"—who have been active in the newsgroup for a long time. These users embody the history and structure of the newsgroup. This is important because Usenet has a short institutional memory; a typical Usenet server receives over 80 megabytes of messages per day, and so can usually offer only the last few weeks of messages for each newsgroup. This lack of history means that the same questions are asked, the same arguments break out, and the same mistakes are made over and over.

The group's experts serve as guides to ensure conversations stay on track, arguments are not repeated, and harsh personal attacks (known as "flames") are rapidly quelled. If the newsgroup is getting stuck on a question that was resolved months before, for example, the expert might post a message that explains what answer the group arrived at. If someone is posting insulting or offensive messages, the expert might send private e-mail reminding the guilty party of the rules of civility that prevail in the newsgroup. Long-term users also help promote a sense of community. As you read more messages from a person, your mental picture of him or her becomes more fleshed out, you come to know the person behind the cryptic user ID. As personalities emerge, a newsgroup begins to feel like a corner cafe with regular customers, traditions, and myths.

Many new communications media—from the printing press to the VCR—have been filled first with sexual material. Usenet is no exception. Three of the five most widely read newsgroups are devoted to erotic material (the other two are special newsgroups that provide information on Usenet itself). Most of the sexual discussion on Usenet resembles an advice column: peo-

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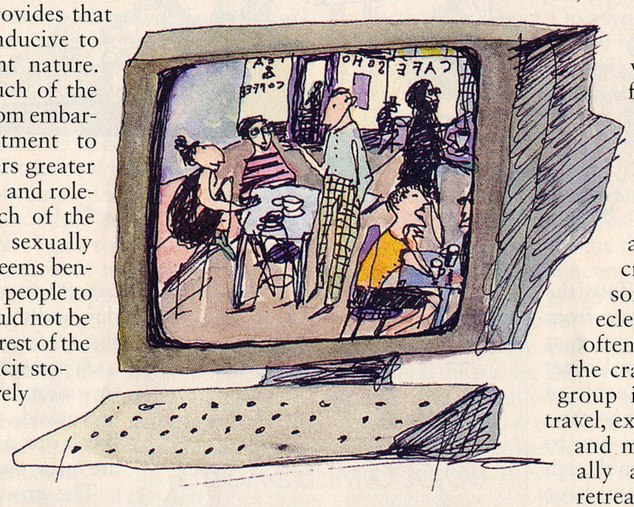
ple with problems or concerns ask questions, which other users from around the world respond to. The tone is earnestly helpful and surprisingly restrained. The newsgroups are also used for classified ads—a way to find an e-mail partner for a "virtual" relationship—and it is not uncommon for these as to lead to real friendships and meetings on the physical plane. Of course, the person at the other end may not be what they seem. One survey of network users showed that many had tried gender-switching by altering their network name.

It is the distancing of mind from body that the Net provides that makes Usenet so conducive to matters of a prurient nature. Usenet eliminates much of the risk in sex and love, from embarrassment to commitment to AIDS, and allows users greater freedom in discussion and role-playing. In fact, much of the frank discussion on sexually oriented newsgroups seems beneficial in that it allows people to ask questions they would not be able to otherwise. The rest of the traffic—sexually explicit stories and pictures—merely duplicates what is available through other media.



Preventing children's access to X-rated portions of the Net remains an unresolved issue. Most likely, as greater numbers of children begin to use the Net, mechanisms will evolve that are similar to "900 number" blocks—a service that phone companies provide that prevents an unauthorized person from dialing one of these numbers. Parents would thus be able to limit what portions of the Net are accessible from their child's account.

The same characteristics of Usenet that promote useful discussion can also prove detrimental. Anonymity, for example, not only fosters uninhibited discussion but also allows people to send inflammatory or harassing messages without fear of social censure. Many women who post on Usenet report receiving aggressive and crude e-mail messages. Technical solutions to this problem seemed doomed; every attempt to end anonymous messaging has led to the discovery of new network loopholes that allow it. Some people on the Internet offer "anonymous re-mailing" services—stripping off the "return envelope" information before forwarding Usenet posting or piece of e-mail to its designated recipient.

Because a newsgroup is a public space—inexpensively accessible by many people and controlled by no one—it takes only a few prolific users to pollute it with garbage. When adding your two cents costs nothing, neither ignorance of the subject nor lack of relevance seems to keep people from contributing.

