Kindness in Cyberspace?
The Sharing of Valuable Goods On-line

Sheen S. Levine
The Wharton School, University of Pennsylvania

Abstract

The rise of the Internet has created new venues for human interaction. While participants in a Usenet newsgroup have never met face to face and hardly know any personal information about each other, they engage in voluntary sharing of economically valuable goods, without any immediate return. Moreover, the contributors cannot trace or identify the beneficiaries, and reciprocity is not guaranteed or even enforceable. The phenomenon has received little academic attention, and popular press coverage has attributed its existence to technological developments, overlooking the social context that underlies it. Based on qualitative research methods, the article describes the various activities that take place within the newsgroup, the way in which the structure and the norms of the group facilitate sharing, the participants’ viewpoint on the phenomenon, and the technological environment that encompasses the activity. Subsequently, several plausible explanations are considered, including low cost, gain from externalities, reciprocity, social norms, common pool resources, and warm glow. It is shown that none of these approaches explains the phenomenon well. The article concludes with recommendations for researchers and for managers, especially those in companies that engage in electronic business or produce digitizable content.

Draft version

Comments are welcome
Questions about cooperation have occupied human thought since early history. What makes individuals cooperate? How and why cooperation evolves, and what is the best way to assure its viability? Initially, answers were given in the form of religious commands and duties or philosophical observations and deductions. Later, scientific thinking has joined the quest and launched a more structured, methodologically defined, pursuit into the sources of human cooperation. The answers offered relied on diverse, sometimes contrasting, assumptions about human nature. They ranged from views of humans as essentially virtuous but still liable to temptations, to conceptualizations of humans as primarily opportunistic creatures, who are likely to deceitfully exploit opportunities. The unit for analysis of human action was also defined in several ways: cognition, individual, community, society, and a supranational class. The result was a range of theoretical perspectives, each having marked views on topics such as human behavior, social institutions, control and enforcement, and the role of government.

This article is about socioeconomic behavior on the Internet. It aims to make both empirical and theoretical contributions. Empirically, this is one of the first attempts to systematically document the incessant phenomenon of valuable goods sharing among Internet users. While the great majority of participants never meet face to face, and hardly know any personal information about each other, they engage in a voluntary sharing of goods such as information, technical advice, and a wealth of digital goods, all without any apparent return. Moreover, the contributing participants almost never know the identities of the beneficiaries, they cannot be traced, and there is no guarantee for reciprocity. The phenomenon has received little academic attention thus far, and popular press coverage has
attributed its existence merely to technological developments, overlooking the social context that underlies such large-scale activity (Shaffer, 2000). This article makes a small step in turning scientific attention to this phenomenon. Based on qualitative research methods, the article describes the various activities that take place within the newsgroup, the way in which the structure and the norms of the group facilitate sharing, the participants’ viewpoint on the phenomenon, and the technological environment that encompasses it.

This leads to the second contribution offered here. Some theoretical approaches in the social sciences have dismissed instances of behavior that is not strictly meant to maximize self-interest. When not dismissed, such instances were sometimes identified, ex post, as utility maximizing (Sen, 1977). If we adhere to economic theory and its assumptions about human nature (e.g. Edgeworth, 1881; Williamson, 1975) the participatory behavior described here should not have existed. It seems to contradict some of the classical economic presuppositions about human nature, and fits only partially with some of the more recent explanations that give greater weight to societal and psychological forces. Since knowing what is not true is at least as important as knowing what is true (Popper, 1959, 1963), the theoretical contribution of this paper is in showing a pattern of behavior that cannot be well explained by existing theory. It should be noted that this article is not meant merely to critique economic theory, especially as sociological and psychological theories have their own shortcomings in explaining the behavior described. Rather, it is a call for refinement of theory.

Immediately following is a method section, which describes the site selection process, the social and technological setting, and the methodology used for data gathering. The data analysis section presents the activities that take place in the group, and brings that participants’ perspective on the practice of sharing. In the discussion section, several
plausible explanations are considered, including low cost, gain from externalities, reciprocity, social norms, common pool resources, and warm glow. It is shown that none of them explains the phenomenon well. The article ends with a conclusion and recommendations for researchers and for managers. The findings are especially relevant to managers in companies that might be affected by the consequences of such cooperation: content producing firms, such as music companies or software companies, and companies that engage in electronic business, and might be exposed, for instance, to malicious computer code or attacks. Two appendices extend on historical and methodological topics.

**Methods**

I began this research effort with a vague research question: “What activity takes place in user-created venues on the Internet?” My primary interest was in the native venues for social interaction, those that have emerged as electronic gathering places for Internet users. In addition to venues that were created by users, there is a wealth of commercial sites where social activity takes place. Their commercial nature, however, limits the kinds of acceptable activities. It is unlikely that incessant sharing of digital goods is sustainable on commercial sites.

The novelty of the phenomenon and the rarity of previous research on it, have led me to adopt qualitative research methods, which are more appropriate for the inductive development of theory, when meaning, process, context, and unanticipated phenomena are uncovered and explained (Glaser & Strauss, 1967; Maxwell, 1996; Strauss & Corbin, 1990). I began the study by taking a broad view of social activity on the Internet. For this purpose, I have spent about two hours of observation thrice a week over four months in 1999,
exploring various forms of activity on-line. I have familiarized myself with the field by visiting and observing a wide range of venues, including chat and discussion rooms, topical Web sites of various kinds, and a great number of Usenet newsgroups, both textual and binary. For comparison, I have also looked at commercial Web sites that offered space for interaction. In addition, I held fourteen interviews with users of such venues. The interviewees included college students, both in the undergraduate and graduate levels, computer professionals, and Internet hobbyists. Both the observations and the interviews were meant to give an impression of how individuals use the Internet as a social space, when, with whom, and for what purpose. I wrote field notes during or immediately after each observation or interview.

**Research Setting**

**Considerations in site choice.** After gaining a broad, if not comprehensive, picture of the native Internet venues, I began to contemplate the choice of a research site. The Internet offers various means for the dissemination, communication or sharing of information. For the purposes of this research, I sought sites that met several criteria: native venue for social interaction, accessibility to observer, overt behavior, and interaction among users. As a result, three types of venues were excluded: 1) sites that primarily facilitate commercial activity, either directly or indirectly; 2) sites that were primarily created to fulfill a specific organizational function, such as public communication, information about activities and events, and relate to organizations that are external to the Internet; 3) sites that are exclusionary though the use of login mechanism (e.g. academic Intranet sites). The remaining sites were categorized based on two factors: the value of information or goods offered, and the degree of interactivity among users. While this is not an exhaustive
categorization, it was proven to roughly map the available sites along the uniqueness and significance of the data available. Based on the selection criteria, several site categories were considered:

1. **Chat and discussion rooms** – Electronic venues that offer synchronous (real-time) discussion among users, either through a textual or a graphic interface. The messages posted are seen immediately by all of the participants, and are typically kept on the hosting computer (="server") for a few minutes only. The interaction is typically conversational, casual, and personal in nature (Danet, Ruedenberg-Wright, & Rosenbaum-Tamari, 1998), with low economic value. Accordingly, the research addressing chat rooms has done so mostly from a psychological or communicational angle (e.g. Marvin, 1995).

