THE OPTIMAL GROUP SIZE IN COMPUTER MEDIATED COMMUNICATION

ABSTRACT

Several researchers in the area of CMC (Computer Mediated Communication) have proposed that the optimal group size is different, and larger, in non-same time, written, computer mediated communication, than in face-to-face communication. Below is two sections from my book Electronic mail, which discusses this effect and its causes. Important in the sections is that this is not only an efficiency factor, but also, and very importantly, a psychological factor.

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(In Adobe Acrobat format). It is an excerpt from the book “Electronic Mail”. More information about that book is available on URL
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GROUP SIZE AND THE CRITICAL-MASS HYPOTHESIS

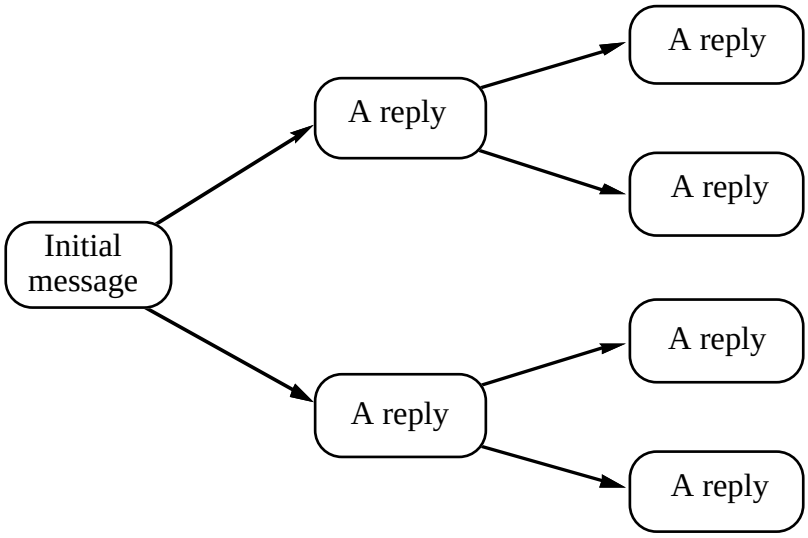

Figure 1: **Chain reaction of group discussions in electronic mail.**

Electronic mail commonly uses either distribution lists or computer conferencing systems/bulletin board systems for group communication. The lower size limit for a successful group for the exchange of experience is usually between 20 and 50 active participants. (Groups for other tasks than experience exchange can be successful with much smaller group sizes.) This is probably because the activity in these groups is a kind of chain reaction. Much of what is written is a response to a previous message. Assume, hypothetically, that the probability for each group participant to reply to a message is 0.05. With *N* participants in the group, each message will on average generate 0.05 x (*N*-1) new messages. If the group size is 21 participants, then this figure will make 1. Thus, with fewer than 21 participants in the group, on average, each message will generate less than 1 new message, so that the chain reaction is subcritical. If the group size is larger than 21 participants, each message will, on average, generate more than one message, and we get a sustained chain reaction. Of course, the real figures

are not always exactly 0.05 and 21, but the principle still applies: group size must be above a certain threshold if activity within the group is to be sustained.

Figure 1 shows how a chain reaction of messages can arise if each message on average causes more than one replying message.

COMPARISON WITH FACE-TO-FACE MEETINGS

Much of the communication in electronic mail systems is group communication. Most electronic mail systems have some built-in support for group communication, ranging from simple distribution lists to advanced computer conferencing systems. Even in those systems that do not support group communication, there is almost always a command to write a reply to a multirecipient message, such that the reply is sent to all recipients of the previous message. Thus you do not need to input the names of all the recipients again. This means that the previous message is in fact used as a kind of implicit distribution list. Even this simple aid supports and is often used for group communication.

Electronic mail is used so often for group communication because it is particularly efficient for many types of group communication; this will be explained further below.

