Genre Repertoire: 
Norms and Forms for Work and Interaction

by

Wanda J. Orlikowski
JoAnne Yates

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Wanda J. Orlikowski
Sloan School of Management
Massachusetts Institute of Technology
50 Memorial Drive (E53-329)
Cambridge, MA 02139
(617) 253-0443
wanda@mit.edu

JoAnne Yates
Sloan School of Management
Massachusetts Institute of Technology
50 Memorial Drive (E52-545)
Cambridge, MA 02139
(617) 253-7157
jyates@mit.edu

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ABSTRACT

Using the genre perspective, we studied the electronic communication of knowledge workers collaborating on a multi-year project and found that their work and interactions were mediated by the use of four genres (or shared types) of communication. Drawing on these findings, we develop the concept of genre repertoire to designate the set of genres enacted by groups, organizations, or communities to accomplish their work. We show that the establishment of a community’s genre repertoire, which typically occurs at its formation, is a process that is largely implicit and rooted in members’ prior experiences of working and interacting. Once established, a genre repertoire serves as a powerful social template for shaping how, why, and with what effect members of a community interact to get their work done. While serving to institutionalize norms and forms of work and interaction, genre repertoires can and do change over time through members’ response to project events, task demands, media capabilities, time pressures, and converging community norms. The concept of genre repertoire offers organizational research a powerful way of understanding mediated work practices and interaction norms, and hence how communication technologies may be associated with changes in the work and interaction of groups, organizations, or communities.
Much recent business rhetoric reflects the attempts by organizations to transform their structures and processes through teamwork, networking, and strategic integration into global enterprises and virtual corporations. Integral to such organizational visions are fast, accessible, and ubiquitous networks that support an array of new communication technologies such as electronic mail, computer conferencing, and desk-to-desk video. Such communication networks will apparently enable organizational members to work collaboratively and flexibly, and to span contexts and boundaries. But exactly how the use of communication technology is associated with changes in work and interaction is insufficiently explicated in such discussions, and seems to be poorly understood in general.

A growing body of organizational research has focused on the influence of electronic media on organizations (see reviews by Culnan and Markus, 1987; Kraemer and Pinsonneault, 1990; Sproull and Kiesler, 1992). On the empirical side, researchers have, for example, examined the relationship between electronic media and particular organizational behaviors and outcomes such as intra-group interaction (Finholt and Sproull, 1990), communication patterns (Eveland & Bikson, 1988; Feldman, 1987; Rice and Associates, 1984), group decision behavior (Poole and DeSanctis, 1992), socio-emotional discourse (Sproull and Kiesler, 1986; Rice and Love, 1987), and managerial effectiveness (from the media richness perspective, e.g., Daft and Lengel, 1986; Schmitz and Fulk, 1991; Sitkin, Sutcliffe, and Barrios-Chaplin 1992; Trevino, Lengel, and Daft, 1987). On the theoretical side, Huber (1991:67) has posited that communication and decision-aiding technologies “will have a significant effect on organizational design, intelligence, and decision making.” He proposed that these technologies will be associated with such organizational outcomes as decreased organizational levels, greater participation in decision-making, more rapid decision making, higher quality decisions, and more accurate, comprehensive, and timely organizational knowledge.

While the empirical research has shed light on the relationship between electronic media and various aspects of groups and organizations, the linkage between new communication
technologies and organizational changes in work and interaction has still not been systematically conceptualized. Further, the theorizing, while interesting, remains abstracted from the situated practices and norms that ultimately explain how and why people act the way they do in organizations (Barley, 1988; Giddens, 1984; Weick, 1990).

In contrast to these prior approaches, we have explicitly focused on and empirically examined the relationship between use of electronic media and changes in work and interaction. To inform our investigation, we drew on the concept of genres of communication (proposed by Yates and Orlikowski, 1992; see also Campbell and Jamieson, 1978; Miller, 1984; and Swales, 1990) as a useful analytic device for studying how knowledgeable actors use media within specific institutionalized contexts. Yates and Orlikowski (1992) suggest that genres of organizational communication -- for example, a memo, a meeting, an expense form, a promotional video, and a resume -- are socially recognized types of communication that are habitually enacted by organization members to realize particular communicative purposes. Each of these genres has a particular role and meaning that has become associated with certain kinds of work practices and interaction norms. The use of such genres thus, does not only mediate organizational communication, it critically shapes the conduct of work and interaction in organizations.

In this paper, we go beyond the notion of genre to develop the concept of *genre repertoire* -- the set of genres enacted by groups, organizations, or communities to accomplish their work. We argue that this concept offers a particularly useful approach for investigating and articulating how electronic media may be associated with changes in work practices and interaction norms. Our argument is based on examining the use of electronic mail by a group of professionals working on an inter-organizational, multi-year project. Because electronic mail was the primary medium through which the participants communicated, their electronic interaction comprised the bulk of their project work. Our detailed investigation of the group’s electronic messages over an extended period of time reveals the repertoire of genres they used to accomplish their work, and explains how and why it changed over time. This analysis allows us to generate some theory
about how and why a community establishes, uses, and changes its genre repertoire, and hence its modes of work and interaction.

As more and more organizational work becomes a matter of symbol manipulation and information exchange, the genres through which information is shaped and shared for particular purposes (reports, spreadsheets, meetings, teleconferences, etc.), are no longer merely an aspect of organizational work; rather, they are the organizational work. Hence changes in genres and genre repertoires reveal changes in work, interaction, and organization. The project we studied serves as a useful prototype for the kinds of work and interaction anticipated in future organizations and groups -- distributed, knowledge-intensive, and networked through communication technologies.

**GENRES OF ORGANIZATIONAL COMMUNICATION**

According to Yates and Orlikowski (1992), a genre of organizational communication is a typified communicative act having a *socially defined and recognized communicative purpose* with regard to its audience. For example, consider the annual shareholders’ meeting genre and the resume genre. The commonly recognized purpose of a shareholders’ meeting is to present the company’s past accomplishments and future outlook to stockholders, while that of a resume is to summarize an individual’s educational and employment history for a potential employer. The purpose of a genre is not rooted in a single individual’s motive for communicating, but in a purpose that is recognized and reinforced within a community. A genre binds the shared purpose to characteristic aspects of substance and form. *Substance* includes the topics, themes, and arguments, along with typical discourse structures, used to express the communicative purpose. For example, the substance of a shareholders’ meeting is usually the company’s new initiatives as well as its past and expected financial performance, while that of a resume is typically the person’s education, experiences, and accomplishments, laid out in a distinctive sequence. *Form* refers to the readily observable features of the communication. For example, shareholders’
meetings typically include oral and visual presentation of progress and plans by company officials as well as voting by shareholders on various proposals. A resume typically displays a standard format with dates, schools, degrees, employers, and job titles. Form has at least three elements: structural features (e.g., text formatting devices such as lists and headings, and devices for structuring interactions at meetings such as agenda and chairpersons), communication medium (e.g., pen and paper, telephone, or face to face), and language or symbol system (including linguistic characteristics such as level of formality and the specialized vocabulary of corporate or professional jargon).

Genres are invoked in response to commonly recognized recurrent situations or occasions for communication, which reflect the history and nature of established work practices, social relations, and organizational policies. For example, an annual shareholders’ meeting is invoked by the end of the financial year and assumes certain economic conditions and arrangements that include the rights and duties of company owners and the responsibilities of management to report to these owners annually. Similarly, a resume is invoked by a job search that is part of a hiring process premised on systems of education and employment as well as the requirements for particular forms of reporting on individuals’ scholastic and professional accomplishments.

In organizations or communities, genres are enacted when members take action by drawing their knowledge -- tacit or explicit -- of genre rules that bind a particular socially recognized purpose and appropriate elements of form and substance with certain recurrent situations. A particular instance of a genre need not reflect all the rules constituting that genre, as long as it is still recognizable as partaking of that genre. For example, business letters with subject lines (RE: ... ) are easily understood as such even though subject lines are more conventionally associated with memos than with letters; similarly, business letters sent via fax are still recognized as such, even though the transmission medium has changed. Enough distinctive genre rules, however, must be followed for the communicative action to be identified--within the relevant social community--as an instance of a certain genre.
Yates and Orlikowski (1992) suggest that genres are produced, reproduced, and modified by individuals through a process of structuring (Giddens, 1984). That is, members of a community enact a genre by drawing on their knowledge of a set of genre rules, and in so doing reproduce or challenge the genre. When community members use genres that -- through tradition or mandate -- have become established as useful for conducting the community's activities, they reinforce those genres. Members can, however, challenge and change these genres through their actions. When changes to established genres are repeatedly enacted and become widely adopted within the community, new or modified genres may emerge -- either alongside existing genres or to replace those that have lost currency. For example, Yates and Orlikowski (1992) show how the memo genre emerged initially as a variant of the business letter genre and ultimately as distinct from it.

While Yates and Orlikowski (1992) posit a mechanism for genre production, reproduction, and change, they do not suggest why communities produce particular genre repertoires, nor how, why, and with what effect communities may change such repertoires over time. These questions of repertoire formation, influence, and change emerged as the focus of this paper. Using the genre perspective as a starting point, we draw on the findings of our research study to establish and elaborate the concept of genre repertoire, and begin to articulate some theory around it.