Usenet works best when newsgroups cover a specific area of interest, such as comp.unix.internals (devoted to the nitty-gritty of computers running on the Unix operating system) and sci.materials. General newsgroups, such as soc.history and sci.physics, are fecund ground for flames, falsehoods, and content-free blather. This is partly due to the large number of users these discussions attract; a newsgroup, like a telephone conference call, does not scale well. More importantly, the lack of focus makes it unclear who the newsgroup is for, and what types of messages are appropriate. Sci.physics, for example, is home to a mishmash of physicists, well-meaning amateurs, and flat-out cranks. The result is sometimes interestingly eclectic, but the process often leads to acrimony as the cranks drown the newsgroup in tirades about time travel, experts try to stem errors and misconception (eventually admitting defeat and retreating to smaller, more specialized newsgroups), and amateurs plaintively ask questions that are rarely answered.

One solution to these problems is the "kill file," a list of users whose messages are automatically made invisible to you—a programmable censor. Another approach is for the newsgroup to have a moderator who screens each message before allowing it to be posted. This runs the risk of bias: moderators may discard messages they disagree with. When all else fails, newsgroups may retreat to the safe harbor of a private e-mail list.

Choosing among these mechanisms is a difficult balancing act. If we erect too many fences, keeping out what we don't want to hear, we lose the friction and diversity that make for interesting discussions, and we diminish the sense of anarchic community that is so important to Usenet. But if we allow complete freedom, newsgroups can degenerate into uselessness, where content is buried beneath misleading or irrelevant messages. The future holds the promise of more intelligent filters that might, for example, tune out all messages in any newsgroup and from any sender that contain the words "gun control" (a favorite topic for flames)—or that would let through only some fraction of such messages, with this fraction being something each user could select.

A reliable indicator that a newsgroup will be free of content is the smell of controversy. Obvious hot spots include talk.origins, where creationists and evolutionists shout past one another in the electronic ether, and talk.abortion. Tempers also flare in the soc.culture hierarchy, where newsgroup wars mirror real-world conflicts; soc.culture.croatia, for example, is an unreadable screaming match. Acute controversy on Usenet follows a predictable pattern: a flurry of messages quickly consumes the newsgroup, then messages begin to be "cross-posted" to other, vaguely related newsgroups throughout the Net. The topic dies a slow death, killed by its own size as it becomes apparent that there are so many messages that no one is reading them. The outcome of the process is more heat than light.

Why doesn't Usenet produce more eloquent, literate debates? One popular explanation is that frequent flaming results from the absence of social and nonverbal cues—the winks, grimaces, and body language that help guide conversation. Another theory, which rings truer to me, was advanced by science-fiction author Bruce Sterling. The problem, Sterling says, is that Usenet messages are "ephemeral": when a message can be sent in a matter of seconds at virtually no cost to the sender, and has a life span of only a few weeks, there is little incentive to spend much time on its content. Off-the-cuff remarks become the norm.

> AS PERSONALITIES EMERGE, A NEWSGROUP BEGINS TO FEEL LIKE A CORNER CAFE, WITH REGULAR CUSTOMERS, TRADITIONS, AND MYTHS.

Usenet's greatest potential is as a global brain-bank and as a modern agora; it is a place where we can all be heard. It is where we can go to ask a question, or to experience the satisfaction of answering other people's. Usenet encourages participants to be helpful but discourages eloquence. It fosters a sense of community but becomes chaotic with too many people. It allows for honest discussion but also allows for harassment without retribution.

One danger lies in commercial adaptations of the system that erect too many fences—banning topics or language that may offend some people—or that serve the needs of advertisers rather than users. Some of today's on-line services, such as Prodigy and America Online, have already taken this path and erred on the side of caution. These services forbid, among other things, swearing, sexual discussion, and criticism of the service itself. This censorship results in a sterile shopping mall instead of a marketplace of ideas—a lobotomized Usenet where the noise-level is low but the discussions lack vitality and spirit.