Group communication using electronic mail is very different from ordinary meetings. Even audio and video conferencing and group phone calls are more similar to face-to-face meetings than to electronic mail. The important difference is that, in ordinary meetings, all communication is concentrated to a short time period (usually one or two hours). All communication must be done in this short period, or it will have to wait for the next scheduled meeting, which might be a week or a month later. If you forget one aspect of an issue, have to look up a fact, or get an idea the next day, then it has to wait until the next meeting. With electronic mail, the process is not concentrated in a fixed meeting period. Participants enter the system when they have time, read what others have written, give their own views, and connect again at a later time.

Electronic mail is more efficient for some kinds of group

communication for the following reasons

- You save the cost and effort of travelling and gathering everyone in the same place at the same time.
- Each participant has greater control over his own communication: what to read, when to read it, what to read carefully, what to skip, and when to write his own comments. If you prefer, you can think about an issue and reply the next day.
- Since you write slower but read faster than listening and talking in voice communication, written communication is more efficient if the size of the group is larger than about five people.

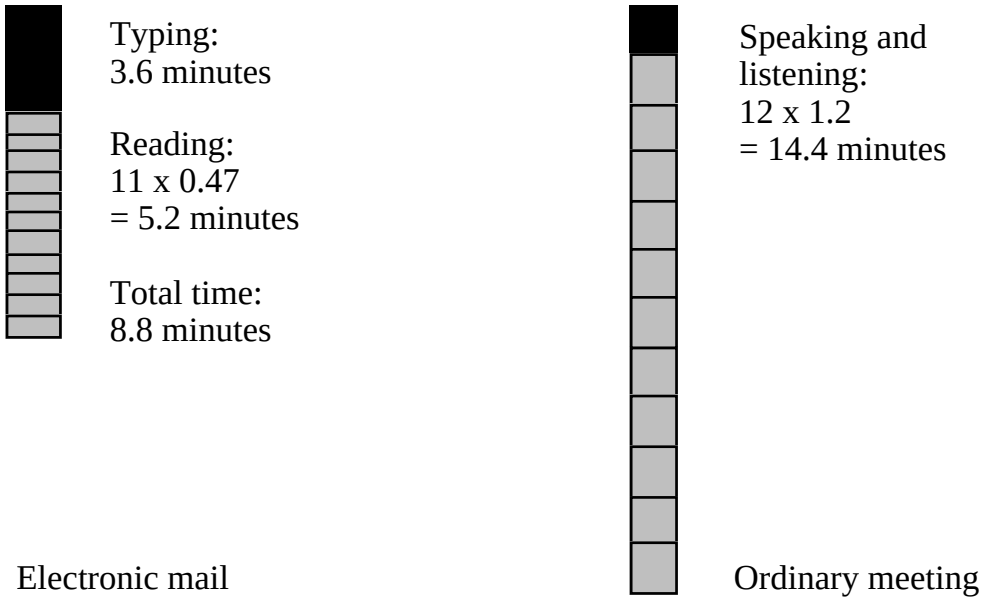

Figure 2: Comparison of the time spent giving and receiving information in written versus spoken communication in a group with 12 participants.

This last point is very important, and is illustrated by the example in figure 2, which compares a meeting of twelve people with the same amount of

communication via electronic mail. The figure shows the total spent effort for all the participants of the group to transfer the information given in an average message. As is shown in the figure, much less time is needed for the same communication with electronic mail, if the group size is larger than five participants.

The shorter reading time with electronic mail is caused not only by the fact that you actually read faster than you listen, but also because you have more control over your own reading than over your listening: it is easier to spend less time on less-important texts and to read carefully what is most important to you.

The results described above are not only a matter of efficient use of time, they are also important psychologically. Everyone knows that it is difficult for face-to-face meetings to work well if the number of participants is larger than about 5 to 8 people. Typical problems of meetings with many participants are:

- The meeting takes more time than planned;
- Everyone does not have time to say what they want;
- There is not enough time to cover all items on the agenda as fully as needed; and
- Many people feel that too much of their time is spent in meetings, and within these meetings on discussion of issues they already know or are not interested in.

There are psychological advantages to face-to-face meetings too, especially for certain kinds of issues.

