

A course on academic research paper writing

You have been given three research articles about various topics. Go over them quickly and answer the following questions.

How many parts does this academic article consist of? What are they?
Art1
Art2
Art3
2. What does the introduction contain?
Art1
Art2
Art3
3. What does the body contain?
Art1
Art2
Art3
4. What does the conclusion contain?
Art1
Art2
Art3
5. What is the main discussion about? What is the research question being investigated/discussed?
Art1
Art2
Art3
6. Are there any paraphrases of other researchers' work? Write one of them in the space provided. List the introductory phrases used before the paraphrases.
Art1

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Art2 Art3
7. Are there any direct quotations from other researchers' work? List the introductory phrases used before direct quotations.
Art1 Art2 Art3
8. How many references does the article have? What kind of sources are used? (Book, journal article, website, magazine, etc...)
Art1 Art2 Art3
9. Do you notice specific writing conventions about form that this article follows?
Art1 Art2 Art3

Student views on learning grammar with web- and book-based materials

Huw Jarvis and Marta Szymczyk

This paper reports on a study which examined students' attitudes to learning grammar in autonomous contexts and their preferences for the learning materials with which to do so. In all, 38 students were surveyed and 13 of these then spent some time working in a language resource centre (LRC) with web- and paper-based materials. Students then completed a series of questionnaires concerning what they liked and disliked about the two types of materials. Four participants were then interviewed in more detail about their responses. The data suggest that despite the well-documented advantages of the tutorial role of computers and the notion of the 'digital native', participants generally preferred working with paper-based materials. The paper concludes with a discussion of the implications of this for materials that LRCs stock and for the changing role of computers in self-study contexts.

Introduction

For many years, learner autonomy has been considered important and language resource centres (LRCs) and the materials that are stocked within them are frequently viewed as ideal physical locations to facilitate such autonomy. Centres will usually provide materials to cover the range of language skills as well as vocabulary, and arguably above all else, grammar-based materials. In a bygone era, such materials would be exclusively paper-based frequently comprising in-house task sheets and published self-study resource books. More recently, computers have come to play a significant role and in many contexts it would be difficult to imagine an LRC without computers.

It is against this background of change that a debate about the role of computers in the teaching and learning of grammar has emerged, a debate which has largely been discussed in terms of the advantages and limitations of computer-assisted language learning (CALL) as 'tutorial CALL' (Levy 1997), in which the computer takes on a teaching function by providing corrections to exercises. Such tutorial CALL offers a number of opportunities for grammar practice. Like more traditional paper-based alternatives, the material allows for practice and production, both in the class and beyond, in fairly controlled situations. With websites now being the primary delivery mode, frequently available at no cost, the resource can be seen as providing 'anywhere, anytime' learning material. Such websites would seem then to ideally match the needs of our 'digital native students' (Prensky 2001) who have known nothing but digitalized technologies

throughout their lives. Tutorial CALL is viewed by some as a dated application and one which is associated with a bygone era of Skinner (1954) and behaviourism, and as such, it is sometimes characterized as 'drill and kill' because students would mechanically input answers into a computer software program over and over again until they got it right. Recently, however, we have seen a renewed interest in, and an evaluation of, its role. In a key publication, Levy and Stockwell (2006: 185) note that 'Although a highly valid and useful application of CALL, drill based grammar activities, which comprise a significant proportion of grammar tutorial exercises, appear to have been the target of criticism in recent years ...'. They go on to suggest that 'Drill-based activities most certainly still have their place in the language curriculum'. The work of Hubbard and Siskin (2004: 495) sets out to identify and then dispel a number of myths. They conclude that '... it is still a valuable part of CALL and deserves serious attention rather than summary dismissal'.

We have already noted the digital native, but there have been at least two other arguments which have been put forward to support tutorial CALL over and above paper-based alternatives. Firstly, with its instant (albeit sometimes limited) feedback, it is seen as being particularly helpful in developing learner autonomy. Jarvis (2008: 369), however, characterizes such links as both well established and problematic:

They are well-established in that it is a commonly held view that the two go together ... The links are problematic, however, in that there is little in the literature which examines what students actually do in such centres and why; empirical data on the practices and perceptions of learners is noticeably missing ...

Secondly, tutorial CALL's motivational value has, over many years, been considered significant. It was over ten years ago that Carrier (1997: 280) observed that 'if we have learned anything from ten years of CALL experiments and lesson development, it is this: computer lessons are motivating ...' whilst Garcia and Arias (2000: 457) assert that their study '... proves that computers enhance motivation and effective learning'.

Given the importance of grammar in independent study, the well-established role of tutorial CALL, the notion of the digital native, and the proliferation of both web- and paper-based resource books, it is perhaps rather surprising that there have been few studies which compare such resources from the perspective of the learner. This study attempts to address this shortfall. In doing so, it helps teachers by identifying what students think of such self-study materials, it also better informs schools, colleges, and universities about the types of materials to stock in their resource centres. Additionally, the findings contribute to an ongoing debate about the role of computers for self-study in language pedagogy.

The study

Our primary questions were as follows:

- What attitudes do students have towards learning grammar outside the classroom?
- Do students prefer websites or paper-based self-study resource books to learn grammar outside the classroom?

- What is the motivational impact of websites and paper-based self-study resource books for learning grammar outside the classroom?

Data were gathered using a variety of quantitative and qualitative techniques. The former were used to explore 'the measurement and analysis of causal relationships between variables, not processes' whilst the latter allowed for a focus on 'processes and meanings that are not rigorously examined, or measured in terms of quantity, amount, intensity, or frequency' (Denzin and Lincoln 1998: 8). During the first phase of the study, participants were asked to fill in a short questionnaire about themselves and their attitudes towards learning grammar (Appendix 1). The second stage of the study, which will be referred to as 'the tasks', aimed at comparing two different materials for independent grammar practice: a free website and a traditional self-study book. These were selected as typical representations of what is currently available with a design and approach which emphasizes 'two predominant methodological features: the provision of descriptions of grammatical points and controlled production exercises' (Ellis 2002: 176)—the primary difference between the materials lies in the medium of delivery and the feedback (automated for the websites). For web-based materials, we used:

- <http://www.english-4u.de/grammar1.htm>
- http://www.englishclub.com/grammar/verb-tenses_present-perfect.htm

For paper-based self-study resource book publications, we used: Murphy (2004) and Vince and Emmerson (2006).

Before working on any of the materials, the participants had in the first phase of the study already expressed a preference for paper-based material, but in order to make more meaningful comparisons and arrive at their reasoning, we asked them to work on both sets of materials in an LRC which was done out of class time. First of all, the participants spent 30 minutes practising grammar on a free website after which they completed a questionnaire (Appendix 2). Second, the participants spent another 30 minutes practising grammar from a popular self-study book and again completed a questionnaire (Appendix 3). Finally, students were given a questionnaire which compared both sets of materials (Appendix 4). A final phase of the study comprised semi-structured interviews.

The first phase of the study involved 38 non-native speakers (NNSs) of English between the ages of 17 and 52 years from Jordan, Morocco, Dominican Republic, Taiwan, Thailand, Saudi Arabia, Greece, the People's Republic of China, Cyprus, Libya, Vietnam, United Arab Emirates, and Turkey. All of them were enrolled on a pre-sessional EAP (English for Academic Purposes) programme at a British University, and as such, all would be going on to further academic study in English upon successful completion of their course. The participants can thus be regarded as having high extrinsic motivation. However, of these, 30 out of the 38 declared that they actually spent time on studying grammar outside the classroom, and it is this figure which is used in discussing this stage of the study. Their level of English varied from pre-intermediate to upper-intermediate, as measured

by an internal placement test. These levels correlate to an IELTS banding of between 4.5 and 7. Variables of age, country of origin, and level of English proficiency were examined but were not found to be statistically significant and are, therefore, not reported here. The second phase of the study consisted of tasks which involved 13 participants who were selected on the basis of a willingness to take part and who were available at a time when it was possible to book a computer room. The final, semi-structured interview phase comprised four participants who were selected on the basis of representing a cross-section of views and had expressed a willingness to take part. The interviews were set up at a time and in a place to suit the participants and were then recoded and transcribed.

Limitations

We acknowledge a number of limitations. Arguably, the most significant is concerned with, what Dörnyei (2001: 16) calls 'the challenge of time'. Although many theorists consider motivation as a relatively stable state, it usually evolves gradually and does not remain constant throughout a longer period of time. This study simply provides a snap shot of students' attitudes towards the materials at a particular time. Therefore, the results cannot be used to generate statements that account for different subphases of motivation that are likely to emerge with time. This is an area of further research. Secondly, for logistical reasons, the choice of materials for independent grammar practice was fairly restrictive. We do, however, consider the material to be typical of what is out there in terms of websites which deliver tutorial CALL and paper-based materials in the form of published self-study books. Finally, small samples were used and we acknowledge that further work might usefully draw upon a larger sample from a wider range of contexts as well as more intensive qualitative techniques such as observations of students working on materials. Despite these limitations, we consider that the data gathered provide us with some valuable insights into this under-explored area.

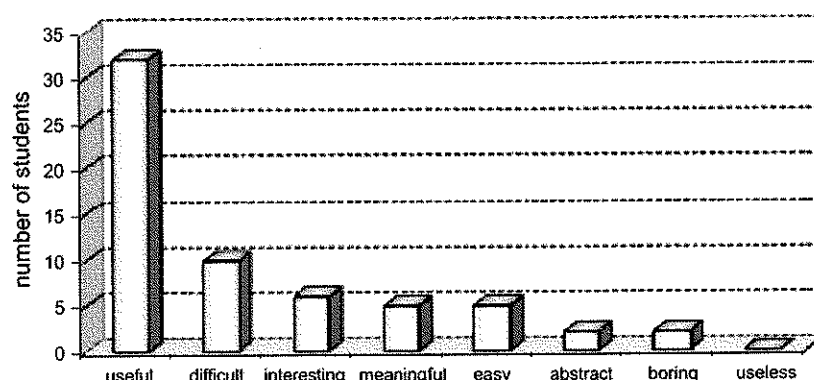
Results

Grammar practice outside the classroom

In general, participants considered grammar practice a very important aspect of language learning. For over half of them (21 students), grammar practice was of great importance. In addition, 13 students considered grammar practice of very great importance and four thought that it had some importance in language learning. Despite its recognized significance, attitudes towards grammar differed. Figure 1 illustrates how the students completed the sentence: *Grammar practice is for me.*

With regard to practising grammar independently, 30 out of 38 students declared that they spent time on studying grammar outside the classroom. Eight students reported not practising grammar independently and they provided a variety of reasons for this: lack of time (two students), because it is boring (two students), practising grammar only with a teacher during an English course (one student), practising other aspects of English such as vocabulary (one student), lack of results (one student), grammar being difficult to practise (one student). These reasons are consistent with literature suggestions regarding problems encountered while learning grammar (Fortune 1992).

FIGURE 1
Students' opinions about
grammar practice.