Real-Time Chatter

If Usenet is the Net's magazine stand, a different class of media is emerging as the Net's answer to radio and television. The best examples are IRC (Internet Relay Chat) and MUDs (Multi-User Dimensions). While a Usenet message may take a few days to propagate around the world, an IRC or MUD message arrives on users' screens in a matter of seconds. IRC and MUD messages are carried over the Internet in the same computer-to-computer fashion as Usenet messages, but they go only to those people who are currently listening. Unlike Usenet posts, IRC and MUD messages are not saved anywhere for later perusal. Messages are passed from computer to computer the way relay runners hand off a baton. The "conversations" that result are much more akin to talking on CB radio than to an exchange of e-mail.

To use IRC, you first connect to an IRC server (there are dozens in the United States and Europe) and then choose a channel to join. You could then type "hello, world," and as soon as you hit the return key, the message would travel to the server, which would then instantly forward a copy to the dozen or so other people who are listening to that channel. At any one time there may be 80 different channels, each with a distinct name, such as #hottub or #china, and two to forty participants. Anyone can create a new IRC channel, and the creator has special commands to control who can then tune in to that channel. IRC is accessible to anyone on the Internet and it attracts users from sixty different countries—a diversity of time zones that ensures there is always someone to talk to.

MUDs are a cross between IRC and role-playing games. Like IRC, MUDs allow for real-time communication among multiple users who are all linked to a common server. In a MUD, however, the server also provides the illusion of a virtual world. Each MUD presents its own geography and theme, from medieval Europe to bizarre alien realms. Rather than channels, as in IRC, there are "rooms"—such as ballrooms, closets, and prisons—each with its own entrances, objects, and written description. Players can create new rooms and objects (I opened a tavern on one system), which other players can then use.

The MUD interface is reminiscent of early computer adventure games. Type "go north," for example, and the screen might display: "You have entered a musty,

Ten Tools for the Internet

THE NET IS STILL A FRONTIER—DIFFICULT TO USE AND WITH A RAW INTERFACE ONLY A COMPUTER SCIENTIST COULD LOVE. HERE ARE 10 POINTERS TO HELP YOU FIND YOUR WAY AROUND.

FAQs

Most Usenet newsgroups have a corresponding FAQ—a list of "frequently asked questions" and their answers. These are often valuable resources in their own right, containing the distilled wisdom of the newsgroup. The fastest way to get a copy of a FAQ is through anonymous FTP (file transfer protocol) from the storage site rtfm.mit.edu (a computer at MIT). At the Internet prompt, type:

FTP RTFM.MIT.EDU

When asked for your user name, type:

ANONYMOUS

To get the FAQ for a particular newsgroup, you have to go to the right directory. Type:

CD /PUB/USENET/<NEWSGROUP NAME>

To list all the files in this directory, type:

LS

To retrieve the file you want into your computer, type:

GET <FILENAME>

IRC

To connect to IRC—the Net equivalent of CB radio—you will need a special IRC client program. It may already be installed on your system; check by typing the command "irc" at the Internet prompt. If the system declares an error, you will need to download and install the client yourself. The program can be obtained with anonymous FTP from cs.bu.edu, in directory /irc/clients. (Follow the same basic procedure given above under FAQs.)

Once you have the client up and running, connect to an IRC server with the command /SERVER irc.colorado.edu. You are now on IRC. For a list of channels, type:

/LIST

To begin communicating on one of these channels, type:

JOIN <CHANNEL-NAME>

MUDs

Each MUD is a different world. Themes range from cyberpunk to sword and scorcery. One of the most popular is LambdaMoo, run by Pavel Curtis at Xerox PARC. To enter the LambdaMoo world, type:

TELNET LAMBDA.PARC.XEROX.COM 8888

Once connected you will be given directions on how to create a new character.

LambdaMoo is used mainly for conversation. A more game-oriented MUD is Apocalypse IV, which can be entered by typing:

TELNET PEABRAIN.HUMGEN.UPENN.EDU 4000

The MIT Media Lab operates a more serious MUD, MediaMOO, intended for researchers interested in issues surrounding interactive media. An application is required to become a member. To join, type:

TELNET PURPLE-CRAYON.MEDIA.MIT.EDU 8888.

Gopher

Gopher is a tool with an easy-to-use menu interface that allows you to connect to other sites and then search through databases and retrieve information. Check if Gopher is already installed on your system by typing the command "gopher." If that doesn't work, you can download the program with anonymous FTP from boombox.micro.umn.edu, in the directory /pub/gopher.

