"Don't forget to put the cat out" - or why collaborative authoring software and everyday writing pass one another by!

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Abstract

Hypermedia technology is seen as offering potentially innovative support for the process of writing as much as information access and reading. However, authoring environments to date have had little impact in the real-world production of text. One possible reason is our poor conceptualisation of current writing practice. In the present paper, 31 adult writers kept diaries of their writing activities over the course of one week. The results indicate that for most people, real world writing is a short communicative act aimed at a limited audience and that technological support for such writing is less likely to resemble a hypermedia workstation than a portable personal communication device. Implications for work in the design of authoring tools are developed.

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Introduction

Wittgenstein (1953) criticised psychological enquiry on the grounds that its methods dictated its identification of problems with the result that real problems were overlooked. A similar criticism could be made of contemporary software design in the domain of authoring applications. Interest in the writing process has increased over the last decade as technology has begun to significantly influence the production of text. At first it was the shift from typewriters to word processors that gained most interest (see e.g., Carroll and Mack, 1984) and issues of metaphor transfer between media were considered central. Then, given skilled word processor usage, text editing became the dominant experimental task in many HCI (Human-Computer Interaction) studies (observe e.g., its use in the classic GOMS work, Card et al., 1983), so much so that the study of human text editing came to be viewed as HCI's equivalent of the psychology's study of white rats.

Outside of HCI, researchers have sought to model human cognition while writing (see for example

Hayes and Flower, 1980; Sharples, Goodlet and Pymberton, 1989) and such work has naturally been coupled closely to the analysis of technological tools to support authoring and text production. Contemporary research embraces a rich view of writing as a complex skilled task involving multiple activities that are worthy of sophisticated technological support (Sharples, 1993).

Any technological design makes explicit the designers' views of the potential user. In this sense, an artefact is not quite the theory (Carroll and Campbell, 1989) but an instantiation of the theory or theory made manifest. It follows, that the technological designs we see established in our everyday surroundings are representative of some designers' ideas of human users and the types of activities in which they engage. This conceptualisation is useful in understanding how information technology transfers to real-world use and why it often fails to impact our lives in the way the original design team imagined. Quite simply, our models (as designers) of the user population are often distorted, inaccurate or misguided.

How designers develop accurate models is the source of much work in the field of human-computer interaction (HCI). Software engineers have always realised that user requirements information was fuzzy and prone to shift. Ergonomists have long-advocated varying degrees of task analysis that will constrain design options and lead to informed views of the user but such analyses are still the exception rather than the rule in systems design (Dillon et al, 1993). Coupled with these issues is the fact that introduction of new artefacts in task performance can alter the very performance itself in often unimaginable ways - witness the shift from typewriting to word processing that occurred in a relatively short time and the quality of current over original text editing applications which has led to a dramatic shift in the nature of much secretarial support in text production unforeseen when the original applications were introduced.

In terms of writing, such concerns are central to the development of hypermedia authoring tools which, if some of the arguments of the technical advocates are to be believed, could mark a social shift in literacy equivalent to the development of the printing press (see e.g. Tuman 1992). In this domain, elaborate claims for the impact of technology on our lives are the norm rather than the exception. Talk now is of 'cultural literacy', 'digital rhetoric' and an emerging, all empowering technoculture (see e.g., Delaney and Landow 1991). No longer are we to be constrained to write (and thereby think) linearly by the tyrannical force of an outmoded medium but we are to be liberated by an electronic information superhighway.

According to Lankan (1992): 'Electronic text invites us to play with ordinary experience rather than to exploit it, to tickle a text or image a little while using it, to defamiliarize it into art....human purpose will be both the same and utterly transformed' (p.241).

But why should this be the case? Has the advent of desktop computing, from the humble word processor to the advanced hypertext application really transformed the task of writing into such an extended cultural experience for even the most computer-literate members of the information society? Evidence to date would make it appear not and it is difficult to envisage such an awe inspiring technological and commensurate cultural shift once the perspective of artefact as theory

instantiation is taken.

Trigg and Suchman (1989) report how they used NoteCards as a collaborative authoring environment in their work. They clearly saw the advantages of a hypertext medium and were quick to borrow a rhetoric from communications theory and sociology in proposing issues worthy of examination such as 'meta discussions' and 'convention adoption'. Yet, as Dillon (1993) pointed out, their published account provides few insights that support the claim that collaborative authoring is itself aided by hypertext or even information technology and their writing experience with the new medium strikes one as curiously equivalent to typical writing practice now, and very far from a paradigm shift in text creation.

