Digital Genres and the New Burden of Fixity

Simeon J. Yates
Faculty of Social Sciences
The Open University
Milton Keynes, MK7 6AA, United Kingdom
S.J.Yates@open.ac.uk

Tamara R. Sumner
Knowledge Media Institute
The Open University
Milton Keynes, MK7 6AA, United Kingdom
T.Sumner@open.ac.uk

Abstract

Stability in the production and transmission of texts has been a taken-for-granted feature of communicative acts for much of history. In the past, this fixity (i.e., the reliability of texts not to change over space and time) has arisen from the interaction between immutable technologies (used to produce text) and social rigidity (in the structure and practices of discourse communities where texts are produced and consumed). These interactions provided stable settings fostering the gradual development of rich communicative genres which, in turn, further contributed to fixity in communicative acts. In the current era of virtual communities and digital documents, this relationship between technology, social context, and fixity has been loosened. We claim the new burden for providing fixity in communications is being met by increased reliance on genre. To support this claim, we examine the four-way relationship between technologies, social contexts, social practices and genre by considering example digital documents produced by two different discourse communities.

1. Introduction

All forms of human communication – whether spoken, written, printed, or digital – are generically structured in both form and content. Generically structured communications share sets of linguistic and structural features that a specific discourse community reflexively recognises as marking a specific genre. These features guide both the production (e.g., writing) and consumption (e.g., reading) of communications. Genres have both immediate effects on human communications and long-term effects on human societies. In the short-term, these socially recognisable markings invoke a shared background that enables both the producers and consumers to better comprehend the current communication and to anticipate its further development. In the long-term, stable genres help promote the development of communities, both real and imagined (e.g., our sense of nationalism), that are so intrinsic to modern life [1].

Recently, genres have come under much scrutiny by several research communities, including socio-linguists [14], human-computer interaction theorists [4] and others studying the relationship between work practices and new technologies [7, 19, 23]. Many researchers are trying to better understand the impact of new technologies on human communications and social contexts [24]. Among others, *there is a growing concern that the rapid advance in new technologies has had a detrimental, destabilising effect on genre use and production* [3, 4]. Specifically, it has been argued that there has been a loss of fixity with the onset of easily editable digital documents and digital communications; that is, there is no longer any reliability of a text not to change over time or space. One consequence of this lack of reliability could be increased difficulty in preserving and transmitting generic form or recognisable markings. Without generic form, members of discourse communities, particularly virtual ones, may experience problems developing and invoking the shared background necessary for effective communication and coordinated practices.

Here, we argue that such communication breakdowns stemming from a loss of fixity will not occur. Current technology *has* destabilised existing genres compared to print technology. However, the result is not a breakdown or loss of recognisable genre. Instead, the distinction between producers and consumers of digital documents is being blurred and we are seeing the democratisation of genre production. More people are providing more input (either implicitly or increasingly explicitly) into the creation and production of genres. As a result, over time communities evolve increasingly well-defined genres to better support their particular communicative needs and work practices. In effect, rather than seeing a lessening in the role of genre, *the new burden for providing fixity in communications is being met by increased reliance on genre.*

In this paper, we examine this reliance on genre by considering example digital documents produced by two different discourse communities. Building on Halliday's conception of a text, we consider a digital document to be any socially and contextually complete semantic unit of communication – including text, video, audio, hypermedia, multimedia, and computer-mediated communication – which is created, stored, and transmitted via digital media [12].

A discourse community is a community in which people do not necessarily live together or ever see each other face-to-face, but where language (either spoken, written or digital) is used among themselves to pursue some common goals [15]. Digital documents are often associated with on-line communities which can be difficult to pinpoint. Zones of 'discourse,' rather than geography, are a useful way of identifying and delineating these virtual communities.

The remainder of this paper is structured as follows. We begin by developing a theoretical model of the sources of fixity in document production. We then analyse digital documents in two case studies to both illustrate and lend support to this model. In our subsequent comparison and discussion of the case studies, we pay particular attention to the differences between the communities and the effects their computational tools had on genre production and evolution.

2. Sources of Fixity in Document Production

Human communication is reliant upon the assumption that changes to communicative practice take place within specific social contexts or across social time frames that are comprehensible to all participants. Fixity, or the perceived reliability of a communication not to change over time and space, is therefore a key aspect of day-to-day communication. However, at the same time, language and communication are in a process of constant change, being part and parcel of ever changing social contexts and communications media. Bakhtin [2] described these opposing tendencies to change and stability as 'centrifugal forces' and 'centripetal forces' respectively. These two social forces are seen by Bakhtin to be at work on any act of communication in any medium be it spoken or written, and by implication contemporary electronic media. As such, the concepts of centripetal and centrifugal socio-linguistic forces can be viewed as aspects of the social structures and systems in which members of an interacting community are situated.

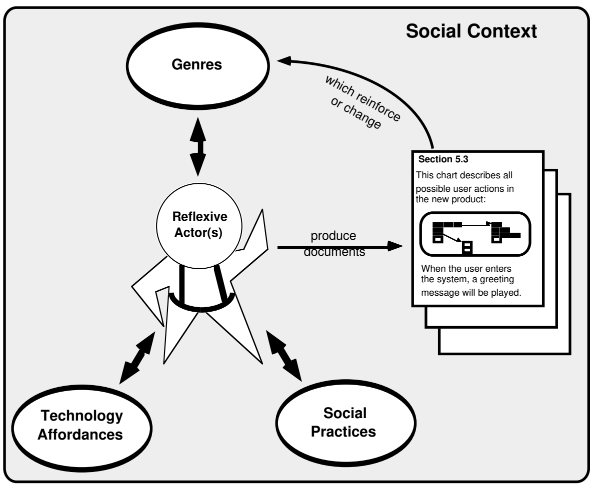

Figure 1: Factors influencing document production in a discourse community.