Our subsequent discussion of data is drawn from the 30 respondents who stated that they practised grammar independently. Regarding the amount of time spent on independent grammar practice, ten declared that they practised grammar once a week, seven two/three times a week, and six more than three times a week. Seven students stated that they practised grammar independently less than once a week. These numbers, however, should not be treated as definite. It is clear from the interviews that the amount of time devoted to independent grammar practice usually depends on a number of variables. The following comments from Interviews II and IV illustrate this:

Interview II: When I meet a problem of grammar I will check the information and practise.

Interview IV: Usually, [I practise grammar] twice a week. But it depends ... sometimes, for example, when I have test I practise more and sometimes not so often. It depends. But usually twice a week, yes.

Nevertheless, the majority of students appear to practise grammar at least once a week which seems to be due to grammar accuracy being considered an important part of general linguistic competence. The view from Interview II supports this argument: 'If your grammar is wrong it's difficult for you to communicate with others. And it's difficult for others to understand ... when you communicate you will meet difficulties where is a problem of grammar. You must speak correctly'.

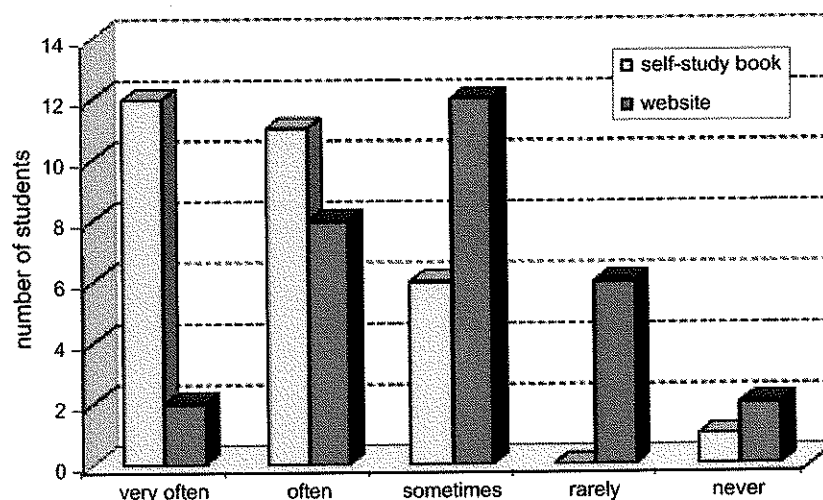
Let us turn now to the data concerning students' choices of self-study grammar materials. Figure 2 illustrates the frequency with which students use the two types of materials.

There is a clear preference for self-study resource book material over and above websites and the task phase of the study gives us some insights into the reasons for this.

Websites versus paper-based materials

This section of the study generated considerable data and the total numbers are documented in full in Appendices 2, 3, and 4. Here we will discuss the most significant findings.

FIGURE 2
Self-study grammar
materials—frequency
of use.



The questionnaire data show clearly that in comparison with websites, the self-study books were viewed more positively and this provides a degree of triangulation to the frequency findings reported in the first part of the study—one would expect students to report more positively on the materials that they chose to work with more frequently. We see that with learning grammar using websites (Appendix 2, 1.1) there is a fair degree of distributed responses across four categories of 'strongly agree', 'agree', 'uncertain', and 'disagree'. At the two extremes, the 'strongly agree' box is selected a total of 15 times and the 'disagree' box is selected 24 times across the ten criteria. For the same ten criteria with learning grammar using a self-study book (Appendix 3, 1.1), we see a lesser degree of distributed responses and a more positive tendency across the categories, here the 'strongly agree' box is selected a total of 34 times and the 'disagree' box only twice. A similar trend is evident with material design; here, at the two extremes, we can note that six students selected 'strongly agree' for at least one of the six criteria for websites (Appendix 2, 1.2) compared to 34 for self-study books (Appendix 3, 1.2) and at the other end of the scale, 14 selected 'disagree' compared to two, respectively. The materials comparison data (Appendix 4) provide further evidence of a preference for self-study books. The open-ended question about difficulties experienced at the end of Appendices 2 and 3 offers little insight into the reasons, with seven and ten participants (out of 12) simply answering 'no'.

The semi-structured interviews, however, do give some insights. Student I stressed the importance of order (sequence), as found in the book, and seemed perturbed by hypertext 'sometimes the internet direct me ... and I find myself in other pages in other subject I don't like it'. Student II expressed a similar view when commenting on the differences between the books and the websites, books were 'very systematic ... On the internet I think the materials are of various—sometimes it's very interesting but not as systematic'. Whilst Student III notes that '... you can take books with you everywhere' a similar point is made by Student IV who

reports that '... books are always available. I mean you can get them and take them almost everywhere. For me it's important because I practise in many places'.

Discussion

The study suggests that, in general, students had positive attitudes towards learning grammar independently, considered grammar practice a vital part of foreign language learning, and that they used a variety of materials for this purpose. The data revealed that students' attitudes towards the self-study book were more positive and that they considered the paper-based material more useful for independent grammar practice than the computer-based counterparts. According to students, among the advantages of self-study books, we can distinguish: availability, clear organization and gradation of exercises, comprehensible presentation and explanation of a grammar point, and clarity of instructions. The biggest limitation, on the other hand, seems to be lack of variety which makes independent grammar practice with a book boring. Regarding the computer-based material evaluation, whilst it cannot be concluded that students' feedback was negative, nonetheless the level of uncertainty was much higher. Students' perception of practising grammar on the Web was generally positive but according to them such practice also had more disadvantages. Insufficient computer skills seem to prevent many students from choosing computer-based materials for grammar practice. Moreover, a lack of systematic organization of materials tends to be perceived as a limitation. As far as advantages of computer-based materials are concerned, the biggest one seems to be variety. Many students emphasized the fact that the websites, unlike any other material, provided them with a vast amount of activities which made grammar practice more interesting.

Conclusion

This study suggests that despite the era of the digital native, our students have not, under certain circumstances, abandoned more traditional resources and it would be a mistake for practitioners and other resource providers to slavishly follow the digitalized medium route for everything. The 24/7 access argument, which is sometimes used to dismiss traditional alternatives, has been turned on its head in this study; it is an argument which was used by this small sample in support of paper-based resources. LRC providers clearly need to stock a wide range of paper-based resource materials alongside CALL alternatives. Furthermore, the potential opportunities offered by a blended approach which combines both digitalized and paper-based materials should not be overlooked and the implications for LRC design need to be addressed. All too frequently LRCs seem to be driven by and designed for digitalized resources which fail to allow for students to work with computers and paper-based resources; workspace is often equated with little more than space for a keyboard and a mouse.

We conclude that the tutorial CALL has a role but shows no sign of replacing paper-based materials. Furthermore, we draw on a parallel study (in the same LRC) to assert a less restrictive role for computers in such contexts. There is some evidence (Jarvis 2008) to suggest that NNSs view a wide range of computer materials as helping with their language studies even

where there is no explicit language learning function such as working on assignments, sending an email, or accessing information from the Web. Students clearly do recognize a role for tutorial CALL, but equally they do not prefer it to resource-based books. Indeed, arguably, today the primary role of computers in self-study contexts is as a medium of communication. The 'assisting language learning' function is just one of many, with accessing and communicating information functions probably being of greater importance. This in turn gives rise to new e-literacy challenges such as assessing the validity of websites or the conventions of writing emails, etc. (see, for example, Jarvis and Pastuszka 2008). Despite a changed context of the widespread availability of computers, a good old-fashioned self-study grammar book still has an important place for our learners.

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References

- Carrier, M.** 1997. 'ELTonline: the rise and rise of the Internet'. *ELT Journal* 51/3: 279–301.
- Denzin, N. K. and Y. S. Lincoln.** (eds.). 1998. *Collecting and Interpreting Qualitative Materials*. London: Sage.
- Dörnyei, Z.** 2001. *Teaching and Researching Motivation*. Harlow, UK: Longman.
- Ellis, R.** 2002. 'Methodological options in grammar teaching materials' in E. Hinkel and S. Fotos (eds.). *New Perspectives on Grammar Teaching in Second Language Classrooms*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Fortune, A.** 1992. 'Self-study grammar practice: learners' views and preferences'. *ELT Journal* 46/2: 160–71.
- Garcia, M. and F. Arias.** 2000. 'A comparative study in motivation and learning through print-orientated and computer orientated tests'. *Computer Assisted Language Learning* 13/4–5: 457–65.
- Hubard, P. and C. Siskin.** 2004. 'Another look at tutorial CALL'. *ReCall* 16/2: 448–61.
- Jarvis, H.** 2008. 'Computers and independent study: practices and perceptions of students' in P. Torres and R. Marriott (eds.). *Handbook of Research on E-Learning Methodologies for Language Acquisition*. Hershey, PA: Information Science Reference.
- Jarvis, H. and L. Pastuszka.** 2008. 'Electronic literacy, reading skills and non-native speakers: issues for EAP'. *CALL-EJ Online* 10/1. Available online at <http://www.tell.is.ritsumei.ac.jp/callejonline/journal/10-1/jarvis.html>. Date accessed 15 August 2008.
- Levy, M.** 1997. *Computer-Assisted Language Learning: Context and Conceptualization*. Oxford: Oxford University Press.
- Levy, M. and G. Stockwell.** 2006. *CALL Dimensions*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Murphy, R.** 2004. *English Grammar in Use: A Self-study Reference and Practice Book for Intermediate Students of English* (3rd edn.). Cambridge: Cambridge University Press.
- Prensky, M.** 2001. 'Digital natives, digital immigrants'. *On the Horizon* 9/5, MCB University Press. Available online at <http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf>. Date accessed 15 January 2008.
- Skinner, B. F.** 1954. 'The science of learning and the art of teaching'. *Harvard Educational Review* 24/1: 86–97.
- Vince, M. and P. Emmerson.** 2006. *Intermediate Language Practice*. Oxford: Macmillan.

The authors

Huw Jarvis is a Senior Lecturer in ELT at the University of Salford in the UK. He has 25 years experience as a language teacher and trainer and has worked with teachers in Sudan, Kuwait, Thailand, Malaysia, the People's Republic of China, and Taiwan. He is the webmaster and editor of www.tesolacademic.org which is a site dedicated to the linking of theory and practice in TESOL-based educational research through a series of video clips
Email: H.A.Jarvis@salford.ac.uk

Marta Szymczyk has worked as an English teacher in Poland for a number of years. She recently completed her MA in TEFL at the University of Salford.

Appendix 1

Grammar questionnaire

I GENERAL INFORMATION

- 1 How old are you?

- 2 Where are you from?

- 3 How would you describe your computer skills? (tick only one)

<input type="checkbox"/> I am an excellent computer user.	<input type="checkbox"/> I am not a good computer user.
<input type="checkbox"/> I am a good computer user.	<input type="checkbox"/> I am a poor computer user.