Other advocates (e.g., Hahn *et al.*, 1991) concentrate more on how the technology to support collaborative authoring is constructed rather than used. While such issues are undoubtedly important they rely on the assumption that such tools are desirable. Even if they are (and it is not yet clear that this is the case), their design is doomed to failure if discussions of functionality and facility provision occur in isolation from user considerations. Even the most recent published studies of collaborative or computer-supported writing (e.g., Sharples, 1993) fail to provide little more than the wish-fulfillment of technological advocates and their disdain for empirical correctives.

There is currently a dearth of evidence in the literature on the nature and extent of writing as it naturally occurs. Indeed, while this statement should not be seen as anyway critical of the pioneering work in cognitive science and human factors on composition and the effects of text-creation tools on authoring (work that the present authors commend as essential to our knowledge base), we are left with common-sense impressions (at best) of how writing proceeds in the everyday contexts of most people's lives. In the empirical vacuum that surrounds the critical evaluation of innovative information technologies, it is the hype that gets most attention, and informed debate that self-destructs. This can only lead to malformed artefacts that will fail basic tests of usability and acceptability regardless of wonderful functionality since the theoretical views of the writer they instantiate are so weakly articulated. No wonder then that Rada *et al* (1989) report that contrary to all assumptions, collaborative writing in their study proceeded better with paper and pen than with hypermedia.

It is against this backdrop that the present research was carried out. In an attempt to gain a firm foothold on current practices we undertook a study of adult writing in context. In order to make it as ecologically valid as possible we decided on a non-observational, writer-regulatory approach involving adult writers monitoring their own authoring over a one week period and keeping a diary of their experiences. Obviously such a method of investigation is potentially problematic. Relying on subjects' own interpretations and their abilities to maintain an accurate record requires the surrendering of control on the investigators part and greatly lessens our opportunities for statistical analyses of the resulting data. We make no claims to methodological purity with this approach but we justify its use on the grounds of potential coverage and its undoubted utility in gaining access to data that are both essential to the work in this domain and stubbornly difficult to obtain by more traditional means. The scope and nature of the study is outlined in detail in the following sections.

The Study

The diary-keeping approach required participants to record their own activities in a form that seemed most appropriate to themselves. However, to facilitate comparison, a record-keeping template was developed by the authors that focussed attention on key features of the activity. These included:

- the date,
- the time of day,
- the length of text produced,
- the medium on which it was produced,
- reason for writing,
- location,
- whether it was collaborative or not, and
- the duration of writing activity.

This template was presented to participants as an aide memoire and not a prescriptive form but all were told that this was the minimum amount of information required for each entry. Our basic level of unit was a writer-defined 'task' - one complete interaction of writer and text resulting in a definable output. Thus for purposes of this study, 'writing' is taken to mean those acts that the participants chose to define as such.

Participants

Thirty-six potential participants were approached to keep diaries of writing activities for one week. Twenty of these were academics at Loughborough University of Technology and 16 were a mixed group of non-academics. Of these, 31 (18 academics and 13 non-academics) produced suitable diaries that were subsequently analysed. Of these, 16 were male and 15 female whom were distributed relatively evenly between academic and non-academic groups.

Procedure

Willing participants were approached in person by one of the authors and the goals of the study were explained. The format of the diary was outlined in detail and all participants received blank summary sheets on which to base their record-keeping. All questions participants had were answered and a starting date for the diary keeping exercise was identified. It was stressed that subjects should keep a record of **every** writing task carried out by them over the seven-day period,

for example, from the most trivial (e.g., signing a form or writing a cheque) to the most elaborate (e.g., composing a long document) and that they should try to keep the diary concurrently i.e., to complete is as and when writing tasks ended rather than at the end of the day. It was also stressed that use of electronic writing tools was to be included in the survey, for example, use of word processors or electronic mail. Instruction sheets outlining all points covered in this initial meeting were also presented to participants. One investigator also explained to the subjects that she would come back after the seven day period had elapsed in order to collect the completed diaries, and that she would also make attempts to contact the participants regularly throughout their seven-day period in order to check progress and remind them of maintaining constant records.