2. **Topical Web sites** – Sites that were voluntarily created to disseminate information to others with similar interest or tastes. The topics are highly varied, ranging from technical to casual to obscure, and the format can resemble a detailed hobbyist magazine. While the information can be economically valuable (e.g. instructions for engine modification to a sport car) the communication is mostly unidirectional, thus the degree of interactivity is low. The impressions or reactions of visitors are not recorded, and the observable interaction is limited.

3. **Usenet textual newsgroups and other asynchronous venues** – Since the early days of the Internet, thousands of discussion forums have appeared on it, devoted to a great variety of topics. A prominent Internet institution is Usenet, a collection of more than

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1 The term refers to the hypothetical price associated with such information. A possible exception is the on-line investors clubs, where the discussants exchange opinions and speculations about stock picking. However, the economic value of the advice given is often dubious.

2 Interactive sites, where users can exchange messages with each other, would belong either in category 1 or in category 3.
34,000 forums, each known as a newsgroup. Participants in a newsgroup can read messages posted by others, post messages in response or begin a new conversation of messages (=“thread”). The interaction is asynchronous: messages are typically kept on the server for at least a couple of days, and other participants can read them within that time. Unlike electronic “mailing lists”, newsgroups can be joined (or just watched) by any Internet user, and the discussion is public. Since the messages are accessible for several days, it is easy to follow and participate in the discussion. Together with electronic mail, the World Wide Web (WWW), and other services, Usenet is a part of the Internet (Hauben & Hauben, 1997).

4. **Usenet binaries newsgroups** – These newsgroups are technologically identical and similar in their interactivity to the textual ones just described. However, they are devoted solely to the sharing of digital goods, such as pictures, video and DVD movies, audio books, software, and music files. Typically, a participant would send to the newsgroup (=”post”) a message containing the digital good as a file attachment, so that any interested user can save an identical copy of the file to his local computer. Social interaction regarding this practice takes place in several adjacent textual newsgroups. These newsgroups facilitate sharing through administration, exchange of knowledge, solicitation of requests for a specific title or file, and enforcement of the newsgroup norms. In such textual newsgroups participants would discuss, for example, how to optimally transfer a music track from a compact disc (CD) to a digital file or how to administrate the newsgroup. They would not discuss, however, the qualities of a song or an artist, as these are considered digressive to the purpose of the newsgroup – sharing. The newsgroups are highly interactive and publicly accessible. Since the communication is asynchronous, the newsgroups serve as a storage space for digital goods. Depends on
the server, the goods are accessible for several days or even weeks. The material posted is often copyrighted, and the posters are thus required to both overcome the copy protection often built into digital goods, and take the inherent risk in offering such materials.

5. **Peer-to-peer sharing applications** – The technology of permanent connection between two computers or more is not new, but the recent appearance of peer-to-peer software applications that allow direct sharing among Internet users has led to a dramatic increase in the frequency of participation (Kover, 2000). The most well known of these applications is probably *Napster* (Levine, 2000), which allows one to search and download music from other users’ computers. While the degree of interactivity in use is potentially high, as the search and the transfer are synchronous, the interaction takes place in private, most often in one-to-one conversations. Moreover, my observations show that participants frequently share goods without exchanging any messages, as interaction is not technically or socially required for sharing. The information available to a researcher is therefore quite limited³.

After consideration of the characteristics of the various venues available for research, I have decided to focus on the Usenet binaries newsgroups and their adjacent discussion textual newsgroups. The economic value of the goods offered, high interactivity, universal accessibility, observability, and the public nature of the venue made it a good starting point for a qualitative inquiry.

**The structure of Usenet.** Much like the rest of the Internet, Usenet is organized in a hierarchical structure that resembles the Dewey or Library of Congress systems for

³ It is still intriguing that a user is willing to allow complete strangers to access her computer and download goods, and warrants additional research, notwithstanding the difficulties in observing such private interaction.
cataloging printed material. The prefix “alt” recognizes newsgroups that are discuss “miscellaneous alternative topics”. The finer category of “alt.binaries” indicates newsgroups that offer binary (=non textual) content, and “alt.binaries.sound.mp3” is for newsgroups that are devoted to the offerings of sound files in the MP3 format (See appendix A for a review of the format and its significance). At this level of resolution, a variety of even narrower newsgroups exist. The gamut includes newsgroups from “alt.binaries.sound.mp3.1940s” (approx. 90 messages in November 1999) to “alt.binaries.sound.mp3.1990s” (160,000). Numerous genres have newsgroups dedicated to them, from “alt.binaries.sound.mp3.jazz” (100,000) or “alt.binaries.sounds.mp3.hyms” (70) to “alt.binaries.sound.mp3.heavy-metal” (3,500) and even “alt.binaries.sound.mp3.spoken-word” (1,600), which offers copies of books-on-tape recordings. The mother group – “alt.binaries.sound.mp3” – has received about 500,000 messages in November 1999 (See Appendix B for a discussion of the statistical figures). The entire assemblage of newsgroups is referred to by the participants as “MP3 hierarchy” or “the hierarchy”.

**Description of the site.** The messages in binaries newsgroups rarely offer any communication aside from the file attachments. Therefore, I conducted most of the work described here in the two adjacent textual newsgroups of the MP3 hierarchy. One is devoted only to discussion, covering administrative, technical, and social topics, as described in depth below. The other one lists requests from users for specific music tracks. The discussion newsgroup, which is the only designated one in the hierarchy of MP3 newsgroups, is highly active. During the study period, an average of 2,000 messages were posted monthly. It should be stressed that the access to all of the newsgroups is universal – any Internet user can access it using easily obtainable, often free, newsreader software. A user entering the

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4 The size of the major newsgroups was steady or increased during the research period.
newsgroup may announce her presence by posting a message, but may also choose to remain invisible to other participants, and can do so even while browsing and accessing messages and files. The newsgroups are not moderated: users are free to post whatever they desire, and nobody but the original poster can delete a message, even a grossly inappropriate one. Since the setting is as public as it can be, and participants tend to mask their real identity, questions of ethics are somehow alleviated here. However, the exact location of the newsgroup, and the names (or pseudonyms) of the participants were changed. The setting also makes it easier to rule out biases created by the presence of an outside observer, since such observer can remain invisible.