You can use this to go to many interesting places on the Net. Type:

GOPHER LIFE.ANU.EDU.AU

to reach a source of biology information;

GOPHER MENTOR.LANL.GOV

for physics resources; and

GOPHER GOPHER.CIC.NET

for a huge library of electronic magazines.

Mosaic

Mosaic is similar to Gopher but has a fancy graphical hypertext interface. Because the graphics need to be transmitted to your computer, Mosaic works best if you have a fast connection to the Internet—at least 19,200 bits per second. You can FTP Mosaic from zaphod.ncsa.uiuc.edu; switch to the directory /Mac/Mosaic or /PC/Mosaic depending on which version you need. The Mac program is called NCSAMosaicMac.-103.sit.hqx; the PC version is wmos20a4.zip.

When you run Mosaic you start off at a "home page." You can either explore from there, or jump directly to other "links" by using the menu command "Enter URL." Links that take full advantage of Mosaic include the Dead Sea Scroll exhibit at http://sunsite.unc.edu/expo/deadsea.scrolls.exhibit/intro.html and the on-line computer science textbook project at http://compsci.cas.vanderbilt.edu/csep.html.

Netfind

Finding a person's e-mail address is often difficult because there is no complete "white pages" for the Net. One tool that goes a long way toward solving this problem is Netfind. Given a name and some keywords about where a person works or goes to school, Netfind will search through many different local white pages.

To use the service, type:

TELNET MUDHONEY.MICRO.UMN.EDU

When asked for a user ID, type:

NETFIND

The menu-driven interface will take you from there. Although large portions of the Net are invisible to Netfind, this is still the best people-finding tool available.

Archie

Archie is similar in spirit to Netfind, except instead of looking for people, Archie will search hundreds of different sites for a specific file. This is useful when you are trying to track down a public domain program whose name you know, such as Gopher or Mosaic.

If Archie is installed on your system, begin a search by typing:

ARCHIE <FILENAME>

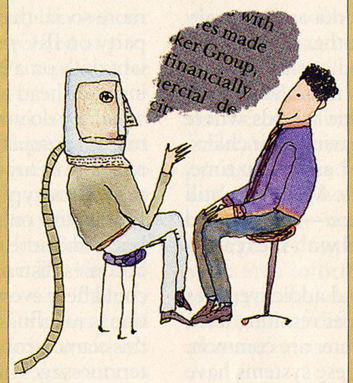
Otherwise, type:

TELNET ARCHIE.RUTGERS.EDU

and log in as "archie." Then, to perform a search, type:

FIND <FILENAME>

If Archie is successful it will print a list of sites where the file is located, and you can then use anonymous FTP to retrieve the file.



THE NET SOMETIMES SEEMS LIKE AN ORACLE CAPABLE OF ANSWERING EVEN THE MOST ESOTERIC OF QUESTIONS.

Libraries

Not all of the Library of Congress is on-line yet, but a growing amount can be searched by gophering to marvel.loc.gov. Another large on-line library catalog system is Melvyl, which covers the entire University of California system. While some parts of the catalog require a password, most of it is publicly accessible. Type:

TELNET MELVYL.UCOP.EDU

You can also use telnet to tap Harvard's library at hollis.harvard.edu, and Yale's at umpg.cis.yale.edu 6520.

Weather

Much of the weather information that ends up in your morning newspaper can be found on the Net in its undistilled form. Type:

GOPHER ASHPOOL.MICRO.UMN.EDU

Select weather from the menu that is offered. From here you can get weather predictions for any U.S. city or download current satellite images. It is popular in some circles to use these images for your screen background. Note that to view these images you will need a program that can display graphics files in the "gif" format. Public-domain gif viewers are available from several FTP sites, such as mirror.archive.umich.edu.

Games

The potential for multiuser games has not gone unnoticed among the Net community. You can play backgammon against opponents throughout the world by telnetting to fraggel65.mdstud.-chalmers.se 4321, or you can play the game of Go by telnetting to hellspark.-wharton.upenn.edu 6969. The Go system includes an automatic ranking system so that players are matched with others of similar skill. A less traditional game is Net-Trek—a graphical, addictive, and highly complex space simulation. To play, you will need to download the client, available from ftp.cd.chalmers.se in the directory /pub/netrek.