Results

Complete diaries were received from 31 participants, 18 of whom were academics. For the purposes of this Results section we present the analysis at the task level, for it is here that we are most likely to find appropriate patterns in behaviour that technical systems can be developed to support. The data are divided where relevant into two groups since it seems likely that professional role might well be an indicator of writing activity. These will be referred to as the academic group and the non-academic group but the data are straightforward enough to combine should one seek the collective view.

As mentioned above in the Method section, forms were designed to facilitate the reporting of writing tasks. In all, 29 of the 31 participants completed the forms, the remaining 2 devising their own method of recording their writing tasks. One participant omitted all details of the length of each writing task he reported.

Due to the subjective nature of writing, there was variation in the level of detail supplied from person to person. The data were considered in terms of the total number of writing tasks reported by all the participants, which came to 929 (518 from the academic participants and 411 from the non-academic participants). An individual writing task was taken to be one entry made by a participant, that is, each instance of writing as reported by a participant. This enabled quantitative analysis of writing tasks in terms of duration and size.

The results obtained are summarised in tabular form in the following sections. In each case, the number of writing tasks is given for the category, and is followed in brackets by the same number expressed in terms of a percentage of the total number of tasks for each group.

When do people write?

The literature on writing often takes as its benchmarks writing at work or in the educational setting suggesting a working week bias in writing tasks. In the present situation we asked writers to maintain a record both of the day of the week and the time within each day. The results suggest that the working day/week model has some accuracy. For all participants, 88% of tasks were performed during the period Monday to Friday, only 12% of writing tasks being completed at weekends. A day

by-day breakdown of writing by group is presented in Figure 1.

Figure 1 Day of the week in which writing was carried out.

Both groups seem to write similar amounts across the week, with the exception of Tuesdays and Thursdays. In order to explain these busy days, it is necessary to consider the method used to carry out this survey. It has been noted that the seven day period during which diaries were kept was not the same for each participant, and table 1 below illustrates the spread of the days on which the participants began keeping their diary.

As can be seen, half the academic participants began keeping the diary on a Tuesday, which as it turned out was the day after a Bank Holiday in the U.K. Therefore, having missed a day at work, this might explain the proportionately greater amount of tasks recorded.

Day	Academic	Non-Academic
Saturday	0	0
Sunday	0	0

Monday	2	3
Tuesday	9	1
Wednesday	2	7
Thursday	1	1
Friday	4	1

Table 1. Day of the week in which diary keeping commenced

Furthermore, recency and latency effects might have occurred as participants adopted a more conscientious record keeping manner at the start or near the end of the week. Indeed, an assessment of writing over the course of the diary keeping period seems to support this hypothesis as indicated in Figure 2 below.

Figure 2. Writing tasks per group as a function of day in the diary-keeping week.

As can be seen, in both groups, lowest reported writing activities occurred midweek (relative to

starting day), while the largest number of writing acts seemed to occur in days one and two, lending some support to the notion of recency and latency effects over any underlying week-day effect. No participant reported a day when they did not write. Therefore it seems as if writing is an everyday activity for all participants with some lessening of activity at the weekends.

Time of day

In as much as there is an image of normal writing times in any one day, one may presume an emphasis on working hours although time of day effects might be expected for morning/afternoon preferences or for peaks and troughs within these periods. The time of day in which writing occurred in these diaries is presented in Table 2.

<i>Time</i>	8am - 12pm	12pm - 6pm	6pm - 2am	TOTAL
academic				
(n = 18)	228 (44%)	220 (43%)	66 (13%)	514
Non-academic				
(n = 13)	170 (42%)	178 (44%)	55 (14%)	403

Table 2. Time of day when writing occurred.

Since incomplete information was recorded, Table 2 shows a lower total of writing tasks. No obvious pattern emerged from a coding of time on an hourly basis thus the data were divided up to encompass a working morning, a working afternoon, and the evening hours indicating a relatively flat activity line rather than any noticeable peaks or troughs either for individuals or for groups. None of the participants reported any writing tasks as taking place between 2am and 8am. Once more, the percentages between the two groups are very similar. No interaction between time of day and day of the week was observed.