II INDEPENDENT GRAMMAR PRACTICE

- 4 Complete the sentence. Grammar practice is for me.
(tick as many answers as apply to you)

<input type="checkbox"/> easy	<input type="checkbox"/> useful	<input type="checkbox"/> abstract	<input type="checkbox"/> difficult
<input type="checkbox"/> boring	<input type="checkbox"/> useless	<input type="checkbox"/> meaningful	<input type="checkbox"/> interesting
- 5 How important is grammar practice in language learning to you?
(tick only one)

<input type="checkbox"/> of very great importance	<input type="checkbox"/> of some importance
<input type="checkbox"/> of great importance	<input type="checkbox"/> of no importance
- 6 Do you practise grammar independently? (tick only one)

<input type="checkbox"/> yes	<input type="checkbox"/> no
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 If **yes** go to question 8. If **no** go to question 7.
- 7 Why don't you practise grammar independently?

- 8 How often do you practise grammar independently? (tick only one)

<input type="checkbox"/> less than once a week	<input type="checkbox"/> two/three times a week
<input type="checkbox"/> once a week	<input type="checkbox"/> more than three times a week
- 9 What kind of materials do you use for **independent grammar practice**
and how often do you use each of them?
(tick all the answers that apply to you)

Type of material/ frequency of use	Very often	Often	Sometimes	Rarely	Never
Self-study books					
Free websites for practising English					

Are you willing to take part in the next stage of the study (short grammar activities and questionnaires in the LRC)?

- I am willing to take part ☐
- I am not willing to take part ☐

Please write your name and email or telephone number if you are willing to participate. Note that all information will be treated as confidential and you will not be personally named in any reported findings.

My name is _____

Tel. no _____

Email _____

Thank you for finding the time to complete this questionnaire.

Appendix 2

The task: questionnaires WEBSITE EVALUATION

(Presented with collated data)

- 1 Please think about the material that you have just used and tick (✓) the sentences which apply to you.

1.1 LEARNING GRAMMAR

The material . . .	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
a was appropriate to my age and level.	1	6	3	3	0
b was appropriate to my needs.	1	6	3	3	0
c provided me with enough practice.	4	5	2	2	0
d presented a grammar point in a clear and interesting way.	1	7	2	3	0
e contained a clear and sufficient explanations of the grammar point.	0	9	2	2	0
f presented and practised grammar structure in isolation (not in the text).	0	12	0	1	0
g contained a variety of interesting activities.	0	8	2	3	0
h was clearly organized and graded.	4	6	2	1	0
i provided me with examples and explanations of how to use the structure in different situations.	2	5	2	3	1
j stressed the importance of using the structure correctly at all times.	2	6	2	3	0

1.2 MATERIAL DESIGN

The material ...	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
a contained attractive visuals.	0	7	2	3	1
b had clear and attractive screen layout/design.	1	9	2	1	0
c used sound and visuals effectively to support grammar presentation and practice (e.g. highlight important points).	0	4	4	4	1
d was easy to use (navigate).	1	11	1	0	0
e provided on-screen help (available at all times).	1	6	2	4	0
f had clear instructions to all the activities.	3	5	3	2	0

2 Did you experience any difficulties while using the material? Specify.

Appendix 3

The task: questionnaires BOOK EVALUATION (Presented with collated data)

1 Please think about the material that you have just used and tick (✓) the sentences which apply to you.

1.1 LEARNING GRAMMAR

The material ...	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
a was appropriate to my age and level.	4	7	1	1	0
b was appropriate to my needs.	1	11	1	0	0
c provided me with enough practice.	5	7	1	0	0
d presented a grammar point in a clear and interesting way.	4	7	2	0	0
e contained a clear and sufficient explanation of the grammar point.	6	6	1	0	0
f presented and practised grammar structure in isolation (not in the text).	3	9	1	0	0

g contained a variety of interesting activities.	1	8	3	1	0
h was clearly organized and graded.	3	9	1	0	0
i stressed the importance of using the structure correctly at all times.	3	10	0	0	0
j provided me with examples and explanation of how to use the structure in different situations.	4	7	2	0	0

1.2 MATERIAL DESIGN

The material ...	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
a contained attractive visuals.	0	7	2	4	0
b had clear and attractive page layout/design.	1	11	1	0	0
c used visuals effectively to support grammar presentation and practice (e.g. highlight important points).	0	9	2	2	0
d was easy to use.	6	7	0	0	0
e had clear instructions to all the activities.	4	7	2	0	0
f contained units of appropriate length.	1	10	2	0	0

2 Did you experience any difficulties while using the material? Specify.

Appendix 4

Materials comparison (Presented with collated data)

1 Please think about the two materials that you have just used and tick (✓) answers that apply to you.

	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
a I feel confident about using the self-study book for independent grammar practice.	7	5	1	0	0

b I feel confident about using the website for independent grammar practice.	1	8	4	0	0
c I found the self-study book useful and effective for independent grammar practice.	9	4	0	0	0
d I found the website useful and effective for independent grammar practice.	3	7	2	1	0
e I found the self-study book easy to use as a whole.	9	4	0	0	0
f I found the website easy to use as a whole.	3	6	4	0	0
g Practising grammar using a self-study book was a positive learning experience.	7	6	0	0	0
h Practising grammar using the website was a positive learning experience.	3	6	4	0	0
i I am motivated to use self-study books for independent grammar practice in the future.	6	7	0	0	0
j I am motivated to use websites for independent grammar practice in the future.	4	5	4	0	0

2 Which of the materials did you find most useful for practising grammar?
(tick only one)

- ☐ self-study book
☐ free website for practising English

3 Give reasons for your choice.

Thank you for finding the time to complete these questionnaires.

Evaluation of a mobile learning organiser for university students

Dan Corlett, Mike Sharples, Susan Bull & Tony Chan

Educational Technology Research Group, Department of Electronic, Electrical and Computer Engineering, University of Birmingham, Edgbaston, Birmingham, UK

Abstract

This paper describes a 10-month trial of a mobile learning organiser, developed for use by university students. Implemented on a wireless-enabled Pocket PC hand-held computer, the organiser makes use of existing mobile applications as well as tools designed specifically for students to manage their learning. The trial set out to identify the most-used tools for such a learning device and their patterns and problems of usage. The primary uses of the organiser were communication, time-management and access to content. No single application took precedence. The results from an analysis of questionnaire surveys and focus groups indicate that there was a demand for institutional support of mobile learning, in particular to provide course content and timetabling information. Wireless connectivity was crucial to the usefulness of the organiser. Usability issues relating to the hardware and software had considerable impact on the students' usage and satisfaction with the system.

Keywords

hand-held computer, learning organiser, mobile learning, undergraduate student

Introduction

Many students embarking on a University course bring with them one or more mobile computing devices, including smart phones, personal digital assistants (PDAs) and laptop or tablet computers. The software on these devices is designed primarily to support the world of office work. Typical applications include time management, communication and productivity tools. While these are of some use to students, they are not designed specifically to support their activities, such as attending lectures, reading course content, revising for exams and meeting course deadlines.

As these hand-held computers and smart phones become more widely used there is an opportunity to harness them to benefit learning, as well as to provide

appropriate institutional support for their use. In the shift from mass teaching to support of personal learning, it is also the responsibility of educators to ensure that students have the relevant skills and environments to succeed as self-directed learners.

Focusing on PDAs, the study described below has investigated whether students would find a hand-held computer useful for supporting their learning, and in particular whether a specially designed, integrated learning organiser would be more suitable for supporting learning than the existing set of 'mobile office' tools, such as a digital calendar, contacts list and to-do list. A mobile learning organiser has been developed at the University of Birmingham (Holme & Sharples 2002) and was evaluated as part of this study.

A group of 17 MSc students at the University of Birmingham were loaned wireless PDAs. The department in which the students were studying has wireless coverage throughout its five storey building. In addition to running standard Pocket PC applications, the PDAs provided a mobile learning organiser

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Correspondence: Dan Corlett, Educational Technology Research Group, Electronic, Electrical and Computer Engineering, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK.
E-mail: d.j.corlett@bham.ac.uk

which comprises an integrated suite of tools for students to access course material, view their timetables, communicate via e-mail and instant messaging and organise ideas and notes. The tools were based on the Pocket outlook personal information Manager (PIM), with a custom-designed interface to present the information in a form that matches the structure of student learning. For example, the calendar was presented as a series of teaching slots corresponding to the standard University timetable.

Two concept mapping tools were also evaluated. Map-It! (Chan & Sharples 2002) formed part of the original integrated organiser and concise concept mapper (CCM) (Rudman & Sharples 2002) is a stand-alone tool.

The trial lasted for 10 months during 1 academic year. The aims of the study were to investigate:

- the usability of the hardware and software;
- the perceived usefulness of the PDA as a learning organiser;
- the perceived impact of the tools on learning;
- reported patterns of usage;
- whether students installed and used additional tools to those provided for them at the start;
- the students' attitudes to the PDAs and their provided tools.

The paper concludes with some implications for the design of future learning organiser tools for students.

Method

Setting

The study was carried out during the academic session 2002/2003 in the Department of Electronic, Electrical and Computer Engineering at the University of Birmingham. Seventeen students on the Human Centred Systems MSc course were recruited to the trial. One student dropped out after a few weeks, but another joined about half way through.

The trial began with a training session to familiarise the students with the hardware and software.

Equipment and software

Each participant in the study was loaned a Compaq iPAQ 3760 hand-held computer, running Pocket PC

2002, with 64 MB memory. Each device was supplied with an expansion sleeve and an 802.11b wireless network card, able to transmit data at up to 11 Mb/s. When attached, the sleeve and card roughly double both the size and weight of the device. The mobile learning organiser comprised:

- a modified 'Today Screen', with a timetable bar showing the times of classes and other appointments (Fig. 1);
- a Timetable Manager with downloaded course timetables and deadlines, which allows the user to see the teaching events for each day (Fig. 2);
- a Course Manager, organised by course module (Fig. 3);
- course material in Microsoft Reader and PowerPoint formats;
- a Communication Centre for e-mail, internet messenger and contacts;
- Map-It!, a concept mapping tool to create a visual map of notes and documents (Fig. 4).

The Today Screen and Timetable Manager use the Microsoft Calendar to store the events, so students

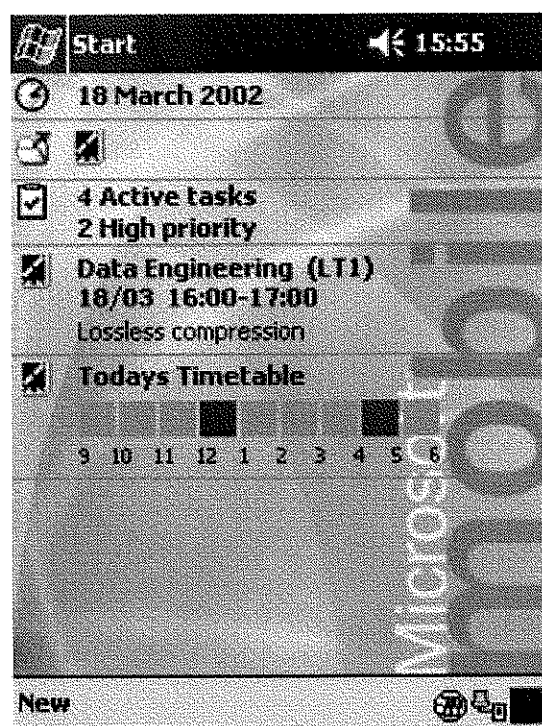


Fig. 1 Modified 'Today Screen'.