**RESEARCH STUDY**

Our research study investigated a project that involved computer language designers who, through the 1970s, had worked with and developed various and largely incompatible dialects of the artificial intelligence language LISP. In early 1981 the Defense Department (a funding source for much LISP work) put pressure on some of these designers to negotiate a standard LISP language so that programs written in that language would be portable across computer types. Over the next two and a half years, the community of LISP language designers engaged in
complex and often controversial negotiations to produce what came to be known as the Common LISP () language. As the language designers were located at universities and company sites dispersed geographically throughout the U.S., their interactions were conducted almost exclusively through electronic mail transmitted via the Defense Department’s ARPANET system. Most of the designers knew each other, either from having previously studied or worked together or from meeting periodically at professional conferences. They were all working in the LISP language and all had a great deal at stake as result of the decision to design a standard LISP language: for the academic participants, future funding from the Defense Department; for the participants working at companies, the commercial potential of LISP-based products.

In introducing the manual, the project’s final product, Steele (1984:xi) noted the centrality of the electronic medium to the project:

The development of COMMON LISP would most probably not have been possible without the electronic message system provided by the ARPANET. Design decisions were made on several hundred distinct points, for the most part by consensus, and by simple majority vote when necessary. Except for two one-day face-to-face meetings, all of the language design and discussion was done through the ARPANET message system, which permitted effortless dissemination of messages to dozens of people, and several interchanges per day.

The participants perceived electronic mail to be an appropriate medium for several reasons, both practical and customary. Their geographic dispersion made face-to-face meetings expensive and difficult to organize, especially since they undertook this project in addition to their other duties, without specific funding from the Defense Department, and with varying levels of support from their organizations. Most significantly, according to the participants, they were all regular users of electronic mail, already using it to communicate locally and at a distance. The medium was thus an obvious one to use. As one participant put it, “We didn’t even consider not using it.”

In preliminary discussions in April 1981, a few key LISP designers came together at a larger professional meeting and agreed to cooperate to define the standard LISP language. In a subsequent informal meeting in June 1981 they assigned responsibility for the manual’s production to designers at one specific site. In August 1981 an initial draft of the manual was issued, based largely on the documentation of the LISP dialect at that site. This draft served as
the basis of discussion at a November 1981 meeting (the first of the two referred to in Steele's introduction), where some basic language design decisions were made, and many other issues raised but not resolved. Between December 1981, when a central electronic archive was established (and when our data set begins), and December 1983, when the manual was essentially complete, there was only one more face-to-face meeting, in August 1982.

The group was ad hoc and relatively unstructured in its operation, with no pre-defined time frame or formal organization. Nevertheless, the person at the chosen site who took responsibility for compiling the reference manual, emerged as a de facto project coordinator, with several others playing key supporting roles. He issued various drafts of the manual (on paper and in electronic form), that served as milestones in the project and foci for the group's work. Another participant took charge of the (electronic) mailing list and also established an archive agreed to be available to anyone interested in it. During a period of over two years the group made hundreds of decisions, both big and small and of varying levels of controversy, about how the language would work; as a result, a record of the discussion was seen as critical. The coordinator noted that the archive "proved invaluable in the preparation of [the] manual." The archive also made it possible for those joining the project later to review what had already been said or decided on specific subjects, as well as allowing regular or occasional participants to revisit prior discussions. The project was negotiated to its desired end product, a reference manual for a standard LISP language, published in 1984 as Common LISP: The Language (Steele, 1984).

Data Collection and Analysis

The primary data for this study consist of almost 2,000 transcripts of archived electronic mail messages. Background information and perspectives for interpreting these messages came from a series of two-phase, semistructured interviews. Since the interviews provided supplementary

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1 All e-mail messages that included the distribution list in the TO or CC field were sent to all individuals participating in the project and were automatically archived. While some one-to-one messaging also took place among the participants (which the participants we interviewed referred to as "back channel" communication), only a handful of these messages made it into the official project archive and hence this study.
rather than primary data, we did not attempt to interview all the participants, conducting
interviews with nine participants. These included the five key players in the project, three core
participants, and one peripheral player (see below). The interviews were conducted after
preliminary content analysis of the messages, allowing us to draw on the results of this analysis.
The first phase of the interview, which was the same for each participant, focused on project
history, membership, roles, and social norms. The second phase, a variation of the discourse-
based interview (Odell, Goswami, and Herrington, 1983), focused on the patterns initially
detected in the message transcripts themselves. This phase included customized questions that
probed the patterns initially observed in the interviewee's messages and those of the group as a
whole. These interviews grounded our interpretation of the messages and helped to elaborate and
explain the patterns we detected. We also communicated with some of these interviewees later
via e-mail to clarify issues that arose in further analysis.

We analyzed the message transcripts both qualitatively and quantitatively. First, we read large
portions of the archive to become familiar with the use of electronic mail by the participants.
Genre analysis requires qualitative textual analysis of messages to understand the situations
within which certain genres are invoked and their shared purpose, substance, and form. This
textual analysis also provided the basis for devising a coding scheme and for interpreting the
patterns and trends identified. Our coding scheme was designed by scrutinizing hundreds of
messages in the archive and categorizing them in terms of two of the four dimensions
constituting the definition of genre, *social purpose* and *form.* We supplemented the observed
features with standard text-formatting devices such as lists and subheadings (see, for example,
Felker et al., 1981). The final set of coding categories included purpose categories and two types

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2 As described in Odell, Goswami, and Herrington (1983), this technique is based on a previous analysis of text written by the
interviewees. It involves showing interviewees specific passages along with one or more variations, and then asking them to
discuss their reasons for using the chosen alternative rather than other options. We did not pose alternatives in our interviews,
but simply inquired about message samples and patterns of use.

3 We did not code for *recurrent situation* because that dimension involves elements outside of the message itself (social context
and history); we depended on interviews to understand this aspect of genre use. We also did not code for *substance* because the
group's project provided consistency on this dimension.
of form categories, structural indicators and language indicators (Table 1 contains a complete list of coding categories):

**Purpose Indicators** refer to the *socially recognizable purposes* of a message, including both primary and secondary purposes. For primary purpose, only one of six options was chosen as a message’s key purpose. Because we observed that many messages had multiple purposes (e.g., a message raising a question and proposing a solution), one or more of the six purposes could be indicated for secondary purpose (including that for primary purpose).

**Structural Indicators**, an aspect of *form*, refer to a message’s formatting features, including those common in non-electronic communication (e.g., subject line, opening, and sign-off), as well as those more characteristic of electronic communication (e.g., graphical elements such as the sideways smiley face :-) created with alphanumeric characters). These categories were coded simply as present or absent.

**Language Indicators**, another aspect of *form*, coded the presence of four linguistic characteristics -- informality, humor, sarcasm, and emphasis. For example, our working definition of informal was “language you wouldn’t normally use in a paper-based business document (e.g., business letter or memo).” These categories were coded as present or absent.

A research assistant used this scheme to code the electronic messages. To judge coder reliability, one of the researchers independently coded a stratified sample of 124 messages selected by the other researcher to represent all coding categories. Intercoder reliabilities were high (Cohen’s $\kappa = 0.80$ or above) for all categories except primary purpose, sarcasm, and the residual “other” categories in purpose, structural, and language indicators (see Table 1). In the subsequent genre analysis we used secondary rather than primary purpose because of its higher reliability, and did not use sarcasm. The “other” categories were used primarily as aids in locating interesting phenomena for later qualitative analysis.

The coded data were next examined for inclusion in the genre analysis. Since the notion of genres of organizational communication is socially based, we examined the frequency of participation by senders. This examination revealed that while a core group of 17 participants sent large numbers of messages, there were also about 100 individuals who sent fewer than 1%

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4 Our use of secondary rather than primary purpose did not pose a significant problem for our genre analyses. Coding multiple purposes allowed genre overlap only for messages classified as proposals (discussed below). It is not surprising that sarcasm posed problems for coder reliability, since it often depended on intimate knowledge of LISP and the community. In fact, in a few messages participants displayed some confusion about whether a particular proposal was made seriously or sarcastically.
of the total messages transmitted during the project (less than one per month). The interviews indicated that many individuals outside the core group essentially observed the process, participating only rarely, if at all. Moreover, responses to our query about the major players in the project produced quite consistent responses, identifying a common and very small set of participants, generally key LISP designers with major responsibilities for LISP implementations, all of whom were well over the 1% threshold. We thus decided to remove from the data set those participants with fewer than 1% of the messages, because as peripheral players they would be only marginally involved in the ongoing enactment of genres in the group. The resulting data set contained 1332 messages sent by 17 participants during a 25-month period. Table 1 shows the frequency of each coding category in this data set.

**Genre Definition**

Because the medium of electronic mail transmits written communication, we began our exploration with the assumption that certain traditional genres of written organizational communication (e.g., the memo) might be enacted by the project participants. Based on the historical evolution (Yates, 1989) and contemporary usage of these traditional genres, we defined the typical form of each in terms of our coding categories.

Because genres are often modified to suit a group’s task or a particular medium, we expected some genre variations in the group, particularly as most of the participants had been using electronic mail before the project began. We used inductive techniques to identify and define such genre variants. Frequencies of coding categories indicated which features were common and which were rare, while textual analysis and interviews provided some rationales for such patterns. In seeking genre variants, we used the frequencies to assess the categories that most limited the number of exemplars of a genre. We then determined which constraints could be dropped without violating the essence of a genre (its recognized purpose and salient
characteristics of form). Where one of these variants was much more common and characteristic than the genre as initially defined, our analysis proceeded with that variant.

In this exploratory study we wanted to be open to the possibility of other genres, including new electronic ones, so we also sought other patterns among the messages by iteratively examining interview data, message texts, and associations among the coding categories.