This result can also be understood by looking at Figure 2, and comparing the additional cost of including one more person in the communication process with electronic mail. This additional cost is less than half of the corresponding cost at a face-to-face meeting. Thus, with electronic mail, you can choose to include more people, at more reasonable additional cost than with face-to-face meetings.

Figure 2 only covers the time the participants actually participate in the meeting. Other costs (gathering everyone at the same time and place, travel, computer, etc.) are usually higher for face-to-face meetings than for electronic mail. The technical costs for simultaneous audio conferences are

comparable to those of electronic mail, while video conferences are much more expensive.

Note, however, that the travel cost per meeting minute is smaller the longer a meeting lasts, for face-to-face meetings. As an example, I have estimated the cost of a meeting assuming that two-thirds of the participants do not have to travel and that one-third must travel 150 kilometres. The estimate includes working time, computer time and travel costs. If more or fewer people have to travel, if the travel distances are larger or smaller, or if you use other prices, the result will differ. The result, with given assumptions, are shown in Figure 3.

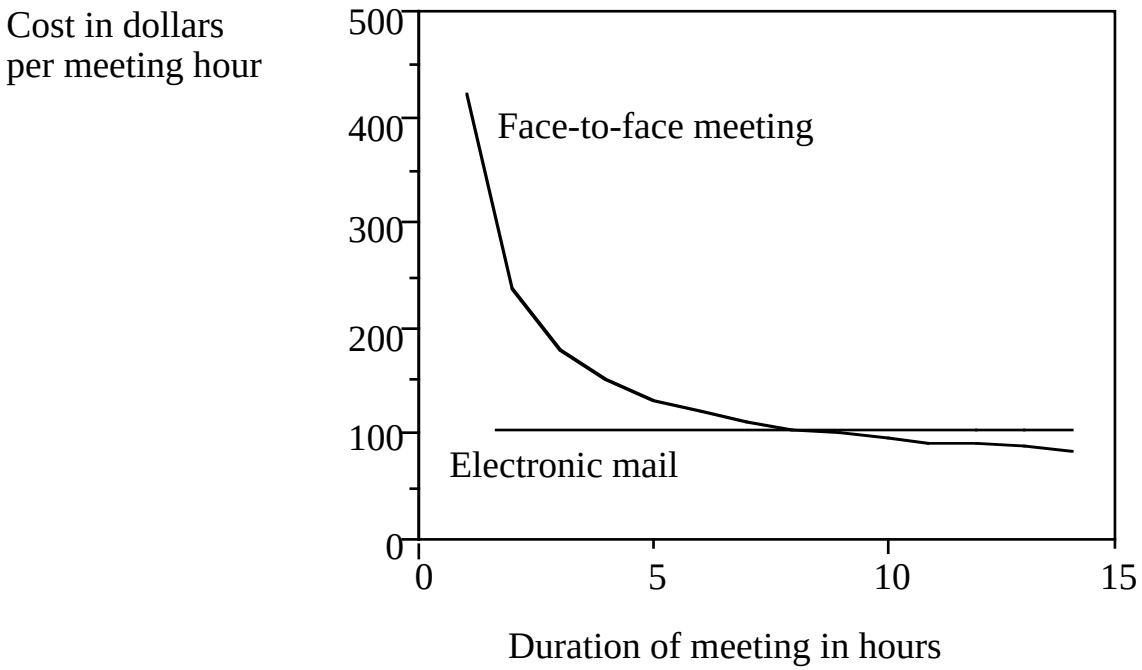

Figure 3: Comparison of cost for e-mail versus face-to-face meeting with five participants

Figure 3 shows that a face-to-face meeting will cost more than electronic mail if the duration of the meeting is less than a whole day. This is, of course, the reason why face-to-face meetings where participants have to

travel usually are held at large time intervals, and last for a longer time. It is obviously a disadvantage if you can only meet a few times a year. With electronic mail, an issue that needs 15 or 30 minutes of discussion can be taken up immediately, and there is no need to wait for the next scheduled meeting.