So the answer to the question “when do people write?” seems to indicate that writing is mainly a daytime activity that occurs steadily across typical working hours. However, over 10% of writing occurs at weekends or in the evenings.

How much writing is produced?

When one thinks of writing it is almost always of the authoring or correction of lengthy pieces of text such as article creation, report generation or creative story writing. Such views are implicit in our terms for applications such as document outliners, writing environments or writing tools which emphasise the undertaking of major writing tasks and their need for technical support. Table 3 (below) summarises the information collected with respect to the length of the writing tasks reported by the present sample and it is clear that this view is not entirely consistent with the data

since for much of the time writing involves little more than the creation of a few lines of text rather than a long document.

As mentioned above, one of the participants designed his own method of reporting his writing, and this led to him omitting to include this information. Therefore, for this frequency count, his diary was not included. Some participants reported "screens full" of writing when using electronic media. In order to avoid bias against accuracy in electronic writing, these have been converted into an equivalent length in terms of either number of lines, or the printed A4 page.

Length	Academic (n = 17)	Non-academic (n = 13)
Words/figures	23 (4.8%)	80 (19.5%)
1 - 5 lines	153 (31.7%)	128 (31.1%)
6 - 10 lines	30 (6.2%)	47 (11.4%)
11 - 40 lines	26 (13.7%)	24 (6.8%)
1 page	75 (15.8%)	43 (14.9%)
2 pages	36 (7.5%)	26 (6.3%)
3 pages	26 (5.4%)	9 (2.2%)
4 pages	25 (5.2%)	13 (3.2%)
5 pages	7 (1.4%)	5 (1.2%)
6 - 10 pages	21 (4.4%)	9 (2.2%)
11 - 40 pages	19 (3.9%)	4 (1.0%)
> 40 pages	0	1 (0.2%)
TOTAL	482	411

Table 3. Length of written text for each group

For both groups, the most typical length of composition is less than five lines, more than half of all composition is less than a page in length and almost two-thirds of all writing results in an output of at most one-page. Worth noting here is the fact that the majority of these outputs are discrete and not merely the page-long additions to lengthier texts that are being built up over multiple sessions. In reality, most of the time when people write they are not composing lengthy pieces.

This is an interesting finding vis-a-vis our conceptualisation of the technology required to support the process. In contrast to the view implicit in the current authoring systems under development and discussion in the literature (see. e.g., Daiute, 1985), a technology aimed at supporting the majority of writing tasks recorded in these diaries would not need to concern itself with argument outlining or with jumping and linking routines but is more likely to concentrate on communicability and rapid input. This issue will be discussed further when the remaining data are presented.

What are people writing with?

If the information revolution is having real impact on writing it would be expected that the authoring act was increasingly occurring electronically. Furthermore, if hypermedia is to have an impact on authoring processes it might be argued that we should be seeing the emergence of advanced authoring tools being employed also (although this argument is conveniently flexible to be interpreted either way depending on the findings since the absence of such tools could be seen as an inherent failure on their part that hypermedia authoring tools will obviously overcome).

Table 4 presents a summary of the medium employed by the present sample. In total, 65% of academic's writing tasks and 77.4% of non-academic's writing tasks were on paper of some form. The table suggests that proportionately more use was made of electronic media by the academic participants.

<i>Text medium</i>	Academic (n = 18)	Non-academic (n=13)
Paper	295 (56.9%)	276 (67.2%)
Word Processor	113 (21.8%)	56 (13.6%)
Electronic Mail	43 (8.3%)	13 (3.2%)
Database	1 (0.2%)	0
Card	10 (1.9%)	11 (2.7%)
Statistics package	8 (1.5%)	2 (0.5%)
Hand	2 (0.4%)	1 (0.2%)
Diary (other)	2 (0.4%)	12 (2.9%)
Disk Label	1 (0.2%)	1 (0.2%)
Beer Mat/Napkin	3 (0.6%)	0
White board	3 (0.6%)	0
Compliments Slip	1 (0.2%)	0
Envelope	3 (0.6%)	6 (1.5%)
Computer Broadcast	6 (1.1%)	0
Desk Top Publishing	2 (0.4%)	0
Post-It Note	15 (2.9%)	6 (1.5%)
Compiler editor	3 (0.6%)	8 (1.9%)
Credit Card Receipt	1 (0.2%)	0
Home PC	1 (0.2%)	0
Electronic Bulletin Board	2 (0.4%)	0
Transparencies for OHP	2 (0.4%)	0
Telnet	1 (0.2%)	0
Computer Spreadsheet	0	2 (0.5%)