We define 'discourse community', building on Swales [20], as a group of *reflexive actors* with shared social practices and shared understandings of text types/*genres*, social contexts, and communicative acts. Interaction between community members takes place through communicative acts where a text is both produced and consumed. *Social practices*, in the form of patterned ways of using *technologies* and shared knowledge systems [18], guide the production of texts. *Social context* also influences text production and consumption by invoking shared understandings of goals and shared knowledge about the relevant and appropriate social practices to engage in, in a specific social context. These five factors all influence the production and consumption of a text or digital document and, as shown in Figure 1, form the cornerstones of our model.

2.1. Technological or Material Basis for Fixity

Our definition of fixity builds on the works of Anderson [1] and Bolter [3]. Both of these authors attribute fixity to the properties of the medium, namely writing or print. This is not an odd claim as many writers have taken literacy, and especially print, to mark the rise of a technology that is less affected by Bakhtin's centrifugal (change causing) forces.

Not only does literacy physically lock individual texts into unchanging form, it also locks language use into fixed forms. Anderson [1], in his exploration of the rise of modern nation states, places great emphasis on the importance of print vernaculars. The ability to mass produce communication in a local national language provided the basis for members of a nation to 'imagine' themselves as part of that greater 'community'. The key feature of print being its ability not to change over time and space. The message it carries is not affected by being taken from shop to home, or by its storage in a library. This ability Anderson describes as 'fixity'. A similar argument is made by Bolter [3] who describes print and writing as supporting the 'fixivity' of a text.

Thus, in the models provided by Anderson and Bolter, fixity is derived from the very technology of literacy, be that print or writing. Ink on paper, much like photographic film and gramophone recording, makes a physical and material mark that is difficult to alter. The affordances of these technologies therefore provide a material basis for fixity. Norman defines technological affordances as both the actual properties of a particular technology that determine how it can be used and the perceived properties that influence how people will actually use it [16]. In the case of digital technologies, their individual affordances impact fixity by influencing the mutability of the media used to construct and propagate a document. According to Bolter, the relationship between technology and fixity has been greatly altered by digital media:

> *The computer can duplicate information with far greater ease and accuracy than printing. But the computer works against the fixivity of text, because each reader/user of an electronic text can introduce changes in his copy and pass those changes along to others.*

The electronic medium combines the reproducibility of print with a flexibility even greater than that of the medieval manuscript tradition. (Bolter, J.D., 1989, p.130).

2.2. Social Basis for Fixity

Fixity also concerns the perceived reliability of texts and perceptions can be provided by means other than the medium itself. It has long been noted that those societies which rely greatly upon oral communication maintain a large number of social practices which allow for the preservation of key texts over time. Such social practices provide the fixity that is otherwise provided by material aspects of the communications technology itself. The overemphasis on material aspects of technologies, and the claim that digital technologies provide a new situation rest upon the assumption that oral communication is somehow 'technology free'. Yet as Finnegan [6] notes:

Oral communication looks at first sight to be unproblematic and 'natural'. But, like literacy, or indeed computer technology, its use rests on social and cultural conventions and on a man-made system of communication - in this case the remarkable system of human speech... a technology which we take for granted, just as human beings always do with established systems which seem too natural and self-evidently human to need any explanation. (Finnegan, R., 1988, p.4)

Thus, it is not that oral communication lacks fixity, but rather fixity is mostly supported by social practices rather than by material technology.

2.3. Genres: A Third Basis for Fixity

Another factor in text production and consumption is 'genre'. The constant production of texts using specific technologies in specific contexts tends to produce what Bakhtin describes as 'relatively stable types' or genres. Genre provides the consumers of texts with a resource for interpreting the content, role and function of a text.

Genres are recognised by both form and content. In the case of print media, genre is not simply a product of the content (e.g., crime novel versus text book) but it is also a product of the very typography of the text (e.g., tabloid versus broadsheet), with complex relations existing between typographic form and social/linguistic content [9, 22]. There are a large number of related, and sometimes conflicting definitions of genre within sociological, linguistic and literary theory. Given that we have adopted a Hallidayan model of the text, we follow Kress and Threadgold [14] who, writing from a systemic-functional perspective, argue:

All texts appear in generic form, hence all utterances (that is, fragments of texts) are necessarily always part of the generic aspect of text and carry traces of the generic form of which they formed a part …. What we call genre therefore is usually and normally a particular configuration of such generic traces, a configuration which has, due to ... social/cultural factors ... a greater or lesser degree of structural and temporal stability. (Kress, G., Threadgold, T., 1988, pp. 240-241)

This argument ties texts and genres to the issue of 'structural and temporal stability', or in our terms - fixity. Genres have an existence in the texts which a discourse community perceives as being of a specific genre, but they are also a shared knowledge resource to be drawn upon in the construction of further texts. In turn, such shared understandings and knowledge resources help to define the discourse community itself.

Giddens uses language to explain how social structure is unintentionally recreated in day-to-day social action. When uttering a grammatical sentence, the main intention of your act is likely to be communication with another. An unintended consequence of this action is the reinforcing and reproduction of the language itself. In the case of social structures and social systems, actors functioning within such systems recreate them through the re-use of existing social practices [8]. The overall conditions which allow for the maintenance and development of social structures, and with them social systems, Giddens terms 'structuration'.