**Genre Analysis**

We examined both the presence of various genres in the archive and the change in their use over time. To ensure that the identified genres were shared among the participants -- a characteristic necessary given our social definition of genre -- we also analyzed the distribution of genre usage within the group. In doing so, we treated the five individuals who each generated over 5% of the messages as separate and key participants, and aggregated the remaining twelve participants, responsible for a total of 33% of the messages, into a composite “other participants” category. All the genres we considered here were used by each of the five key as well as the composite other participants at a level we considered more than adequate evidence of social support.

To get an overview of genre change, we initially divided the chronological series of messages into fixed-size clusters (nine periods of 148 sequential messages each). The fact that the messages were distributed quite unevenly over the period analyzed precluded calculating meaningful percentages of genres for many time periods. Grouping by number of messages allowed analysis of all the messages by genre and “period.” We believe this grouping adequately captures what we are trying to investigate -- the ongoing enactment of genres within a social unit. After grouping the messages in fixed-sized clusters, we searched for trends in the relative enactment of genres over time, ensuring that these trends--where present--were sufficiently common to be considered shared within the group.
In examining changes over time, we explored one obvious possible factor that might account for such changes--interactions with the participation and genre use of group members. Individual contribution to the data set as a whole varied over time. Consequently, our analysis of changes in the use of genres distinguished broad-based changes in use levels from changes in the participation of different individuals with different genre preferences.

This analysis of the genres in the archive and their changes over time is reported in the next section. The notion of genre repertoire which emerged from this analysis is developed in the following section, where we examine the genre repertoire to learn what it can reveal about the nature of the group and its actions. We then build some theory about genre repertoires by examining how and why the repertoire was established and how and why it changed in the context of project history, time pressures, events, media capabilities, and community norms.

**GENRES AS RESOURCES FOR WORK AND INTERACTION**

Our study of the project found that the participants enacted four different genres or genre variants within electronic mail in order to accomplish their project work: memo, proposal, dialogue, and ballot (see Figure 1). The first two are variants of the traditional paper-based memo and proposal. The latter two, though they have precedents in written or oral genres of interaction, are different enough to be considered separate genres not typical of most written organizational communication.

**Memo Genre**

A memo traditionally documents intra-organizational communication (Yates, 1989). We defined the form of the memo genre as follows (see Table 2 for a precise definition in terms of coding categories, and Figure 2 for an example):

*Memo:* a message using the standard memo header provided by the system (To, From, Subject, etc.), allowing common features such as subheads and lists, having formal language, and lacking any distinctive features of the other genres, such as greeting and sign-off, or features new to the electronic medium, such as graphic devices.
Using this definition, we found that 15% of the messages in the archive matched the characteristics of the memo. This genre was fairly widely shared across the participants: the five key participants varied in their individual levels of use from a low of 2% to a high of 28%, while the twelve other participants used it 25% of the time.

In seeking potential variants of the memo, we considered several options but ultimately focused on the formality constraint. Our textual analysis and interviews had revealed that the group tended to use a great deal of informal language more typical of conversation than of formal written organizational communication. This impression was confirmed by the coding, which identified 63% of the messages as having informal language. All five key and twelve other participants used informal language frequently, from a low of 57% to a high of 85%. This informality probably reflected both the informal culture of the group and the rapid exchanges allowed by the electronic medium. We thus defined an informal variant of the traditional memo genre that maintained its structural features but removed the restriction on formality. This variant (which includes memo itself as a subset) comprised 38% of the messages in the archive. It was also widely shared among the group, with usage levels of the five key participants ranging from 8% to 69%, and the twelve other participants at 56%. Since this variant of the memo allowing informal language was much more characteristic of the group's interaction, we focused on it in our subsequent analysis.

It is not surprising that use of this broader form of the memo was so prevalent and widely shared in the Common LISP interaction. As noted above, the socially recognized purpose of the memo is to document intra-organizational communication, in situations where such documentation is called for. Documentation was clearly an underlying purpose of the entire electronic exchange on Common LISP, as suggested by the archiving of all messages. Subject lines, prompted for but not required by the software, were used in 93% of the messages; our interviews suggested that the participants used the subject lines to separate various threads of discussion and to facilitate retrieval of messages from a specific thread at a later time. As one participant said, "I find
[subject lines] very useful as a way of indexing content and issues." While the members of the Common LISP project worked for different organizations, they were part of the same professional community and many of them knew each other fairly well before the project began. Moreover, the project by its nature asked these individuals to come together in at least a temporary, electronic organization with a common goal, making an intra-organizational genre seem appropriate. In addition, most of the regular participants used an e-mail system that provided fields for the standard memo header. Thus the memo might have served as a kind of default genre.

Some of the Common LISP messages classified as memos are brief replies to previous messages that lack context, closure, or both, and depend on knowledge of previous messages. These memos bear some resemblance to pieces of an ongoing conversation, a quality likely reflecting the more rapid exchange of messages possible in e-mail than in the paper medium. Despite their fragmentary structure, these e-mail messages were seen by the participants as serving a communicative purpose similar to that of paper-based memos. As one participant noted in an interview, "we used them the same way we used interoffice memos."

Figure 1 shows how use of the memo changed over the project. From an initial level of 45%, its use rose to 54% during period 2, then dipped sharply in periods 4 and 6 (explained in part by ballot activity, discussed later) to a low of 22% in period 6. If we smooth out those sharp dips, however, we see a general decline from period 3 to the end of the project, when it stood at 27%. The downward trend is widespread within the community, with all five key and the twelve other participants showing a decline in the number and percentage of memos used in later periods. Over time, then, the group gradually decreased its use of the memo variant.

Proposal Genre
A proposal has a specific communicative purpose -- to advocate a course of action for consideration by others -- but it can vary in length, formality, and structural features. We did not
initially seek this genre, but were alerted to its presence in an interview with a key participant. We defined the form of the proposal genre to match the particular variant found in the messages (determined qualitatively and through analysis of the coding data), as follows (see Table 2 for a precise definition in terms of coding categories, and Figure 3 for an example):

**Proposal:** a message having proposal as (secondary) purpose, a subject line, and a formal specification or example of LISP code, offset from the rest of the text.

The subject line was required both to identify the specific aspect of the LISP language dealt with and to aid in later retrieval. The presence of LISP code precluded general proposals about group process. Analysis of the data set revealed that 7% of the messages matched this definition. This genre was used by the five key participants at levels ranging from 3% to 16%, with the twelve other participants at 6%. This distributed use suggests that it had a broad enough social base within the group to qualify as a genre.

This genre appears to be a variant of the traditional written proposal, sharing its social purpose of proposing some idea or action for approval, though restricting the subject matter of such a proposal to the Common LISP language, thus making it a subgenre that would be recognized only within the community. We did not restrict formality, nor did we require the section headings characteristic of longer and more formal types of proposals but not essential to informal, memo-like proposals in many organizations. Paper-based proposals can take a very specific form (as in the NSF proposal) or can be realized in the form of various other, more abstract communication genres such as letters and memos. Likewise, in this electronic archive, we found that the proposal overlapped with other genres. Specifically, of the 97 proposal messages found, 40% were also classified as memo, and 14% as dialogue (discussed below).

Because the variant of the proposal genre was very specific to the task at hand, change in its use over time (see Figure 1), not surprisingly, reflected specific events in and tasks of the project, rather than simply increasing or decreasing over time.\(^5\) The single face-to-face meeting that took

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\(^5\) The relatively small numbers precluded examining the trends for each participant.
place during the time covered by the archive occurred during period 3. Our interviews as well as many of the messages indicated that during the meeting, a number of unresolved issues were delegated to various participants who were to prepare proposals on the issues and present them to other participants through electronic mail, thus creating a situation invoking proposals. For example, one proposal message began with this introduction: “At the meeting I volunteered to produce a new proposal for the ...” while another stated: “At the meeting in August I was assigned to make a proposal...” In addition, the two major ballots (to be discussed below) in periods 4 and 6 were a mechanism for gauging level of agreement on proposals as they accumulated, and they in turn spawned more proposals. Thus percentage use of the proposal genre peaked in periods 4 through 6, with a high of 14% in period 5.

The relative use of the proposal genre declined to its earlier level in periods 7 and 8 before picking up slightly just before the end when all outstanding matters had to be resolved (increasing to 7% of the messages in period 9). A detailed textual analysis of these final proposals indicates that many of them referred specifically to their “last minute” nature. For example, one message (sent at 11:26 pm) began with the comment, “Okay guys, here is a (literally) eleventh-hour proposal for ...” Others were suggestions for what should go into the next edition of the manual.

Dialogue Genre

Dialogue, which was identified both qualitatively and quantitatively from patterns in the data and confirmed in the interviews, is a form of written interaction that is modeled on oral dialogue. This genre uses a specific structural feature, the embedded message (all or part of a previous message, inserted into but visually differentiated from the text of the current message6), in a way that suggests a conversation. At the same time, it makes use of the documentary quality of

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6 This feature, not available in all electronic mail systems but available to the core participants, is not automatically invoked when replying to a message, but has to be explicitly selected.
written communication. We defined the form of the dialogue genre as follows (see Table 2 for a precise definition in terms of coding categories, and Figure 4 for an example):

**Dialogue:** a message responding to a previous one and including all or part of that previous message followed by a direct response to it. Such a message also had a subject line, typically picked up from the original message and occasionally modified.

Analysis of the data set identified 20% of the messages as dialogue. Use of the genre was widespread, ranging from 6.3% to 45% among the five key participants and 17% among the other twelve participants.