OPAC	0	8 (1.9%)
Newspaper	0	6 (1.5%)
Photographic Prints	0	1 (0.2%)
Blackboard	0	2 (0.5%)
TOTAL	518	411

Table 4. Writing tasks classified by medium

It is worth noting in this context Shackel's (1990) finding that over 90% of academics in his sample (from the same University) had a computer on their desks then. Hence we would expect high levels of usage for this technology yet it still only accounts for around one-fifth of academic writing acts. What is curious for the academic group at least is the wide range of media employed. Although we might talk of paper as a standard medium, it covers more than the imagined A4 white sheet. As these diaries testify, people write on all sorts of bits of paper, often appearing to reach for the most affordable medium close to hand (such as beer mats). It is in such an analysis that we come to appreciate writing as opportunistic and communicative, acting as a form of external memory (the post-it note or one's hand), verification (the credit card note) or instruction (the envelope). For electronic medium watchers there is the use of electronic messaging systems, email and even OPACs as writing technology. In these data are indices of the diversity of everyday writing.

Where do people do their writing?

The traditional view of writing, and one that is reinforced in the technologist's image of text support systems is of a seated, desk-bound writer. Indeed, as table 5 shows, although the majority of writing seems to occur in the workplace, a quarter of all academic writing and 40% of non-academic writing occurs in the home, in shops, banks and on the move. Even if we examine the majority of writing occurring in the workplace, we cannot be certain that it is occurring at the writer's desk since incidental observation of some of the academics at work indicated frequent movement throughout their buildings. To date, none of the discussions of hypermedia authoring support systems have addressed mobility directly.

<i>Location</i>	Academic (n = 18)	Non-academic (n = 13)
Work	385 (74.3%)	250 (60.8%)
Home	83 (16.0%)	108 (26.4%)
Alternative Workplace	18 (3.5%)	13 (3.2%)
Shop/Bank	11 (2.2%)	7 (1.7%)
Transport	8 (1.5%)	4 (0.9%)
Leisure Place	10 (1.9%)	19 (4.6%)
Another Home	3 (0.6%)	10 (2.4%)
TOTAL	518	411

Table 5. Writing classified by location.

How long do people spend writing?

As with the length of document, there is an implicit assumption in the field as a whole that people are spending extended periods of time writing one document and thus the technological support that they require must be designed to facilitate this process. It can be seen from Table 6 (reduced data set resulted from some participants failing to provide this information) that writing typically occurs in short bursts not extended periods of time. Furthermore, the diaries suggest that such bursts of writing are not parts of an overall authoring act but discrete activities.

<i>Length of time spent writing</i>	Academic (n = 13)	Non-academic (n = 8)
< 1 min	8 (3.0%)	62 (23.8%)
1 min	24 (8.9%)	18 (6.9%)
2 mins	18 (6.7%)	21 (8.1%)
3 mins	6 (2.2%)	11 (4.3%)
4 mins	2 (0.7%)	5 (1.9%)
5 mins	20 (7.4%)	20 (7.7%)
6-10 mins	22 (8.2%)	20 (7.7%)
11 - 15 mins	29 (10.8%)	19 (7.3%)
16 - 30 mins	47 (17.6%)	26 (10.0%)
31 - 45 mins	10 (3.7%)	3 (1.2%)
46 - 59 mins	5 (1.9%)	4 (1.5%)
1 - 2 hours	41 (15.2%)	28 (10.8%)
2 - 3 hours	25 (9.3%)	14 (5.4%)
3 - 4 hours	9 (3.3%)	4 (1.5%)
4 - 5 hours	0	3 (1.2%)

> 5 hours	3 (1.1%)	2 (0.7%)
TOTAL	269	260

Table 6. Duration of writing tasks

Here there are slight differences apparent between the groups with the academics tending to write for longer stretches (30% of all academic writing takes between 11 and 45 minutes while 30% of non-academic writing takes one minute or less). This finding does seem to reflect professional differences as traditionally envisaged.

Why do people write?