This is also the case with texts: the constant production of texts using specific technologies in specific contexts tends to produce 'relatively stable types' or genres. Genre(s), akin to social structure(s), provide rules and resources to be deployed in the construction of a text by actors within a specific set of social relations (a community) and sharing similar social practices. As with social structure, genres are not solely produced 'unconsciously,' they can be the result of explicit actions and goals. Following Giddens' [8] claim for the 'duality of social structure,' we see genres as both a medium and outcome of the text production they help to recursively organise. Table 1, following to an extent Giddens' model of structuration, outlines the relationship between genres, discourse communities, and the centrifugal/centripetal forces at play.

Table 1: Genre, community and language change/stability

Genre(s)	**Discourse community(s)**	**Centripetal/Centrifugal Forces**
Rules and resources, or sets of transformation relations, organised as properties of discourse communities	Reproduced relations between actors or collectives, organised as regular social practices.	Conditions governing the continuity or transmutation of language forms (e.g. genres), and therefore the reproduction of discourse communities

2.4. The Conservation of Fixity

This section developed a model of the factors influencing text production in discourse communities by looking at existing theories and historical analyses of literacy and orality. One purpose of this model is to illustrate that we do not need wildly new theories to deal with digital documents. The very same factors which have historically played a role in structuring the form and content of texts are at work upon digital documents. Digital media may challenge our assumptions about texts, but in truth they are just another historical step in the development of communicative acts.

Another purpose of the model is to develop an analytical tool that will help us to examine the centripetal and centrifugal forces at work in document production. According to our model, the production of texts results from a complex interaction of reflexive actors with four key factors: existing generic forms, technological affordances, social practices and the social context in which the text is produced (Figure 1). Centrifugal forces are often initiated by changes in social structures and new technological affordances. With the upsurge in use of digital media and rapid changes in technology, large centrifugal forces have certainly been unleashed. By examining changes to social structures and technologies within a discourse community, we can plot the changes to social practices and documents and see if these forces have had a destabilising effect on genre use and production.

Finally, an important goal of this section was to argue that the concept of fixity in communication has broader implications beyond material properties. Fixity can be viewed as a higher order product of actors' discursively conscious (explicit) or practically conscious (tacit) interactions [8] with Bakhtin's centripetal forces within a specific social context. That is, fixity is the marker of centripetal, change inhibiting factors. All societies, whether reliant upon orality or literacy, rely upon some form of fixity in some classes of text.

Without some degree of fixity, the shared understandings and social practices necessary for effective communications within a discourse community cannot develop. In effect, we have argued that there is a 'conservation of fixity.' When the balance of fixity is upset by centrifugal changes in some factors influencing text production, it will be restored by countering centripetal changes in the remaining factors.

In the following two case studies, we will show how fixity has been conserved by an increased reliance on genre. The first case study takes a detailed look at the genres in use in an educational support community at a single point in time. The second case study takes a longitudinal look at the genres developed over time by a group of professional designers.

3. Case 1: A CMC Discourse Community

This section explores a case of genre production within a computer-mediated communication (CMC) discourse community. The data presented here come from a corpus based socio-linguistic study of CMC. During this study a corpus of some 2,222,049 words of CMC data was collected from interactions taking place on an international distance education university's computer conferencing system. Following from our model, we need to identify a number of background factors before considering the genres developed during the CMC interactions.

The *discourse community* interacting over this system consisted of a mix of academics, students, regional teaching staff and university administrative staff. This conference interaction was maintained over many years, and still currently continues on a new CMC system. The discourse community consisted of a mix of heavy CMC users (both students and staff) and students new to the system. Though one might consider all of the conferencing users as one distinct discourse community, there existed clearly separate communities whose coherence was marked by their distinctive use of the medium.

In this study, a number of similar *social contexts* were found. These included tutor-student interactions and student-student interactions, academic discussions, administrative interactions, and more casual group interactions on various topics. The more casual group interactions were known by all users as 'chat topics,' but as we shall see in a moment, not all interactions taking place in these interpersonal contexts were generically similar.

The *social practices* tied to CMC use have not yet been fully explored, though various studies and publications are now touching on these [13]. The research upon which this case is based found that some, but not all, users were discursively aware of changes to their text production practices with some members engaging in a debate about such changes. Social practices were also tied to negotiated rules about acceptable content within a given context.

The *technology* in use was a text-based computer conferencing system (specifically the CoSy technology running on a VAX cluster). At the time that the research was conducted, few users had access to very efficient GUI interfaces to the system and most users worked with command line interfaces and VT100 based editors. Such a system provides few technological affordances for the formatting of texts and the visual presentation of messages.

3.1. Structural and Linguistic Markers in CMC Genres

Before moving on to discuss the genres within the corpus, let us consider the classic form of CMC – namely an electronic mail message – and examine how the technology allows for the production and maintenance of generic forms. CMC Example 1 shows an interaction between one of the present authors and a friend.