This pattern exhibits all the basic components of a genre. The messages are invoked in a recurrent situation—the interaction of group members collaborating on a common, ongoing task. They have a shared social purpose (replying to specific issues raised in another message in a way that continues a line of discussion) and common features of form (the embedded message and the subject line). The embedded message feature takes advantage of the capability of many electronic mail systems to insert a previous message into a new message, a capability not easily available in the paper medium. The closest paper-based analogue to this genre would be a memo on which a response has been written by hand or to which one has been attached. In that analogue, however, the exchange is unlikely to continue beyond a single reply. In contrast, dialogue messages may occur in a chain of interwoven messages, creating what one participant called “the metaphor of a conversation.”

Unlike the relative independence reflected in the conventional (paper-based) memo genre, dialogue, as the name implies, creates a continuity and interdependence among messages. While the memo variants in the data set sometimes reflected more dependence on preceding messages than in paper-based memos, dialogue messages were explicitly dependent on each other, as indicated by the inclusion of previous messages or pieces of messages and by the use of a subject line that usually repeated or varied an earlier subject line. In interviews, participants noted the usefulness of this type of communication. For example, “I use embedded messages all the time
as a way of letting people know what I am referring to,” and “It was a way of making a connection with what had come before.”

Examining change in level of use of this genre, we see a general rise over the project. It started out at a relatively low 8% of all messages. Our interviews revealed that dialogue was already in use at the time the project began. One participant noted that “inserting quotes from a previous message so it gets more like a conversation was not invented by this group, [but] imported from outside.” Use of dialogue rose through most of the project, with local peaks in periods 4 and 6 coinciding with the two major ballots (see below). Its use surpassed that of memo in periods 6 and 9, ending at a high of 28%. The increased use of dialogue was widespread in the group. Four of the five key participants increased their use of dialogue over the project, as did the twelve other participants. The pattern of change revealed in Figure 1 suggests that while dialogue was a part of the repertoire from the beginning and while task demands (the first major ballot) may have encouraged its original rise, it became an increasingly accepted and used mode of interaction, whatever the task. Moreover, the distinctive structural characteristic of this genre, the embedded message, was explicitly recognized as a useful aspect of the group’s communication. For example, one participant told us in his interview, “There definitely is a trend towards increased use of embedded messages.” Another was able to articulate the formation of specific norms for using this genre, saying:

My software lets me do this easily -- it drops in the whole previous message into your new message and then indents it. I would then carve out what was extraneous and add my response to that. ... Some people were using this technique as well but most were not bothering to delete the extraneous stuff and just dropping in the whole message (header and all). I find that very annoying. Actually so do other people. I remember a message RG sent to the group ... objecting to the practice of including the whole previous message. He said something like, “Why can’t you do what SF does and send me just what I need not the whole message.” So I remember this as a style that we developed in Common LISP.

Dialogue messages represent a significant genre in the archive, and one likely to arise only in electronic mail systems that offered the capability of embedding messages.

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7 We examined and eliminated one possible explanation of the rise: that over time there were more messages that could be embedded. Qualitative analysis showed that dialogue messages were almost always in response to the most recent messages.
The label and socially defined purpose of the dialogue genre reflect a conversational quality, being realized asynchronously and in writing through electronic mail. In discussing “sequence of discourse,” Rubin (1984:206) notes, “Although a written text is a monologue, writers may similarly enter into dialogic relations with a previous piece of writing by authoring a variety of types of comments, counterstatements, exegeses, or replies.” Unlike memo and proposal, the dialogue genre attempts to internalize and visually highlight this dialogic relation within a single written document. This genre, apparently new to the electronic medium, thus integrates characteristics of both written and oral modes of communication while depending on capabilities unique to electronic media.

Ballot Genre

The other nontraditional pattern revealed through our textual analysis was associated with what the group referred to as balloting. We defined the form of the ballot genre as follows (see Table 2 for a precise definition in terms of coding categories, and Figure 5 for an example):

**Ballot:** a genre comprising three distinct types of messages: (i) the ballot questionnaire, which was a message from one group member soliciting participation in the ballot, providing instructions on voting, and listing and describing the issues to be voted on; (ii) the ballot responses, which were messages from the members containing their votes on each of the issues in the ballot; and (iii) the ballot result, which was a message from the ballot initiator, summarizing the results of the voting, tallying the votes for each issue and reproducing comments expressed by the participants.

Six ballots were found in the data set, each with all three message types, including varying numbers of electronic responses to each. Of these six ballots, the ones in October 1982 and May 1983 were major, each representing significant decision points on over twenty unresolved issues. Our interviews revealed that these two ballots served as important milestones for the project, highlighting what had been accomplished to date and what still needed to be done. The other four ballots, some of which were referred to by participants as “mini-ballots,” covered fewer issues and were treated as less important events.
This pattern, defined by detailed qualitative analysis of all messages coded as "Other purpose," rather than in terms of a specific set of coding categories, fits the most essential aspects of our definition of genre, though it also pushes the boundaries of that definition in some ways. Balloting is invoked in response to a recurrent situation and has a shared communicative purpose. The initiator used ballots after several unresolved issues accumulated. For example, the initiator of the second major ballot in May 1983 indicated that it was occasioned by the increased number of issues raised in recent discussions: "I was going to send these out in smaller doses, but a bunch of issues built up and I decided that a real ballot would be easier." The socially recognized purpose of balloting was to get a sense of members' positions on various outstanding issues that needed to be resolved. The project coordinator, who was the initiator of the first major ballot, described its purpose and substance in its preamble:

Here is what you have all been waiting for! I need an indication of consensus or lack thereof on the issues that have been discussed by network mail since the August 1982 meeting, particularly on those issues that were deferred for proposal, for which proposals have now been made.

The purpose was not simply to find out what solution the majority favored. Rather, ballots were used to identify whether agreement had emerged or whether more discussion was needed. As one key participant told us, "it was a way of seeing if we had consensus and a way of putting all the little details away--a way of sticking a pin through our decisions." Issues in which such a consensus did not emerge were recycled for further discussion.

The purpose and recurrent situation, then, were fairly clear. The form of the genre is slightly more problematic. While ballots had distinctive aspects of form, they were different for each of the three types of messages--ballot questionnaire, ballot response, and ballot results--raising the question of where to draw the boundaries around the ballot genre. Is each message type a genre in its own right? That definition makes it easier to identify elements of form for each of the three types of messages. On the other hand, a mechanical application of our social criterion to the ballot questionnaire or the ballot results by themselves would be problematic, since only two individuals initiated and reported on all of the instances of ballots, though many participants sent ballot responses. Alternatively, we could view the genre as the series of three different types of
messages (just as the formal meeting genre includes the agenda, face-to-face interaction, and
minutes). This view seems more satisfactory in some respects, since the three types of messages
are necessarily linked and "balloting" required all three. By this definition, however, there were
only six instances of the genre. Thus, we have used a combination of these perspectives,
depending on our purpose.

For purposes of counting the number of messages in this genre in order to assess the proportion
of messages it accounts for, we included all instances of all three types, for a total of 55
messages.8 Because the ballot seemed such a specific genre, we ensured that such messages did
not overlap with any of the other genres (see Table 2). For assessing the genre's social
acceptance, we included respondents as well as initiators of ballots. By that definition, all five
key and twelve other members participated in the ballot genre.

In looking at the form of this genre, we analyzed the three types of messages separately,
necessarily beginning with the ballot questionnaire, which shaped the responses and results. Its
form consisted of a numbered list of items phrased as issues or questions. Each was followed by
a statement of the issuer's sense of the groups' and/or his own current preference for handling the
issue. In the first major ballot, the initiator specified the exact form of the responses so he could
compile them electronically. In the other ballots, this process was abandoned for a more manual
process of compilation. In most cases, however, the responses tended to include both a simple
statement of agreement or disagreement with the stated position and a statement of reasons,
especially when the position was one of disagreement. The results were generally copies of the
ballot, with a summary of the responses on each item.

In interviews, the participants indicated that they thought such electronic ballots were new to the
medium, as well as to their group. One participant told us, "I have only seen this ballot in
Common LISP. But there is nothing surprising about it. We were experimenting with the new

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8 There were more responses from peripheral players which were eliminated when we restricted the data set to core participants.
technology." The initiator of the first major ballot explained in his interview that "I probably invented the form, but I was modeling it on paper formats." In fact, he sent the ballot out in paper and electronic media, because it was formatted with text editing commands that some electronic mail systems could not translate. Thus the ballot questionnaire is clearly related to previously existing forms of voting. Such paper-based ballots are not, however, commonly used in non-electronic, project communication in organizations. In face-to-face meetings, emerging consensus might readily be tested by informal means (summarizing a position and asking if everyone agrees, or at most, asking for a show of hands), and paper ballots are more often used in more formal settings or for more formal tasks (e.g., electing officers in an organization). Since consensus in the group was harder to gather by informal, nonverbal and oral means, a more formal mechanism was appropriated from another medium.

**GENRE REPETOIRE: CONSTITUTING WORK COMMUNITY**

The set of genres presented above and the changing pattern of genre enactment by the participants can be usefully analyzed in terms of the notion of genre repertoire, a key concept that emerged from this study. Just as understanding a symphony orchestra’s repertoire of musical pieces sheds light on the orchestra’s range, capability, and character, understanding the composition of a community’s genre repertoire can provide valuable information about the scope and richness of its communication, and the nature of its activities and interactions.