Getting Access

To get on the Internet you need a computer, a modem, telecommunications software, and an account. Most Internet users have accounts through their school or employer. Individuals can get access through any of several companies. Here are three:

CRL NETWORK SERVICES:
$17.50/month gives unlimited hours; $19.50 setup fee. Phone: 415-837-5300.

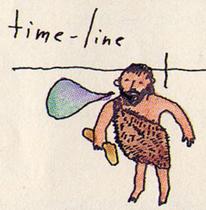
NETCOM:
$17.50/month gives unlimited hours; $20 setup fee. Phone: 408-554-8649.

SOFTWARE TOOL AND DIE:
$5/month plus $2/hour, or $20 per month plus $1 for each hour after the first 20 hours; no setup fee. Phone: 617-739-0202.

abandoned warehouse. You see another player behind some weathered crates." The first MUDs were simply games that allowed people to move about an imaginary universe while killing monsters and other players. But talking with the other players turned out to be more popular than killing them, and now most MUDs are intended as virtual hang-outs—exotic worlds where people can gather and chat without leaving their chairs. There are about 300 active MUDs at any given time, each with its own set of regular users. MUDs are still something of a cult, and their population—an estimated 20,000 worldwide—is tiny compared with the readership of Usenet.

IRC and MUDs are entertaining and addictive; tales of ruined relationships and failed classes resulting from long nights spent in front of the computer are common. What makes this surprising is that these systems have

HISTORICALLY, NEW FORMS OF COMMUNICATION HAVE PROFOUNDLY CHANGED THE WAY PEOPLE THINK.



none of the computer graphics or special effects we expect of modern entertainment. With only the 94 ASCII characters that can be produced by typing on a standard computer keyboard, users construct a parallel world that is sometimes more compelling than our own. In these virtual worlds, identity becomes malleable: our gender is what we say it is. This not only changes how we interact (by eliminating the social cues we are accustomed to) but also destroys the notion that identity is rooted in the body. The ability to collectively create a world out of words stretches the imagination and exercises our intelligence in ways television cannot.

People who have not used IRCs and MUDs sometimes deride them as mere escape for people who are socially inept in "real life." This shows blindness toward these media's capabilities, and ignores the factors that have made other forms of entertainment successful. While typing at a computer screen sounds about as interactive as doing your taxes, the mechanics of reading a novel or watching a movie do not sound very compelling either. This new medium should likewise be seen not as a poor replacement for real life but rather as a way to have experiences that would otherwise be impossible.

As with reading a novel, taking part in MUDs and IRCs allows us to expand our experience through an alter ego. But in this new case the experience is neither solitary nor completely vicarious and, as a result, it is more emotionally real. In fact, MUDs and IRCs are far more social than either reading or watching a movie. A party on IRC *feels* like a party, and when you explore a labyrinth on a MUD you begin to type nervously, keeping your head low.

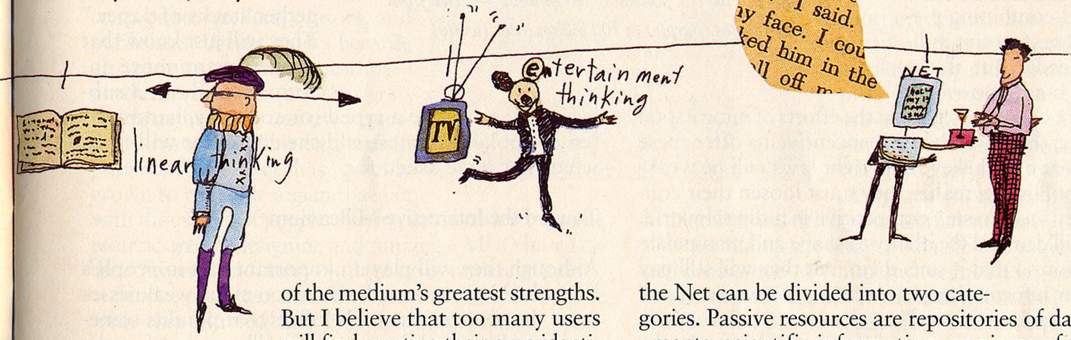
MUDs do not foster deep discussions. Users engage in multiple simultaneous conversations: while I wait for a response to my first message, I begin to type a new question (slow typists are the social misfits of MUDs and IRC). With only a few participants this is manageable, but with more than five or so people on the channel it becomes distracting. It is as if you were at a party and could hear every conversation equally well—and everyone is juggling two conversations at once. Because of this clamor, conversations usually consist of simple banter: messages are short (less than 10 words), and hesitating to think is discouraged; the medium fosters the textual equivalent of "sound bites." Although this forced brevity makes IRC and MUDs less than ideal for, say, scholarly discussions, bars and dinner parties do not lend themselves to scientific discussion or complex oratory either, yet they remain important to society.