This short exchange resembles, in a general sense, the kind of generic interaction that takes place every day on the street, at home or in work. It has a clear beginning and end and contains many conventional language forms one might expect in such genres of oral interaction. It is in the first place an exchange of morning greetings and then some small personal details. It is interesting, though, how this is achieved. The greeting is not part of the main text of the message; it is given as the subject of the message in the initial header of the electronic mail. The greeting is therefore delivered before the main text has even been read. The return greeting is even more ambivalent in nature as it is simply generated by the electronic mail system once a ‘reply’ or similar command has been issued. This attaches the formal memo-like ‘Re:’ to the initial greeting. This type of behaviour is much more akin to the written memo [23] or formal letter rather than the informal personal morning greeting. We have, then, evidence that CMC messages may mix existing oral and literate genres in very novel and interesting manners. This claim is given further support if we consider the typographic aspects of CMC messages.

```
From:  OUMAIL::"R.Ohara@sheffield.ac.uk" "R Ohara"
To:  s.j.yates@open.ac.uk
1-Subj:  good morning

How are you today, did Mark get away alright?
Are ye going to eat there before coming up this evening?
See you later, safejourney.
Rachel.

From:  S.J.Yates "Simeon J. Yates"
To:  OUMAIL::"R.Ohara@sheffield.ac.uk"
2-Subj:  Re: good morning

Yes Mark got away ok. I am not sure if we will have some
tea or not. I'll let you know later,
Sim.
```

CMC Example 1: An e-mail exchange of greetings showing the mixing of oral and literate genres.

A defining feature of written genre is the typographic form and presentation of the text. Waller [22] drawing upon typographic considerations of written genres, argues that: “In practice it is ... likely that genres are recognised through their more obvious and typical physical characteristics.” For example, presentation of a journal article is very different from that of a novel, or a children’s book. Waller distinguishes several aspects of these physical characteristics, including format, configuration, and visual elements.

Nearly all forms of CMC have typographic conventions derived either from aspects of the technology or from developing CMC conventions, and in most cases, a combination of the two. Two common examples of these features are: the marking of quoted material with angle brackets (>); and the use of ‘signatures’ at the close of e-mail messages (see CMC Example 2).

The typographic features of CMC messages would therefore seem to fit with Waller’s interpretation of typography’s role in defining literate genres. These typographic features not only conventionalise the presentation of CMC texts, they also mark position of a CMC text in the interaction. These typographic features allow the user to place the text in an overall discursive context that is likely to have its own schematic flow.

```
Date sent: Fri, 24 Feb 1995 20:56:16 +0200
To:  foucault@jefferson.village.virginia.edu
From:  [discussant 6]
Subject: Re: "local" vs "universal"

[discussant 5] wrote:

>I tend to see what [discussant 6] is saying about
>Foucault's version of modernism as inclusive of a strand
>of postmodernism. The Enlightenment project is afterall
>the exemplary metanarrative that post modernists point
>to as having lost its legitimacy.

It is true that the Enlightenment is the project post-
modernists have said as having lost it's credibility, but that
is not the point I tried to say. What I meant was that in his
late writings Foucault tried to find a _positive_ way to
think about Enligtenment and modernity.

[discussant 6]

*******************************************
[discussant 6]
University of Jyvaskyla
Department of Literature
SF-40351  Jyvaskyla
FINLAND
*******************************************
```

CMC Example 2: Common typographic features are the marking of quoted materials (by angle brackets: >) and signatures (by asterisks: ******).

3.2. A Snapshot of Genres in Use in the CMC Community

A combined qualitative and quantitative analysis of the corpus texts and the interactions was conducted [24]. The results indicated that a number of generic forms had developed which could be categorised as shown in Table 2. Though these genres were found using mostly statistical corpus linguistic methods, the differences between them can easily be seen. In this subsection, we’ll analyse in detail the features of two of these genres.

Table 2. Five types of generic forms were found in four social contexts.

Social Contexts	Generic Forms Found
Chat	• Focused interactive interpersonal discussion • Open interactive interpersonal communication
Academic	• Academic’s discussion
Teaching	• Student/Tutor discussions
Administrative	• Non-Academic discussion

In the case of the social context of interpersonal chat, two genres of communication were apparent. First, there was *open interactive interpersonal communication* (see CMC Example 3). Interactions of this kind will contain several thousand messages by the time they close. Much of the conversation is of the kind to be found in any informal interpersonal situation. Messages are seldom more than a few lines long and are more often than not directed specifically towards the group or to a specific individual. The content is often of a social and personal nature. Much use is also made of various typographic tricks in order to convey social and emotional information such as the 'CMC smiley' (e.g. **:-)**).

In the case of *focused interactive interpersonal discussions* the messages are fairly long (see CMC Example 4), about the size of a terminal screen, and represent a focused consideration of the topic under discussion. They are often about personal or social issues and can include large amounts of self disclosure and self reference. Not only is the use of personal pronouns and personal reference high (e.g. "I'm arrogant", "I had an accident", "please mail me and I'll add you", "Every time I see a new mini"), but these aspects of the message are often over and above the main purpose of the message in the simplistic terms of passing information.

```
==========================
dt200-debate/chat £107,[discussant 6], 80 chars, 13-Apr-93
13:23
This is a comment to message 103
There is/are comment(s) on this message.
There are additional comments to message 103.
--------------------------
A point in favour of I.T. helping women, I think.
Keep it up Hilda! :-)

==========================
dt200-debate/bar £100,[dicussant 7], 161 chars, 11-Apr-93
13:12
This is a comment to message 84
There is/are comment(s) on this message.
--------------------------
Hi Rosemary, yes I was in York from the 8th of Aug for T102
summer school, I was a member of the yellow group. Wonder
if we met.
Good luck with DT200. Bye Paul.
```

CMC Example 3: Open interactive interpersonal messages

Take for instance the example of the cycling discussion message in CMC Example 4. The main informational aspect of the message is in the first few lines and details for the other conference members a review of a new form of bicycle tyre. The personal reference comes after this and details an accident that the CMC participant had recently. Taken as a whole the message could be seen to contain several utterances from specific speech genres (passing information/self disclosure), or possibly even an initial written genre (reviewing a cycling advert/article) followed by a spoken genre (self disclosure). As in the E-mail examples earlier, these conferencing messages are actively using existing genres to aid in the construction of a text.

