

# THE SOCIAL IMPACTS OF ELECTRONIC MAIL IN ORGANIZATIONS

A case study of electronic power games using  
communication genres

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## Abstract

This paper investigates the effects of the introduction of electronic mail on organizational structure and power. It provides empirical support to the view that technology, organizational context, and individual actors interact to shape the use of Information and Communication Technologies (ICTs) and their effect on organizations. Through an analysis of power games reflected in the progressive constitution of electronic mail genres, it illustrates in particular how the specific organizational configurations in which technology is deployed deeply influence its ultimate use. Far from transforming an organization, it appears that the introduction of electronic communication tools may in certain circumstances help reinforce an organization's preexisting structure.

## Keywords

electronic mail, organizational change, sociology of organizations, social impacts of ICTs, communication genres, power games

## INTRODUCTION

For a long time now, Information and Communication Technologies (ICTs) have been presented as having the potential to transform organizations. Early on, Leavitt and Whisler (1958) proposed that computing power would be used to reduce middle management levels. With the advent of desktop computing in the 1980s, visions of autonomous knowledge workers and empowered clerical staff surfaced. Later on, as computers became networked within and across organizations and offered new pathways for communication, predictions of virtual organizations emerged (e.g. Mackenzie 1986; Hedberg, 1991; Baskerville *et al.* 1994).

It is true that the tools deployed in the last decade were, for the most part, *electronic communication tools*. Technologies such as electronic mail are now

predominant in organizations, and their use is still rising (there are 209 million business e-mail users in the USA alone, and this number is expected to double in the next five years (The Industry Standard 2000). Moreover, it is well accepted that inter-personal communications are an essential foundation on which organizations are built: for example, pioneering scholars such as Barnard proposed that '*an organization is born when there are individuals who are able to communicate, and who are determined to engage in actions oriented towards a common goal*' (Barnard 1938, emphasis added). Later, it was estimated that up to 95 percent of a manager's time is spent in written and verbal communication (Mintzberg 1973). More recently, some even proposed that organized work could be simply described as a network of conversations for action (Winograd and Flores 1986). Therefore, technologies affecting such a crucial organizational process deserve particular attention.

Before studying the use and effects of electronic communication tools in organizations, however, some analytical pitfalls have to be avoided. First, and contrary to a widespread view, the information carried by such tools is not in itself a new economic and social resource (Castells 1996). Second, these technologies are not limited only to new, ingenious technical capabilities. What is new is how and when people get access to information, how much information is available to them, how they use it and with whom they are connected (Dutton 1999). In the end, electronic communication tools have both efficiency effects and social systems effects (Sproull and Kiesler 1991), and there is no guarantee that these effects will lead to predictable transformations in organizational structure (Fulk and De Sanctis 1995; Robey and Boudreau 1999).

Consequently, we need to adopt for the study of communication technologies a socio-technical perspective, in which the social and structural factors combine with technical factors to influence the nature of work (Olson and Lucas 1982). ICTs are not a 'magic bullet' (Markus and Benjamin 1997) radically transforming organizations, as some have suggested (e.g. Hammer and Champy 1993). The behaviour of human organizations affects the design and implementation of computer systems, and the effective use of computerized systems in organizations does not depend on technology alone: it is contingent on organizational practices and resources (Kling 1996).

Crozier and Friedberg's (1977) sociology of organizations offers a theoretical framework fitting this perspective perfectly. Actors, technology and context are considered not as distinct entities studied separately, but rather as elements constantly interacting inside the boundaries of 'games'. Games are arenas of competition and co-operation structured by a set of rules and assumptions about how to act to achieve a particular set of objectives (Dutton 1999). Inside their

games, actors fight for power through the manipulation of strategic resources. Consequently, Crozier and Friedberg's theory can help us understand how electronic communication tools such as e-mail affect the dynamics of these power games in organizations.

Indeed, a change in technology increases uncertainty as attempts are made to master the new tools, devices or techniques (Tushman and Anderson 1986). According to Crozier and Friedberg (1977), uncertainty is a fundamental resource used inside the games played by organizational actors. Moreover, control over communication channels is another resource used during games and e-mail has the potential to open up new communication pathways (Romm 1999). The introduction of e-mail can be, therefore, doubly disruptive as far as power games are concerned.

By looking at how e-mail and the uncertainty it introduces inside these games, we can understand how and why changes in interaction patterns occur, if they do. Structure can be viewed as patterned, repeated interaction among social actors (Mintzberg 1979); hence, this offers us a window through which to analyse the structural changes (or lack thereof) caused by the use of electronic communication tools inside an organization. But an approach drawing directly on the sociology of organizations has never been used to study the organizational impacts of communication technologies (although for similar approaches see Rice 1994). In this paper, I plan to close this gap and show how Crozier and Friedberg's theory can help us conceptualize the interaction between electronic communication tools and organizational structure.

Consistent with my emphasis on the importance of each specific organizational context and its associated actors, I will present the results from a qualitative case study of the use of e-mail in an organization. The particular nature of the organization studied (a university) is interesting in its own right. Indeed, Romm (1999) already analysed the phenomenon of politicking with e-mail in university settings. As I will illustrate, my analysis confirms some of Romm's findings, especially the centrifugal effect this technology can sometime have inside universities.

After a short review of the relevant literature on the organizational and social impacts of electronic mail, I will present a series of hypotheses based on Crozier and Friedberg's analytical framework. Through an empirical analysis of a large, bureaucratic institution, I will show how an organization's structure is not passively affected by communication technology, but interacts with it. To do so, I will use an original quantitative approach to characterize patterns of communication within the organization. I will explore in particular how electronic communication genres (defined as expectable forms that materials

in a given medium might take; Agre 1998) are enacted and evolve over time, reflecting the existence of dynamic power games mediated through technology. Finally, I will conclude by analysing the implications of my findings for organizational change research, as well as discuss areas in need of further exploration.

## E-MAIL IN THE RESEARCH LITERATURE

Garton and Wellman (1995) have already proposed a very complete synthesis of the research on electronic mail's impacts, which I have reproduced, and updated with some more recent studies, in figure 1. Following these authors, I divided research on electronic mail into three main categories: studies of media choice and its relation to organizational context; studies of the structural impacts of e-mail; and finally analyses of e-mail's relational impacts.

Discussions of media choice within organizations have treated media choice as an individual, voluntary act of matching tasks to media (Daft and Lengel 1984, 1986). They have paid less attention to the influence of organizational power, group perceptions and social network relations (for an example of such a study see Rice *et al.* 1990). But it seems social networks, social influence, interpersonal relationships and organizational power structures all affect how groups and individuals use e-mail (see 'organizational context' and 'structural impacts' in figure 1).

Another important point is that e-mail provides fewer cues than face-to-face communication about interactions, physical context or social roles. On the one hand, it can foster status equalization, but on the other hand, there is also less awareness of group members' expertise, organizational niche and power, and characteristics such as age and gender. Many studies show that people are more uninhibited, non-conformist and conflictual when using e-mail. Still, meta-analyses (e.g. Walther 1992, 1995) show that uninhibited behaviour is quite infrequent when e-mail is used in organizations, and decreases with time, group history and anticipated future interaction.