Method

I did not enter the field without caution. While a new arena for human interaction is always interesting in itself, its appearance does not guarantee new forms of social interaction. Indeed, my null hypothesis was a conservative one (Becker, 1998): I expected to find that a pattern of interaction that would resemble social practices elsewhere, possibly with some minor differences. While I did know that some social organization had existed on-line, I was not expecting to find such common and seemingly non-utility-maximizing sharing behavior. Following guidelines for inductive research, I remained as descriptive as possible, until a major theme emerged from the data (Glaser & Strauss, 1967; Miles & Huberman, 1984). Only when I found an incessant and recurring sharing of economically valuable goods, I concentrated my attention on the MP3 hierarchy, and especially on the discussion newsgroup in it. Using personal computer and several news-reader software applications (Microsoft Outlook Newsreader, Netscape Messenger, and Forte Agent), I spent eight to ten hours per week observing and documenting the happenings in the newsgroup, reading several hundred messages each time. In addition, I spent about two hours each week visiting
the binaries newsgroups, where the digital goods were actually offered and shared, and the textual newsgroup devoted to participants’ requests for the posting of specific material. I also observed the structure of the MP3 hierarchy and followed changes, such as the addition newsgroups. The focused effort began in May 1999, and the data used here were collected until February 2000.

About 2,000 messages were posted each month in the discussion newsgroup. The great number of messages required a systematic selection rule for analysis and coding. To select in a non-haphazard manner, the subject line of each message was read, and the number of responses the message drew was recorded. The message was then ranked on a scale between one and three, based on its topic (technical vs. non-technical) and the number of replies it received (no response vs. much response). Following the scale, I read all of the messages that incited a conversation, regardless of the topic. I also read all of the messages that were non-technical in nature, and received some response. I read only some of the messages that were purely technical and received little response, or messages that were not replied. I estimate that 450 messages were read each month during the observation period.

About two months and half into the observation, I posted a message to the newsgroup participants, explaining my interest and expressing my wish to communicate with them in person. The message drew responses that ranged from disbelief to wariness, but resulted in several valuable contacts. Overtime, I managed to create rapport with some members of the group, who became informants.

**The public nature of interaction.** A challenge to the comprehensiveness of the data might have arisen if the publicly observable interactions used here were just a marginal part of a wider interaction, which might have taken place mostly in private. In other words, one might suspect that the messages posted in the newsgroup are just meant to create an
initial contact between users. Allegedly, once such contact is established, the interaction moves into private venues such as personal electronic mail or files exchanges. The data, however, do not provide support for this scenario: I find that participants have little or no interaction outside of the group. First, interviewees were asked specifically about interaction with other participants outside of the group through other means such as electronic mail, phone or face-to-face meetings. All of them pointed out that such interaction rarely takes place, and limited to few instances of electronic mail exchange. One said: “I purposely do not get too personal with any one in the [name omitted] group”. To my question, he explained that he was not interested in extending the contact into “real life” relations. Second, most of the participants of the newsgroup use fake electronic mail addresses, so personal replies are impossible. Third, some of the messages in the newsgroup discuss personal issues, giving support to the assumption that even such issues are not discussed in private. Based on the data, I conclude that an observer can get a near complete picture of the social activity in the newsgroup by reading the posted messages. Furthermore, an observer has access to the exact same information available to the participants. The form of archived reality is obviously quite different from more common research settings, where the researcher can observe only bits of the social reality. Thus, the plain nature of this social reality eases some of the limitations commonly associated with observation as a research method. While it also limits the kinds of interaction possible among the participants, this is a result of the very nature of the field, and not a limitation of the method.

Data Analysis

Interaction in the newsgroup

The purpose of the newsgroup is defined in the introduction to the group’s Frequently Asked Questions (FAQ) document: “This group is for the discussion of MP3s, MP3
technology and other MP3 related topics” (Anonymous, 2000). The newsgroup participants are involved in activities of several kinds: answering requests for information, discussing control and administration, enforcing group norms, and chatting among themselves.

**Requests for information.** The accumulation and dissemination of knowledge and information are two of the primary functions of a newsgroup (Hauben & Hauben, 1997). Indeed, participants in the newsgroup devoted about half of their conversations for this purpose. At the time of the study, MP3 technology was typically not part of a polished commercial product, but was often included in jointly written or freely shared software. Even if commercial products were involved, users worked to extend the functionality of the software, either to solve specific issues or just out of curiosity. Such modified programs were also offered for sharing, and those that had picked them sought technical support on the newsgroup. Hence there was a constant flow of questions from users regarding use of software, technology and related topics. Other users, who might have run into similar problems, or know the software well enough to answer, shared their knowledge by posting replies to the newsgroup. In one case, a participant requested to know how to play an MP3 file before it was completely transmitted to his computer (=”downloaded”). He posted a question in the newsgroup, explaining what he was attempting to achieve. Within less than two hours, the poster received four replies, some of them quite long, which suggested ways to accomplish that. After trying one of the suggestions, the participant posted another message to the group, explaining what he had done, and requesting further help. This request was again answered in length. The exchange of messages took place in a short time: the first response appeared less than two hours after the original message was sent. The

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5 The situation has changed recently, as more user-friendly commercial products have appeared. Consequently, the discussion in the newsgroups has moved into topics that are beyond the capabilities of the available commercial software.
entire thread of discussion, which contained about six pages of printed text supplied from eight different users, ended within less than five hours. This intensity of discussion, and the number of people involved, are quite common, and suggest that there is a significant number of knowledgeable participants that read the messages frequently, probably several times a day.

Discussion of appropriate ethics and control. The FAQ document contains more than a statement of purpose. It is a collective body of information, know-how, and rules of behavior. It takes the form of an on-line guide, encompassing over 60 printed pages, whose stated mission is to serve as a collection of answers to common questions, easing the toll of answering repeated and educating new participant. In addition, the FAQ serves as a guide of conduct for all of the newsgroups in the MP3 hierarchy. For example, the part of the FAQ that lists technical requirements for the files posted (e.g. “Use a high quality [MP3] encoder”) also contains guidelines for conduct, such as: “Limit your posts to 75 megabytes per day”6; “Check your MP3s before posting them”; “Don’t post binaries in the discussion group and vise-versa” (Anonymous, 2000).

The FAQ is meticulously written, organized in a question and answer format, and includes a table of contents where each question is listed and indexed according to its section and serial number. The answers often contain references to other topics or links to WWW sites, all in an encyclopedic style. Colors and boxes are used to distinguish between different topics or between text and names. It seems that a great effort was put in the FAQ, but no writer name is listed. Rather, the interested reader is directed to contact the “guys who

6 It is remarkable that the participants found it necessary to set a maximum limit to the quantity that can be shared daily by a single participant. Apparently, over-sharing can also be a problem.
update the FAQ” via the newsgroup, and the humorous copyright notice reads “© by Sucker@a.n.a.n.”