At the same time such texts are viewed by the discourse community as being of a specific genre. In this case, the conferencing system users tended to call such messages 'phoenix' messages, and described situations where many of these types of messages occurred as 'phoenix spilling over into another conference'. This naming derives from the conference where this generic form arose (note the headers on the example messages).

```
==========================
phoenix/zenith £1001, [discussant 1], 716 chars, 14-Jul-92
17:12
This is a comment to message 997
There is/are comment(s) on this message.
--------------------------
Oh yes. I'm arrogant in that way (thinking more voters ought
to agree with me), too. In fact not to so think seems
excessively timid to me.

But what I was referring to was the notion that if only people
were more educated, they would agree with me. That is quite
a plausible claim, granted, but not axiomatic. It rather
depends on the education, and at least in my case I think
some kinds of education might take people further from my
views, rather than nearer to them.

I accept the overlap on the gas price - sorry if I seemed
pernickety. I suppose I was really commenting on the logical
status of /any/ claim of "people are inconsistent because they
want X and Y, but X and Y are incompatible".
==========================
agony/advice #908, [discusant 4], 403 chars, 2-Apr-92 10:41
This is a comment to message 901
There is/are comment(s) on this message.
--------------------------
Minis? Who in their right mind wants a 30 year old design at
BLs prices? Every time I see a new mini I wince for the fool
who bought it. For the same dosh, or less, you can buy up to
the minute style, efficiency and know-how from Japan,
Malaysia, Europe or even good old Ford or Vauxhall. Note that
I am not being partisan at all.
==========================
cycling/spokes #100, [discussant 2], 506 chars, 8-Dec-92 20:34
This is a comment to message 88
There is/are comment(s) on this message.
There are additional comments to message 88.
--------------------------
The latest issue of New Cyclist (Jan 93) mentions the tyre.
Quote 'the best attempt to date. They contain an air-filled
cellular structure which gives some cushioning. The
manufacturor recommends its tyres for round-town cycling,
and for children's street bikes, where high performance takes
second place.' Does this mean the tyres are heavier than
standard? Appreciate your loss, I had an accident Thursday,
lossened all the teeth and bent the forks in half.
Take care and carry a BIG chain, 8-) Dave P.
```

CMC Example 4: Phoenix/Focused interactive interpersonal discussion

In these two genres, ostensibly literate forms are being used to conduct oral forms of interaction. The length of the 'Phoenix' messages provide an interesting dimension to this form of argument. The technological affordances of CMC are providing the speakers/writers the opportunity to develop a form of language use that would not be possible in a face-to-face situation. The affordances provided by the technology (i.e., asynchronous communication and basic word processing) are combined with social practices and existing genres to construct a text which fits the social context as understood by the discourse community.

4. Case 2: A Design Discourse Community

This section looks at genre production in a professional design community. It differs from the previous case by focusing on a longitudinal look at the evolution of genres within this community. The analysis presented here is based on a participant-observer study conducted over a three year period with a user interface design group at a regional phone company in the United States. A combination of qualitative data was collected including workplace observations, field notes, analyses of existing design tools and representations, videotape analyses, and open-ended interviews with members of the design community.

The *discourse community* in this study consisted of members of the design group (including user interface designers, student interns, testers and simulation builders) and members of other stakeholder groups (i.e., marketing and the vendor). The design group was charged with creating and modifying voice dialogue applications such as voice information systems and voice messaging systems. These applications have phone-based interfaces consisting of a series of voice-prompted menus requesting the user to perform certain actions; e.g., "to listen to your messages, press 1."

The *social context* is one of product development within a large organisation involving a multidisciplinary group of stakeholders spanning both intra- and inter-organisational boundaries [5, 11]. More specifically, the overall design context follows the contractual software product development context as discussed by Grudin [10]. The designers are hired by internal marketing groups to specify the functionality and interface of an application. The design specification serves as a contract between the two groups. Once a design has been approved by the marketing group, the designers are then responsible for dealing with external vendors who implement the product.

Interdisciplinary design teams often experience communication problems due to differences in members' goals, knowledge, and backgrounds (including educational, cultural, and organisational) [5, 11]. In this community, these differences were confounded by the fact that other stakeholders (i.e., marketing and the vendor) resided in different states separated by large geographic distances. However, *social practices* had arose to help overcome some of these problems. As one designer noted, "the critical problem is communicating the design to other people in a way that doesn't require a lot of specialised training [on their part]." Towards this end, these designers created specialised design representations emphasising different aspects of the design. In this case, each of the four major representations – flow charts, tables, test plans, simulations – is tailored to the special needs of each major stakeholder group. Thus, members of this design community were actively thinking about how to improve their work practices. As such, they were discursively aware of changes to their document production practices and much effort was spent negotiating and debating these changes.

There was a complex and ever-changing assortment of *technologies* in use during this study. The designers assembled collections of off-the-shelf software tools to support making each of the different design representations. Typical off-the-shelf software tools include word processors, spreadsheets, databases, and flow charting tools. The task of creating a design representation was considerably facilitated or hindered depending upon the choice of tool. For instance, while it is possible to create a flow chart in MacDraw, the task is much easier if a specialised flow charting tool is used. Experimenting with document production practices often involved looking at different tools in addition to changing the form and content of design representations. The community also relied on communication technologies such as E-mail and telephone conference calls.