Applying the repertoire concept to groups and communities has parallels in the organizational and rhetorical literatures. For example, in the organizational literature Gersick and Hackman (1990) are interested in the set of habitual routines that constitute a group’s behavioral repertoire, March and Simon (1958) refer to the performance programs an organization possesses, and Clark and Staunton (1989) define an organization’s structural repertoire as the set of typical mechanisms and ideologies from which particular structural responses are selected. In the

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9 Interestingly, more recent electronic media for facilitating face-to-face meetings have embedded other variants of paper-based balloting or straw polls (Nunamaker et al., 1991; Poole and DeSanctis, 1992).
rhetorical and socio-linguistic literature, Platt and Platt (1975) suggest that the range of linguistic varieties employed by a discourse community constitutes its speech repertoire, Bakhtin (1986) notes that a repertoire of speech genres is associated with a given sphere of activity, and Devitt (1991) explores the genre set of a professional community. We will draw on this literature to interpret our findings so as to yield more general insights than may be available from a single study (Corbin and Strauss, 1990).

An in-depth examination of a genre repertoire explores the nature and source of genres that are recognized and accepted by a community of practice as legitimate forms of working and interacting, and helps to explain when, how, and why established norms and practices shift over time. For example, Berkenkotter and Huckin (1993) have argued that in academic communities, genres of academic writing serve to enact and reflect the epistemological, ontological, and ideological assumptions of particular disciplines. They note that in such communities, "Knowledge production is carried out and codified largely through generic forms of writing: lab reports, working papers, reviews, grant proposals, technical reports, conference papers, journal articles, monographs, and so forth. ... [Genres thus] package information in ways that conform to [the community's] norms, values, and ideology" (p. 476).

In organizations, groups, and professional communities, genre repertoires similarly reflect and shape their members' values, expectations, and actions. For example, an organization that issues many instances of documentary genres such as memos, reports, and bulletins and that conducts face-to-face meetings following Roberts' rules of order reveals a different set of political values and social norms than an organization that relies on frequent open-ended meetings, face-to-face conversations, informal notes, and only occasional memos and reports. Each genre repertoire defines a different set of interaction norms and work practices, and each serves to define a different kind of community. As Bazerman and Paradis (1991:7) have observed, "communities establish themselves as distinctive through their discourse practices." In her study of the genre set of the tax accounting profession, Devitt (1991: 340) argues that "In examining the genre set
of a community, we are examining the community’s situations, its recurring activities and relationships. The genre set accomplishes its work.

When members of a community draw on the community’s genre repertoire, they constitute the nature of that community while also reaffirming their status as community members. In this sense communities emerge out of and are shaped by their members’ practices (Brown and Duguid, 1991). Where members of a community introduce new genres into the repertoire or deviate from the established genres—whether inadvertently or deliberately—they may shift the nature of the community’s interactions and work practices, hence changing how community members communicate and negotiate meaning, how they take action and produce outcomes, and how they define and understand the nature of their community.

The following sections examine three different aspects of a community’s genre repertoire, first in the context of the project findings and then more generally:

- **its nature**, i.e., what do the genres composing the genre repertoire tell us about the work practices and interaction norms of the community;
- **its establishment**, i.e., how and why do community members initially enact the set of genres that they will use to work and interact;
- **its change**, i.e., how and why does the repertoire of genres initially established in a community change over time, both in terms of the frequency with which genres are used and in terms of the types of genres themselves.

**Genre Repertoire: Nature**

The set of genres that community members use (and don't use) to conduct their interaction reveals a great deal about the nature of that community, its interaction norms and work practices. We found that the group’s electronic genre repertoire was composed of four genres—memo, proposal, ballot, and dialogue—generated and distributed within electronic mail on a regular basis. In addition, two other genres were clearly important parts of the group’s non-electronic

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10 We did not have access to private e-mail messages between specific participants, nor to other interactions such as telephone conversations and chance encounters at professional meetings or hallway corridors.
repertoire: the manual and its six drafts (generated on paper, and distributed via the postal system, though also available in electronic form); and the formal face-to-face meeting, executed twice. We can learn more about the group and its activities, by examining this set of genres from the perspectives of task specificity and mode of interaction,

In the electronic repertoire, the proposal, ballot, and manual drafts are task-specific genres, enacted as needed for specific activities. In contrast, the memo and dialogue are not tied to specific tasks, but are invoked for a wide range of communicative purposes, as is the face-to-face meeting genre to a lesser extent. The group's genre repertoire thus included both task-specific and more abstract types of genres. Task-related genres in the repertoire of a group reveal the specific tasks and ways of approaching those tasks that make up the group's work practices and norms. In this case, proposal, ballot, and manual were central to the group's purpose. A completed and published manual accepted by all key LISP implementations was the ultimate goal of the group. The manual drafts published episodically during the project represented the content of the work and progress towards that goal. The proposal, which suggested ways of handling specific aspects of the language, and the ballot, which allowed the group to test for consensus around such proposals, were specific mechanisms for achieving that goal. These specific mechanisms reveal a group that depended on informal individual proposals from a wide range of group members, but that employed a more formal mechanism, the ballot, to assess level of agreement and establish decisions as final when it was high.

Ballots were initiated by only two group members: the individual who initially undertook to coordinate and compile the manual, and another individual who stepped in to help at a point relatively late in the project (an incident described below). The fact that proposals came from many individuals but the critical ballot events were initiated and coordinated by only two members of the group also reveals the relative influence and power afforded to particular individuals in the project. While interviewees insisted that the project was accomplished by a group of peers, the coordinator (and later the individual who helped him move the process
forward) clearly structured the process by framing the questions, interpreting the issues, and closing the debate. Interviews revealed that the coordinator was accorded that status in part for his ability to refrain from using this power to push his own beliefs, in part out of respect for his technical ability, and in part because he had already worked on the manual for one of the LISP dialects and was willing to take on that responsibility for Common LISP. The genre repertoire thus provides information about a community’s power structures because it sheds light on members’ influence as they use genres to accomplish work.

The absence of another common task-specific genre in the group’s repertoire (electronic or otherwise) provides information about the group’s relationship to outside constituencies. If this project had been explicitly funded and authorized (rather than simply encouraged) by DARPA, the group would probably have had to submit a series of progress reports and a final report. The project as a whole, however, was documented in a published manual, rather than in formal reports. Moreover, the report genre, an extended and analytic documentation of a subject or situation, was not consistent with the messages, which tended to be short and rapid exchanges. The absence of formal reports, along with the presence of the manual, proposal, and ballot, reveal that the group felt itself answerable primarily to its members and the broader community of practice (LISP designers and implementors), rather than to an external funding institution (DARPA).

The more abstract genres that are not associated with specific tasks provide insights into the interaction norms of a group. In this case, the absence of available genres such as the letter and the note provides clues about what kinds of interaction were not valued or central to the group’s activities, while the presence of memo, dialogue, and meeting provides clues about what kinds of interaction were important to members.

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11 To check that the report genre was indeed absent from the electronic archive, we searched for the presence of a structural indicator characteristic of the report--the main heading. This feature appeared in only five (0.4%) of the messages, none of which corresponded to the report genre on textual inspection.
Because the group included members from various organizations, we looked for something resembling the business letter genre, traditionally used to communicate across organizational boundaries. In spite of a definition that was as loose as possible without rendering the genre unrecognizable or undifferentiable from memo or note,\textsuperscript{12} we found only four examples (0.3\%) in the entire data set. In interviews, respondents indicated that they did not distinguish their local (intra-organizational) electronic mail messages from those used to communicate with their colleagues in other organizations. As a participant noted, "I saw them all just as colleagues." Given the informality of the group, we also looked for the least formal genre of written organizational communication: the note. A note is used to communicate briefly, informally, and relatively personally, and is typically considered ephemeral rather than documentary. Only three (0.2\%) of the messages fit our definition of note.\textsuperscript{13} Openings, which appeared in only 3\% of the messages, were a major factor limiting the note genre. As one participant said in an interview, using openings in CL messages "would be like saying hello all the time during a conversation." It appears that in this community--where professional ties were strong and where informality was the norm--and for this type of work--extended, complex, and documented negotiations among peers--letters and notes were not seen as appropriate or effective types of communication.

The participants apparently perceived themselves as sending memos to a group of people or taking part in an ongoing group dialogue. The heavily used abstract genres, memo and dialogue, reveal the group's drawing on but moving beyond traditional genres. One of these, memo, draws on a traditional, non-electronic genre of written organizational communication. While recognizable as such, the electronic memos also varied from the traditional memo in that they were often less formal in language and sometimes less complete, referring to the readers' knowledge of immediately preceding messages. The other abstract genre, dialogue, is not part of

\textsuperscript{12}The loosest variant of the business letter was defined as having opening, signoff, no heading, no embedded message, no graphical elements, no nonstandard elements, no asides to individuals, and no informal language.

\textsuperscript{13}The note was defined as having a greeting, sign-off, no subject line, no heading, no embedded message, and no personal aside.
the traditional repertoire of written communication in organizations, but seems to draw on oral conversation as a model.

This oral influence raises a broader question of mode (written versus oral) in the genre repertoire. Because messages in the electronic mail medium are written, we initially sought traditional genres of written communication in the group (i.e., business letter, memo, note, and report). As one participant stated in his interview, however, electronic mail shares characteristics of oral and written communication:

Electronic mail feels halfway between writing and speaking. . . . One thinks of having a conversation. It feels like interaction--like speech--interactive and informal. [It also feels] like writing where you have the opportunity to think about the message and edit it.