Moreover, as it is more difficult to interpret the intentions of the sender, misunderstandings are more likely to emerge and more difficult to resolve. Groups tend to be more polarized, and are slower to develop leaders and reach consensus. This is balanced by the fact that their greater range of ideas may also produce more innovative and better decisions (see 'relational impacts' above).

As Romm (1999) noticed, these themes closely follow an historical progression typical of emerging technologies. Although early research was concerned with

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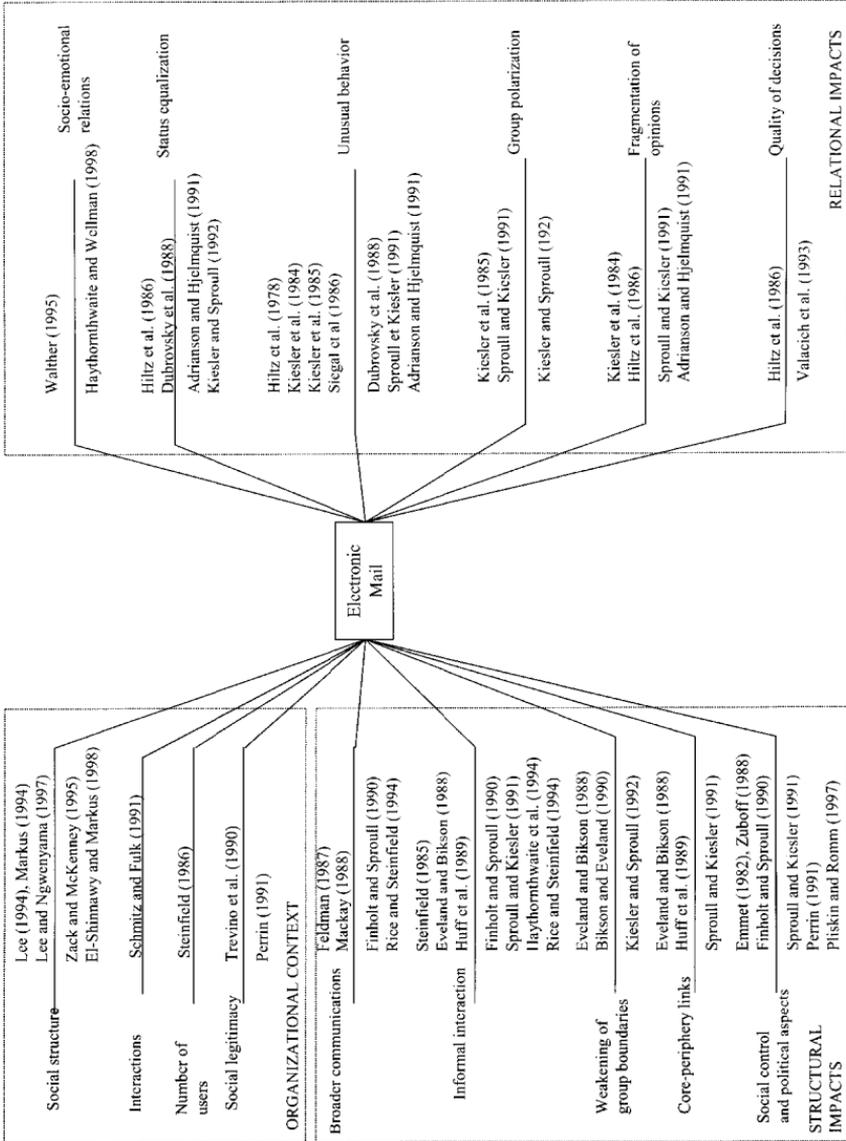


Figure 1 Overview of the research literature on electronic mail

contributing and hindering factors to diffusion, later research looked at e-mail as a social phenomenon with much broader organizational implications. However, research on the latter is recent and quite fragmented, and the effects of this technology are difficult to predict. The technological properties of the medium can explain some of these effects, but not all.

Moreover, it is surprising that little research so far has sought to analyse the effects of electronic communication tools using theories of organized action, such as Crozier and Friedberg's (1977) sociology of organizations. Their multi-faceted approach to the behaviour of actors in organizations could make it easier for us to understand why these tools and their effects are not predetermined by strictly technical considerations. In the next section, I will describe how electronic mail can be integrated in Crozier and Friedberg's model. This will allow me to draw a series of hypotheses that I will then test empirically.

## **ELECTRONIC MAIL AND THE STRUCTURING OF ORGANIZED ACTION**

### **Organization, Actor and Power**

For Crozier and Friedberg (1977), an organization is seen as an integrated social construct offering a solution to the problem of co-operation. Indeed, inside an organization, each actor is relatively autonomous, has objectives concretely or potentially diverging from those of other actors, and adopts a specific strategy to accomplish these objectives. An organization is seen as a set of regulatory mechanisms considerably restricting the negotiation power of actors, thereby making co-operation possible.

Consequently, an organization is the scene of power relations articulated as 'games' in which relatively autonomous actors follow their own diverging interests and negotiate their participation to the organization. The notion of games can be defined as follows (Dutton 1992): a game is an arena of competition and cooperation structured by a set of rules and assumptions about how to act to achieve a particular set of objectives. All games share several attributes: there is a set of players (here, organizational actors), defined by the fact that they interact; there is a set of rules that govern their moves and strategies; there is a set of objectives; and there is a set of prizes underlying those objectives.

The notion of power is central during games. Power is not to be understood in the narrow sense of political or hierarchical power: according to Crozier and Friedberg, it has a relational character. This relation is instrumental, non-transitive, reciprocal but also unbalanced. Power inside organizational constructs

resides in an actor's margin of freedom, that is, his/her ability to change the nature of the game or displace uncertainty zones. Anyone mastering an uncertainty zone, from a simple worker to a manager, can exert power.

The organization offers the structure to create and regulate these uncertainty zones. One uncertainty is fundamental and imposed on everyone: the survival of the organization, and with it the possibility of continuing the games. Hence, the organization regularizes power relations by reintroducing some certainty into the behaviour of actors. Indeed, it regulates their capacities, their motivations, their resources and the prizes they can obtain.

According to the type of uncertainty mastered by an actor, it is possible to distinguish between four categories of power: (1) mastery of a specific competency; (2) pivotal relationships with the organization's environment; (3) control over communication and information; and, (4) control over organizational rules. The existence of a source of uncertainty, however, is not a guarantee that actors will choose to exploit it: their behaviour is opportunistic.

Crozier and Friedberg demonstrate that there are no completely regulated or controlled social systems (see fig. 2). The individual or collective entities that constitute them cannot be reduced to abstract or disembodied functions: they are actors, who, sometimes acting under heavy constraints, still have a margin of freedom they can use strategically in their interactions with others.

## **E-mail Inside Organizational Constructs**

### *Communication networks*

An organization creates power simply through the way its members organize communication and information channels between its units. In order to accomplish his/her tasks, an individual will need information possessed by others. And if, for a variety of reasons, he/she cannot short-circuit them or do without their help, these others will have power over this individual, simply out of the position they occupy in a given communication network. Indeed, the way these contacts will choose to transmit information (with more or less speed, filtering, etc.) will deeply affect the action capacity of the recipient. The recipient will be able to fight back only if he/she also has control over information or another source of uncertainty, thereby affecting the games of the others.