This document can be seen as a participative product of the newsgroup, expressing the collective view regarding technology, hierarchy, and conduct. It is a bureaucratic institution (Weber, 1947, 1968) that documents knowledge and describes structure. It also sets concrete, specific rules, and explains the rationality behind them. The participants’ commitment to the FAQ can be seen by the frequent references they would make to it, for example to support a point in their messages. I observed it being used to direct a new user to look up an answer to a common question, but also when an argument about posting policy erupted. Some participants even add the FAQ address as their electronic mail signature, so that an invitation (or an order) to read the FAQ appears in every message they send. One of the posters, who used the alias “FAQ-Man”, posted daily excerpts from the FAQ to several MP3 newsgroups, as a form of education for “newbies” (=new users), and as a way to remind the group norms to veterans.

The newsgroup norms are not only clearly expressed, but are also strictly enforced. An example is the case of Bob, who set a target of posting one album per day for sharing with the other participants. According to the messages exchanged, some personal matters prevented Bob from meeting this voluntary goal. To keep up with the self-set pace, he requested permission to post two albums per day, until he returns to schedule. The response to his request is harsh – the rule stands. Below the original request, followed by the response:
Today I find myself in a rock and a hard place. I missed a day's worth of posting due to a busy day, and am 1 album behind schedule. I don't like posting 2 albums in 1 day, but would like to maintain the ALAN PARSONS PROJECT and BOSTON--SCHEDULED POSTING PLAN (Updated) post that I created so that those who may be following it may reference it and know that it is accurate. My humble apologies. I am going to bend the rule and do a 2 album post today.

I shall do my utmost to ensure that this does not happen again, and continue to do my part for Usenet.

Thanks for your understanding,

Bob :-)

I don't understand, and I don't care about your schedule and whether or not you keep to it.
The cap is 75 MB/24 hours!
Period.
End of discussion.

Since the newsgroup is not moderated, nobody could have prevented Bob from offering as much as he wanted to. However, for the fear of public scolding, out of strong group loyalty or for some other reason, Bob felt it was necessary to receive permission before sharing his album collection. In an interview, one frequent participant – Ben – justified the reaction by stressing the need for order in the potentially chaotic environment of the Internet:

“True consideration and respect for its beginnings, and a mature approach to binary-text purity and balance is the agenda of the true friend of Usenet. Spam, text in binary groups, binaries in text groups, unrestrained uploading via cable and other conduct oblivious to Usenet's limited storage resources and the interdependency of Usenet's elemental parts and the self-imposed guidelines is perhaps its greatest threat, and all but one of those, Spam, originate from within, at the hands of unskilled or uncaring part-time participants.”

7 Unsolicited electronic mail, which sent in bulk to either e-mail addresses or newsgroups.
8 Cable modem allows high-speed connection to the Internet, allowing a user to offer a comparably huge quantity of goods to share.
While requests for exemption are often denied, and the requester is “flamed”\(^9\), the rules can be changed, but only in a formal way – after public debate and even a vote, if necessary. About a quarter of the newsgroup discussion is devoted to policy proposals, discussion of such proposals, and debates about the enforcement of norms. In November 1999, for instance, a reader proposed to create a new newsgroup that will be dedicated for posting of music from the coming decade. Such newsgroups already existed for each one of the decades from the 1940s further. A long discussion developed, with about twenty users seriously debating the proposal. Rounds of messages were exchanged, with arguments for and against. Finally, the emerging consensus was against the proposal. The rationale for rejection was that it is premature to create such group, since it would be empty for several weeks, and since music released in the first weeks of the year 2000 will still carry a 1999 copyright notice.

Members expressed pride when asked about the newsgroup organization. Ben observed that:

“This playing field is level. Those whose reason and logic seem sound gain support from equals. It is a pure form of self-government of and by the people using the forum, with the adult democratic majority teaching, coaching, and yes, scolding, and at times ridiculing when anarchy, chaos and self-serving dictatorship at the expense of others is perceived to be the poster's agenda.”

**Enforcement of group norms.** In spite of the stated rules and procedures, and the expressed desire of the participants to promote order on the newsgroup, the distributed nature of the Usenet makes any form of control difficult. Consider, for example, a user that violates the principles of cataloging when offering music by “The Doors” in the newsgroup devoted to sharing of music from the 1990s. Nobody can stop users from doing so, and even after the fact – only the original poster can remove those files from the inappropriate category. Other participants, whose offered files might be removed from the server due to

\(^9\) “Flaming” is Internet jargon for giving someone a verbal lashing in public.
lack of space, can only send out messages to persuade the violator to cancel his own postings. It is up to him to decide whether to accept the request and adhere to the newsgroup norms. Also, since most of the participants post under an alias, often using a phony electronic mail address, violators could easily disguise or change their identity. In extreme cases, such as those of blatant commercial “spam”, angry participants might send an electronic mail complaint to the Internet service provider of the poster, claiming abuse of the Usenet. However, those occasions are rare, and it is unclear how willing are providers to deal with such complaints. Therefore, almost all negative sanctions are in the form of public scolding. Consider the following excerpt, which is a part of message exchange between two participants. The first two paragraphs are a quote from a message in which a participant apologizes, retrospectively, for posting textual requests in one of the binaries newsgroups (which are devoted to the sharing of digital files and should not contain textual content, as explained earlier). In the opening of this message (omitted here), he excuses his violation by explaining that the songs he requested were needed for a Christmas gift.

>REQ: NEED FOR A CHRISTMAS GIFT - ANY & ALL versions of "Amazing Grace" -
> Please read

> I know it's not 'kosher' to post requests to binaries ng's, but I really would like to reach >the largest audience. Please excuse the faux-pas.

Your faux pas is NOT excused.

Well, Prof, since you went ahead and crossposted to binary groups anyway, even though you KNEW it was not "kosher", the requests group got trashed because someone was nice enough to honor your request without checking for your crossposting. At last count there were at least 13 binaries totalling over 40 MEGABYTES posted to the requests group. How many requests could have fit in that amount of space? Hmm?

Your selfish attitude now has caused lots and lots of other "considerate posters" requests to get scrolled off servers just so you could get what you wanted. Well, Merry Bleeping Christmas!

How about a show of faith and an apology by cancelling your original crossposted request and reposting it PROPERLY?
Clearly, the participant responding to the public apology expressed anger for audaciously violating the newsgroup rules, and demands that the violator apologizes and cancel his original request. But even if done, such cancellation would be merely a symbolic act, for the damage had already been done.

But what happens when a poster not only ignores the norms of the newsgroup, but also mocks them in public? That was the case of Henry, who revolted against the “FAQ Nazi”, as he called those who demanded him to adhere to the FAQ directives. After publicly clashing with them, Henry began to post messages that were meant to upset the participants: he repeatedly mailed nonsensical messages, impersonated participants by using their aliases, and tried to rally others to join him. Below is an excerpt from his mail, followed by one of the many mocking responses he received.