Perhaps the most crucial aspect of the analysis of human activities is why people do what they do. We considered this issue to be of central importance in coming to an informed understanding of what it is that people do when they write. The diaries allowed participants to explain the reason behind their decision to write and such data place many of the other findings in a more meaningful interpretative context.

To aid analysis given the diversity of response we obtained, each stated reason was written on a card, and sorted by the two authors independently into categories. Since there were 929 tasks in all, any duplicates as determined by both were assigned one card only, which led to a significant reduction in the amount of cards to be handled (reduced to 230). The cards were then sorted independently by the authors as raters and the results compared. Despite data set reduction, the process of sorting the cards proved laborious, and took both sorters between 2 and 3 hours each to complete. It was then necessary to collate the remaining 699 duplicated reasons, a task which took a day to complete. This latter task was necessary in order to ensure that all 929 tasks had been categorised correctly, and that the results from both of the card sorters could be compared.

Rater 1

Rater 2

Category	No. of Tasks	Category	No. of Tasks
	Notes/records of events/memos		308 (33%)
	Notes/reminders		299 (32%)
Drafts/text creation	125 (14%)	Text creation	46 (5%)
Form filling	85 (9%)	Forms	93 (10%)
Lists	84 (9%)	Lists	88 (9%)
Editing	67 (7%)	Editing	63 (7%)
Replies	29 (3%)	Messages and replies	135 (15%)
Unclassified	37 (4.0%)	"One-liners"	49 (5.3%)

Addresses	33 (3.5%)	Reports/summaries	37 (4.0%)
Signatures	32 (3.4%)	Addresses	26 (2.8%)
Reports	22 (2.4%)	Notices/announcements	20 (2.1%)
Cards	16 (1.7%)	Drawings	17 (1.8%)
Calculations	14 (1.5%)	Calculations	16 (1.7%)
Instructions/plans	14 (1.5%)	Instructional/teaching	16 (1.7%)
Labels and markers	14 (1.5%)	Computer programs	13 (1.4%)
Graphics	12 (1.3%)	Unclassified	6 (0.6%)
Computer programs	12 (1.3%)	Creative	5 (0.5%)
Notices/info updates	10 (1.1%)		
Summarising	8 (0.9%)		
Explanations	5 (0.5%)		
Doodles	2 (0.2%)		

Table 7. Major categorisation of writing tasks by two independent raters

Over 20 categories were identified by the raters and are presented in table 7 with scores per category expressed as raw data and percentages of the total.

As can be seen, there is close agreement between the raters as to the nature of categorisation, as well as the percentage of tasks included within their categories. The top seven categories included in the above table account for the majority of the writing tasks (75% for Rater 1, and 78% for Rater 2). A formal correlation analysis was not deemed necessary since the data largely speak for themselves as presented here. That is, those categories which took in the larger amounts of writing tasks were considered similar in nature and size by both of the card sorters.

There are, however, two obvious exceptions which are brought out by the table, and these occur in the categories comprising "drafts/text creation" and "messages and replies". Rater 1 designated 125 (14%) of the 929 writing tasks as being "drafts/text creation", whereas Rater 2 included only 5% of the total to a similar category, called "text creation". This was mainly due to the fact that the card sorters classified the task of sending a message through the electronic mail system differently. Rater 1 considered electronic mailing as a type of draft or text creation, whereas Rater 2 counted it in her category for messages and replies. Since there were 41 electronic mail messages reported by the participants, which works out as 4% of the total, this obviously had some effect on the categorisation scores. Furthermore, Rater 2 included electronic mailing within the category entitled "messages and replies", and the table above illustrates a comparatively large difference between the percentage of tasks within that grouping, since Rater 1 classified some writing outputs only as "replies".

There are also two categories which are alike in nature, but which have slightly different titles, and

these are "notices/announcements/ information updates" and "graphics" designated by Rater 1 which seem to match "notices/announcements" and "drawings" from Rater 2.

The results of these analyses tell us why people start to write and by far the most important motivation is to provide some form of reminder or record of an event. The heading "notes/records etc." covers all occurrences of diary entries detailing such writing acts as taking a message of who called on the telephone, the time and location of a meeting, a note to a colleague and the apocryphal "don't forget to put the cat out." In this sense we can see the writing act both as a means of externalising memory into the world around us, using the physical world to provide us with the means of recording and maintaining information, and as an extended communicative act, supporting the delivery of information even in the absence of a recipient. Were a technological solution to be required for any imagined problem here it might look less like a workstation than a personal communicator.