But e-mail also has the potential to transform communication networks by offering anyone the capacity to communicate with everyone. Romm (1999) proposed that this particular feature of e-mail is a major contributor to its political potency. Zmud (1990) also suggested that the wider and denser communication

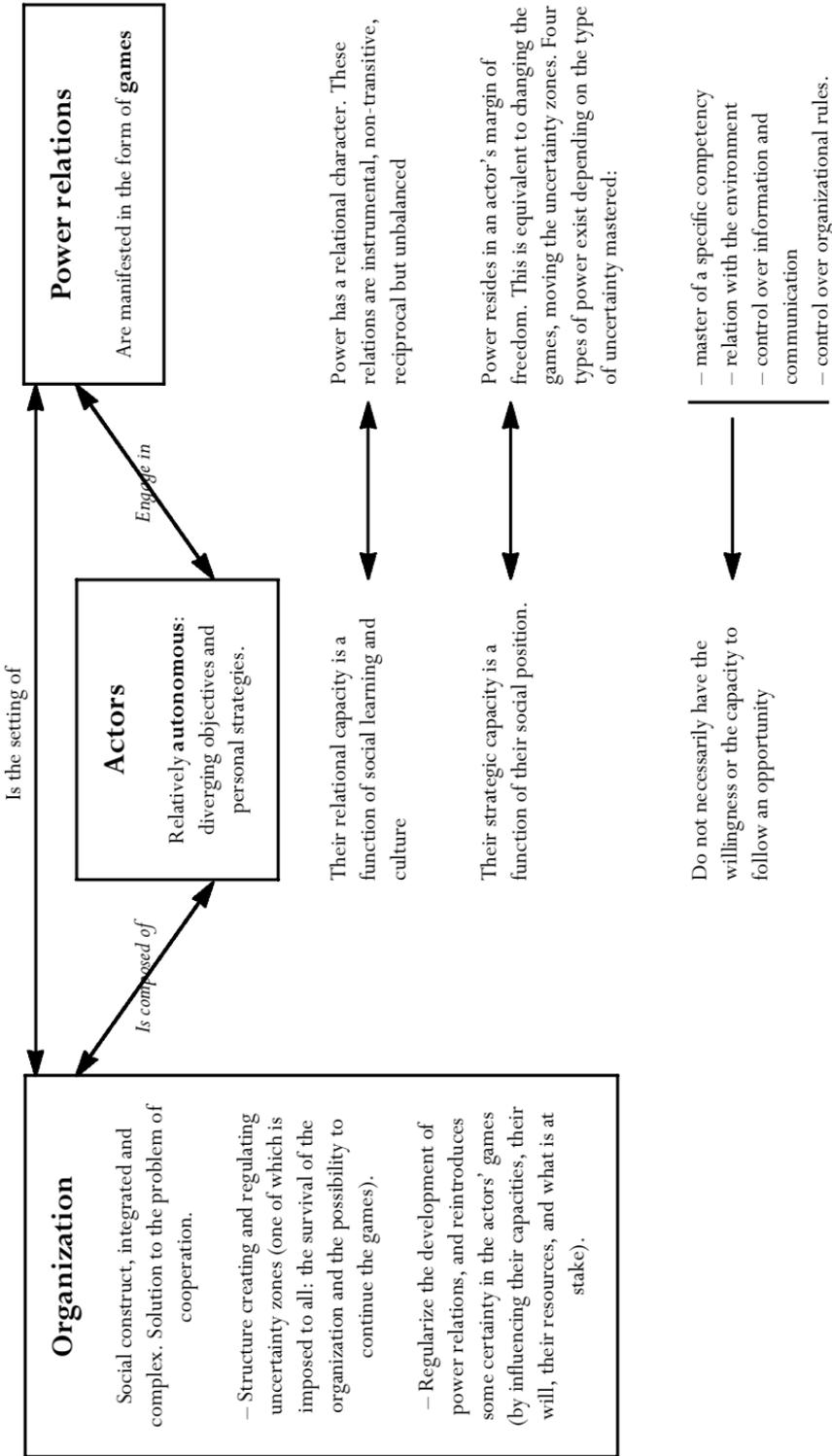


Figure 2 Crozier and Friedberg's theoretical framework

networks made possible via e-mail should increase the incidence of strategic information behaviour. Consequently, the power that some individuals used to hold because of their position in information networks could be greatly diminished. This leads to the following hypothesis:

H1: When e-mail is adopted by an organization, power linked to an individual's initial position in information networks is reduced.

Logically, actors will not accept this situation passively. As Pfeffer (1981) noted, stability, not change, is typical of the distribution of power and influence in most organizations, and those in power seek to perpetuate their power advantage. Thus, while a technological change may provide the opportunity for a redistribution of power and organizational structure, it does not guarantee it. Whether stability or change occurs when a technology is introduced can be greatly influenced by the power and social network position of those who are first to adopt it (Burkhardt and Brass 1990).

Those who are in a position of authority threatened by e-mail have different options at their disposal to re-establish the status quo, different potential games they can play. In the first one, individuals whose power is threatened by e-mail's introduction can use another source of power to counter its effects: organizational rules. For instance, it is possible to imagine managers using their formal hierarchical power in the form of policies limiting electronic communications to certain pathways (for examples of such a behaviour, see Romm 1999):

H1a: Actors whose power is threatened by e-mail's introduction will use organizational rules (if they can) to counter this effect.

In a second type of game, actors in a position of authority can avoid entering the electronic arena and impose face-to-face communications, in what could be called an avoidance strategy (such a possibility is also illustrated in Romm 1999):

H1b: Actors whose power is threatened by e-mail's introduction will refuse the electronic game, and impose face-to-face communications.

The third possible reaction is that actors in a position of authority will fully play the electronic game, and use their formal power in the electronic arena to re-establish their dominating position (for earlier findings regarding this hypothesis see Burkhardt and Brass 1990):

H1c: Actors in a position of formal authority will use their formal power during electronic communications.

The last possibility is simply the reduction of managers' power. The beneficiaries are notably those at lower hierarchical levels who can now bypass former communication bottlenecks. The role of managers inside communication channels can be greatly diminished, but only if they do not react by playing one of the previously mentioned games. This passivity is at the heart of the following hypothesis:

H1d: After e-mail's introduction, power is transferred toward the bottom of the hierarchy, and there is a diminution of managers' influence.

### *Actors' characteristics*

As I mentioned earlier, by mastering a type of uncertainty an actor gains power he can then use in games. Some actors are more at ease with new communication tools. Studies have found that attitude and education levels, for instance, are related to early adoption of a new technology (Rogers 1971). In the case of e-mail, other factors can also come into play. For example, it has been proposed that electronic communication tools could increase strategic information behaviour by allowing an easier, indirect interaction via artefacts rather than direct interaction (Zmud 1990). This is an opportunity that some could use in their games.

Moreover, an actor's opportunistic behaviour should be examined in relation to the actor's standing in the organization's hierarchy. We know that the equalizing aspect of e-mail can diminish inhibitions for certain individuals. Patterns of inhibition often follow organizational hierarchies, with low-level employees being inhibited during face-to-face contacts with their superiors. Therefore:

H2a: As e-mail equalizes status and removes inhibitions, the lower levels of a hierarchy exploit the opportunity to use the technology in their power games.