>Wanna bug a FAQ Nazi? Change your name to [other user's alias]. these jerks will >freak. LOL [="Laughing Out Loud"]

Are you at mommy and daddy's house already?!?! Shouldn't you be studying for next week's finals?!?!

The technological environment of Usenet, where access and posting rights are equally distributed to all users, makes enforcement of norms difficult. The hierarchical structure is completely flat, without central authority for control. As explained, messages cannot be canceled and users cannot be ousted from a newsgroup. While one might expect chaos in such circumstances, the observations reveal rather organized and participatory social institutions, which are protective and participatory. Rules are set only after a public discussion, and one must provide rational justifications for them. When rules are broken, the violator is publicly scolded and must offer remorse before forgiven. While previous research has found this system to be generally effective (Smith, McLaughlin, & Osborne, 1997), the organization is still fragile. Such instances were not common in the MP3 discussion
newsgroup, but their existence serves to demonstrate how depended is the newsgroup on the good will of each participant.

**Personal discussions and joking.** Notwithstanding the strictness with which they apply group rules and decisions, participants occasionally reach to discuss personal topics. While casual chatting is not encouraged, the exchange of messages and greetings testify that some collegial contacts tie the participants. As said earlier, even such personal discussions take place in the public space of the newsgroup. In one occasion, Jerry talked about the social ties formed in the newsgroup:

“MP3 is merely a file format. This group is a social organization. It's about people and music as well as technique. You see many topics other than MP3 discussed. General computer and software questions that are somewhat related to MP3 and Usenet but could be answered in another group are broached here because of the social aspect of the group. One tends to ask their friends first or someone whose credibility they've come to trust. Because we're among friends10 widely ranging topics and personal issues are sometimes discussed at length or quickly and respectfully dismissed as off topic and another more appropriate forum is suggested.”

As participants have developed some knowledge of others, they sometimes applaud (or ridicule) messages, based on the writer’s social history in the newsgroup. But instances of pure social interaction are not very common the newsgroup, and as Jerry noted, most of them are dismissed as “off topic”, i.e. digressive to the self-declared official mission of the group – sharing.

**Voluntary sharing**

In addition to discussing and debating, the participants of the newsgroup are also active in offering MP3 files for sharing, often in response to requests from other participants. Just like requests for advice or assistance, requests for specific pieces of music are posted in the appropriate newsgroup. Participants may read the request, and – if they posses the requested track – can post the file in the suitable newsgroup to the attention of the requester.

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10 It is telling that Jerry refers to the newsgroup participants as “friends”, bearing in mind that he has never met them in person, nor knows their real name, gender, nationality or age.
**Producing goods for sharing.** Sharing requires the production and posting of MP3 files, which is not an instantaneous or trivial process. Starting with a music CD, the user needs to convert the music tracks into digital music files, which can be stored on a personal computer hard drive. Creating a faithful digital representation of recorded music requires much space: at least 10 MB of data for each minute of CD quality music track. Since such large files are impractical to share in a newsgroup, the user has to compress those files using the MP3 compression algorithm, which can be found on-line. Although some combined software packages exist, the production process still requires some technical knowledge and computer time. Once the compressed music files are ready, the user should connect to the Usenet and post the files to the attention of the requester. Since these files are typically still 3-5 MB in size, they first should be sliced into smaller pieces, using a pre-specified format. Only then they can be posted to the newsgroup. Posting of a typical music files, containing 4-5 minutes of music, would take 15-30 minutes of Internet connection time to the typical home user, making the whole process as long as 60 minutes. In spite of the lengthy process, participants in the MP3 hierarchy devote a great deal of attention to supplying others’ requests for specific music files, although most of the requesters are total strangers to them. Even when not requested, participants voluntarily share music from their own collection, or files that they have found somewhere else.

This counter-intuitive eagerness to share is reflected in one of the interesting discussions that developed in the newsgroup. Knight has attempted to find out whether anyone reads and fulfills the requests posted on the request newsgroup. Holding thousands of requests, this is one of the busiest newsgroups in the MP3 hierarchy – not an intimate or personal setting. Knight’s question, which seemed demeaning to some, sparked a long exchange. A few
participants replied stating that they regularly read and fulfill requests, whenever possible. Below is one of those replies, preceded by the original posting:

> I am curious. You don't have to reply to the group. If you think this is a worthless thread, just reply to me personally. Is there anyone out there who reads every request in [group name] (this includes every posted list as well as every header). If so, how many days running have you read every request? 
> Thank You, 
> Knight

My hand is up! I try to scan through every request just about every day. Most of us do have real lives, so if we don't see and fill every request every day, please pardon. Do I open up every posted list? Nope, no way, especially the LONG ones. I also don't care for crossposted requests because of the potential for harm to the text groups. I try to remind folks of this.

Do I fill every request I could fill? Nope. How many? If you go looking for my nym to see how many I have posted in recent memory, you will find zero. Some folks use a different nym for posting binaries. It is a good habit.

Question back at ya. How many requests have you filled?

The response to the question posted by Knight exemplifies that sharing is quite obvious. Questioning the inclination of the members to share or their willingness to satisfy is inappropriate or even insulting. However, during the entire length of observation, this was the only instance of discussing the greater issue of sharing. To me, as an outsider, it was striking that while discussions in the newsgroup dealt with the minutiae of administration and technology, questions about sharing never arose. There was also little discussion of the reasons for participation in the newsgroup, or the justification for sharing copyrighted work.

Since no discussion of sharing took place – it was simply taken for granted – I brought up the topic with some participants. For Dan, sharing seemed natural, and no source for wonder. He plainly said:

“I love music and I'm fascinated with computer technology. I also like to help people, so that's why I participate in the [discussion] group.”

Jerry, another participant, seconded this seemingly altruistic approach:
“The medium makes sharing imperative. Trading is frowned upon because of its mercenary and selfish overtones. It's not yours to begin with, so deriving personal benefit from its distribution is viewed as criminal. That is an ethic unique to Usenet.”

Jerry knew that many users benefit from the shared music, but not all contribute back:

“There is often cooperation, so that mutual benefits may be realized, but there are untold thousands who are benefiting from that collaboration.”

For him, however, this was not a reason to abandon cooperation or doubt its benefits.

Discussion

The description above pictures a well-organized group, with a clear mission, strong norms, and some informal social bonding. It can be easy to forget that the members have not met face to face, and do not know the real identities of their counterparts. Moreover, there is no definition of membership, anyone can freely enter or exit the group, and users can limit themselves to reading messages or copying files, remaining invisible to others. Even visible participants, those who share information and files, can hide and change their identity at will. Nevertheless, individuals spend time and thought in answering questions and providing explanations, creating policy and guidelines for behavior, communicating them to other and enforcing them – all in addition to engaging in the primary purpose of the MP3 hierarchy – sharing digital music on-line.