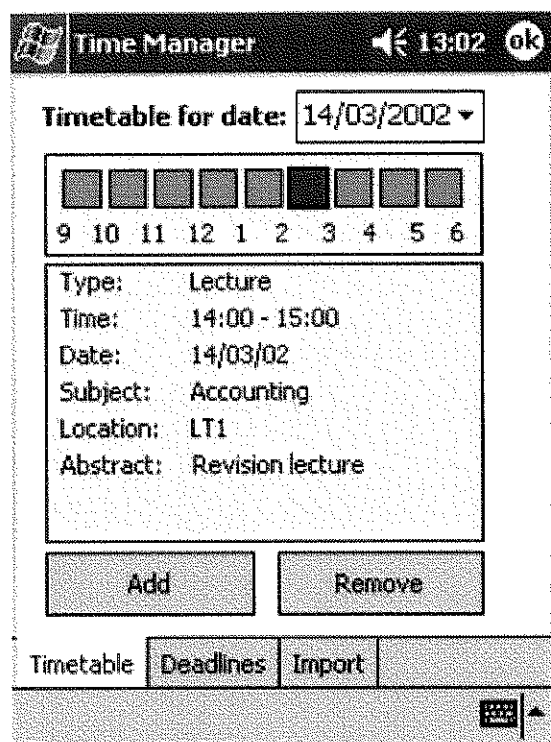


Fig. 2 Timetable manager.

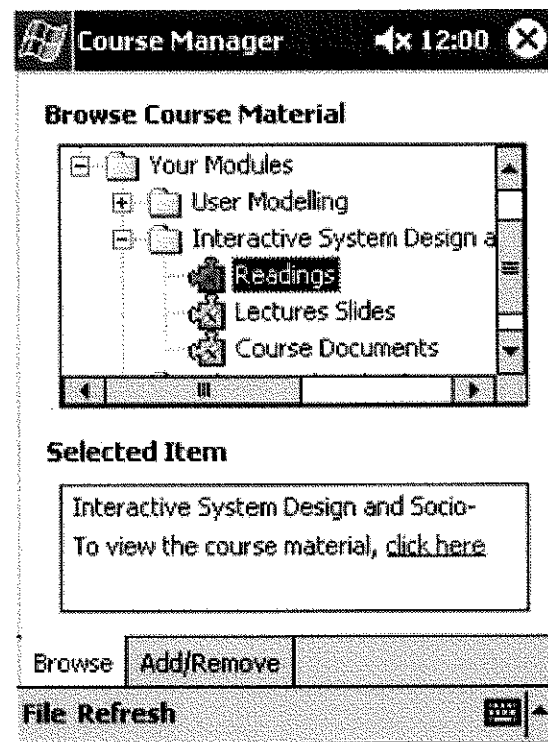


Fig. 3 Course manager.

have the choice of viewing their scheduled classes within the learning organiser, or on the standard Calendar. Later, a second concept mapping tool, CCM, was provided to the students (Fig. 5).

The choice of software tools was pragmatic. Given the limited time for software development, the organiser and content elements were based on the standard Pocket PC suite, which had the advantage of presenting a familiar Microsoft look and feel. Timetabling was assumed to be an important issue for the target student group owing to the nature of their course, which is taught in short, intensive modules and where the detailed schedule for each module is often not publicised until shortly before it runs. Content for each module was packaged in PowerPoint and Reader formats. Both formats were optimised for the small screen and allow students to annotate, save and share their notes.

Both concept mapping tools were designed for the Pocket PC with a stylus input, and both assist information recording through visual semantic association. However, they differ significantly in operation.

Map-It! uses a logical tree structure that the user navigates by clicking on an outer node which brings it to the centre, displaying the related topics. Clicking on the centre node displays any document associated with it. The user adds a new node by selecting a document from file. CCM provides a free-form concept map with interaction by pen gestures, dragging and scrolling the map as necessary. Search and zoom facilities reduce usability problems inherent in working with large maps on a small screen.

The concept-mapping applications were chosen because of the evidence that tools for desktop computers, such as SemNet[®], can aid studying and note-taking (Gorodetsky & Fisher 1996). Despite the obvious limitation of screen size, it was considered that the advantage of being able to make maps wherever learning is taking place may be of benefit. A comparative study of the concept map usage (Sharples *et al.* 2004) shows differing benefits of each application with respect to the students' learning, with CCM best designed for note-taking and Map-It! for exploration of pre-prepared content.

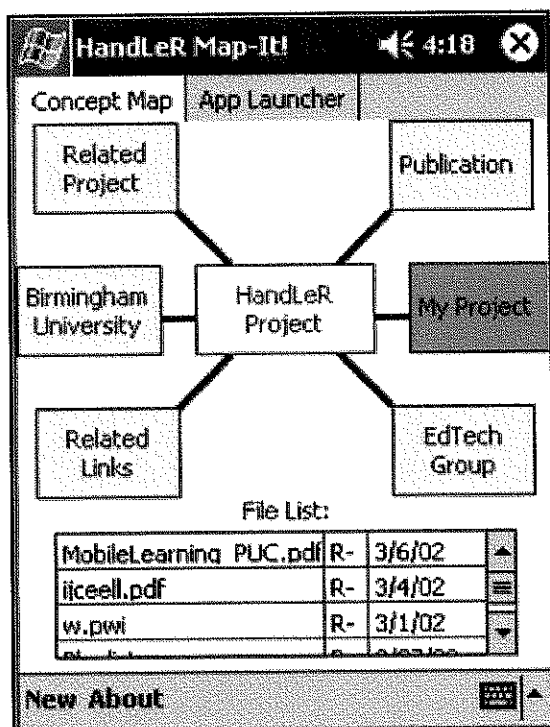


Fig. 4 Map-It! concept-mapping tool.

Throughout the year, students were also encouraged to use their PDAs for their leisure and entertainment and to add any software they wished.

Methodology

In order to evaluate the mobile learning organiser in a realistic setting, students were permitted to use their PDAs as they wished. Results were collected by three methods, as listed below.

- Questionnaires were administered at 1, 4, 16 weeks, and 10 months.
- Focus groups were held to follow on from each of the questionnaires.
- The students kept logbooks for 6 weeks.

Each of these methods was designed to reveal:

- students' attitudes to the technology;
- students' attitudes towards the learning organiser;
- patterns of usage of the various applications (including any they had downloaded themselves);
- patterns of usage of the technology, particularly with respect to wireless connectivity;

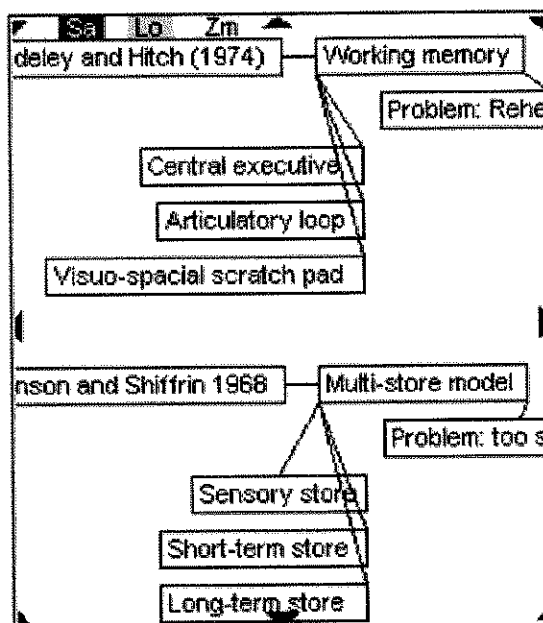


Fig. 5 Concise concept mapper.

- usability issues;
- issues relating to institutional support for mobile learning devices.

Results and discussion

This paper draws largely upon the results collected at the final questionnaire and focus group, although some reference will be made to the earlier findings, particularly with respect to changes in usage patterns and attitudes during the course of the trial.

Usability of the hardware

Data on usability came from the final survey, in particular from questions that asked 'What software, services or hardware would improve the usefulness of the iPAQs?' and 'Were there times you would have preferred the use of a laptop computer to a Pocket PC? If yes, briefly describe one scenario.' The students were also asked to describe usability problems during the final focus group. The most reported issues related to the usability of the hardware, including weight and screen size, the limited memory and the battery life.

The problems of limited memory increased during the year as students continued to download content, such as games and music, without wishing to remove existing materials. As the participants were required to

return the PDAs at the end of the year, they were not willing to invest in additional memory modules.

Although a recharged battery would generally last for 1 day, if left uncharged for a number of days, the units lose all data and programs added by the user since these are stored in volatile memory. On a few occasions (generally during the vacations), students left their devices disconnected from the mains for longer than a week, and as a result had to reinstall all their software and data.

The backup process (part of the standard synchronisation software) was reported by some students as being slow and unreliable. Thus, participants backed up infrequently, compounding the difficulties experienced when the memory was erased.

Screen width, general crashes and applications not fully closing (and therefore slowing the device unnecessarily) were also cited as annoyances about the device. Survey responses indicated that entering text was cumbersome, and in the final focus group the students indicated that a foldaway keyboard could offer a big improvement for entering large amounts of text.

Usability of the mobile learning organiser software

The main software usability issues identified in the questionnaire were as follows:

- the mobile learning organiser software was slow to respond. In particular, the Timetable Manager was slower and less easy to use than the Outlook Calendar.
- Content and timetable information would have been easier to download had it been deployed online rather than through the synchronisation tool.
- Much of the content made available by lecturing staff over the web was not optimised for Pocket Explorer, making it difficult to read.
- The concept mapping tools were difficult to use without further instruction.
- Participants were reluctant to use the concept mapping tools, in part because the content was not stored in a format that could easily be transferred to other applications, such as Word.

Perceived usefulness of the PDA as a learning organiser

No single tool stood out as being likely to revolutionise the students' learning or personal organisation. Table 1

shows the perceived usefulness of the various tools at three stages of the trial. Communications tools, the web browser and the timetabling features were consistently among the most useful. The perceived usefulness of the course content and the concept mapper decreased over time. It should be noted, however, that the students were provided with less content and materials later in the course, and at the time of the 10-month survey students were concentrating on project work as the taught component of the course had been completed.

Perceived impact of the tools on learning

Participants were asked in the survey to name the tools that made the greatest impact on their learning, personal organisation and entertainment. The freeform answers were collected under generic headings. Table 2 lists each tool mentioned as having the greatest impact, with the number of students who mentioned it. It indicates that for learning, course materials are regarded as having most impact despite the lower perceived overall usefulness. Despite the wireless connectivity in the department, and the perceived usefulness, e-mail did not feature highly as a benefit to learning. Web browsing was a useful learning support for some students, and the calendar and mobile learning organiser timetable and deadlines were useful for personal organisation. The Media Player had the greatest impact in the entertainment category. Concept mapping was not considered of greatest importance by anyone in any category.