Text creation and drafting of lengthy documents is a far less common reason for writing than imagined although it still registers in at least one raters categorisation as the next largest reason. Despite the possible explanation for the divergence between the categorisers here, it must be noted that even if the highest estimate is taken (14%), such writing acts are not the most common by a long shot. Thus the field's concern with the possible technology to support such writing processes might be better placed examining the broader range of writing acts.

Do people write collaboratively?

Of the total 929 writing tasks recorded, 124 (13%) were reported as being collaborative in nature. Only 2 participants (1 from each group) explicitly reported that none of their writing was collaborative, and a third participant omitted to include any information on collaboration in his writing (subsequent questioning revealed that some had been collaborative though his data was not used for further analysis of this issue).

Looking at the two groups separately, for academics, 15% of tasks were considered to be collaborative; for non-academics this was 10%.

The analysis of collaboration was carried out in a similar way to that for the total writing tasks, however, those tasks which were reported as being collaborative were singled out and analysed separately from the rest. This concentration on collaborative writing acts was deemed important in this context since it is precisely this form of writing that may be most amenable to electronic support (see e.g., Sharples, 1993).

No effect for day of the week or time of day was observed with both groups producing most collaborative work mid-week and during the day. In other words, there seems to be nothing intrinsic to collaborative writing that distinguishes it in terms of time of occurrence from non-collaborative writing. Between groups however, academics produced more collaborative writing in the evenings (17%) than non-academics (5%).

In terms of length, there were slight differences between the collaborative and non collaborative tasks with far fewer collaborative writing tasks resulting in texts of five lines or less and slightly more occurring at the 1 page or more level for both groups. These results are summarised in Table 8.

<i>Length</i>	academic (n = 18)	Non-academics (n = 13)
Words/figures	1 (1.2%)	5 (11.9%)
1 - 5 lines	7 (8.5%)	3 (7.1%)
6 - 10 lines	6 (7.3%)	5 (11.9%)
11 - 40 lines	5 (6.1%)	3 (7.1%)
> 40 lines	0	4 (9.5%)
1/2 page	11 (13.5%)	0
1 page	13 (15.8%)	8 (19.1%)
2 pages	7 (8.5%)	6 (14.3%)
3 pages	5 (6.1%)	4 (9.5%)
4 pages	8 (9.8%)	2 (4.8%)
5 pages	3 (3.6%)	0
6 - 10 pages	8 (9.8%)	2 (4.8%)
11 - 40 pages	8 (9.8%)	0
> 40 pages	0	0
TOTAL	82	42

Table 8. Length of writing for collaborative tasks.

The majority of collaborative tasks were carried out using paper-based media. This was particularly true of the non-academic participants, among whom 67% of collaborative writers employed paper-based media - i.e., exactly as for total writing tasks. For academic authors, collaborative writing also occurred mostly on paper although only 56% in this case as opposed 65% for total tasks suggesting a greater use of electronic media for collaborative writing than for non-collaborative writing among academics. Location of collaborative writing activities was similarly workplace-rooted.

Rater 1

Rater 2

Category	No. of tasks (% of total amount of collaborative tasks)	Category	No. of tasks (% of total amount of collaborative tasks)
Editing	26 (21.0%)	Editing	26 (21.0%)

Notes/records of events/memos	19 (15.3%)	Notes/reminders	19 (15.3%)
Drafts/text creation	15 (12.1%)	Text creation	15 (12.1%)
Lists	11 (8.9%)	Lists	11 (8.9%)
Unclassified	11 (8.9%)	Messages and replies	10 (8.1%)
Computer programs	7 (5.6%)	Reports/ summaries	8 (6.5%)
Form-filling	6 (4.8%)	Forms	8 (6.5%)
Graphics	6 (4.8%)	Drawings	7 (5.6%)
Calculations	4 (3.2%)	Computer programs	7 (5.6%)
Summarising	4 (3.2%)	Instructional/ teaching	5 (4.0%)
Reports	4 (3.2%)	Calculations	4 (3.2%)
Replies	3 (2.4%)	Notices/announcements	3 (2.4%)
Instructions/plans	3 (2.4%)	One-liners	1 (0.8%)
Notices/announcements/info updates	2 (1.6%)	Creative	0
Cards	1 (0.8%)	Addresses	0
Labels and markers	1 (0.8%)	Unclassified	0
Explanations	1		
TOTAL	124	TOTAL	124

Table 9. Reason for writing collaboratively.