Conversely, it is logical to propose that high-level individuals could use e-mail less than others, since it diminishes their influence (this, of course, as long as they have also not chosen to play the game described in H1c). This has been suggested, for instance, by Perrin (1991), and leads to the following hypothesis:

H2b: As e-mail diminishes the influence of high-level individuals, these individuals will use it less.

**The Case: X University**

X University was among the first business schools founded in its country (1907), and has approximately 9,000 students in residence each year. At the organizational level, its structure is extremely close to a professional bureaucracy (Mintzberg 1979). While not being exactly identical to Mintzberg’s ideal-type, X University strongly tends toward this specific configuration, and its essential characteristics are as follows.

Professional bureaucracies hire duly trained and indoctrinated specialists – professionals – and give them considerable control over their own work. This control means that the professional (the university professor in our case) works relatively independently of his/her colleagues, but closely with the clients he/she serves (here, the students). The training of professors aims at producing standards in order to serve the clients and co-ordinate professional work, which is why the structure of a university is essentially bureaucratic. But authority here is of a professional and not hierarchical nature: this is the power of expertise.

The operating core (the professors) is the key part of the professional bureaucracy. The only other part that is fully elaborated is the support staff, but it is very much focused on serving the operating core. Indeed, given the high cost of professionals, it makes sense to back them up with as much support as possible, to aid them and have others do whatever routine work can be formalized. This structure can be summarized with figure 3.

At X University, each professor is member of a department specialized in a specific academic discipline. These departments are managed by a director (usually one of the professors, nominated by his/her colleagues), assisted by a staff of assistants and secretaries. The administrative structure is responsible for the cross-departmental co-ordination of high-level activities. It is divided into four programmes (Bachelor, Masters, Doctoral and continuing education)

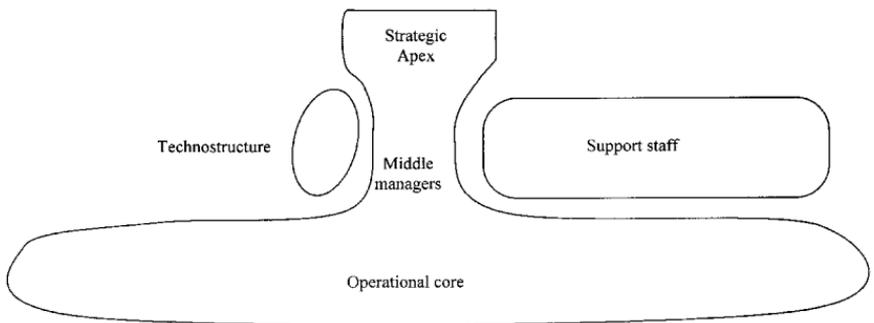


Figure 3 X University’s structural configuration

and the registrar. The strategic apex takes the form of a committee, chaired by an elected president, assisted by a board of members and a general secretary. Finally, a variety of support services (e.g. the library) is available to the whole organization.

It is easy to see that such a structure is highly decentralized, in both its vertical and horizontal dimensions. *A great deal of the power over the operating work rests at the bottom of the structure, with the professors who constitute the operating core.* The professors' power derives from the fact that not only is their work too complex to be supervised by managers or standardized by analysts, but also because their services are typically in great demand.

Professors do not only seek to control their own work, they also seek collective control of the decisions that affect them. Because of the power of their operators, professional bureaucracies are sometimes called 'collegial' organizations, or inverse pyramids. However, some parts of the structure, such as the support units, have a much more formal and constraining organization. That is why *two parallel administrative hierarchies* coexist in a professional bureaucracy such as X University: one democratic and bottom-up for the professionals, and a second machine bureaucratic and top-down for the support staff. In the professional hierarchy, power resides in expertise. In the non-professional hierarchy, power and status reside in administrative office and function.

## RESEARCH METHODS

### Communication Genres: A Window into an Organization's Structure

The analysis of electronic messages received by a specific organizational actor is an indirect, but also efficient, way of obtaining a sample of electronic communications coming from various organizational groups. Indeed, actors who are central nodes in an organization's social network are in communication with nearly all the other organizational groups, and professors at X University are exactly in this position. Luckily, one professor from the Organizational Behaviour department had archived all his electronic communications for three years. This archive constituted a perfect opportunity to get a closer look at electronic power games in the organization via a content analysis of the e-mail messages.

To determine a way of coding e-mails, I was inspired by Yates and Orlikowski (1994) and Yates *et al.*'s (1995) work on communication genres. Agre (1998) defines genres as 'an expectable form that materials in a given medium might take'. When a new medium comes to be used, people will try to define its place

in their relationships, to ultimately reach a ‘relatively stable, expectable form of communication’. The changes ‘will express latent potentials in the local social system, and they will be influenced heavily by the participants’ own (shared or conflicting) understandings of the situation’ (Agre 1998). Genres are, therefore, a window into an organization’s social structure.

In their study of genres in an organizational context, Yates and Orlikowski had to analyse a large sample of electronic mails. To perform their analysis, they defined three coding categories: purpose, structural and language indicators. After adapting these categories to fit the specific context of X University, I adopted the same methodology for the analysis of my e-mail archive.

Tables 1–5 describe the indicators that were present in the archive. It is important to point out that they are in no way exhaustive: it is perfectly conceivable that in other contexts of use, some of these indicators would not be relevant while others would be detected. The categories used here are only those that appeared in the e-mails obtained from the professor.

*Table 1* Senders categories

<i>Senders</i>	<i>Description</i>
<i>EPHD</i>	PhD students
<i>EMSC</i>	MSc students
<i>EBAC</i>	BCom. students
<i>ExMSC</i>	Former MSc students
<i>ExPHD</i>	Former PhD students
<i>SDOB</i>	Direction’s secretary, Org. Behaviour department
<i>SPHD</i>	PhD programme secretary
<i>DPHD</i>	PhD programme director
<i>DirMSC</i>	MSc programme director
<i>SDUN</i>	University’s president secretary
<i>SDBAC</i>	Direction’s secretary, BA programme
<i>R</i>	Registrar’s office
<i>TI</i>	Information Technology department
<i>SERP</i>	Employees’ services department
<i>CO</i>	Colleagues (professors)
<i>CRCH</i>	Research centre
<i>AR</i>	Research assistant
<i>F</i>	Family member
<i>FRND</i>	Friends
<i>EXT/INC</i>	Other or unknown

Table 2 Other factual data

<i>Factual data</i>	<i>Description</i>
<i>Date</i>	Date the message was sent
<i>Time</i>	Time the message was sent
<i>Audience</i>	Number of recipients: 1, 2, 3, many (more than 3), DL (Distribution List)
<i>Location</i>	Sender's location

Table 3 Purpose indicators identified in the e-mail archive

<i>Purpose</i>	<i>Code</i>	<i>Description</i>
<i>Broadcasting</i>	<i>FYI</i>	For Your Information – the message gives factual information to the recipient
<i>Task-related</i>	<i>Q</i>	Question – the message contains a work-related question and solicits an answer
	<i>R</i>	Reply – a follow-up to a question
<i>Social</i>	<i>SOC</i>	Socialization – the message contains friendly or personal information, rumours . . . The information is at best indirectly related to the professional context
<i>Other</i>	<i>EXC</i>	Excuses