This influence of the oral mode of interaction on genres in electronic media is an interesting one that deserves further examination. Some researchers who have closely examined language use in electronic media (Murray, 1985, 1988; Ferrara, Brunner, and Whittemore, 1991) have suggested that computer-mediated communication, particularly on-line, synchronous communication, is heavily influenced by oral use of language. Similarly, in a closer examination of the language of the messages in general, reported elsewhere (Yates and Orlikowski, 1993), we found ample evidence of oral as well as written patterns of language.14

The presence of more abstract genres that reflect a strong oral and dialogic influence in a community’s electronic genre repertoire likely reflects in part certain capabilities of electronic media (speed and flexibility) that facilitate conversational usage. This suggests that electronic media may provide an opportunity for members of a community relying largely on written communication for interaction to recapture some of the conversational nature of speech through the enactment of written genres such as dialogue. As more communities adopt electronic mail as their primary medium for work and interaction, and as members gain experience in this new

14 Another aspect of the group’s language in electronic mail reported in (Yates and Orlikowski, 1993) was the relative absence of what has come to be known as “flaming” (i.e., emotional outbursts, name-calling, and sarcastic or obscene language) (Sproull and Kiesler, 1986). In interviews, participants cited two primary reasons for the relatively low level of flaming: familiarity with other participants and task demands. One participant said, “Peer pressure prompts people to tone down their messages,” while another noted “There was a reason to be polite. We had a job to do.”
communication technology, we may expect to see a similar trend of increased orality in the composition of their genre repertoire, moderated, of course, by contextual factors such as community or organizational norms and specific task demands such as requirements for documentation. For example, we might hypothesize that the genre repertoires of communities that have relatively hierarchical structures and formal interaction norms will draw on and use with greater frequency genres influenced by the written mode, whether they are actually conveyed on paper, via electronic mail, or orally. Conversely, the genre repertoires of relatively informal, nonhierarchical communities are likely to show a relatively greater influence of the oral mode. The broader consequences of such changes are difficult to assess without further empirical study, but we suggest that if greater dialogical interaction in organizations lessens the reliance on formal, routine, or bureaucratic procedures, it might facilitate more participation and flexibility in work practices.

**Genre Repertoire: Establishment**

The evidence presented in the section above and depicted in Figure 1, indicates that from the beginning of the project, the memo, dialogue, and proposal genres were being drawn on by the project participants. Our interviews indicate that no explicit discussion of genre rules or interaction norms took place at the start of the project. The participants appear to have initially and implicitly imported into the project their knowledge of how they had worked and interacted in other contexts. All the participants were active members of the artificial intelligence computer science community, and were also computer language designers. Many of them had trained together in two institutions -- MIT and Stanford -- and hence shared background knowledge, experiences, and cognitive schemas, including knowledge of the project’s task (designing computer languages), its domain (LISP dialects), and its process (norms about language design and use of electronic mail). Thus they were able to introduce -- without apparent discussion or dissent -- a set of interaction rules and formats based on their shared *a priori* assumptions about how their community of practice communicates about and works on matters such as language
design. This knowledge was then exhibited (and reinforced) through their enactment of the memo, proposal and dialogue genres.

This finding of genre importation is also exhibited in the participants’ use of the manual genre. They designated the existing manual for one of the dialects, SpiceLISP, as the first draft which they would work from and modify to achieve the final manual. As a key participant recalled:

Here, [we] were working on SpiceLISP, and [the coordinator] was drafting the manual for SpiceLISP. Then when we got involved in Common LISP, we just transferred parts of the manual we were already working on to get the Common LISP effort going.

Thus this previous manual served as a genre template for the final manual. Although the nature of the LISP language was up for debate, the structure and form of the manual genre were not.

The pattern of importation corresponds to existing research on the formation of norms within groups. Bettenhausen and Murnighan (1985, 1991), for example, showed that “members of a new group import norms they held as members of different groups in similar, previous situations” (1991:20). Likewise, Gersick and Hackman (1990) found that early interaction rules and resources are initially formed through members’ prior experiences and exposure to certain cultural norms. Initially, the set of norms and rules that members will use to accomplish their actions is often established quite implicitly. Gersick and Hackman (1990:75-76) note that in the early stages of a group’s life when the members “have common previous task experiences, or share a common set of subcultural norms,” they “may simply proceed to do what everyone knows should be done, and a pattern of habitual behavior may be established without any explicit thought.” For example, a newly formed task force or committee may decide at the outset, with little debate, to meet regularly in weekly, one-hour, face-to-face meetings, and to distribute minutes and report drafts on paper via inter-departmental mail. These decisions are shaped by a number of factors including institutional procedures, task exigencies, and available media, but they are also and strongly influenced by members’ shared expectations of how communication takes place in committees. These expectations comprise genre knowledge which is often based
on members’ prior experiences in similar situations, and their sensibilities about what communicative actions would be appropriate for a committee such as theirs.

The tendency to invoke the familiar when faced with a new situation is particularly wide-spread, appearing in cognitive sociology (Cicourel, 1974; Goffman, 1974) and organizational studies (Van Maanen, 1984; Weick, 1979). For example, Van Maanen (1984:238), examining organizational socialization, notes that “Given a degree of similarity between an old and a new activity, the new will be approached in the much the same way as the old.” Likewise, in the context of technology implementation, new technologies are often assimilated under previous patterns of practice and interpretation (Barley, 1988). For example, Orlikowski and Gash (1994) show how users of a new computer conferencing system attempted to make sense of it in terms of more familiar technologies such as fax, voice-mail, and spreadsheets.

Extrapolating from our study and the literature just cited, we can suggest that to the extent that members of newly formed groups share background, experiences, and assumptions, and are undertaking familiar types of tasks, they are initially likely to import genres they have used in the past, implicitly and without extensive reflection. If, on the other hand, group members come from diverse backgrounds and experiences, more reflection and negotiation are likely to be required to establish the new group’s genre repertoire and hence its modes of work and interaction. In this case, the initial genre repertoire may take longer to form.

**Genre Repertoire: Change**

Above we saw how the establishment of a genre repertoire is relatively conservative -- preserving the familiar norms and practices in the context of a new group. Over time, however, the original genre repertoire may change as the group’s activities change and as people’s experiences in the group and with the available media grow. Because genre use is a process of structuring, it is always open to change, whether inadvertent or deliberate. Changes in the genre repertoire can occur through changes in composition (that is, the addition of new genres,
modification of existing genres, and deletion of obsolete genres) and changes in use (that is, changes in the frequency with which different genres are enacted over time).

The primary change in composition of the genre repertoire was the addition of the ballot genre during the course of the project. This genre was introduced by the coordinator in period 4, and was thereafter invoked intermittently (a total of six times) as required by the status of the project. The ballot served as an efficient mechanism for facilitating the rapid and written polling of members so that the key participants could determine whether there was agreement among the participants on a set of issues. Introduction of the ballot genre thus appears to have been triggered specifically by a project-related requirement to assess the level of consensus.

Clark and Staunton (1990:188) suggest that organizational repertoires may be changed by participants through two different mechanisms -- what they term “custom” and “reflective agency.” Custom refers to change that occurs unintendedly in the course of routine structuring. In this type of change, the main intention of participants is to reproduce past custom, but through inadvertent slippage or improvisation alterations are introduced. Reflective agency refers to deliberate action by participants to observe, revise, and modify their established actions. In this type of change, participants actively choose to adopt new routines or alter old ones, either by experimenting through trial and error, by actively searching for alternative routines, or by learning from others (Levitt and March, 1988).

The addition of the ballot genre to the genre repertoire was accomplished through the reflective agency of one participant (the project coordinator), and the subsequent acceptance and use by other participants, including members who responded to the ballots and the member who stepped in to help the coordinator later in the project. In his interview, this participant suggested that he borrowed the ballot conventions from the paper ballots he had experienced in other contexts. Here again, we see a familiar template established in one medium being transferred into a new medium. Unlike the initial establishment of the genre repertoire where the transfer of genres was
largely implicit and unreflective, this transfer of a familiar genre into a genre repertoire some time after its establishment was clearly the result of deliberate and reflective agency.

Because the presence or absence of certain genre types in a community’s repertoire does not tell us how frequently they are being used, we must also analyze changes in the use of a genre repertoire. For example, the genre repertoire of a committee may include memos, reports, and face-to-face meetings. Without knowing that the face-to-face meeting genre is invoked every week, memos once a month, and reports every quarter, knowledge of the repertoire’s composition alone cannot provide much insight into the nature of the committee’s interactions and the rhythm of its work.

In the project, use of the genre repertoire changed noticeably over the 25 months of the project, and we will use both Figures 1 and 6 to interpret these usage changes over time. Figure 6, which shows the monthly use of genres in the project (in absolute, not relative, terms), reveals three distinct episodes in the project around which the changes in genre usage cluster. The first increase in usage of the memo, dialogue and proposal genres followed three project events: (i) the release of the first draft of the manual -- the Swiss Cheese edition (subtitled “Full of Holes---Very Drafty”) -- in August 1981; (ii) the face-to-face meeting in November 1981, at which a number of basic language decisions were made, and (iii) the release of the second draft of the manual -- the Flat Iron edition (“Still a Few Odd Wrinkles Left”) -- in February 1982. This second draft sparked a major discussion among the participants (evident in the rise of memo and dialogue genres in March 1982) having to do with the treatment of a particular symbol (“NIL”) in the language. The participants appeared to be significantly divided on this issue, and the debate was only resolved after a number of key players agreed to compromise their positions. This disruptive incident led to a drop-off in project activity for a few months, as one of the participants recalled:

The issue of whether NIL is a symbol was one of the most divisive and religious of issues in the LISP community. In some cases significant implementation decisions hinged on the answer to that question. ... [After a few of us compromised] the list went dead ... decompression from this debate was the essential cause.
After very little activity on the project from April to June, the action picked up again with three project events -- the release of the latest manual draft (in July 1982), a face-to-face meeting (in August 1982), and a series of three ballots (in September, October, and November 1982), one of which was major. A face-to-face meeting rather than an electronic ballot was enacted because the timing coincided with a professional conference attended by most of the core participants, as evident in this message sent by the coordinator in early July 1982:

Inasmuch as lots of LISP people will be in Pittsburgh the week of the LISP and AAAI conferences, it has been suggested that another Common LISP meeting be held at CMU on Saturday August 22, 1982. Preparatory to that I will strive mightily to get draft copies of the Common LISP manual with all the latest revisions to people as soon as possible, along with a summary of outstanding issues that might be resolved.