Reported patterns of use

The study aimed to find out where and when students used the device and its constituent tools. The ques-

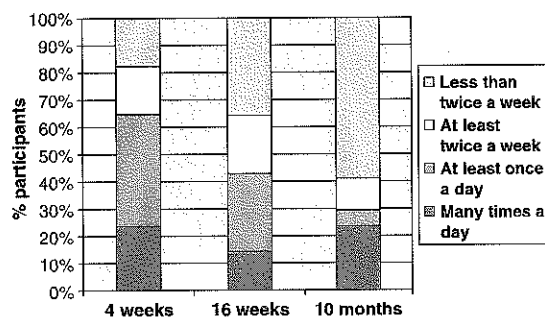
Table 1. Perceived usefulness of tools, showing mean of a five point scale (Not Useful, Probably Not Useful, Possibly Useful, Useful, Very Useful) at 4 weeks ($n = 17$), 16 weeks ($n = 14$) and 10 months ($n = 17$)

	4 weeks	16 weeks	10 months
Timetable	3.7	3.6	3.9
Web browser	3.8	3.8	3.6
Instant messaging	3.8	3.5	3.4
E-mail	3.8	4.0	3.4
Course materials	3.7	3.1	3.1
Supplementary materials	3.6	2.9	2.7
Concept mapper	2.6	2.5	2.1

Table 2. Perceived impact of tools on learning, personal organisation and entertainment

Learning	Personal organization	Entertainment
Course materials (6)	Timetable and deadlines (6)	Media player (7)
Browser (3)	Calendar (5)	Games (3)
Timetable and deadlines (2)	Writing/note taking (2)	Messenger (2)
Writing/note taking (1)	E-mail (2)	Browser (1)
Calendar (1)	Task manager (1)	Writing/note taking (1)
		Reader (1)

Figures in parentheses indicate the number of students naming the tool as having greatest impact. Not all participants answered all three questions.

**Fig. 6** Frequency of use of the personal digital assistant through the course of the trial.

tionnaire asked the students to indicate how often they had used the PDA during the previous 2 weeks. As can be seen in Fig. 6, use of the PDAs overall declined over time. However, the percentage of participants using the devices many times per day stayed much the same, at around 15–25%. Starting with a more even spread, usage became more polarised between some students who used them many times a day and a larger number using them very infrequently.

The logbook study that took place during the first 6 weeks had revealed that home, the department and elsewhere on campus were the most common locations of use (Bull 2003). Participants were therefore asked in the surveys how frequently they used their PDAs in each of these three locations (on a four-part scale of Frequently, Sometimes, Rarely, Never) and whether this was for MSc-related work or other ac-

Table 3. Number of students reporting that they had used their PDA frequently, in four locations for MSc-related work (and in parentheses, for other activities)

	4 weeks	16 weeks	10 months
Home	4 (7)	0 (3)	3 (4)
Department	5 (2)	1 (2)	3 (2)
University (elsewhere)	0 (1)	0 (0)	0 (1)
Travelling	0 (2)	1 (2)	1 (4)

PDA, personal digital assistant.

tivities. Given that we are aiming to support the mobile learner, the survey also asked whether they used their device while travelling, a further 'location' in which some students used their PDA during the logbook study. Table 3 shows the number of students reporting that they had used their PDA frequently, for each of these locations during the study. At home and in the department were the most popular locations early in the study for both MSc and unrelated activities. For unrelated activities, 'travelling' gained in popularity. It is worth noting again that more project work is carried out towards the end of the course, so it is likely that students will spend less time in the department. However, this result may also suggest that the students were finding more uses for the devices and beginning to see their value as mobile tools.

Students were invited to describe their patterns of use through a question that asked 'If there are any common patterns to your iPAQ use, please state them below (for example, frequently read and send e-mail in EECE common room)'. Some interesting observations include the following:

- Although e-mail is synchronised to the device and can be read anywhere, students only tended to use e-mail when in an area covered by the wireless network.
- E-mail and instant messaging were frequently mentioned together, as if they were complementary tasks.
- Participants used the calendar and timetabling in all locations, as they had need. For some, the PDA became a replacement for a traditional diary.
- In the week 4 survey, there were many references to using the device for listening to music and playing games. By week 16, these activities were less frequent.

- A few students reported regularly reading course materials, offline web content and e-books when at home or in their dormitories. This was surprising, since the final focus group revealed that all of the participants had their own desktop or laptop computers in their apartments.
- For a few students, this was the first time they had kept their personal organisation information in an electronic format. Among those, some only made use of this information through the PDA, even though it was synchronised to a laptop or desktop.

A separate question on how students' use of the PDAs had changed over the course of the year did not yield any noticeable trends. Some students attempted to use it for many activities in the early stages, before accepting that some tasks were better done on a standard PC. Others, who were sceptical at first, later became frequent users of the devices. Either way, after 10 months, students had evaluated the capabilities of the PDAs, adapted them to their needs and settled into a personal pattern of use.

Other tools that students chose to use

Participants were encouraged to use the devices for their own personal activities and to install any software they wished. A number of them chose to develop software for PDAs as part of their project work.

Not surprisingly, among the most popular downloads were various games and an additional media player. Several different PIM applications were tried as alternatives to the ones included with Pocket PC or the integrated learning organiser. Other installations included a money manager and a photo album.

Two students used Microsoft Portrait (a Pocket PC equivalent of NetMeeting). One of these students reported to have used Portrait to contact his family living on another continent. He received audio and video of them, and was able to speak to them, using the PDA as a mobile internet phone.

Several of the students installed Chinese character support for their communication with one another and their friends and family at home. In the focus group they requested that this should be included as standard in any later projects, since finding and installing a suitable package had taken some time to do.

Only two online services were subscribed to by any students. Three students used AvantGo on a regular basis to synchronize Web content including news.

In total, just 18 pieces of additional software were installed, by eight students. This result was explored further in the final focus group, and two reasons became apparent:

- Most students saw all the value of the PDAs being either in time management or in e-mail/messaging. These were already catered for with the standard software.
- Because the devices had to be returned within the year, participants were reluctant to invest much of their own money or time in personalisation.

Students' attitudes

An attitude survey was conducted as part of the final questionnaire. The questions were designed to assess the students' attitudes to using the PDA as a tool for learning and to aspects of its usability that the earlier surveys had indicated as being important. Students were asked to rate statements on a five-point Likert

Table 4. Mean and standard deviation of responses to a 5 point Likert scale from Strongly Disagree (1) to Strongly Agree (5)

Statement	Mean	SD
(a) I think the iPAQ has assisted my overall learning process this year.	3.19	0.98
(b) I think I planned better for my learning with the iPAQ than if I had not had it.	3.37	1.31
(c) Having to use the iPAQ hindered my learning	2.31	1.14*
(d) I would have used the iPAQ more had there been fewer technical problems.	3.00	0.89
(e) I found battery life a significant problem	4.06	0.68*
(f) I felt uncomfortable using the iPAQ because I didn't know how to use it.	2.19	0.65*
(g) I felt self-conscious using the iPAQ in public	3.00	1.09
(h) The advantages of having an iPAQ outweighed the drawbacks of taking part in the trial (attending meetings, doing questionnaires etc.).	3.56	0.96*
(i) I have changed the way I plan for learning as a result of using the iPAQ.	3.18	1.17
(j) I have changed the way I take notes as a result of using the iPAQ.	3.06	1.38

Starred items are significant at $P < 0.05$. $N = 16$.

scale. Table 4 shows the mean and standard deviation of the response to each item, in the range from 1 (Strongly Disagree) to 5 (Strongly Agree). A one-sample *t*-test was performed on each mean, with 3 (No Opinion) as the constant value. Four statements show a significant difference from No Opinion ($P < 0.05$):

- Using the PDA did not *hinder* learning (c), however, neither did it greatly assist (a).
- Battery life was a significant problem (e).
- Students did not feel uncomfortable using the PDA though not knowing how to use it (f).
- The perceived advantages of having a PDA outweighed the disadvantages of taking part in four questionnaires, three focus groups, one training session and keeping a log book for 6 weeks (h).

It was never intended to conduct a quantitative study into the learning gains brought about by using mobile technology. However, it appears from their self-assessment that the technology has not revolutionised or greatly improved their learning. It seems simply that the learning organiser is just *another* resource among many.

A separate question was asked, that assuming students had access to a PC at home and one in the department, would they prefer a laptop or a PDA as their *only* mobile device. The responses were nine to six in favour of a laptop. This is far from the unequivocal preference that could be expected from the quantity and variety of negative issues raised about the PDAs, and the obvious advantages of a fully functioning portable PC. This question was pressed further in the final focus session where students were demonstrated a Tablet PC. Even with a Tablet PC as the alternative, the same proportion of students preferred the PDA. Six of the students claimed there were never any times while using the PDA that they would have preferred the use of a laptop. This could suggest either that the PDAs sufficiently met their mobile needs, or simply that they made judicious choices as to when to use them and so were never disappointed.

Asked in the group interview, nobody felt compelled to buy their own PDA following their course.

Implications for future design

The study has indicated issues of relevance to the design of mobile learning organisers for PDAs.

Wireless connectivity and the ability to send e-mails and engage in messaging appear to be essential components. As educational institutions develop their wireless infrastructure, then PDAs could offer students easy access to these facilities across the campus.

The study has shown no clear need for a custom-designed learning organizer, with a separate interface to that of a PIM such as Pocket Outlook. However, there would appear to be a need for tools that enable students to easily find, browse and read course materials, and also to be reminded of course deadlines. Further research and system design studies are needed to discover whether such study management tools could be integrated into a conventional PIM.

Another opportunity is to provide tools that adapt to a student's context and learning needs, based on location data and information from a learner model constructed during interactions (Bull *et al.* 2004).

The usability limitations of PDAs could, in part, be overcome by providing students with pen tablet computers with a longer battery life and larger screen, but at the cost of greater bulk and weight. We are conducting a study in which a cohort of students use pen tablet computers to support their studies.

Summary and conclusion

This study was designed to discover the patterns of use of a mobile learning organiser (wireless Pocket PC with appropriate and useful software installed) when used by students in a wirelessly networked study environment and other locations of their choice.

A few clear modes of use emerged. Students made considerable use of the calendar and timetabling features as well as the communications tools. More use was recorded in their department of study than elsewhere. Study materials were also well used, and participants requested that more content could be delivered in this way.

PDA-optimised content was well used, and there was a clear request from students that more resources be made available in PDA format, including administrative information.

There is no conclusive evidence of the need for a specifically designed suite of tools in addition to those already included in the device, although the time management tools were well received. The concept-mapping tools were not widely adopted. This is not

proof that they are not required or are unhelpful. Rather, at this stage, the evidence simply suggests that the specific tools had usability issues and that students were not well acquainted with the skills of concept mapping. Participants were also concerned that maps could not be easily transferred to other software and devices after their course.

Ownership of the technology is clearly important. While the PDAs are loaned, students are reluctant to invest time and money in personalising and extending them. Despite this, several students were able to see future benefit of the devices as learning aids and invested time as part of their projects in developing software for them. A higher specification of device is also likely to increase use. If students can download more music and other content, PDAs are likely to become a part of their lifestyle.

Only one student made use of the wireless network card in another location (at home and at a train station). As wireless networks become more widespread, the device will become more fully functional in more settings. It is likely that acceptance and patterns of use would change considerably.