What MUDS *are* good at is fostering friendships between people who live far apart, at allowing people who are usually inhibited to express themselves. They also provide a unique entertainment form that allows people to cooperatively create different worlds and identities. Because the medium is more interactive, more visceral, than Usenet, the friendships that form are closer and the community is more tightly knit. Most MUD users seem to feel a sense of responsibility for keeping the system running smoothly that is found only rarely among Usenet participants.

IRC and MUDs have been less successful at tasks outside of casual communications. During the September 1993 coup attempt in Russia, for example, IRC users in Moscow typed in updates as everyone gathered around; this is often cited as an example of IRC's usefulness as a news medium. But television is likely to remain better for updates on breaking news—especially as ultraportable satellite uplinks are making it possible to broadcast live video from anywhere on earth at any time.

As virtual meeting places, MUDs could serve as venues for scientific conferences. MIT and Xerox PARC researchers have pursued this idea, but so far, at least, it has not caught on. Live and in-person gatherings are still the rule—and scientists who are interested in electronic meetings have found videoconferencing a more effective medium.

Most of the commercial on-line services offer an equivalent of IRC. A few, such as CompuServe and America Online, also offer environments similar to MUDs. These pseudo-MUDs are less powerful than those on the Internet, limiting the ways in which users can modify and extend the virtual worlds. But many companies—not only on-line service providers but also entertainment companies such Lucasfilm—are intently exploring future offerings in this medium. If commercial service providers, afraid of the ambiguity in today's MUDs, insist that real names be used and descriptions stay fixed, they will eliminate one of the medium's greatest strengths. But I believe that too many users will find creating their own identities compelling, and will discover ways to do so.



Dipping into Info Oceans

When Vice-President Al Gore talks about the information highway, he rarely extols it as a way to meet people. Instead, he speaks of schoolchildren looking up information in electronic libraries. This is like promoting the telephone as an emergency tool for the elderly—it focuses on a marginal, albeit important, application while ignoring the medium's main use. Yes, the Net offers access to a vast collection of information resources. But most people who inhabit the Net use it chiefly for human-to-human contact, not for gathering information from computer databases. One reason for this preference is that, all rhetoric aside, information on the Net is difficult to find. Every Internet newcomer ("newbie") quickly learns how daunting it is to explore the labyrinth of the Net—it's like being lost in a foreign country where the maps are out of date.

Fortunately, the situation is improving. New programs that serve as maps, such as Gopher and Mosaic, are becoming available (*see "Ten Tools for the Internet," page 26)*. These programs provide consistent interfaces to Net explorers, minimizing the need to master esoteric commands like "telnet" and "ftp." Gopher uses a menu-driven interface. Mosaic adds a further level of abstraction with an attractive, graphical interface that allows the user to jump from one topic to another with a click of the mouse.

But even with this kind of aid, it's easy to get lost on the Net; the sheer size of the place is disorientating. It is like using an encyclopedia: something will catch your eye and you end up perusing an interesting side path and then are not sure how to get back. If you know exactly what you are looking for it is better to use the tour guides of the Net, programs such as WAIS (for wide area information service) and Veronica. When you type in keywords, these programs will search hundreds of different databases and then either display the information you seek or point you to where you need to go to find it.

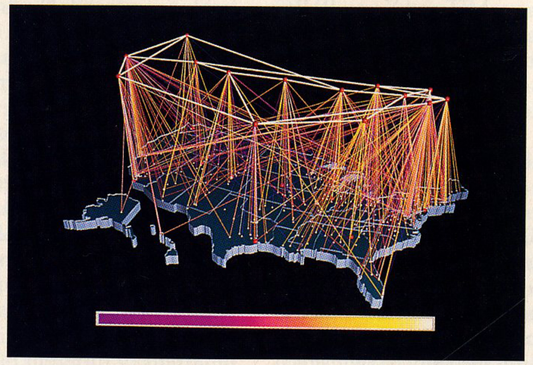
The resources available on the Net can be divided into two categories. Passive resources are repositories of data—documents, scientific information, or pieces of software stored on some computer on the Net—that users can retrieve, or download into their own computers. Active resources, such as electronic libraries and on-line weather bureaus, take advantage of the Net's interactive nature to provide services that previously would not have been possible. For example, you can view a weather map of the country and then zoom in on a region of interest.