The manual mentioned in this message was released at the end of July, and it constituted the third draft of the manual -- the Colander edition (“Even More Holes Than Before---But They’re Smaller!”). The manual draft, meeting and three ballots generated a series of discussions, new proposals, and agreements on unresolved issues. This second episode of activity culminated with the release of the fourth draft of the manual -- the Laser edition (“Supposed To Be Completely Coherent”) in late November 1982.

In December 1982 the project coordinator changed jobs, occasioning a drop-off in project activity from late December 1982 through April 1983. As he indicated in our interview, “I was starting a new job, so there was a real drop off in my participation. I was tired.” As coordinator of the manual, he had the responsibility for issuing the next draft of the manual, and a decline in his participation and attention meant a decline in activity for the whole group. For those participants who had software products (in the form of LISP implementations) depending on the final definition of the language, this delay became increasingly problematic as time passed. In May, one such participant was sufficiently frustrated to take action. He contacted the coordinator and offered to share the responsibility for completing the manual. As he recalled:

Time was running out, and we were hanging from our fingertips. ... That's when I became the moderator even though [the coordinator] kept responsibility for the manual. I was moving the discussion process forward.
This decision to share responsibility as a way of moving the process forward was announced to
the rest of the group in this message in May 1983 by the new moderator:

For reasons too complicated to discuss here, progress on the Common Lisp Manual has been rather slow lately. [The coordinator] and I have discussed how to fix this, and we have decided that the best way to converge quickly is for him to concentrate on editing in the relatively non-controversial things and those items on which decisions have been reached, and for me to orchestrate the arpanet-intensive process of reaching some sort of consensus (or at least a decision) on those issues that still require some debate.

This new division of labor spawned increased activity in the project, with all four of the genres affected. This increased activity was associated with three ballots issued by the new moderator at the end of May and in early June, all aiming towards completion by Flag Day (June 14). This date was designated as the final date for accepting changes to the language in a message sent by the coordinator on June 9, 1983. He wrote:

The Great Mail Blizzard of '83 appears to have subsided, and the outstanding issues, nasty and otherwise, appear to be suitably dealt with. We have to choose a cutoff date, and now seems to be a good time. I propose to give yet another meaning to "Flag Day"... After that point [23:59 on June 14, 1983] I propose to terminate "elective" changes to the Common LISP manual.

This increased communicative activity was reflected in the changes that were integrated into the fifth draft of the manual -- the Excelsior edition ("Suitable For Framing Or Wrapping Fish!") -- released in July 1983. This edition was sent out, as the coordinator explained in a message, "for the purpose of proofreading and implementation," and he sought "feedback only on typographical errors, outright errors or lies, and necessary improvements to the presentation."

Activity in the project did not end with Flag Day 1983; amendments, corrections, and final proposals dribbled in over the next few months. No more ballots were initiated, however, and use of memo, proposal, and dialogue dropped off, with some slight increases as a number of participants engaged in last-minute debates about the implications of certain decisions. This episode culminated in the release of the sixth, and final, draft of the manual -- the Mary Poppins edition ("Practically Perfect In Every Way") -- at the end of November 1983.

While changes in use of the genre repertoire cluster in distinct episodes, these episodes seem to be initiated and terminated by specific happenings in the project (see Figure 1). Such associations
resonate with the findings of Gersick’s (1994) study of a start-up company, in which she identified two different mechanisms that seemed to trigger changes in participants’ attention and actions -- temporal pacing and event-based pacing. Temporal pacing generates a predictably-timed alternation of attention between momentum and change, while event-based pacing regulates attention through the recognition of specific events. These two mechanisms are useful analytic devices for attempting to identify when and why participants initiate changes in their attention and actions.

Gersick (1994:36-37) argues that temporal pacing may be more prevalent when there is a deadline, when participants have some control over their own actions, and when the specification of the final outcome is at least partly indeterminate. While the second of these applies to the participants in the sense that they were all volunteers on the project, and hence participated largely on their own terms, the first and third characteristics do not. The project did not have a predetermined deadline, and the participants knew quite clearly what the final outcome had to achieve, even though the specific details and features had to be negotiated.

Although temporal pacing to specific, periodic deadlines did not seem to account for most of the changes in use of the genre repertoire, there were three time-related pressures on the project that clearly influenced genre usage and that seem related to Gersick’s notion of temporal pacing. The first was the influence of various LISP implementation groups whose software development activities critically depended on the manual being completed. These product development efforts were typically long and expensive, and involved multiple people including external vendors; as a result, there was much pressure from these quarters to complete the project expeditiously. This influence can be seen in the efforts of one participant (responsible for one of the LISP implementation efforts) to advance the project by assuming the role of moderator in May 1983. This pressure thus triggered a transition in project activity from a phase of very low genre use (January - April 1983) to one of high genre use (May 1983) with the usage of all four genres increasing significantly.
The second temporal influence was the designation of Flag Day, 1983 as the final date for submitting substantive changes to the manual. Until this point the debate about language features had ebbed and flowed without any specific endpoint. Flag Day came to represent a significant milestone in the project, and its passage occasioned a marked transition in genre usage from high use of all four genres (May - June 1983) to almost none or much lower genre use (July - August 1983). The third temporal influence is evident in the final weeks of the project, when the memo, dialogue, and proposal genres all experienced a slight increase in use as well as a change in focus and content. This recognition of the end of the project appears to invoke two shifts in attention and action. First was a final burst of activity to achieve closure on some outstanding issues and to complete all the work. Second was a change in genre content that reflected participants’ recognition that the project was winding down and that it was time to shift gears--cognitively and communicatively--to begin discussing LISP implementations and next versions of the manual.

Event-based pacing, the second of Gersick’s triggers of change, is more likely under conditions when there is more certainty about what is required for success, when participants have less control over the speed and timing of events, and when there is less emphasis on deadlines than on achieving specific outcomes (pp. 36-37). The first and last of these characterizes the participants quite well. They knew what was required to complete the manual, and they knew they had to get this job done (to provide the basis for other LISP projects), however long it took them. The second characteristic applies in the sense that these participants were working on the project in a largely part-time capacity. The exigencies of their regular jobs and work responsibilities would have impinged on their participation in many and often unpredictable ways. For example, the coordinator’s job change in December 1982 triggered a significant drop-off in project activity (from January to April 1983) that was only reversed with the intervention of another participant reacting to the pressure of his product development schedule. The other events shown in Figure 6 and described above -- two meetings, six ballots, and six manual editions -- are clearly associated with either increases or decreases in genre usage. The meetings
and ballots are triggered by the accumulation of issues that need to be voted on and resolved (either via oral or electronic ballot). The manual editions are accounts of the work done on the project to date, and are produced as major issues are resolved and incorporated into text.

Figure 1, which shows the relative change in genre usage by period, reveals much broader trends than are visible through the more closely-grained analysis of Figure 6. In particular, this figure suggests that changes in the frequency of use of the abstract genres, *memo* and *dialogue*, appear to be related -- not only to the events detected in Figure 6 -- but also to converging interaction norms and increasing experience with the medium and the project. That is, use of the dialogue genre gently increased throughout the project, while that of memo declined sporadically. In contrast to the use of the genre repertoire in the initial periods of the project -- where use of the monologic memo genre dominated the conversational dialogue genre -- the final four periods of the project reflect, if not a complete reversal, than a substantially altered pattern of repertoire use. Both in periods 6 and 9, participants drew more on the dialogical than the monological genre.

This change in repertoire use seems to reflect some convergence towards project norms. Over the course of the project, the participants became increasingly likely to take advantage of the medium's facility for embedding messages and to enact the dialogue genre, rather than merely to issue their own stand-alone messages. They further developed a characteristic form of embedding messages that emphasized efficiency and convenience for the reader -- retaining only the salient pieces of the embedded message. The increased use of the dialogue genre over time suggests that the participants came to share an understanding of dialogue as a more efficient and effective means for interacting than memos, as it supports indexicality, maintains discussion threads, and facilitates a more conversational tone to the deliberations. Bettenhausen and Murnighan (1985), for example, show that the shared experiences of a group lead members to develop a "common definition of appropriate group behavior," which then forms the basis of expectations about future interactions. Similarly, we might suggest that as participants become more cognizant -- whether discursively or tacitly -- of the genre norms of their community -- they
will increasingly draw on those norms in their work and interaction, thus further reinforcing a convergence of genre norms in the community.

Such convergence and reinforcement reflects the tendency within communities of practice or organizations towards institutionalization that results in the habitual enactment of particular behavioral routines (Zucker, 1977). A similar process of institutionalization occurs around genre norms. As members interact and perform work through enacting genres, their shared understandings, experiences, and expectations about how work should be accomplished and how interaction should take place shape become stabilized, normalized, and taken for granted. Once institutionalized in this way, the genres constituting a community’s genre repertoire serve as behavioral and interpretive templates for the community (Barley, 1988).