4.1. Genre Evolution: From Ill-defined to Well-defined Design Representations

Much communication between the stakeholders centred around understanding the benefits and limitations of the current design as depicted in several specialised design representations. In this analysis, we will focus on the flow chart and table design representations. Flow charts are the primary design representation and are constructed to communicate the essential aspects of the interface such as spoken prompts, menus, and control flow to marketing, the vendor organisation, and customer support. Additional detailed design information is presented in a separate table representation that is primarily constructed for the vendor organisation responsible for implementing the final design. As shown in Figure 2 (bottom), these two representations have a very rich form (including conventions guiding the layout, use of typography, and occurrence of visual elements) and very structured content (including conventions guiding the use of prose such as its formality).

However, as Figure 2 shows, both the form and content of these representations have changed considerably over time. At the beginning of the study, designs were represented using textual specification documents created in WORD (Top, Figure 2). These textual specifications consisted of verbose, formulaic prose descriptions of all possible actions and outcomes at each point in the interface. Document formatting was used to distinguish between *voice menus* (using document sections) and *phrases* and *messages* (using formatting conventions such as italics and capital letters).

In 1991, one designer was asked to create one of the most complex applications to date and decided it was time for a whole new approach. The textual specifications were getting so large and complex that few people bothered to read them. Those that did had trouble understanding them. This designer established a personal convention of using flow charts and a new, complex table as the primary design representations (Middle, Figure 2).

His flow charts contained four different elements, *voice menus*, *prompts*, *messages*, and *decisions,* that were distinguished by graphic appearances. These charts were schematic in that most nodes did not contain the full text of their audio messages. Each node in the flow chart had a corresponding entry in the table representation. Correspondence was indicated using a new *two letter.two digit number* naming convention where the two letters indicate the design subcomponent; e.g., PO.01 indicates the first node in the personal options design subcomponent. This naming scheme facilitated long distance communication; when talking over the phone, stakeholders could ground their discussions by referring to “prompt PO.01.” Excel did not support the complex layout needed for the new tables, so the designer switched to a database program called FoxPro. He used MacDraw for the flow charts simply because that tool was readily available.

The two representations – textual versus flows and tables – coexisted for about one year. Other designers were reluctant to switch for two reasons. First, several had long-term relationships with their vendors and marketers and were reluctant to switch representations on them. Second, constructing the flow charts in MacDraw was tedious and time-consuming.

By mid-1992, several things happened that led to the emergence of flows and tables as the primary design representations. First, new versions of flow charting tools (e.g., TopDown) made it much easier to construct the flow chart representation. Second, new designers were hired to embark on a long series of enhancements to an existing product and they adopted the flow and table representations. These designers also created a document describing “how to read” the new representations to assist other stakeholders Initially, the marketing group was sceptical concerning the merits of the new representations. However, after a period of continual modifications, often at the marketers’ behest, the group now prefers the new representations.