Table 4 Language indicators

<i>Language indicators</i>	<i>Description</i>
Emphatic	The sender uses grammatical forms denoting insistence (e.g. 'Your extraordinary work')
Humour	The message contains humorous references
Informal/friendly	The message uses a casual, friendly language
Sarcasm	The sender employs scornful language
Professional/neutral	The message contains professional, literate language
Authoritative	The message contains orders ('You must . . .', 'It is imperative. . .')
Sadness	The sender shows sadness
Anxiety/Fear	The sender expresses fear or anxiety

*Table 5* Structure indicators

<i>Structure indicators</i>	<i>Description</i>
Reference to other(s)	Another organizational member is referred to
Citation	All or parts of a previous message are re-used in the body of the message
Heading	The message contains, before salutations, one or many lines of text (date, address, reference). This is information added by the sender, not the one automatically generated by e-mail software
List	The message contains a series of points arranged in a precise order
Non-standard text	The text contains irregular words, signs or use of grammar (e.g. smiley, slang)
Openings	The message starts with a form of salutation ('Dear Prof. X', 'Hi there!')
Signature	The message ends with a signature
Sub-titles	The text is decomposed into distinct sub-sections
Subject	The sender filled out the 'subject' line of the message
Emphasis	The sender uses a graphical form of emphasis (e.g. boldface, high-case)
Attachment	A file is attached to the message
Size	Size of the message (in lines of text)

### **Format of the Data Set**

My analysis is based on 669 messages received from 19 April 1995 to 2 June 1998, coded using the aforementioned categories. Messages were entered as cases (in rows), and the coded categories as variables (in columns), in the statistical package SPAD 3.5.<sup>1</sup> In order to study the genres of communication present in the sample, a principal component analysis was used to group messages containing similar content and features (through q-analysis, that is, factor analysis of the columns instead of the rows). I then related these typologies with illustrative variables not participating in their construction, such as, for instance, the social category of the sender.

It should be noted before entering this analysis that I have adopted an essentially descriptive approach. Indeed, I do not pretend to have at my disposal a perfectly

representative sample of all the e-mails exchanged in this organization, much to the contrary. Getting access to such a representative sample would have been impossible anyway, since very few people are willing to let anyone look at the content of their e-mail messages. This limited data set is, therefore, an already valuable research opportunity, despite its inherent limitations.

**ANALYSIS**

**Multi-Dimensional Analyses**

Table 6 presents the eigenvalues and the percents of variance explained for each factor. Based on this information, it appeared that taking into account the first four axes was sufficient to avoid distortion in interpretation and maximize the information extracted<sup>2</sup>.

In Tables 7–10, the four factorial axes retained are described concisely. SPAD 3.5 offers a way to quickly visualize the most important traits of a multi-dimensional analysis such as the one I performed: it is called the ‘test value’ (*‘valeur test’*, represented as V Test in tables 7–11).

*Table 6* Eigenvalues and percents of variance explained

<i>Factor</i>	<i>Eigenvalues</i>	<i>Percentage of variance</i>	<i>Cumulative percentage</i>
1	0.1419	14.19	14.19
2	0.0944	9.44	23.63
3	0.0867	8.67	32.30
4	0.078	7.83	40.13
5	0.0698	6.98	47.10
6	0.0628	6.28	53.38
7	0.0609	6.09	59.47
8	0.0558	5.58	65.05
9	0.0547	5.47	70.52
10	0.0498	4.98	75.49
11	0.0474	4.74	80.23
12	0.0467	4.67	84.90
13	0.0444	4.44	89.34
14	0.0384	3.84	93.17
15	0.0319	3.19	96.36
16	0.0310	3.10	99.47
17	0.0053	0.53	100.00

*Table 7* Description of factor 1  
(a) By the active variables

<i>V test</i>	<i>Label</i>	<i>Variable</i>	<i>Weight</i>
-22.55	No	Professional	276.00
-22.48	Yes	Informal	269.00
-11.17	Yes	Opening	503.00
-10.52	No	Heading	623.00
<i>Central zone</i>			
10.63	Yes	Heading	45.00
11.17	No	Opening	166.00
22.48	No	Informal	400.00
22.49	Yes	Professional	392.00

(b) By the illustrative variables

<i>V test</i>	<i>Label</i>	<i>Variable</i>	<i>Weight</i>
-13.84	1	Audience	475.00
-8.31	SOC	Primary purpose	84.00
-6.94	Region	Where	154.00
-6.24	ExMSc	Category	52.00
-4.52	R	Primary Purpose	50.00
<i>Central zone</i>			
5.52	UNI	Where	369.00
6.82	SPHD	Category	59.00
7.07	List	Audience	35.00
8.53	FYI	Primary purpose	300.00
10.44	Many	Audience	137.00

The principle is as follows (from Morineau 1984). To evaluate the amplitude of differences between proportions or means, statistical tests are performed and then expressed in terms of the number of standard deviations from a normal distribution. The V Test is equal to this number of standard deviations. Therefore, when a V Test is superior to two in absolute value, a deviation is significant at the usual level of 5 per cent. By sorting the items in the decreasing order of their V. Test, the items are sorted in the order of their importance for the characterization the object (when two proportions are compared, the hypergeometric law is used to evaluate the differences; when two means are compared, a corrected Student's t test is used).

Table 8 Description of factor 2

(b) By the active variables

<i>V test</i>	<i>Label</i>	<i>Variable</i>	<i>Weight</i>
-14.80	No	Emphasis	615.00
-13.45	No	Authoritative	630.00
-12.10	No	Reference	542.00
-10.90	No	Signature	101.00
<i>Central zone</i>			
10.90	Yes	Signature	568.00
12.10	Yes	Reference	127.00
13.45	Yes	Authoritative	39.00
14.80	Yes	Emphasis	54.00

(b) By the illustrative variables

<i>V test</i>	<i>Label</i>	<i>Variable</i>	<i>Weight</i>
-4.28	CO	Category	164.00
-3.57	List	Audience	35.00
-3.51	FR	Where	55.00
-2.80	CRCH	Category	25.00
-2.50	F	Category	13.00
<i>Central zone</i>			
2.55	Q	Secondary purpose	58.00
2.64	Many	Audience	137.00
3.59	SDOB	Category	12.00
4.27	Q	Primary purpose	202.00
7.34	SPHD	Category	59.00

With the description of the factorial axes, we start distinguishing between distinct profiles of communication. Factor 1 separates two groups of active variables: on the one hand, informal messages – starting with an opening and very loosely structured (no headings); on the other hand, professional messages – very structured but without opening. The analysis of contributions<sup>3</sup> show the validity of such a representation, with certain variables such as ‘informal’ and ‘professional’ having  $\cos^2=0.76$ , and others being close to  $\cos^2=0.2$ .