CONCLUSION

We began this study as an attempt to observe genre use and change over time in an electronic medium. The emergence of the notion of genre repertoire and our findings about the group’s electronic genre repertoire ultimately shed light not simply on the electronic medium, but on the operation of task-based groups in general, consequently broadening the implications of the study. In fact, the concept of genre repertoire offers organizational research a powerful way of understanding work practices and interaction norms, whatever the communication media. While this single study certainly cannot be taken as definitive, it has initiated a process of theory generation around this concept. By linking our observations in this case to some of the organizational and rhetorical literature, we have been able to suggest some hypotheses about the nature, establishment, and change of a community’s genre repertoire.

As a fundamental premise, we suggest that the genre repertoire of a group of knowledge workers reflects and embodies its work practices and interaction norms. Bazerman (1988:182) notes that the features of a community’s discourse are a major aspect of its communal activities, particularly where these activities are largely oriented towards producing information.
Examining the changing genre repertoire of such a community, then, is not merely an exercise in classifying discourse or communication types. Rather it is a way of understanding the nature of the community and the social action it engages in (Miller, 1984).

We also suggest that when a group, organization, or community is formed, its members come to some understanding--whether tacitly or explicitly--about the set of genres and media that they will use to interact as a collectivity. As members act on this initial understanding, they produce a structured pattern of social interactions, which defines and shapes the initial social structure of their community. Over time, with reinforcement, this pattern becomes increasingly established, taken for granted, and identified as the way the community works and interacts.

Despite the conservative influence of institutionalized genre repertoires, we should keep in mind that they can and do change over time and with changing circumstances. Genres, while highly influential, do not necessarily determine the particular ways in which members work and interact. Because the enactment of genres occurs through a process of structuring (Giddens, 1984), members are always negotiating, interpreting and improvising in ways that may allow for “slippage between institutional templates and the actualities of daily life” (Barley, 1988: 51). As reflective agents, members respond to time pressures, project events, task demands, media capabilities, and converging community norms by changing their behavior. Such action may introduce new norms and forms of working and interacting, which over time and through diffusion and reinforcement may change the genre repertoire of the community.

We introduced this paper by suggesting that existing organizational literature has not systematically addressed the relationship between new communication technologies and changes in work and interaction. We believe that the concept of genre repertoire developed here and the implications we have begun to draw about its use and effects, provide a solid conceptual basis from which to understand how and why work and interaction will be mediated and possibly changed by the introduction of new communication technologies.
REFERENCES


<table>
<thead>
<tr>
<th>Coding Categories</th>
<th>Definitions of Coding Categories</th>
<th>Reliability (Cohen's κ)</th>
<th>N</th>
<th>%</th>
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<tr>
<td><strong>Audience Indicator:</strong></td>
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<tr>
<td>Number of Recipients</td>
<td>Number of receivers to whom message sent</td>
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<td></td>
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<td>Comment on group process or use of the medium</td>
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<td>25</td>
<td>1.9%</td>
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<td>2.6%</td>
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<td>Embedded Message</td>
<td>Message includes all or part of a previous message</td>
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<td>Graphical Elements</td>
<td>Message includes graphical elements</td>
<td>1.0</td>
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<td>1.0%</td>
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<td>Heading</td>
<td>Message includes a single main heading</td>
<td>0.90</td>
<td>5</td>
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<td>LISP code</td>
<td>Message contains offset extracts of LISP code</td>
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<td>List</td>
<td>Message includes lists in the body of the text</td>
<td>0.98</td>
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<td>13.2%</td>
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<td>Nonstandard Usage</td>
<td>Message includes nonstandard grammar or punctuation</td>
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<td>Opening</td>
<td>Message includes an opening salutation or phrase</td>
<td>1.0</td>
<td>46</td>
<td>3.5%</td>
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<td>Signoff</td>
<td>Message includes a closing remark or signature</td>
<td>0.96</td>
<td>466</td>
<td>35.0%</td>
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<td>Subheadings</td>
<td>Message includes subheadings in the body of the text</td>
<td>0.85</td>
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<td>Subject Line</td>
<td>Message includes a completed subject line in the header</td>
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<td>Word or Phrase Emphasis</td>
<td>Message emphasizes some words or phrases</td>
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<tr>
<td>Other</td>
<td>Message includes other structural indicators (residual)</td>
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<td>12.2%</td>
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<td><strong>Language Indicators:</strong></td>
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<tr>
<td>Emphatic</td>
<td>Message includes strong discussion or argument</td>
<td>0.84</td>
<td>317</td>
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<td>Humorous</td>
<td>Message includes jokes or humorous references</td>
<td>0.80</td>
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<td>Message indicates informality and colloquialism</td>
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<td>Sarcastic</td>
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Table 2: Definition and Distribution of Genres in the CL Electronic Repertoire

<table>
<thead>
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<th>Genre</th>
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<th>%</th>
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</thead>
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<tr>
<td>Memo</td>
<td>subject line; no opening; no signoff; no heading; no embedded message; no graphical element; no nonstandard elements; no aside to individuals; not ballot</td>
<td>508</td>
<td>38.1%</td>
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<tr>
<td>Common LISP Proposal</td>
<td>secondary purpose=&quot;proposal&quot;; LISP code; not ballot</td>
<td>97</td>
<td>7.3%</td>
</tr>
<tr>
<td>Dialogue</td>
<td>secondary purpose=&quot;response&quot;; subject line; embedded message; not ballot</td>
<td>258</td>
<td>19.4%</td>
</tr>
<tr>
<td>Ballot</td>
<td>not captured by coding categories; identified through textual analysis of those messages where secondary purpose=&quot;other&quot;</td>
<td>6 (55) msgs</td>
<td>0.5% (4.1%)</td>
</tr>
</tbody>
</table>

1 The numbers in this column do not add up to 100 percent because not all the messages in the archive were uniquely classified as genres of communication. Further, some of the messages were not uniquely classified, and overlapped with some of the other genres.

2 This includes 6 Ballot Forms, 1 Ballot Form amendment, 42 Ballot Responses, and 6 Ballot Responses. Additional responses to each ballot were eliminated from our data set when peripheral participants were eliminated.
Figure 1: CL Genres over time by period (as %)

- Memo
- Dialogue
- Proposal
- Ballot

Swiss Cheese edition of manual 8/13/81
Face-to-face meeting 11/26/81
Flat Iron edition of manual 2/26/82
Colander edition of manual 7/29/82
Face-to-face meeting 8/22/82
Mini Ballots 9/29/82 & 11/8/82
Major Ballot 10/5/82
Laser edition of manual 11/16/82
Flag Day 6/14/83
Excelsior edition of manual 7/28/83
Mary Poppins edition of manual 11/30/83
Figure 2: Example of Memo

Date: Monday, 26 July 1982, 14:07-EDT
From: DW
Subject: Re: Boole
To: Common-Lisp at SU-AI

I would like to state for the record that either BOOLE should be strictly limited to three arguments, or it should work as it does in Maclisp (any number of arguments, left-associative). It is unacceptable for it to do anything other than these two things, on the grounds that adding new arguments incompatible with Maclisp cannot possibly be so worthwhile that it is worth introducing the incompatibility. As to which of these two things it does, I’ll be equally happy with either.

Figure 3: Example of Common LISP Proposal

Date: 27 April 1983 15:30-EDT
From: KP
To: Common-Lisp @ SU-AI
Cc: Common-Lisp @ SU-AI

The T dialect has a family of special forms called things like CASE, SELECT, etc. and a related family called XCASE, XSELECT, etc. meaning "exhaustive". I suggest that Common-Lisp could adopt a similar convention.

(XSELECTQ FOO .. forms ..)

would be like

(SELECTQ FOO .. forms .. (OTHERWISE .. error ..))

Is this what you’re looking for?
To me, the purpose of the asterisks is to flag those variables that are “property of Lisp” so that the user doesn’t accidentally blunder into them.

Hmm, that’s an interesting and novel idea. We handle that by having DEFVAR complain if you define the same variable in more than one file, and by using packages to decrease the likelihood of that. The asterisks are not there to distinguish the system’s variables from the user’s variables.

My philosophy is “the fewer magic distinctions between the system and the user the better; anything the system can do the user should be able to understand and to change.”
Memorial Day Ballot:

I was going to send these out in smaller doses, but a bunch of issues built up and I decided that a real ballot would be easier. A few more issues will be sent out for consideration as soon as we have come up with some coherent proposals and analyses. Please reply by Wednesday afternoon to SF and/or Common LISP.

Recommendations in square brackets are by SF.

1. It is proposed that we eliminate PARSE-NUMBER from the manual.

[I am strongly in favor of this. This function is hard to document properly, hard to implement in its full generality, and useless. Most of what this function does can be handled simply by calling READ on the string. Other cases, such as Teco-like integer prefixes, can easily be handled by application-specific user functions to scan a string for the first non-digit, etc.]

2. LOOP should create a BLOCK NIL around the TAGBODY, so that RETURN works.

[I am strongly in favor. If LOOP doesn’t do this, the user will almost always have to, and any future complex LOOP package would have to create such blocks as well.]

3. Define GET-INTERNAL-TIME to get some implementation-dependent form of runtime. Add a second function, GET-REAL-TIME that returns some measure of elapsed real time in the same internal-time format. On some machines, especially personal ones, these times will be identical, and implementations may not be able to supply one or the other, but where both are available (as on the Vax), there are legitimate needs for both.

[I am strongly in favor.]
Figure 6: CL Genres over time by month

EVENTS KEY:
- b1 - b6: ballots
- f1 - f2: face-to-face meetings
- m1 - m6: versions of CL manual
- x: flag day -- manual frozen