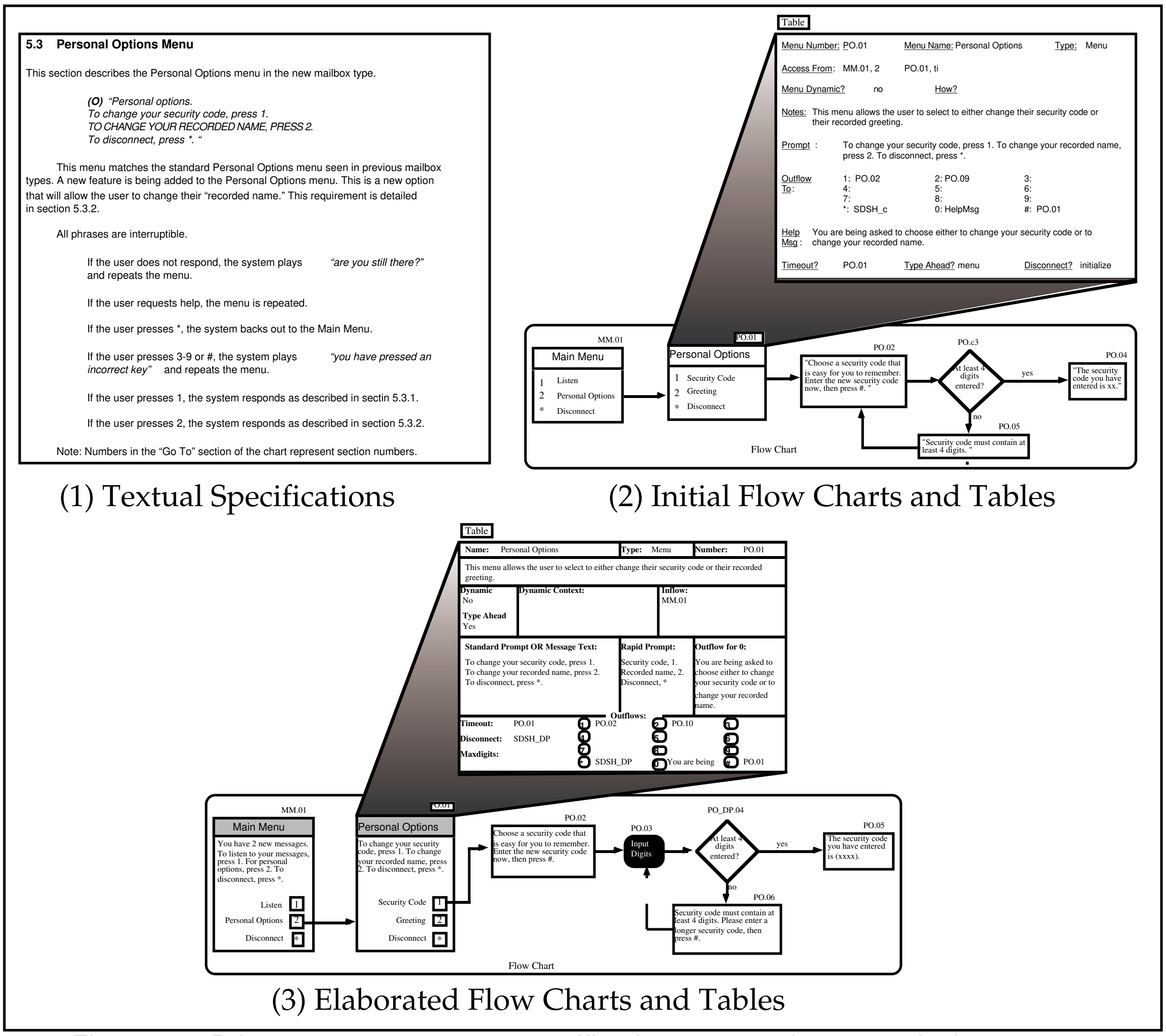

Figure 2: Prior to 1991, textual specifications were the sole design representation. By 1991, one designer introduced schematic flow charts and tables as the primary design representation. By 1992, more verbose flow charts and tables became the preferred representations and are still being used today.

Over the next two years, the new designers elaborated on the flow and table representations (Bottom, Figure 2). To improve the readability of the flow chart, the designers added some verbosity back into the nodes by including the full text of audio messages in each node. New elements emerged such as *inputters*, *error handlers*, and *digit collectors*. The layout of the table representation was redone to emphasise the different kinds of voice output and help prompts. One designer even programmed the database to detect inconsistencies between the flow chart and table representations. The vendor liked the formality of the table representation and suggested ways to formalise it even more with pseudo-code-like prose.

In this case study, the design community was actively engaged in "designing their design process" by continually re-thinking their tools, representations, and practices. Over time, this continual process redesign resulted in increasing formalization and standardisation of design representations as they progressed from being ill-defined to well-defined.

The original textual specifications were ill-defined because important aspects of the design were not made explicit by the representation. Key interface features were buried in the middle of paragraphs and this resulted in design errors and communication breakdowns. As the community recognised common breakdowns in the design process, they improved their representations to overcome these breakdowns. The outcome was a progression towards well-defined design representations that made explicit significant objects and their relationships.

In effect, this community was discursively designing genres of organisational communication [23] to support their specific communicative needs. While production of the documents was done primarily by the design group, all stakeholders participated to varying degrees in explicit negotiations over the form and content of the representations. These socially-recognised genres contributed to the overall design process by promoting the consistent production and interpretation of the design representations.

5. Comparison of the Two Cases

In both communities, changes in technology introduced centrifugal forces and members responded by appropriating existing genres around which countering centripetal forces acted. In the CMC case, the use of the new conferencing technology, which placed little demand on the content and timing of messages, introduced centrifugal forces. Previous oral and literate genres were appropriated for the construction of new texts and genres. Some of these existing genres are providing points around which centripetal forces are acting, such as the development of the new 'phoenix' genre. In the design community, changes in technology led to rapidly increasing application complexity and existing genres of organisational communication (i.e., the textual specifications) did not scale up To handle these new demands, one member of the community appropriated other existing genres (i.e., flow charts and tables) and these document forms are currently being reinforced and refined through further centripetal forces.

Technology affordances affected the genres produced in both communities. In the CMC case, tool features such as the "reply" command impacted both the look and content of CMC genres. The availability of formatting features clearly has a big impact on genre development. In general, the lack of marked visual distinctions in CMC genres probably reflects the impoverished formatting features provided by the system. On the other hand, the rich formatting features of the designers' tools gave them lots of leeway to tailor the look, typography, and visual elements in their design representations.

Brown & Duguid [4] raise the issue that "mutability can be seen to challenge the genre as a whole" (pg. 22). They claim that a possible effect of mutable technologies is 'demassification,' where tailoring of objects by individual users leads to a lack of mutually shared objects and representations This was certainly not the case in the design community we studied. Over time, progressive tailoring by individuals led to well-defined design representations based on elaborate, socially-recognised genres. This observation resonates with other reports on the emergence of systemisation [21] or canonical forms [17] in work groups tailoring tools to better support their practices.

In addition to rich formatting commands, other important affordances of the technologies-in-use were the ability to share and reuse existing designs. Designers rarely began designing from a blank screen; they nearly always began by modifying an existing design stored in a repository of previous designs, either on their hard disk or on the group's shared server. This style of document-production-by-modification both explicitly and implicitly propagated the community's genres (see [7] for similar arguments on the emergence of home page genres on the World Wide Web).