Therefore, the first axis represents a *stylistic opposition between familiarity and professionalism*. These two communication profiles are associated with two interesting groups of illustrative variables: in the same zone as the familiar messages, we find bilateral exchanges, coming principally from the university’s

Table 9 Description of factor 3  
(b) By the active variables

<i>V test</i>	<i>Label</i>	<i>Variable</i>	<i>Weight</i>
-16.60	Yes	Citation	42.00
-11.99	Yes	Emphatic	23.00
-11.49	Yes	Sarcastic	15.00
-11.20	No	Opening	166.00
<i>Central zone</i>			
11.20	Yes	Opening	503.00
11.49	No	Sarcastic	654.00
11.99	No	Emphatic	646.00
16.60	No	Citation	627.00

(b) By the illustrative variables

<i>V test</i>	<i>Label</i>	<i>Variable</i>	<i>Weight</i>
-4.70	R	Primary purpose	50.00
-3.19	CRCH	Category	25.00
-3.11	Many	Audience	137.00
-2.79	List	Audience	35.00
-2.69	SOC	Primary purpose	84.00
<i>Central zone</i>			
3.66	1	Audience	475.00
5.24	Q	Primary purpose	202.00

region, sent by former students whose purpose is to socialize or to follow up on a previously initiated dialogue. The professional messages are associated with a larger audience (many recipients, even distribution lists), are authored by the administration, and are sent internally in order to inform.

The analysis of factor 2 uncovers another interesting opposition. Unsigned messages, without emphasis or authority, are clearly distinguished from signed, emphatic and authoritative communications frequently citing other individuals. The variables contributions to this factor are quite high, oscillating between  $\cos^2=0.2$  and  $\cos^2=0.3$ .

The second axis seems to reflect the *transmission (or lack thereof) of formal authority* through structural (signatures) and language (authoritative and emphatic tone) indicators. It is worth noting that, in a previous study of signatures in e-mail (Sherblom 1988), messages sent downward through a hierarchy were generally unsigned. But here, signature and authority go hand in hand.

Table 10 Description of factor 4  
(b) By the active variables

<i>V test</i>	<i>Label</i>	<i>Variable</i>	<i>Weight</i>
-12.27	No	Non standard text	629.00
-12.20	No	Authoritative	630.00
-10.78	Yes	Emphatic	23.00
-9.07	No	Emphasis	615.00
<i>Central zone</i>			
9.07	Yes	Emphasis	54.00
10.78	No	Emphatic	646.00
12.20	Yes	Authoritative	39.00
12.27	Yes	Non standard text	40.00

(b) By the illustrative variables

<i>V test</i>	<i>Label</i>	<i>Variable</i>	<i>Weight</i>
-3.98	EPHD	Category	164.00
-3.59	1	Audience	35.00
-2.92	Q	Primary purpose	55.00
-2.51	R	Secondary purpose	25.00
-2.41	City	Where	13.00
<i>Central zone</i>			
2.42	META	Primary purpose	58.00
2.44	SOC	Secondary purpose	137.00
2.53	SDOB	Category	12.00
3.08	Many	Audience	202.00
9.00	SPHD	Category	59.00

Illustrative variables are spread in an interesting way along this axis. The 'low authority' messages are linked with broad communications (distribution lists), coming from professional relations (colleagues and research centres), or even from family relations. Many of these messages are sent from abroad. On the other hand, authoritative messages are also linked with large communications, but their purpose (primary or secondary) is to question. The administration is highly represented in this zone of the factorial axis.

The third factor represents another communicational trend. Direct (no opening), emphatic and sarcastic messages reusing the words of other individuals are opposed to more conventional messages (with openings), making no use of

sarcasm, emphasis or citation. The variables contributions to the axis are good, situated around  $\cos^2=0.2$  and rising up to  $\cos^2=0.41$  for 'citation'.

Hence, the third factorial axis seems to *oppose mockery and uninhibited communications to more conventional and reserved ones*. On the uninhibited side of the factorial axis, we find socializing messages or answers, addressed to many recipients and often sent by the research centres. The more conventional messages are associated to bilateral communications used to ask questions, without any real domination from a particular social category.

The fourth and last factor opposes messages that are emphatic in their tone but not their form, and also not transmitting formal authority, to messages that are authoritative and emphatic in their form, making non-standard use of grammar and text layout. The contributions are correct for 'authoritative' and 'non-standard text', lower for the other two variables.

The fourth axis seems to oppose insistence in tone to a more graphical form of insistence. They are in fact *two different ways of transmitting authority, one through symbols and the other through words*. The illustrative variables are positioned as follows: on the side of the 'verbally authoritative' messages, we find bilateral communications and questions (even if 'answer' appears in the table, its weight is much too small), coming from PhD students and sent from within the university's city. On the side of the 'symbolically authoritative' messages, we find largely diffused messages geared towards socializing and coming from the administration.

### Different Social Groups, Different Genres

The analyses above made clear that a great variety of styles and purposes are used in electronic messages at X University. Most notably, these various styles and purposes seem to be linked with the social category of the message sender. To test this assumption, I later grouped the senders of each message into three social actor groups (professors, students and administration) and performed a multivariate ANOVA on the frequencies of each language, purpose and structure indicators. These dependent variables were significantly affected by each of the sender categories (professors,  $F(17, 669) = 18.27, p < 0.01$ ; students,  $F(17, 669) = 6.36, p < 0.01$ ; administration,  $F(17, 669) = 10.42, p < 0.01$ ). Therefore, it is possible to say that each of these social groups developed its own genre of communication.

Based on these findings, it became interesting to see how much of a social category's total communication volume belonged to each genre. This information is summarized in table 11, which indicates what type of message a sender in each of the social categories is most likely to send:

Table 11 Frequency of messages belonging to each genre, for each social category

	Factor 1		Factor 2		Factor 3		Factor 4	
<i>Familiarity</i>	<i>Professionalism</i>	<i>Formal authority</i>	<i>Lack of formal authority</i>	<i>Uninhibited</i>	<i>Conventional</i>	<i>Authority through symbols</i>	<i>Authority through words</i>	
Administration (%)	3.6	13.6	15.5	6.4	3.6	55.5	15.5	0.0
Students (%)	42.8	1.5	0.3	9.9	45.5	29.5	0.6	5.1
Professors (%)	41.7	6.8	0.5	21.9	4.2	66.7	0.5	0.0

Note: a message can belong to several genres, or none. Therefore, the sum of the frequencies for each row can be more or less than 100%.

To summarize, it seems possible to distinguish between three dominant profiles of e-mail use at X University:

- First, messages from professional relationships (colleagues, research centres) are socially neutral. They make little use of status indicators or extreme language, and do not transmit authority. They are equal-to-equal, peer communications. The goal here is to exchange information and maintain contacts fostering work conditions from which everyone can benefit.
- Second, messages from the students, especially former students, have a very strong social content. Casual tone, communications that are often iconoclastic and humorous reflect their goal of maintaining a person-to-person relationship, not to deal with professional issues. These messages are bilateral communications with highly personalized content.
- Finally, messages from the administration have characteristics sharply distinct from the others. Here by administration I mean the administrative structure and the middle managers, since no message from the strategic apex was ever received: the school's top management seems to have a certain reluctance to use electronic communications. Perrin's (1991) observation that managers are more reluctant to use e-mail is reproduced here.

The administrative messages project formal authority, transmitted through tone, structure and purposes (for instance, the messages are mostly questions; the administration is the group with the lowest use of humour or informal tone; their messages almost never start with salutations, are short and highly emphatic). Interestingly, this contradicts Kiesler and Sproull's (1992) hypothesis that e-mail fosters open and equal discussions. Rochlin's (1997) proposition that information technologies can be used to increase direct control is closer to what we observe here.