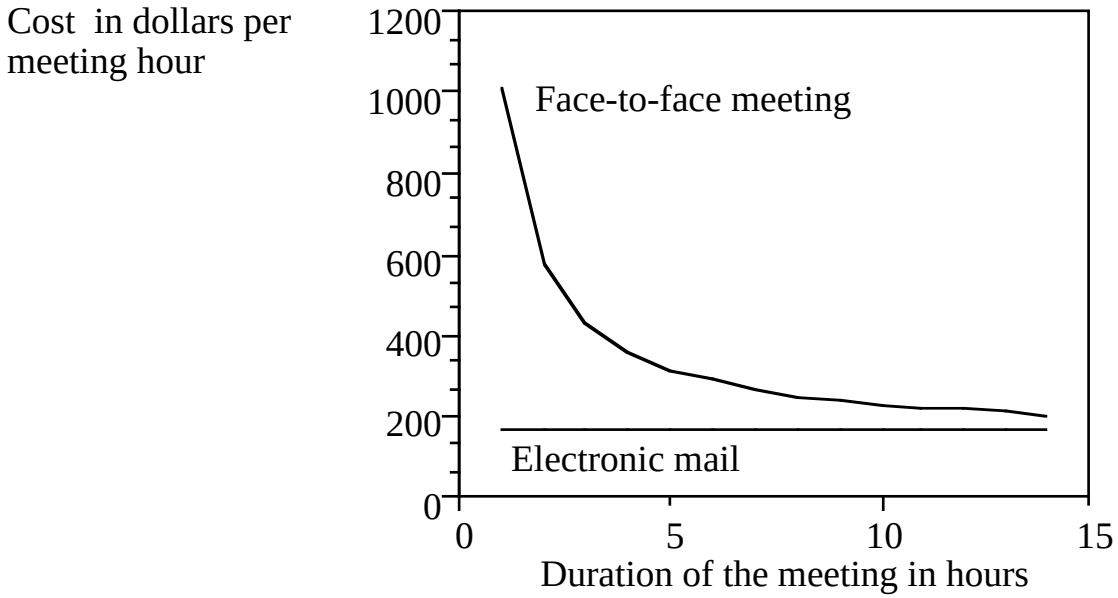

Figure 4. Comparison of cost for e-mail versus face-to-face meeting with twelve participants.

Figure 4 shows that, with twelve participants, electronic mail will be less expensive even if the duration of the meeting is two full days.

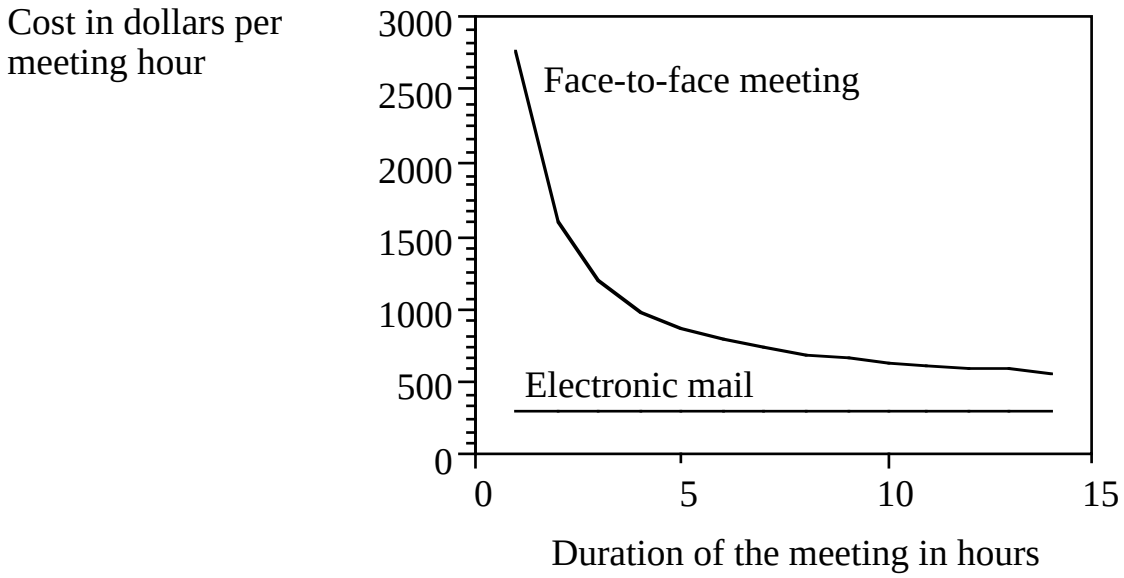

Figure **5:** Comparison of cost for e-mail versus face-to-face meeting with 33 participants.