The use of PDAs as learning organisers has implications for institutional support of learning. For example, to be effective, teaching materials and websites will need to be designed for display on small screens. Although there is no indication that the mobile learning organisers used in this study greatly altered students' styles or patterns of learning, they did have some impact on the way the students worked, and on the demands placed on their lecturers.

By the end of the study, only 30% of students were using the device every day. Although this constitutes a minority, this figure is sufficiently large to warrant further work, considering that students had not previously owned a hand-held computer, and were assigned to the study according to their choice of modules rather than as volunteers. As ownership of PDAs, or mobile phones with PIM facilities, increases, demand for PDA-based study and learning tools may also grow. However, it must be remembered that our users were highly computer literate and, moreover, had a strong interest in computer technology and its uses. As well as extending the study with the current user group, it must also be applied in user groups studying different kinds of subjects, before any claims

can be made about the generalisability of our findings. As mobile technology becomes a more intrinsic part of everyday life, it is important that these patterns and demands are known and understood.

Acknowledgements

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References

- Bull S. (2003) User modelling and mobile learning. In *Proceedings of User Modeling 2003: 9th International Conference* (eds P. Brusilovsky, A.T. Corbett & F. de Rosi), pp. 383–387. Springer-Verlag, Berlin.
- Bull S., Cui Y., McEvoy A.T., Reid E. & Yang W. (2004) Roles for mobile learner models. In *Proceedings of IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE 2004), 23–25 March 2004, Taoyuan, Taiwan* (eds J. Roschelle, T.-W. Chan, Kinshuk & S. J. H. Yang) pp. 124–128. IEEE Computer Society, Silver Spring, MD.
- Chan T. & Sharples M. (2002) A concept mapping tool for pocket PC computers. In *IEEE International Workshop on Wireless and Mobile Technologies in Education* (eds M. Milrad, U. Hoppe & Kinshuk), pp. 163–166. IEEE Computer Society Press, Vaxjo, Sweden.
- Gorodetsky M. & Fisher K.M. (1996) Generating connections and learning in biology. In *Knowledge Acquisition, Organization and Use in Biology* (eds K.M. Fisher & M. Kibby), pp. 135–154. Springer-Verlag, Berlin.
- Holme O. & Sharples M. (2002) Implementing a student learning organiser on the pocket pc platform. In *Proceedings of MLEARN 2002, European Workshop on Mobile and Contextual Learning* (eds S. Anastopoulou, M. Sharples & G.N. Vavoula), pp. 40–43. The University of Birmingham, Birmingham, UK.
- Rudman P. & Sharples M. (2002) Supporting learning in conversations using personal technologies. In *Proceedings of MLEARN 2002, European Workshop on Mobile and Contextual Learning* (eds S. Anastopoulou, M. Sharples & G.N. Vavoula), pp. 44–46. The University of Birmingham, Birmingham, UK.
- Sharples M., Chan T., Rudman P. & Bull S. (2004) Evaluation of a mobile learning organiser and concept mapping tools. In *Learning with Mobile Devices* (eds J. Attewell & C. Savill-Smith). Learning and Skills Development Agency, London.

VOCABULARY AND CHRONOLOGY THE CASE OF SHAKESPEARE'S SONNETS

BY MACD. P. JACKSON

There is still no agreement about when Shakespeare wrote his sonnets. But statistical analysis of rare-word links between groups of sonnets and Shakespeare's plays provides solid new evidence. Each Shakespeare play can be shown to be most closely connected in its rare-word vocabulary with other plays written within the same period. Shakespeare poems whose dates of composition are known display the same relationship to the chronologically ordered dramatic canon. This principle helps date the sonnets. The traditional notion that they were essentially completed in the period 1593–6 is certainly mistaken. The time-span, even for Sonnets 1–103 and 127–54, must be extended forward at least another three years, and most, if not all, of the last twenty-odd in the sequence to the Fair Youth (104–26) belong to the seventeenth century. This article builds on the pioneering work of A. Kent Hieatt and his associates, but significantly modifies their findings. It supports Katherine Duncan-Jones's conclusions in her Arden edition of the sonnets (1997) that Shakespeare was composing, revising, and arranging the 1609 Quarto sequence until well into the seventeenth century.

In the course of his career as playwright and poet, Shakespeare used a vast number of different words. Some appear in every play he wrote: *the*, *have*, *good*, *sir*, *love*, and *fair*, for example. Others appear only within early works, or only within late works, or are much more frequently used in the first or second halves of his writing life. Some are limited to a specific period of three or four years; or instances of their use tend to cluster within such a period. The noun *goodness*, for example, occurs only five times in the twenty-two plays written before *Hamlet* (1600–1), and no fewer than fifty-one times in the fifteen plays from *Hamlet* to *Henry VIII* (1612–13).¹ The fact that the only poems in which *goodness* is found are Sonnets 118 and 124 suggests that these may have been composed in the seventeenth century. The adjective or noun *particular* is used sixty-five times in Shakespeare's works, but the first fourteen plays and the two early narrative poems, *Venus and Adonis* (1592–93) and *The Rape of Lucrece* (1593–94), account for only one of these instances. *Particular* becomes an obsession with Shakespeare during the period of his great tragedies. Its presence in *A Lover's Complaint* and in Sonnet 91 affords a scrap of evidence for assigning both those poems to Shakespeare's

¹ Unless otherwise stated, the dates here assigned to Shakespearean works are those of *The Riverside Shakespeare*, ed. G. B. Evans (Boston, Mass., 1974), 47–56. Line references are to this edition.

maturity.² The verb *to ban* (meaning 'to curse'), by contrast, is used only in *1 Henry VI* (1589–90), *2 Henry VI* (1590–1, twice), *Venus and Adonis*, and *The Rape of Lucrece*, unless we accept the dubious instance of 'banning' in the Quarto (1622) of *Othello*, where the more authoritative Folio text reads 'foaming' (II. i. 11).

In short, every item of Shakespeare's lifetime word store was not equally accessible to him at any given moment. Not only were items added to his active vocabulary, or effectively dropped from it, but his personal development took place within a changing linguistic environment. The English lexicon was itself undergoing extraordinary expansion. A word for which the *Oxford English Dictionary*'s first citation is 1600 is obviously much less likely to be encountered within a sixteenth-century Shakespeare work than within a seventeenth-century one.³ The opposite holds for words that the *OED* indicates to have been falling into disuse around the turn of the century.

A tendency for the rarer items in Shakespeare's vocabulary to be used in works composed at about the same time has been demonstrated in elaborate statistical detail by Eliot Slater, who, checking all words that occur in at least two Shakespeare plays but not more than ten times within the canon as a whole, compiled tables enumerating each play's links with every other play.⁴ Most plays show a significant excess of lexical links with at least some of their chronological neighbours and a significant deficiency of links with plays from which they are chronologically more distant. Slater's research has helped establish the likely date of composition of plays for which other evidence is indeterminate.

Analysis of vocabulary has been applied to the vexed problem of the date of Shakespeare's sonnets. One hundred years ago Gregor Sarrazin, examining words that occurred only twice or thrice in the Shakespeare canon, found a surplus of links between the sonnets and plays written around 1593–8.⁵ Slater himself showed that the sonnets exhibited a significant excess of lexical links with a cluster of four chronologically proximate plays, *Love's Labour's Lost* (1594–5), *Romeo and Juliet* (1595–6), *Richard II* (1595), and *A Midsummer Night's Dream* (1595–6), and also with the chronologically adjacent pair *Much Ado About Nothing* (1598–9) and *Henry V* (1599). He concluded that the sonnets belonged to 'the second quarter' of Shakespeare's career.⁶ These two

2 MacD. P. Jackson, *Shakespeare's 'A Lover's Complaint': Its Date and Authenticity* (Auckland, 1965), 27.

3 'Much less likely', but of course the *OED* is far from infallible in its recording of first and last usages.

4 E. Slater, *The Problem of 'The Reign of King Edward III': A Statistical Approach* (Cambridge, 1988). This book is the culmination of Slater's research, but many of his findings had been published in articles listed in his bibliography.

5 G. Sarrazin, 'Wortechos bei Shakespeare', *Shakespeare Jahrbuch*, 33 (1897), 121–65, and 34 (1898), 119–69.

6 E. Slater, 'Shakespeare: Word Links between Poems and Plays', *Notes & Queries*, 220 (1975), 157–63.

studies were useful, but suffered from one serious flaw: each treated the 1609 Quarto sequence as a homogeneous unit, lumping its individual components together.⁷

A. Kent Hieatt, Charles W. Hieatt, and Anne Lake Prescott have recently taken a different approach.⁸ They came to doubt 'that Shakespeare had essentially completed composition of *Sonnets* in the first half of the fifteen-nineties' (p. 73), realizing that—like his contemporaries Samuel Daniel and Michael Drayton, who kept revising, supplementing, and rearranging sonnet sequences over many years—he may have continued to compose or recast sonnets until shortly before publication of the Quarto, which they judge to have been fully authorised.⁹ They therefore undertook an investigation of all words occurring in the sonnets and in at least three but not more than seven other Shakespeare works, concentrating on those lexical items that were used only within the first half of Shakespeare's career, from *1 Henry VI* (1589–90) to *As You Like It* (1599), or only within the second half, from *Hamlet* (1600–1) to *The Two Noble Kinsmen* (1613).¹⁰ They discovered that twenty-four of the rare words in the sonnets, or 3.62 per cent, were 'late rare words', whose usage was otherwise restricted to the second half of the Shakespeare canon. *The Rape of Lucrece* (1593–4) and *Richard II* (1595) each had twelve late rare words, and *2 Henry IV* (1598) had twenty-seven, yielding percentages of late rare words (in relation to all rare words) of 1.46, 1.07, and 2.17. They concluded that 'Shakespeare was occupied with *Sonnets* at a date posterior to 1598' (p. 83).

Hieatt, Hieatt, and Prescott found that the late rare words were more unevenly distributed in the sonnets than in *2 Henry IV*, where absence of late rare words from long stretches of the text could, in any case, be related to a general scarcity of rare words in the dialogue of 'rhetorically unskilled speakers', such as Mistress Quickly, Shallow, Silence, and Doll Tearsheet (p. 86). But the sonnets also yielded fifty-four 'early rare words'. On the basis of the distribution of both these and the late rare words, they divided the Quarto into four 'zones'. Zone 1 (Sonnets 1–60) contained twenty early rare words (12.3 per cent of the total of rare words), and seventeen late rare words (10.4 per cent). For Zone 2 (Sonnets 61–103) the figures were twenty-two early (14.8 per cent) and three late (2 per cent); for Zone 3 (Sonnets 104–26), three early (4.5 per cent) and three late (4.5 per cent); and for Zone 4 (Sonnets

7 Each author realized, however, that the sonnets may have been written over a long period of time. A valuable contribution was also made by J. M. Nosworthy, 'All too Short a Date: Internal Evidence in Shakespeare's Sonnets', *Essays in Criticism*, 2 (1952), 311–24. But Nosworthy's use of lexical data was somewhat impressionistic.