Given that collaborative writing seems to reflect many of the same characteristics as non-collaborative writing (with some shift towards the creation of lengthier text and the slightly greater reliance on electronic media for academics), it is interesting to consider how the motivation or reason for writing might be different in the collaborative arena. Table 9 summarises findings from the content analysis carried out by the raters.

The table shows that the highest percentage of collaborative writing tasks for both card sorters were counted in the "editing" category, and indeed the four groupings with the highest frequency counts were of similar nature according to the sorters, as well as containing exactly the same number of tasks.

Discussion

The data captured here were task based. Writers recorded their actions on the basis of one unit of writing activity as they perceived it. In organising data capture that way, we sought to understand the motivation for writing - the initiation of the process, the intention of the author and the situation of its occurrence. In effect we obtained a low-level naturalistic description of the everyday performance of this skilled activity.

We see several trends in this data that are in need of attention from advocates of a new-world literacy mediated by technological advances. First, the reasons people write are very varied. It is insufficient to postulate hypermedia based authoring tools predicated on a view of the writer as communicator of complex arguments. Writers do seek to communicate but in the vast majority of cases it is often to themselves or to participants in a rapid-response two-way dialogue, to maintain or generate records and so forth. We must seek to answer the question therefore, are such forms of writing to be considered outside of the concerns of researchers and developers of hypermedia applications? If so, we may maintain the cosy image we have of 'real writing' but at the price of greatly diminished ecological validity.

Second, writing is a well-practiced skill for most adult writers in our communities (and this includes all technologically advanced societies). Part of the reason for this is the means we have constructed (and are capable of exploiting) to perform this act. The world around us is shaped to afford writing objects (witness the multiple forms of paper used by participants such as beer mats, scraps of paper, their own limbs!) and the humble pen or pencil is a highly usable artefact whose basic modus operandum is both intuitive and transferable. The output of a writing act can utilise physical location and spatial cuing to attract the attention of the intended recipient (notes pinned to doors, left on chairs or stuffed in milkbottles). This is not true of even the most sophisticated authoring tools we have at this time and an interactive technology capable of replacing or even matching this would be a marvel of design indeed.

Third, writing is not predominantly collaborative and the drive towards shared workspaces might not be as necessary as frequently postulated by many in this field. Certainly, a proportion of writing is collaborative but it is a small proportion. While many researchers seem to interpret the Faigley and Miller (1982) finding that 75% of all authors write collaboratively at some time as an indication of the extent of collaboration, our findings suggest that the proportion is indeed higher (closer to 90%) but that the typical rate of performance is far lower than such figure may be misconstrued to suggest.

In terms of hypermedia authoring studies and suggestions for technological support for writers, we need to refine our image of precisely how this work should progress. If through technological artefacts we seek to support the performance of human tasks then our first duty is to understand clearly what such tasks are and how and when they are carried out. If, as it seems from the present data, lengthy and/or collaborative writing is not the norm then our concern to support only this form of writing needs to be justified. If typical everyday writing is not to be addressed by

hypermedia and collaborative work research then we place beyond the pale the majority of tasks most typically performed by writers.

If on the other hand we seek to support writing in all its glory then our image of appropriate technologies must be broadened. In the sense that an artefact is an instantiation of theory then current document support systems should seek to better outline their theories of the writer or risk missing their targets. On the basis of the present data, we imagine the hypermedia equivalent to the pen and paper of old to be less like a workstation and more like a communication device - one whose outputs ought to have the throwaway-ability of paper or be linked into a world wide web of similar devices that support locational placement of message and tolerate absence of recipient at time of arrival.

While we may only speculate on such technologies (and one finds closer agreement with Nelson's original ideas on xanalogical structures with such speculation) we need to address the image of the writer implicit in the arguments for digital rhetoric which become explicit in the technological devices such arguments produce. Certainly writing may shift as new media emerge, but it is only by informing such emergent systems with current practices that we can produce a more democratising technology, not a elitist one.

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