Figure 5 shows that, with 33 participants, face-to-face meetings will be so expensive that such meetings in fact are very seldom organized. Symposia, lectures, conferences, etc., are of course exceptions. My assumptions are not valid for such meetings, however, since I have assumed that all participants have roughly equal rights to speak. At symposia and lectures, this rule does not hold: the speakers have more opportunities to talk than the other participants. In this way, higher efficiency is achieved for larger group sizes. This is an important difference between electronic mail and face-to-face meetings: discussion with equal rights to "talk" is possible through CMC even with 33 or more participants.

Some may object that this is irrelevant, since large face-to-face meetings with equal speaking rights are seldom held, but the reason such meetings are so seldom held is that before electronic mail, there was no efficient medium for them. If electronic mail provides an efficient medium for large meetings, the result will be opportunities that simply could not be realised otherwise. The more people can participate in a discussion, the more people can be kept informed, the more people get a chance to have their say, the less is the risk of forgetting some important factor. A survey of users of an e-mail and computer conference system showed that a large majority of

its users agreed with these statements [3].

An interesting factor to note is that, in a face-to-face meeting with 5 participants, each participant is allowed to talk for an average of 20 percent of the time. In an electronic mail meeting with 33 participants, each participant also spends 20 percent of the time giving information, writing messages, etc. See Figure 6.

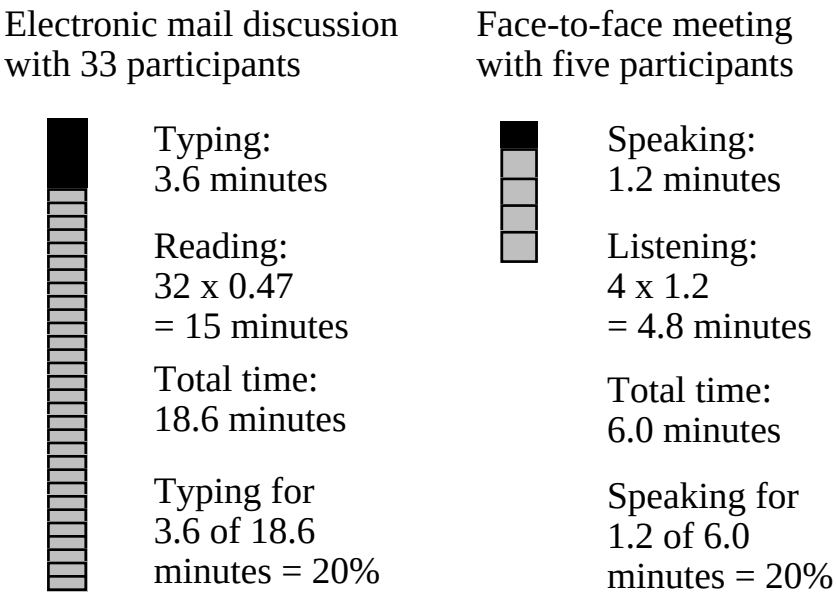

Figure 6: Number of participants to get roughly 20 percent giving and 80 percent receiving per participant.

Maybe human communication (with equal speaker rights) works best psychologically if the participants can be active and give information at least 20 percent of the time. This could be the reason why face-to-face meetings seem to be most efficient with group sizes of about 3-7 people, while group communication using electronic mail or computer conferencing systems seems to be efficient in groups of 20-100 people or more.

References

The ideas about group size effects in this paper were first presented in the book The Network Nation: Human Communication Via Computer., by Murray Turoff and Starr Roxanne Hiltz, Reading MA, Addison Wesley 1978, Revised Ed. 1993, MIT Press.