### **TEMPORAL ANALYSIS**

From the above analyses, I have obtained an image of the electronic communication profiles inside this university. These profiles, however, reflect more than three years of communication. Even if an in-depth analysis of their temporal evolution is beyond the scope of the present paper, it is interesting to informally consider the importance of each social category over the years.

It is easy to see (from table 12) that, as time moves on, the proportion of messages coming from the students remains relatively stable. Meanwhile, the proportion of messages coming from the professors progressively decreases. Most

Table 12 Evolution of the importance of each social group in the total volume of communication, year by year

Category	Year			
	1995	1996	1997	1998
Administration (%)	0	8.7	12.1	35.8
Students (%)	38.5	29.9	30.5	26.4
Professors (%)	61.5	61.4	57.4	37.8
Total (%)	100	100	100	100

importantly, the administration's portion rises sharply: *starting from 0% in 1995, it occupies more than a third of the communication volume in 1998, thus becoming the dominant category.*

Knowing that the volume of communication from each social group changed over time, it is interesting to see if the genres of their messages also changed. Table 13 is identical in its principle to table 12, but shows the frequencies of messages in each genre broken down by year:

As time advanced, messages sent by the administration became more and more conventional and inhibited, while making an increasingly higher use of symbolic authority. Meanwhile, the students' messages became more uninhibited and less conventional. Finally, messages from the professors progressively lost their casual, familiar tone. The formality and professionalism of their messages diminished initially, but this trend reversed in the end, with more and more messages going back to a professional, formal style.

The results of this temporal analysis, along with those from the previous multi-dimensional analysis of communication genres, will now be discussed in light of my analytical framework.

## DISCUSSION

Agre (1998) recently proposed that a genre of communication must fit the characteristics of the community who uses it. My analysis of the messages received by a professor at X University supports this point of view. By exhibiting various structures and tones in their messages, members of different organizational communities expressed what they thought the dominant usage of the medium should be: *each organizational community defined its own e-mail genre.* The professors' genre could be called 'electronic scholarly dialogue'; the students' genre,

Table 13 Frequency of messages belonging to each genre, for each social category, by year

Factor 1	Factor 2		Factor 3		Factor 4		
	Professionalism	Formal authority	Lack of formal authority	Uninhibited	Conventional	Authority through symbols	Authority through words
Administration							
1995	No messages this year						
1996	0.0%	7.7%	26.9%	7.7%	46.2%	7.7%	0.0%
1997	7.7%	11.5%	15.4%	3.8%	53.8%	15.4%	0.0%
1998	3.4%	10.3%	10.3%	1.7%	60.3%	19.0%	0.0%
Students							
1995	47.1%	17.6%	0.0%	23.5%	58.8%	0.0%	5.9%
1996	42.1%	13.5%	0.0%	35.1%	31.6%	0.6%	4.7%
1997	42.6%	5.3%	1.1%	53.2%	27.7%	1.1%	7.4%
1998	44.0%	4.0%	0.0%	74.0%	16.0%	0.0%	2.0%
Professors							
1995	40.0%	33.3%	0.0%	0.0%	66.7%	0.0%	0.0%
1996	56.3%	19.5%	0.0%	4.6%	65.5%	0.0%	0.0%
1997	32.7%	14.3%	0.0%	4.1%	67.3%	0.0%	0.0%
1998	22.0%	31.7%	2.4%	4.9%	68.3%	2.4%	0.0%

Note: a message can belong to several genres, or none. Therefore, the sum of the frequencies for each row can be more or less than 100%.

'socializing letter'; the administration's genre, a 'business memo'. Saunders *et al.* (1994) also obtained similar results, and showed that the content and network of communication among professionals using a computer conferencing system were significantly related to occupational roles.

But how can we interpret this variety in the use of e-mail depending on the social category? How might we reconcile the fact that some authors' propositions apply to certain groups, and not to others? My claim is that we simply have to place these observations in the larger context of the organization and its associated power games, as I will now explain.

### **The Effect of E-Mail on Power Games**

#### *A reinforcement of the existing games*

We have just seen that messages sent by the administration are sharply distinct, in tone as well as in structure, from the messages of other groups. More precisely, messages from the administration are impregnated with authority and rigour, while messages from the students or colleagues are more informal and friendly, or at least neutral. This situation can be easily explained if we take into account the structural configuration inside which e-mail is used. The stylistic gap between the administration on one side and the operating core (professors) and the organization's clients (students) on the other side illustrates the inherent tension characteristic of professional bureaucracy. Mintzberg (1979) called this phenomenon 'dysfunctional response'.

For individuals in an organizational unit such as the administration, which is characterized by its clear and structured hierarchical lines, the notions of order and control are central. Therefore, the administration projects in its usage of e-mail its desire of direct supervision ('pull to centralize'). But the professionals are accustomed to great freedom and an absence of direct supervision. Reacting against this threat to their freedom, the professionals detach themselves from the administration and get even closer to their clients (which is illustrated in the friendly, often humorous nature of the communication with students). In parallel, professional peer relations are created both to constitute a solid group against adversity and to maintain a certain collegial distance so that everyone preserves his/her margin of freedom.

Orlikowski (1993, 1996) pointed out that 'two organizational elements [. . .]: people's cognition, or mental models, about technology and their work, and the structural properties of the organization, such as policies, norms, and reward systems' are especially relevant for the success of electronic communication tools'

implementation and their subsequent use. She proposed that 'cognitive elements are the mental models or frames of reference that individuals have about the world, their organization, work, technology, and so on'. These frames are individual, but also shared with others through common educational backgrounds, work experience and regular interaction. In the case of X University, members of two distinct internal hierarchies clearly developed very different mental models about technology. But *e-mail*, because of its flexibility, fit the two different cognitive frameworks at the same time.

At X University, technology was therefore a place of conflict, a space in which the two frameworks could clash. Since no guidelines were specified as to what e-mail was to be used for, each social group tried to project its own view of what the use of the medium should be. As Orlikowski (1996) explains, people tend to revert to their own frameworks when no explicit guidance is provided, and this is exactly what happened here.

Consequently, in this particular context, *e-mail did not transform the structure of communications inside the organization; rather, it reinforced it*. Hypothesis H1c, 'Actors in a position of formal authority will use their formal power during electronic communications', is confirmed. Here e-mail does not eliminate the existing games: it offers a new arena in which these games can be transported and reinforced. This is analogous to McKenney and Zack's (1995) proposition that groups can appropriate communication technologies in a way reinforcing their existing social structure. In the end, we are faced here with one of the possible effects of e-mail described by Romm (1999): the *centrifugal effect*. E-mail did not serve to create a feeling of unity, but instead sharpened the differences between each organizational group, thereby fragmenting the organization even more.

### *The refusal of the game*

The messages from the administration, however, mainly come from intermediate levels of the hierarchy, more precisely from secretaries. Even though they often cite their manager in order to reinforce the authority of their messages, these managers do not send any e-mail themselves.

This trend has already been spotted in other studies (Perrin 1991): since e-mail reduces the influence of high-level individuals by erasing status indicators, these individuals refuse the electronic game and simply impose other communication channels, like face-to-face for instance. Evidence for the latter at X University does not come from the messages I have analysed, but was very clear by simply observing the day-to-day activities in each department: administrators convene a lot of meetings and frequently engage in face-to-face discussions. Therefore

hypothesis H2b, 'As e-mail diminishes the influence of high-level individuals, these individuals will use it less' and H1b, 'Actors whose power is threatened by e-mail's introduction will refuse the electronic game, and impose face-to-face communications', seem to be confirmed.