8 'When Did Shakespeare Write *Sonnets* 1609?', *Studies in Philology*, 88 (1991), 69–109. Page references to this article are given in the text.

9 This is the view taken by Katherine Duncan-Jones in 'Was the 1609 *Shake-Speares Sonnets* Really Unauthorized?', *Review of English Studies*, 34 (1983), 151–71, and in her Arden edition of *Shakespeare's Sonnets* (London, 1997).

10 They followed the Riverside chronology, as set out on p. 76 of their article, which is why I have chosen to adopt it.

127–54), nine early (15.2 per cent) and none late (0 per cent). They deduced that Zones 1, 2, and 4 had been written mainly during the first half of the 1590s, but that Zone 1 had been subject to seventeenth-century revisions or additions, perhaps as late as 1608 or 1609. Zone 3 they tentatively assigned to ‘around the turn of the century’ (p. 93).

The work of Hieatt, Hieatt, and Prescott represents a big step forward. They have established beyond reasonable doubt that Shakespeare’s involvement with the sonnets extended beyond the mid-1590s. But some of the refinements in their theories are not adequately supported by the evidence they adduce—which is not to say that they are necessarily mistaken. Three control texts—*The Rape of Lucrece*, *Richard II*, and *2 Henry IV*—are very few from which to draw inferences about Shakespeare’s practices, and numbers of late rare words are too small for us to be sure that their slightly more uneven distribution in the sonnets than in *2 Henry IV* is genuinely significant, requiring an altogether different explanation.¹¹ Hieatt, Hieatt, and Prescott seem wrong to claim that there is no relation in the sonnets between the frequency of late rare words and the frequency of all rare words (p. 90). The thirteen sonnets that contain late rare words but no early ones average 3.77 ‘generally rare words’ (words that occur in the sonnets and three to seven other works, but are used in both chronological halves of the canon), while the ninety-three sonnets that contain neither late nor early rare words average only 1.97 generally rare words.

More importantly, Hieatt, Hieatt, and Prescott offer no information about the number and distribution of *early* rare words in *2 Henry IV* or their other control texts, so we have no means of assessing whether the mix of early and late rare words in Zone 1 sonnets might have arisen in work that Shakespeare composed once and for all close to the mid-point of his career. It would be surprising if extended passages in some ‘middle’ plays did not yield roughly even numbers of early and late rare words, along with many whose usage spanned both halves of the canon. Marked preponderance of early over late rare words certainly suggests sixteenth-century composition,¹² and marked preponderance of late over early rare words suggests seventeenth-century composition, but an approximately equal incidence of items from both categories is less readily interpreted.

11 In *2 Henry IV* the average interval (expressed in hundreds of words) between occurrences of late rare words is 9.22, with a standard deviation of 8.09; the largest intervals are 2.39 and 2.21 standard deviations from the mean. In the sonnets the figures are: average 7.04, standard deviation 8.15, largest intervals 3.16 and 2.82 standard deviations from the mean. In *Richard II* the largest interval is 2.71 standard deviations from the mean. The differences are not very remarkable.

12 This is true only if the total number of ‘early rare words’ (as defined in the Hieatt–Prescott article) in the Shakespeare canon is roughly the same as the total number of ‘late rare words’. In an Internet communication in the ‘SHAXPER’ controversy, Donald Foster asserts that Shakespeare’s early rare words appreciably outnumber his late rare words, which would imply that late rare words are stronger indicators of late composition than early rare words are indicators of early composition.

Another pertinent point is that 'earliness' and 'lateness', as Hieatt, Hieatt, and Prescott define them, are very broad concepts. The periods within which rare words classed as early or late may occur are extensive: ten years covering twenty-four works, and thirteen years covering nineteen works. And yet a substantial proportion of all the rare words—those appearing in the sonnets and in at least three but no more than seven other Shakespeare works—is associated exclusively or mainly with works written neither towards the beginning nor towards the end of Shakespeare's career, but in the middle. For example, the word *hymn*, classified as 'early', is absent from Shakespeare's first twelve works, appearing, outside the sonnets, only in *King John* (1594–6), *Romeo and Juliet* (1595–6), *A Midsummer Night's Dream* (1595–6), *The Merchant of Venice* (1596–7), and *Much Ado About Nothing* (1598–9), while *aggravate*, also classified as 'early', is confined to *Richard II* (1595), *A Midsummer Night's Dream* (1595–6), *The Merry Wives of Windsor* (1597), and *2 Henry IV* (1598), all written within the brief period 1595–8. The verb *o'erturn/overturn* is used only in the successive histories, *1 Henry IV* (1596–7), *2 Henry IV* (1598), and *Henry V* (1599).¹³ So it seems worth extracting from the Hieatt–Prescott tables all the rare words whose use is restricted to the twenty-one works written after the first twelve and before the last ten, and so falling within an intermediate range, comparable in length to the early and late ranges, between *King John* (1594–6) and *Macbeth* (1606).¹⁴

Table 1 displays the results, alongside the Hieatt–Prescott figures for early and late rare words in the four suspected zones. The overall picture remains much the same. Indeed, the data for 'middle rare words' provide some support for Hieatt, Hieatt, and Prescott's interpretation of their figures for early and late rare words. In Zone 1 there are fairly similar numbers and percentages in all three columns. In Zone 2 early and middle rare words strongly predominate. In Zone 3 the figures are too small for confident interpretation, but the total for middle rare words exceeds the combined total for early and late ones. Zone 4 is heavily weighted with early rare words, and is the zone with the smallest percentage of middle rare words, besides being devoid of late ones.

There is a notable cluster of middle rare words in Sonnets 77–87, a series that includes the 'Rival Poet' sonnets. There are eleven middle rare words in eleven sonnets, 84 and 85 each having two and 83 and 86 being the only two

13 Hieatt, Hieatt, and Prescott list all 'early' and 'general' rare words and their contacts in an appendix (pp. 99–109), italicizing the 'early' ones, and all 'late' rare words in a table (p. 79). For some reason, presumably oversight, they do not mark *o'erturn/overturn* as an 'early rare word', though it meets their criteria.

14 A few 'middle' rare words also qualify as 'early' or 'late' rare words. The list, with the sonnets in which the 'middle rare words' occur is: 2 *thrifless*, 6 *self-willed*, 20 *whereupon* (= 'upon which'), 21 *muse* (n.), 24 *perspective*, 26 *totter/tatter* (v., 'to make ragged'), 29 *hymn* (n.), 32 *muse* (n.), 35 *eclipse* (n.), 38 *muse* (n.) (three times), 41 *twofold*, 55 *o'erturn/overturn*, 60 *eclipse* (n.), 77 *mouth* (v.), 78 *muse* (n.), 79 *muse* (n.), 80 *wilfully*, 81 *o'er-read/over-read*, 82 *muse* (n.), 84 *penury*, 84 *copy*, 85 *muse* (n.), 85 *hymn* (n.), 87 *patent* (n.), 95 *habitation*, 100 *muse* (n.) (three times), 101 *truant* (adj.), 101 *muse* (n.) (three times), 102 *hymn* (n.), 103 *muse* (n.), 107 *prophetic*, 107 *eclipse* (n.), 109 *preposterously*, 110 *motley* (n.), 113 *latch* (v.), 118 *anticipate* (v.), 125 *rent* (n.), 140 *slanderer*, 142 *rent* (n.), 146 *aggravate*, 148 *denote*.

TABLE 1. *Totals and percentages of early, middle, and late rare words in four different 'zones' of Shakespeare's sonnets*

	Early		Middle		Late	
	Total	%	Total	%	Total	%
Zone 1 (1–60) .4	20	12.3	15	9.2	17	10–
Zone 2 (61–103)	22	14.8	21	14.1	3	2.0
Zone 3 (104–26) .5	3	4.5	7	10.4	3	4–
Zone 4 (127–54) .0	9	15.2	4	6.8	0	0–

^a Percentages are of 'all rare words' as defined by Hieatt, Hieatt, and Prescott, 'When Did Shakespeare Write *Sonnets* 1609?', from which data have been extracted. 'Early' means found in

with none. An even tighter cluster of middle rare words occurs in *Sonnets* 100–3, which have nine.

More light can be shed on the subject by a new analysis of Sarrazin's century-old data, in terms of the Hieatt–Prescott zones. Slater demonstrated that the rarest words within the canon exhibit the strongest tendency to cluster according to chronology: thus words occurring in at least two plays and only twice or thrice in the canon are more apt to link plays of about the same date than words occurring nine or ten times.¹⁵ Sarrazin's twice-used and thrice-used words, which he termed 'dislegomena' and 'trislegomena', ought therefore to be quite sensitive indicators of chronological position. And in fact they are. In *Studies in Attribution: Middleton and Shakespeare*, I have shown that counts of Sarrazin link-words assign almost every Shakespeare play to the right one of four groups of plays formed according to Karl Wentersdorf's modified version of E. K. Chambers's standard chronology.¹⁶ Only two plays failed to have the largest (or equal largest) number of Sarrazin links with the chronological group to which they rightly belonged, and in neither case was the evidence seriously misleading: *A Midsummer Night's Dream*, the last play in Group 1, had three more links with Group 2 than with Group 1 (but

15 Slater, *Problem*, 88: 'The rarest words show . . . the greatest tendency to cluster'.

16 MacD. P. Jackson, *Studies in Attribution: Middleton and Shakespeare* (Salzburg, 1979), 148–58 and 211–12. K. Wentersdorf, 'Shakespearian Chronology and the Metrical Tests', in W. Fischer and K. Wentersdorf (edd.), *Shakespeare-Studien. Festschrift für Heinrich Mutschmann* (Marburg, 1951). The groups are: (1) *Tit.*, *1H6*, *Err.*, *2H6*, *3H6*, *Shr.*, *R3*, *TGV*, *LLL*, *MND*; (2) *Rom.*, *R2*, *Jn.*, *MV*, *1H4*, *2H4*, *Wiv.*, *Ado*, *H5*, *JC*; (3) *AYL*, *TN*, *Ham.*, *Tro.*, *MM*, *Oth.*, *AWW*, *Tim.*; (4) *Lr.*, *Mac.*, *Ant.*, *Per.*, *Cor.*, *Cym.*, *WT*, *Tmp.*, *H8*. My analysis excluded Fletcher's share of *H8*, according to the traditional Spedding–Hickson division, and the first two acts of *Pericles*. Sarrazin's tables are not perfect, but one or two obvious errors are easily corrected, and his data are accurate enough to furnish results that are trustworthy as far as their broad import is concerned.

considerably fewer with Groups 3 and 4);¹⁷ *Much Ado About Nothing*, belonging to Group 2, had four more links with Group 1 than with Group 2 (though, again, fewer with Groups 3 and 4). Worth noting is that for some of the plays written late in the sixteenth century, such as *Henry V* (1599) and *As You Like It* (1599), the number of links with each of the four groups is much more even than for the plays that are decidedly early or late.