The information, administration, and communication provided by the group are beneficial to at least some of the participants. They get their questions answered, have access to MP3 files that are neatly organized by era or genre, and can share information about technological developments or products. Moreover, the shared files have a clear economic value, which can be approximated by the market price for commercial music goods, such as compact discs. Unlike in the market, however, transactions here flow from an individual to a
collective, and vice versa. I did not observe any rent payment to the holder of the goods, not monetarily or in any other form. So is the case for the advice providers, norm enforcers, and the keepers of the FAQ – a summary of organizational knowledge. They are all volunteers, who do not receive any wages for the group or any other tangible benefits in return to their work. Clearly, this arena for sharing differs much from traditional or electronic markets. This is especially remarkable as it has the potential to become case of near-perfect competition, as can be observed in other on-line venues.

Possible explanations reviewed

Among other things, mainstream economic theory explains well situations of market exchange. Since one of the basic presumptions is that individuals engage in transactions to increase their utility, it should be clear to the economic mind that individuals, off-line or on-line, would not engage in an activity that does not benefit them (or at least leaves their utility unchanged). Some phenomena, however, posit a challenge to such explanations, as the benefits of the transaction are not immediately evident. In such case, following economic rationale, it is often deduced that the players’ actions are beneficial to them in ways other than simple monetary reward. Starting from this view, which serves as my null hypothesis, I discuss several seemingly plausible explanations to the phenomenon of sharing. I also consider approaches that slightly relax the presumption of self-interest. However, I find that none of the approaches gives a comprehensive, well-fitted explanation of the phenomenon.

Low cost. Lakhani and von Hippel (2000) look at a Usenet newsgroup devoted to technical support for operators of the Apache server software. The pattern of sharing information and advice is similar the one described here in its breadth and intensity. Using questionnaire-based data, the authors conclude that participants share knowledge since the
retrieval and posting costs are low, e.g. because contributing participants read the discussions anyway, to benefit from exposure to practices in their field. While their findings explain why the cost associated with sharing might be low, it is still clear that the cost is positive. Therefore, theory still needs to explain why participants bear this cost, as low as it might be, as this cost is not a condition for using the information provided. In addition, the low cost argument is less valid in the MP3 hierarchy: the sharing of such digital goods is more time consuming, possibly cumbersome, and exposes participants to legal risks. Moreover, unlike the operators of computer servers, participants in the MP3 hierarchy are not professionals who have to access the newsgroups as part of their job.

**Gain from externalities.** Presuming that individuals do not engage in an activity unless some gain is attended, Lerner and Tirole (2000) offer an explanation that attributes participation to gains allegedly derived from externalities. The authors look at three cases of open software development, and without directly observing, interviewing, or surveying the participants, they offer a wealth of reasons for such sharing. Not only that direct empirical evidence is missing, but also most of the explanations seem to be of ex-post nature. Since predictive power is one of the requirements from a scientific theory (Popper, 1963), I find it troublesome that the authors do not explain why emergence of open and free software was not predicted by the same theory they now use for explaining the phenomenon. A main argument is that individuals who took part in the open source movement could have had better employment opportunities as a result. Even if we accept this argument, for the sake of discussion, it still does little to explain the sharing observed here. Participants in the MP3 hierarchy deal with goods and information that have do not have much use for legitimate business. Let us not forget that the action of sharing digital goods is on the verge of legality. Moreover, even an employer would have a use for such knowledge, and would be willing to
hire one of the participants for work, it will be quite difficult to locate them, as few use traceable electronic mail addresses. In fact, the prospects of future employment are so slim, that interviewees found this explanation quite amusing.

Another external source of reward that can be dismissed in this context is that of reputation. Reputational effects can be important motives in making contributions or sharing wealth, such as in the case of donors to museums (Becker, 1974). They can also play a role on-line, as some of the respondents of Lakhani & von Hippel (2000) indicated. But good reputation is an asset only if it is fungible – can be translated to social status, business connections, an invitation to dine with the president, or any other desirable end. In other words, reputation is worthless if nobody can identify you. This is exactly the case here, for contributors to the newsgroup mask their identities behind pseudonyms and phony electronic mail addresses. In such conditions, any reputation gained is only exercisable in the newsgroup. Such social credit cannot buy much in this context, since all the goods shared are equally available to everybody at no cost. Also, those with negative reputation can easy mask or change their identity.

Reciprocity. Even if they do not expect external benefits, such as future employment or good reputation, participants in the newsgroup might simply be sharing so that others would pay them back. But once again, the absence of real identities and the existence of made-up identities that can be replaced or eliminated at will, make it difficult to reciprocate on a personal basis. Moreover, if personal reciprocity were desired, why would the discussion take place in a public forum, where others can benefit without being held responsible for reciprocating? Once a participant learns that another has a digital good he desires, the two could have an exchange done thought private means, such as electronic mail or file transfer. The absence of personal exchange receives further support from previous
research (Constant, Sproull, & Kiesler, 1996; Lakhani & von Hippel, 2000), which finds that personal reciprocity is not expected, and that participants rarely know each other in person.

**Social norms.** A possible explanation would attribute the pattern of sharing to social norms, which allegedly promote contribution to the newsgroup. There is little doubt that norms of behavior exist in newsgroups, shown here by the FAQ and the examples of norm enforcement, as well as in prior research (e.g. Wellman & Gulia, 1999). However, this explanation fails to show why such norms of sharing would develop, and more importantly – how they are sustained in the face of incentives to enjoy the public goods created without giving back (free ride). From similar weakness suffers the revealed preference argument that contribution to others is part of the utility function of the participants (Sen, 1977). It does not explain how and why such inclination developed among Usenet participants, and not among stock traders at the New York Stock Exchange, for example.

**Generalized reciprocity and CPR.** One might turn to the anthropologic literature in an attempt to explain this phenomenon. Primarily identified with the ethnographic work of Mauss (1954), generalized reciprocity is a form of social collaboration that is based on *impersonal* favors. When a member of the community is in need, she would be helped by another member, even if personal reciprocity is not likely. If in need, the helper would be assisted by another member of the community, and so on. Generalized reciprocity can explain, for instance, why villagers would rush for the help of an old widow whose home was damaged in a storm, although they know that she could never reciprocate for their help. Generalized reciprocity is a social institution that guarantees help to anybody in need; from a rational behavior perspective, this is a form of social insurance. However, as with other forms of insurance, generalized reciprocity invites some individuals to exploit the good will of their fellows. They can avoid (or underinvest in) helping others, while enjoying the
benefits of communal help themselves (Axelrod, 1986; Trivers, 1971). A similar case of potentially exploitable mutual responsibility is that of common pool resources (CPR), which are nurtured collectively, but used individually by members. Examples are common grazing grounds, irrigation systems, roads or fisheries. Just like in the famous prisoner’s dilemma (Rapoport & Chammah, 1965), where the desirable outcome is lost due to the pursuit of self-interest and mistrust, systems of collective responsibility are viewed as unstable at best:

“Unless the number of individuals is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational, self-interested individuals will not act to achieve their common or group interest.” (Olson, 1965: 2)

Ostrom (1990) presents a number of cases in which such self managed systems operated well for an extended period of time, without privatization or governmental intervention, both of which introduce new problems. She delineates a set of seven conditions that must be present for common interests to be achieved and narrow self-interest to be kept at bay. Some of these conditions are met in the MP3 hierarchy, such as collective choice arrangements. However, three of the conditions are clearly not met. The first is of clearly defined boundaries, so that it would not be hard to determine who is entitled to use the common resources (e.g. long time residents of a village) and who is not (e.g. those who arrived to the village just recently). For such entitlements to be meaningful, those who oversee the common resources must be able to identify the status of an individual who wishes to use the common resources (Netting, 1976). The second condition is that of mutual monitoring systems, so that members of the community can observe and sanction those who exploit the common resource. Third is a condition requiring a threat of sanctions, to deter abusers of the common good.

The first condition does not hold in the MP3 hierarchy. The public nature of the newsgroup, where anyone can observe the discussion or download files, inhibits the
formation of clear boundaries. Interestingly, creating boundaries is possible on-line, and participants in the newsgroups could have erected them, if they wished so. The second condition, that of efficient monitoring, is also difficult to achieve in the newsgroups. On-line identities are fluid, and a change in identity can turn any indebted participant debt-free. Moreover, even if the participant is not deceitful, he could always benefit from advice given to another participant and goods offered by others, without ever making his presence known. Usenet allows user to remain completely hidden from others, as explained earlier. Ergo, efficient monitoring of credit and debit is impossible in this environment. So is the case with the threat of sanctions. As the case of Henry showed earlier, participants of the newsgroup have little power over deviating participants. Such deviants cannot be ousted, prevented from posting messages or denied access to the shared goods.

In line with the technical difficulty in enforcing fair contribution, previous research has found that reciprocity was not very important to participants. Constant, Sproull, & Kiesler (1996) find that few contributing participants list expectation for reciprocity as a reason for sharing. Lakhani and von Hippel (2000) do find reciprocity as a reason for offering advice, but less so among frequent providers.

But even if participants believe that reciprocity and the benefits of common pool resources are good reasons to help others, it still does not explain why such phenomenon is sustained. Cooperation would benefit collectives as a whole in a myriad of other cases, but such cooperation does not take place or deteriorates quickly, as opportunistic individuals take advantage of the public good (Axelrod, 1981; Axelrod & Dion, 1988).

**Warm Glow.** A contemporary attempt to explain the sustained existence of voluntary public good institutions, the warm-glow theory (Andreoni, 1990) holds that individuals gain not only from the total supply of public goods available, but also from the
very act of giving. Thus, they are not indifferent between gifts made by themselves, and gifts made by others or by the government. Intuitively appealing, and able to explain the existence of such bodies as the Nature Conservancy or the Red Cross, Andreoni’s approach shifts the focus from the results of giving to the act of giving. The act itself is the source of utility for an individual. However plausible, in the case described here participants do appear to be interested in the benefits others derived from the goods shared. An example is the request newsgroup: participants post their requests, and others fulfill them. Earlier I demonstrated the importance that newsgroup members attribute to the satisfaction of requests for sharing. While not all of the content shared in the newsgroup is specifically asked for, much of it is requested, and those who share seem to gain from knowing that others enjoy their offerings, not merely from making the good available to others. The findings of Lakhani and von Hippel (2000) are similar to my observations. While the setting is different, they find the contributing participants respond to specific requests posted, and not just post information, as useful as it might be.

**Conclusion**

The rise of the Internet has created new venues for human interaction. Presented here is such venue – an on-line group devoted to the public sharing of digital music and information, offered by its participants to any interested user. In addition to sharing such goods, participants spend time and effort in administration, coordination and enforcement of group norms, all to facilitate sharing. However, contributors do not receive any obvious return for the effort invested or for the value of the goods shared.
Several plausible explanations were discussed. Clearly, the sharing described does not take place in a market setting, and participation incurs positive cost to the contributor. It is also not merely by-product of other activities, as the case might be with voluntary technical support. Explanations of external benefits, such as employments or reputation, were shown to be weak in this case. In line with earlier work, it was shown that neither personal nor generalized reciprocity hold here. Arguments about strong social norms or an extended utility function lack predictive power and tend to fall into tautology. Also, some of the conditions presumably needed for viable common pool resources do not hold in this setting. Lastly, the theory of warm glow also falls short of fully explaining the described patterns of sharing.

In conclusion, the phenomenon of resource sharing among Internet users, varying from information and advise to forms of digital goods, was shown to be at least partially incompatible with a range of plausible explanations.

**Recommendations for Researchers**

Much has been written on business development and competition in Internet based businesses, but little exploration concentrated on the societal and economic forces that have led to, and enabled, the emergence of the Internet. I find this ahistorical, non-dynamic discussion to be incomplete, maybe even misleading. The Internet is not merely a platform for business nor a technological innovation that appeared out of thin air. Rather, it is a human project, embedded in socioeconomic conditions, created for specific purposes, and flourished due to social practices and institutions. Elusive as they may be to the causal observer, native social forces determine the path of the Internet as much as the business forces do, and sometimes one finds those two moving in opposing directions.
As said earlier, the purpose here is not merely to critique economic theory, especially as more sociological and psychological theories have their own shortcomings in providing a plausible explanation. Rather, it is a reminder that social science theory should be able to both explain the basis, economic or other, for such phenomena, and predict when participative behavior would replace exchange-based or other forms of economic activity.

Understanding the socioeconomic behavior of Internet users would not only shed light on some idiosyncratic phenomena such as the open source movement or malicious computer code, but it also would assist in paraphrasing more general conclusions about human cooperation, rational behavior and social organization (Granovetter, Forthcoming).

While the existence of altruistic behavior is still in doubt, we have some evidence that individuals do contribute to others with no apparent return (Baron, 2000; Dawes & Thaler, 1988). As much of the existing observations are esoteric, the Usenet environment supplies a natural experiment environment for gaining further insight. If cooperation and sharing develop in such unstructured, open, and anonymous environment, it might be that our assumptions on human nature should be revisited. While pure altruism is not a sufficient explanation, it might be that a combination of technological environment, social institutions and norms, and certain incentive structure would result in seemingly altruistic behavior. Future work is needed to identify the conditions facilitating such participative behavior, whether these are societal, economic, psychological, technological, or a combination thereof.