Consequently, the effect of e-mail on power games in this organization can be summarized as follows: actors used e-mail to reinforce existing games, or simply did not use it. It does not seem that e-mail was used to play new games, such as forming new cross-departmental coalitions that would have been visible through their electronic communication genre.

### *The temporal structuring of power games*

Power games are essentially dynamic. In the case of e-mail, this raises the question of the importance of early adoption. Indeed early adopters, by being the first to occupy the electronic space, will define the subsequent usage norms.

In the case of X University, the first users were students and professors, as we saw in the temporal analysis of e-mail exchanges. This could only reinforce the gap in tone and style that I analysed earlier. Indeed, early adoption is a strategy (conscious or not) to orient the game in the direction of the adopting group. From quantitative evidence (the temporal analysis), but also from my own qualitative experience with the organization being studied, it is possible to analyse the situation as follows.

Being the first users, professors had the advantage and projected in their use of e-mail their ideal of autonomy and equal communication. Students respected this emerging genre and added to it a socializing element through the use of humour and personalized content. But when the administration entered the 'electronic genre battlefield' and tried to enact a genre based on formalism and authority, tensions resulted. Considering these messages incongruous, since they did not fit the genre they had defined, professors started to feel uneasy about e-mail. While their messages were initially more and more familiar and informal, they later moved back to a more formal and conventional style, and reduced the number of messages they sent.

In the meantime, the administration converted most of its communication to an electronic form, and the number of administrative messages started to greatly exceed those of students and professors. The logic of tension inherent to professional bureaucracies could only reinforce this progressive communication gap.

Therefore, we are faced here with a real *territoriality of communication media*. Depending on the stakes specific to each structure, actors will try to dominate

a communication space in order to orient the games in their direction. In the present case, this only led to a reinforcement of existing games, but other outcomes are certainly possible. For instance, Burkhardt and Brass (1990) saw in another case study that employees who were powerful, central figures in an organization prior to a technological change tended to be displaced by early adopters. There are, however, fundamental differences between Burkhardt and Brass's study and my own in both the technology studied and the structural properties of each organization. Consequently, this is not incompatible with my own analysis: rather, it points to the fundamentally contingent nature of the games played in organizations when a technology is introduced, and to the variety of outcomes possible.

*Structure as a moderating variable*

It seems possible after this research to propose that the organizational structure is a moderating variable of e-mail use. My analysis of power games, as they are revealed through electronic communication genres, shows that e-mail use in a bureaucratic organization is deeply influenced by the organization's pre-existing structure. As Eveland and Bikson (1987) proposed after a research in similar settings, it is possible in certain contexts that electronic links enhance existing interactions, rather than initiating interaction patterns that were formerly not in evidence. Conversely, it is possible to imagine that in 'adhocratic' (Mintzberg, 1979) and loose institutional settings, the organizational structure will be much less influential. Again, Eveland and Bikson (1988) showed that in 'virtual' groups supported mostly by electronic communication tools, the structure developed was significantly different than that developed by standard groups operating inside the constraints of a formal organization. Most notably, the virtual groups took advantage of electronic media in terms of breadth of access and opportunity to participate.

The practical lesson to be drawn from this proposition is that implementers of electronic communication tools need to understand the organization in which the technology is to be implemented. More precisely, they need to be aware of the nature of the games being played inside the organization, and how they will affect or be affected by the introduction of a new electronic communication channel.

## LIMITATIONS AND FUTURE RESEARCH

Time constraints, associated with some inherent limitations of my data set that I described earlier, led me to limit my analysis to a single actor's communications, taking place in a specific organizational context. To confirm (or refute) the results of my research and the moderating nature of organizational variables such as power and structure on ICTs' impacts, the same study should be conducted in other organizational contexts ('*adhocracy*', mechanical bureaucracy, etc.), or inside the same organizational context but for different actors.

This research proposes a method to evaluate the effect of electronic mail on the complex power games that are played inside a specific organizational configuration: the next task is to determine the extent to which these results could be generalized.

## CONCLUSIONS

One of the earliest predictions about ICTs was initiated by Leavitt and Whisler (1958), who argued that information technology's introduction into an organization would induce considerable change within management ranks. Following this trend, popular business literature on ICTs and structural change in organizations is still proposing a picture of the new 'ideal type' organization, in which hierarchical configurations are viewed as dinosaurs of a previous epoch displaced by more open configurations using ICTs as their infrastructure. There is little doubt that ICTs are enabling fundamental change in the way work is being organized. Still, I proposed that contemporary organizational change is far more complex than this kind of change literature suggests, because the introduction of communication technologies is not made in a vacuum: it interacts with relational power games already in progress inside specific organizational configurations.

One might be tempted to include the results of this study with others that support technology's influence (or non-influence) on structure. But the importance of this research is not, I think, whether it adds to the debate on the existence or absence of a technological imperative. Indeed, a simple case study will not conclusively decide the argument either way. The significance of this research lies in its attempt to understand the *mechanism* by which technology may affect structure, or vice versa. My proposition is that this mechanism is fundamentally dependent on the nature of the games played inside specific organizational structures, and that it can be described and understood using Crozier and Friedberg's (1977) theory.

Using this framework, my analysis of e-mail messages has illustrated that large organizations can maintain their older corporate structure after the introduction of electronic communication tools, despite the assertion that these technologies should flatten hierarchies and rearrange communication networks. The 'networked' capabilities of e-mail can coexist with an established hierarchy. This is very much in line with the debate on the apparently Janus-faced character of ICTs (Robey and Boudreau 1999), and their ability to be deployed in ways which support 'centralized decentralization'.

Once again, I am not saying here that my specific study should be taken as the general case: there are a number of cases supporting the existence of open, networked organizations. However, these could be taking place on a smaller scale than is implied in popular prediction literature, and be much less pervasive. Further studies in different organizational contexts are now needed to confirm and expand these findings.

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### **NOTES**

- 1 SPAD 3.5 is a statistical package developed in France by CISIA-CERESTA (<http://www.cisia.com>). It is particularly suited to large multi-dimensional analysis. However, it employs some statistical techniques and data presentations with which a North American reader may not be familiar. I have tried to explain these differences as much as possible when necessary.
- 2 If the numbers presented here may appear relatively low, they are nevertheless sufficient regarding the important number of variables analysed. Indeed, inertia (or the percentage of variance extracted) and validity are not synonymous. In general, inertia is a pessimistic measure of the real share of information represented, and it is difficult to interpret alone (Fenelon 1981). Numerous counter-examples show that low percentages satisfactorily

reflect the structure of data (Lebart and Salem 1994: 91). The percentages obtained here offer therefore a sufficiently solid basis for the continuation of my analysis.

- 3 In SPAD 3.5, the quality of the representation of a variable in each factor is given by its square cosine. A poorly represented statistical individual, orthogonal to each of the axes in the factorial plan, has a null square cosine; conversely, an individual perfectly located on a single factorial plan has a square cosine of 1, since its angle with the plan is null.

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