Passive resources, which are more common, speed the distribution of information. But its benefits are limited. Once I download a document, I usually print it out so that I can read it on the train and scribble in the margins. So if distribution is already convenient, having the resource available electronically is unnecessary. Few people read the *New Republic* or *Technology Review* electronically (although both are available on the Net) because it is just as easy to pick them up at your mailbox or local newsstand.

Passive resources are unsuited for information that costs someone a lot of money to produce. Publishers, for example, are wary of making books available on the Net because people can easily repost the text elsewhere, violating copyright law and ending the publisher's control of the material. This has led some people to argue that the Net will fundamentally alter our notions of

information ownership, and that the concepts of copyright and intellectual property cannot be reconciled with the fluidity of digital information. This battle over intellectual property law, now being fought in the courts, will as much as any purely technological factor alter the shape of future interactive media.

Laws that are overly strict in their definition of "fair use" will eliminate a key advantage of digital media—the ease of modifying and combining pictures and text to suit individual needs. But if the laws are made too weak, and do not adequately protect the efforts of information providers, there will be little incentive to offer these resources at all. I believe copyright laws will be weakened as publishers realize they must loosen their control if they wish to stay competitive in a digital world. People will demand the ability to shape and manipulate information so that it suits them, but they will still pay money for information that is timely, convenient, and well-packaged.



Enormous amounts of information course through the Net. During one typical month, traffic volume on the NSFNet—the backbone of the U.S. portion of the Internet—varied from zero bytes (purple) to 100 billion bytes (white).

Active resources raise a different problem. As the repeated failures of home banking and videotex suggest, most people do not want to interact with computers. At best, such interaction is something they grudgingly put up with. It is no coincidence that the Home Shopping Network, which many people see as the forerunner of interactive TV, has "live" people describing products rather than just prerecorded demos. Although the success of automated teller machines is often held up as a counterexample to this computer aversion, this is one of only a few uses where the advantages so outweigh the public's distaste toward communicating with machines.

Broader use of interactive services may be catalyzed by the development of electronic "agents"—intelligent programs that filter and retrieve information on your behalf. Think of agents as secretaries who live inside the network and, by watching your actions, learn your informational needs and interests. A simple example of an agent is the Usenet kill file, which filters out messages from designated senders. In the future, agents will become more sophisticated: you might have an agent that knows from your schedule that you are flying to Memphis and so retrieves the relevant weather information without an explicit request from you.

As intelligent software robots like this become more common, the network of resources will turn into a computer-to-computer medium. Ultimately, agents will make the network transparent. Schoolchildren of the future, for instance, will probably look up information in electronic libraries (undoubtedly pasting the text into their reports, free from the drudgery of retyping encyclopedia entries). But they won't think of it as using "electronic libraries" any more than today's students think of books as "bound-together stacks of paper." They will just know that if they want more information about a subject, they can issue a typed (or someday, handwritten or spoken) request and the computer will fetch what they have asked for.

Toward the Interactive Millennium

Although they will play an important part in people's lives, the Net's new media have too many weaknesses to be the newspaper or TV killers that pundits sometimes predict—and they certainly will never replace the intimacy of face-to-face communication. A bulletin-board messaging system such as Usenet works well as a global oracle but breaks down when used for discussion of controversial or overly general topics. Real-time electronic interaction through IRC and MUDs has enormous entertainment potential, but constrains conversation to simple chatter. And while network resources will grow more useful and more popular, it will be many years before they offer the visual richness and ease of use that will be required to become truly pervasive.