Implicit propagation can occur when tools do not support the concept of 'styles' and designers must manually recreate the look embodied in the document. This commonly occurs in drawing and flow charting tools which do not allow users to associate names (or 'styles') with particular typographic or visual arrangements. Tools which support the concept of styles (e.g., word processors) contribute to the explicit propagation of genres by making it easier for others to reuse the same markings in a consistent manner. Other tools, such as databases, support even more extreme kinds of tailoring. These types of programmable tools support the continual reproduction of genres by allowing the rules guiding the look, layout, and sometimes even content of visual elements to be programmed into the software. The design community had programmed their database tool to promote both a consistent look (by report generation) and a consistent content (by creating a program to detect inconsistencies across fields and records) in their table representation. Interestingly enough, the extreme tailorability that can introduce centrifugal forces into a community can also eventually lead to centripetal forces in document production. Once a community invests so much effort in tailoring their tools to support their specific practices and document production needs, it becomes extremely difficult and time-consuming to modify genres without redoing lots of existing tailoring work. (See Sumner [19] for a detailed discussion of tool affordances and their impact on genre maintenance, elaboration, and modification processes.)

6. Conclusions

In summary, we developed a theoretical model of the factors affecting document production and consumption in discourse communities. We used this model to analyse the digital documents and genres produced by two different discourse communities. These analyses highlighted both the centrifugal and centripetal forces at work in both communities and showed how genres were being relied upon to 'conserve the fixity' otherwise lost by new technology affordances.

We are not trying to push this argument too far. In all media, context, practices, genres and technologies play a role. The argument we are presenting here concerns the *balance* between these factors. In digital discourse communities, members rely more on genre to both produce and consume documents. Genres help in constructing communications relevant to the social context; but as they are also a key marker of that context, they also assist in consuming the communication. Given that the technology itself often does not differentiate between texts, unlike print or writing where the copy of 'War and Peace' is destined for a shelf and the 'yellow sticky' for the bin, genres increasingly help orientate users to the document and help them evaluate the nature of the document. The overall import of genres comes from the role they play in differentiating between documents, which are constructed and delivered through an otherwise undifferentiated digital medium.

7. References

1. Anderson, B., *Imagined Communities: Reflections on the Origin and Spread of Nationalism,* Verso, London, 1983.

2. Bakhtin, M. M., *The Dialogical Imagination: Four Essays by M.M. Bakhtin,* University of Texas Press, 1981.

3. Bolter, J. D., "Beyond word-processing - the computer as a new writing space," *Language & Communication,* Vol. 9, Iss. 2-3, pp. 129-142, 1989.

4. Brown, J. S. and P. Duguid, "Borderline Issues: Social and Material Aspects of Design," *Human-Computer Interaction,* Vol. 9, Iss. 1, pp. 3-36, 1994.

5. Curtis, B., H. Krasner and N. Iscoe, "A Field Study of the Software Design Process for Large Systems," *Communications of the ACM,* Vol. 31, Iss. 11, pp. 1268-1287, 1988.

6. Finnegan, R., *Literacy and Orality,* Basil Blackwell, Oxford, 1988.

7. Furuta, R. and C. C. Marshall, "Genre as Reflection of Technology in the World-Wide Web," Technical Report Hypermedia Research Lab, Texas A&M, 1996.

8. Giddens, A., *The Constitution of Society,* Polity, Cambridge, 1984.

9. Graddol, D. J., "English Manuscripts: The emergence of a visual identity," in *English: history diversity and change*, D. Graddol, D. Leith and J. Swann, Ed., The Open University / Routledge, London, 1996.

10. Grudin, J., "Interactive Systems: Bridging the Gaps Between Developers and Users," *Computer,* Vol. 24, Iss. 4, pp. 59-69, 1991.

11. Grudin, J., "Systematic Sources of Suboptimal Interface Design in Large Product Development Organizations," *HCI,* Vol. 6, pp. 147-196, 1991.

12. Halliday, M. A. K., *Language as Social Semiotic: The Social Interpretation of Language and Meaning,* Edward Arnold Ltd, 1978.

13. Herring, S., *Computer-Mediated Communication: Linguistic, Social, and Cross-Cultural Perspectives,* John Benjamins, 1996.

14. Kress, G. and T. Threadgold, "Towards a Social Theory of Genre," *Southern Review,* Vol. 21, Iss. 3, pp. 215-243, 1988.

15. Mercer, N., "English at Work," in *Using English: From Conversation to Canon*, J. Maybin and N. Mercer, Ed., Routledge, London, 1996, pp. 84-107.

16. Norman, D. A., *The Psychology of Everyday Things,* Basic Books, New York, 1988.

17. O'Day, V. L., "Intermediaries Sustain Borders," *Human-Computer Interaction,* Vol. 9, Iss. 1, pp. 105-108, 1994.

18. Scribner, S. and M. Cole, *The psychology of literacy,* Harvard University Press, 1981.

19. Sumner, T., "Designers and their tools: Computer Support for Domain Construction," University of Colorado at Boulder, Ph.D. Dissertation, Dept. of Computer Science, 1995.

20. Swales, J., *Genre Analysis: English in academic and research settings,* Cambridge University Press, Cambridge, 1990.

21. Trigg, R. and S. Bodker, "From Implementation to Design: Tailoring and the Emergence of Systemization in CSCW," *Conference on Computer Supported Cooperative Work (CSCW '94),* Chapel Hill, North Caroline (October 22-26), 1994, pp. 45-54.

22. Waller, R., "The Typographic Contribution to Language," University of Reading, Ph.D. Dissertation, 1988.

23. Yates, J. and W. Orlikowski, "Genres of Organizational Communication: A Structurational Approach to Studying Communication and Media," *Academy of Management Review,* Vol. 17, Iss. 2, pp. 299-326, 1992.

24. Yates, S. J., "The Textuality of Computer-Mediated Communication: Speech, writing and genre in CMC discourse," Open University, Ph.D. Dissertation, Institute of Educational Technology, 1993.