Lastly, when entering a new arena for human interaction, the use of qualitative research methods offers greater capacity for consideration of behavior by drastically limiting the number of implicit assumptions. Even if theory development is not sought, qualitative data would allow better subsequent design of quantitative tools, such as surveys or models.
Recommendations for Managers and Other Decision-makers

1. **The Internet is not just an electronic marketplace.** Seeing the Internet as another vehicle for commerce, many businesses have begun on-line activities without paying full attention to the idiosyncrasies of the medium. For example, executives of music companies, who thought about the Internet as just another channel for public relations, were forced to react hastily when faced with massive piracy of their copyrighted material. Information technology professionals, who have to deal with malicious computer code or electronic attacks, would gain from understanding the social forces that derive users to engage in such behavior.

2. **When rushing into a newly discovered land, it pays to learn to local customs.** The Internet has existed long before businesses discovered it. Internet users have developed social practices that have both positive and negative consequences for business, and managers would have to become familiar with those practices. Blind to the socio-economic reality of sharing and the fascination of users with technology, Microsoft Corp. and other were surprised by the tremendous popularity of open source software such as the Linux operation system and the Apache Web server. As with any environment, those who fail to follow changes will not survive.

3. **What makes the Internet attractive also makes it difficult to control.** Internet users have developed a strong ethic of sharing that is will not disappear soon. It enjoys a capable and viable social infrastructure, and is unlikely to succumb to court orders. It is impossible to find quick and easy solution to problems of copyright violations on-line, due to the distributed and borderless nature of the Internet.

4. **The truly great changes are still to come.** The Internet allowed us to order pet food on-line and to auction surplus widgets instantly, but this was still pretty much
“business as usual” for everybody. Now we are about to witness a dramatic development. Everything that can become digital – music, video, book, information – can become free. Shutting down web sites, outlawing software, or even selling digital music on-line would not eliminate sharing. Music companies, film studios, book publishers, and owners of any digitizable content would have to rethink their raison d'ètre if they wish to survive. It will not be easy, but it is possible.
Appendix A: The development and consequences of the MPEG 3 audio algorithm for audio compression (MP3)

In 1987, a team of researchers at the Fraunhofer Institut Integrierte Schaltungen, began developing an algorithm for perceptual audio coding, as part of a greater, pan-European effort in development of Digital Audio Broadcasting standards. The Motion Picture Expert Group (MPEG) was spearheading an effort to create an efficient algorithm for digital representation of video images. Extremely information rich, video images are difficult to transform efficiently into bytes of information, and conventional digitization methods would create files that are too large for any practical use. Therefore, the research effort was aimed at finding a mathematical compression algorithm that would allow reduction of information, but with minimum loss of quality. The group realized that sound tracks contain much redundant information, which is not perceived by the human ear, and thus digital sound (e.g. compact disks) could be digitized and compressed significantly, almost without any quality loss. The algorithm that was developed for this purpose was named MPEG Layer-3. It was enormously efficient: the digital sound files produced by MPEG Layer-3 were 10-12 times smaller than digital sound files produced by conventional methods, such as compact disks. As product of scientific research, MPEG Layer-3 was made publicly available as an international standard for digital audio compression. The files it created were identified by their MP3 suffix, and this became the popular name for the products of the algorithm (Brandenburg, 1995).

Since the sound files produced by the new algorithm combined small size with high quality, and since the technology was publicly available, avid computer users began transferring their CD collection into MP3 files. The smaller size also made it feasible to attach the files to an
Internet newsgroup message, or offer them on Web sites. The unexpected consequence of the MPEG Layer-3 standard development, which began as an esoteric trend of computer devotees who could handle the technicalities, has soon broke away as the knowledge spread among users. The Internet has mushroomed with offerings of MP3 files, infringing on the artists’ copyrights. Music companies expressed deep concern, and used their legal departments to send stern warning letter to operators of such Web sites (Guzman, 1998). The Usenet receives less media attention, and is also less easy to control, since is not stored on any single computer but on a series of servers that mirror each other’s information. Unlike Web sites, which are registered and their owners can be identified, the posters in Usenet could use aliases or remain anonymous at will. The owner of the host server, usually an Internet Service Provider, cannot possibly verify the legality of each one of the millions of Usenet message stored on the server. The Usenet has remained a flourishing ground for posting of digital music files. Currently, there are over 150 newsgroups that are devoted solely for the posting of such files\textsuperscript{11}. Organized by genre or period, the lists are exceedingly active, and the most popular among them offer tens of thousands of posting per day.

\textsuperscript{11} Based on a count by the Usenet access supplier net.alt. The actual number varies from service to service, since ISP typically do not offer access to all exiting group carry. For instance, RCN, a commercial ISP, offer access to about 130 MP3 newsgroups.
Appendix B: Estimation of total unique file offerings in most active newsgroups

The number of messages estimated in the methods section is a conservative estimate, based on the minimum number reported by the news servers. As news servers provide unequal space for message storage, they differ in the total number of messages accessible. The actual figures could be as high as twice the estimated minimum. It should also be noted that a given piece of music is typically sliced into several files, due to technical limitations. In addition, the same posting can appear in more than one newsgroup. The following is an excerpt of a posting by one of the newsgroup users. The poster argues here that most of the MP3 newsgroups are underutilized, with some being overly crowded. To support his point, he supplies some statistics concerning unique posts\textsuperscript{12} in the most frequented groups, for a period of 10 days between October 10-20, 1999:

\begin{verbatim}
12126 alt.binaries.sounds.mp3
5224 alt.binaries.sounds.mp3.1990s
3158 alt.binaries.sounds.mp3.1980s
3151 alt.binaries.sounds.mp3.1970s
2226 alt.binaries.sounds.mp3.bootlegs
2163 alt.binaries.sounds.mp3.dance
1984 alt.binaries.sounds.mp3.jazz
1453 alt.binaries.sounds.mp3.heavy metal
1321 alt.binaries.sounds.mp3.1960s
1227 alt.binaries.sounds.mp3.French
1150 alt.binaries.sounds.mp3.comedy
\end{verbatim}

\textsuperscript{12} Without multiple counting of files that appear in more than one group or that are spread over several messages.
alt.binaries.sounds.mp3.video games
alt.binaries.sounds.mp3.complete CD
alt.binaries.sounds.mp3.beatles
alt.binaries.sounds.mp3.1950s
alt.binaries.sounds.mp3.rap hiphop
alt.binaries.sounds.mp3.christian
alt.binaries.sounds.mp3.classical
alt.binaries.sounds.mp3.brazilian
alt.binaries.sounds.mp3.gothic industrial
alt.binaries.sounds.mp3.nospam
alt.binaries.sounds.mp3.classic rock
alt.binaries.sounds.mp3.latin
alt.binaries.sounds.mp3.blues
alt.binaries.sounds.mp3.zappa
alt.binaries.sounds.mp3.indie
alt.binaries.sounds.mp3.reggae
alt.binaries.sounds.mp3.rock.full album
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