Many newcomers to the Net are struck first by how raw it seems, with its poor spelling and occasionally crude content. These new media are a far cry from the processed and filtered products we are accustomed to. These rough edges are an important part of what makes the Net compelling—but it is also the aspect most likely to be lost in commercial adaptations. For while the Net has so far been driven by users' desires and funded largely by the government, the information highway that is starting to emerge will be driven by what is commercially viable. These forces often overlap—to be commercially successfully, a service must attract users. But there is an important difference that will fundamentally shape the media: advertising. As government support inevitably recedes, commercial sponsors will fill the funding void, subsidizing the services we want but could not otherwise afford. Market forces are not necessarily ruinous; the Greek agora, after all, was used for both commerce and communication. But some of the strengths of the Net do seem to conflict with advertisers' interests.

I draw three lessons from the Net's successes and failures. Advertisers and service providers will resist the implications of these lessons. But we should heed them if we want to ensure that interactive media fulfill their promise:

■ ***The information highway must be two-way.*** The Net allows all of us to be storytellers, orators, and publishers. Usenet works because answering someone's question—producing content—is just as gratifying as having your own questions answered. This explains in part why the Net has quickly grown to resemble a giant bazaar, with thousands of people offering information on some esoteric area or designing and running a MUD based on their favorite sci-fi story—all for no commercial gain.

Service providers and advertisers are uncomfortable with this blurred line between information "consumers" and "producers" because it means losing control over content. This is why the first interactive offerings are likely to be one-to-many services, like video-on-demand—a six-lane highway into our homes with a dirt trail going out. To prevent this, regulators need to ensure that the information highway is what cyberspace guru Mitchell Kapor—cofounder of the Electronic Frontier Foundation—calls an "open platform." That is, the network must be open to anyone who wants to provide content, whether it be pictures of a recent trip or a dating channel, just as the PC is open to anyone who wants to develop software.

■ ***We must have the same freedom of speech we have in other media.*** What we say should not be controlled by who owns the wires. More controversially, I believe that users should have a way of remaining anonymous, with the system therefore encouraging open discussion, even on sensitive subjects and personal issues. Advertisers do not like users to be anonymous. They want to be able to build customer profiles so they can, for example, target advertisements for Scotch to affluent people. To satisfy both sides, perhaps a neutral gatekeeper could be entrusted with profile information—ensuring that ads go to the right people while keeping advertisers from knowing individual names. Such "pseudonymity" would be a reasonable compromise between anonymity, accountability, and privacy.

EXTOLLING THE NET AS A WAY TO TAP LIBRARIES IS LIKE PROMOTING THE PHONE AS AN EMERGENCY TOOL FOR THE ELDERLY—A MARGINAL, ALBEIT IMPORTANT, APPLICATION.

■ ***Everyone must have access to the network.*** The Net did not take off as an interactive medium until the population grew beyond the scientific community. Diversity makes discussions more interesting and allows for a wider pool of knowledge: Usenet messages are now posted by everyone from homeless poets to rock stars, and on IRC you are as liable to meet a Finnish banker as a high-school student in Georgia.

The Clinton administration has trumpeted universal access to what it calls the national information infrastructure, but has been short on details. Does access simply mean that the physical wire is available, or must it also be at a price everyone can afford? Will universal access be ensured by government regulations, as with telephone service, or do we trust that market forces will guarantee availability and drive prices sufficiently low?

Determining the correct balance will require continued debate over what interactive media is good for and how it should be used. To the extent that the Net offered mainly entertainment, guaranteed access to it would be no more imperative than equal access to, say, Broadway shows. But the Net is in fact becoming a "place" where business is done and where one can get information and tools not readily available elsewhere. It therefore becomes essential that the Net not bypass the poor and those living in rural areas—people who would benefit the most from electronic resources.

We need to think about these issues now, before they are decided for us. Interactive media are still new and relatively rare—the trajectory of the technology has not been set. This means that we as consumers, as regulators, and as designers still have time to shape the medium—to make the most of what it does well and to improve its weak points. If we close our eyes and do not try to predict the uses and effects of interactive media, we will likely come to regret the path that market forces have pushed us down.

My hope is that interactive media will improve our lives and augment our intelligence in ways far more substantial than quick movie delivery or multiplayer videogames. While in junior high I believed the Net to be a magical world with infinite potential, but I also believed that I would soon be commuting to work by jet-pack. I have given up on the latter scenario, and now I hope my vision of a global agora does not prove to be a mirage as well. ■

PHOTO: DONNA COX & ROBERT PATTERSON, NATIONAL CENTER FOR SUPERCOMPUTING APPLICATIONS