Also, for each play, a calculation of the percentage of Sarrazin links with the third and fourth groups combined served as a simple index of 'lateness'. When plays were ranked according to the size of this percentage, the order correlated quite strongly with Wentersdorf's chronological order. For thirty-one of the thirty-seven plays (84 per cent) a dating arrived at by reading their position on the vocabulary order as a position on Wentersdorf's chronological order was not more than three years out, and half were correct to within a single year. For middle plays such as *Henry V* and *As You Like It* this way of handling the data tended to clarify the indistinct findings of the four-group analysis.

For *Venus and Adonis* the Sarrazin links with the four groups are 58:38:29:27, giving a percentage of 36.84 links with the last two. The evidence points overwhelmingly to composition within the first quarter of Shakespeare's career, and the actual index of 36.84 per cent places the poem at exactly the right point, for a date of 1592–3.¹⁸ The figures for *The Rape of Lucrece* are similar: 84:47:44:34, with an index of 37.32, for a correct date of 1593–4. *A Lover's Complaint* affords a striking contrast. The figures are 5:11:22:24, with an index (or percentage of links with the third and fourth groups) of 74.19 per cent, which is higher than for any play (*Antony and Cleopatra* representing the peak of 63.7). The Sarrazin links thus confirm other vocabulary studies that assign its composition to the seventeenth century.¹⁹ The closest parallel to the four-group pattern of *A Lover's Complaint* is furnished by Shakespeare's share of *Henry VIII* (18:17:29:31), though the proportions for several other plays from *Hamlet* onwards are somewhat similar.

17 The Riverside chronology would place *A Midsummer Night's Dream* after *Romeo and Juliet*, *Richard II*, and *King John*.

18 See Jackson, *Studies in Attribution*, 212, for the relevant table. Data for the narrative poems have since been extracted from Sarrazin, 'Wortechos'.

19 Jackson, *Shakespeare's 'A Lover's Complaint'*; K. Muir, '"A Lover's Complaint": A Reconsideration', in Edward A. Bloom (ed.), *Shakespeare 1564–1964* (Providence, RI, 1964), repr. in Muir, *Shakespeare the Professional and Related Studies* (London, 1973), 204–19; Slater, 'Word Links'; A. K. Hieatt, T. G. Bishop, and E. A. Nicholson, 'Shakespeare's Rare Words: "Lover's Complaint", *Cymbeline*, and *Sonnets*', *Notes & Queries*, 232 (1987), 219–25. The 17th-cent. composition of 'A Lover's Complaint' has been accepted by recent editors of the sonnets, such as John Kerrigan (Harmondsworth, 1986), G. Blakemore Evans (Cambridge, 1996), and Katherine Duncan-Jones (London, 1997), and by John Roe in his edition of *The Poems* (Cambridge, 1992). Hieatt, Bishop, and Nicholson agree with Slater that Shakespeare drafted the poem about 1600–3 and revised it 1608–9. In my own statistical analysis of data presented in *Shakespeare's 'A Lover's Complaint'* the poem's strongest lexical associations were with *All's Well That Ends Well* and *Timon of Athens*, which are adjacent in Wentersdorf's chronology (1604–5); there are also significant links with *Hamlet* and *Troilus and Cressida* (1600–2), and with *Cymbeline* and *Coriolanus* (1607–9).

The Sarrazin links for the sonnets are presented in Table 2. The most notable feature is the sharp distinction between Zone 3, where Group 3 links predominate and links with Group 4 provide the second highest total, and the other three zones, in which the majority of links are with the first two groups. The percentages of second-half links (with Groups 3 or 4) are: Zone 1, 41.2, Zone 2, 38.5, Zone 3, 64.1, and Zone 4, 45.8. The raw figures for Zone 4 are too low, and thus too likely to have been subject to chance factors for the anomalous pattern, in which the highest and next-highest totals are for Groups 2 and 4, to be confidently interpreted. The pattern for Zone 1 is most closely matched by plays near the end of Group 1 and the beginning of Group 2, and

TABLE 2. *Rare-word links between different 'zones' of Shakespeare's sonnets and four chronological groups of plays*

	Group 1	Group 2	Group 3	Group 4
Zone 1 (1-60)	15	15	12	9
Zone 2 (61-103)	11	13	10	5
Zone 3 (104-26)	8	6	14	11
Zone 4 (127-54)	3	10	3	8

^a Links are for words used twice and thrice in the canon, as calculated from the tables of Gregor Sarrazin.

the index would also suggest a date of around 1595-6. The slightly lower index for Zone 2 would place it in 1594-5: though it has two more links with Group 2 than with Group 1, it is more notably deficient in Group 4 links than is Zone 1. The evidence seems to indicate that Zone 3 was composed in the seventeenth century: the index of 64.1, associating it with the very last plays, cannot be taken too seriously, but Shakespeare's involvement with sonnets in this zone in the early Jacobean years is probable, and those scholars who have associated Sonnet 107 with Queen Elizabeth's death and King James's peaceful succession in 1603 are unlikely to have dated this particular sonnet too late.

As far as links formed by Sarrazin's dislegomena and trislegomena go, results for Zones 1, 2, and 4 might reasonably be added together, to give the following pattern of links with the four groups of plays: 29:38:25:22. This quite closely matches such plays as *1 Henry IV*, *The Merry Wives of Windsor*, and *Henry V* in the period 1596-9, though the index of 41.2 would point to 1595-6. But of course these are merely dates upon which a period of several years' composition might centre. There is no clear support in the Sarrazin

figures for the theory that Zone 1 was subjected to late revision and supplementation: though the proportion of links with the final group of plays is marginally higher than that for Zone 2, it is much lower than for Zone 4, and the four-group distribution would be quite normal for work written in the years 1595–7, for example.

One minor detail of possible significance is that Zone 3 has two Sarrazin links with the early narrative poems *Venus and Adonis* and *The Rape of Lucrece* and two with the much shorter, and evidently late, poem *A Lover's Complaint*, whereas the total links for the other three zones are nine with the two early poems and one with the late one (2:2 versus 9:1). This gives a modicum of support to the conclusion that Zone 3 was written appreciably later than most of the remainder of the sequence. Another small point is that the pattern of links for Sonnets 1–17, the 'marriage sonnets', is 3:5:2:2. Although the figures are very low, they hint at composition in the second quarter of Shakespeare's career, rather than in the earliest period of 1588–94.

A little more information may be extracted from Hieatt, Hieatt, and Prescott's data. In an appendix to their article they record every instance of an early or generally rare word within each individual sonnet, together with a list of the other Shakespeare works in which it occurs. Supplementing this list with their similar, but far shorter, list of late rare words, we can chart the number of links between each sonnet and the four chronological groups of plays used for my analysis of Sarrazin's twice-used and thrice-used words. The Hieatt–Prescott rare words—apart from those that are early, middle, or late—are unlikely to be such good indicators of chronology as Sarrazin's words, since they are found in up to seven plays, and presumably several times in some of these plays. But one might expect them to behave rather like Slater's words that occur six to ten times in the canon. I have tallied Group 1, 2, 3, and 4 links with each sonnet. For thirty-six of the sonnets that have at least ten links, Groups 3 or 4 yield the highest or equal highest total.²⁰ The pattern of Sarrazin links for these sonnets is 5:8:17:10, which represents a surprising measure of agreement. For the fifty-nine sonnets that have at least ten links, but with the highest or equal highest total being with plays of Groups 1 or 2, the pattern of Sarrazin links is 16:16:9:8, which is again in accord with the Hieatt–Prescott data.

If we calculate for each zone the number of sonnets that have their highest or equal highest total of Hieatt–Prescott links with Groups 1, 2, 3, or 4, we obtain the following results: for Zone 1 the pattern is 9:12:10:7; for Zone 2 it

20 Sonnets for which the highest or equal highest total of links is with Group 1 or 2 are: 2, 6, 8, 11, 13, 15, 18, 19, 21, 23, 25, 26, 27, 29, 32, 37, 46, 50, 53, 55, 61, 64, 65, 66, 67, 68, 70, 76, 78, 80, 82, 83, 85, 89, 90, 94, 95, 96, 97, 100, 101, 102, 105, 113, 118, 120, 122, 124, 125, 127, 133, 137, 138, 139, 140, 146, 147, 148, 151; sonnets for which the highest or equal highest total of links is with Group 3 or 4 are: 3, 4, 12, 22, 23, 25, 30, 35, 38, 43, 49, 56, 58, 59, 60, 62, 74, 77, 81, 83, 84, 87, 98, 106, 107, 108, 110, 116, 117, 126, 137, 140, 141, 148, 153, 154. Sonnets listed twice have equal highest totals of links with Group 1 and/or 2 and with Group 3 and/or 4.

is 14:9:7:1; for Zone 3 it is 4:4:4:3; and for Zone 4 it is 8:4:3:3.²¹ This tends to confirm that Zones 1 and (probably) 3 are 'later' than Zones 2 and 4, and the almost complete absence from Zone 2 of sonnets connecting most strongly with Group 4 is notable. But the Zone 1 pattern is perhaps marginally more suggestive of composition mainly within the early middle period than of very early composition and very late revision and augmentation.

Another set of relevant data concerns each zone's Hieatt–Prescott links with the three poems, *Venus and Adonis*, *The Rape of Lucrece*, and *A Lover's Complaint*. For Zone 1 the figures are (for links with each of the above poems in turn) 12:33:7; for Zone 2 they are 16:28:3; for Zone 3 they are 7:17:7; and for Zone 4 they are 10:12:1. On the basis of the size of the three poems, one would expect 33.5 per cent of the links to be with *Venus and Adonis*, 56.5 per cent to be with *The Rape of Lucrece*, and 9.9 per cent to be with *A Lover's Complaint*.²² The most striking deviation from these expectations is Zone 3's figure for links with *A Lover's Complaint*, which works out at 22.6 per cent. Zone 1 also has a higher proportion of *A Lover's Complaint* links than expected, 13.5 per cent, while percentages for Zones 2 (6.4 per cent) and 4 (4.3 per cent) are below expectation. Zones 1 and 3 have, proportionally, the fewest links with *Venus and Adonis*, 23.1 per cent and 22.6 per cent, while Zone 4 has more than expected, 43.5 per cent. Zone 1 has the highest percentage of links with *The Rape of Lucrece*, 63.5 per cent. *Venus and Adonis* was published in 1593, *The Rape of Lucrece* in 1594, and there is now general agreement that *A Lover's Complaint* was written in the seventeenth century. The pattern of sonnet links with the three poems is thus in accord with other indications that Zone 3 (Sonnets 104–26) especially, and Zone 1 (1–60), are later, or contain more late writing, than Zones 2 (61–103) and 4 (127–54).

It is possible to tally all the Hieatt–Prescott links with all the plays, and check observed frequencies against expected frequencies calculated according to the size of each play's vocabulary in proportion to the sum of these vocabularies.²³ A summary of the main points emerging from such an analysis may be useful. For Sonnets 1–103 to the Young Man (combining Zones 1 and 2) the notable result is the highly significant excess of observed over expected links with *A Midsummer Night's Dream* (1595–6) and *Henry V* (1599). *King*

21 Links with the poems and with *The Two Noble Kinsmen* have simply been left out of account, since my four-play chronological groupings ignored these works.

22 The 'size' of the poem is here based on the number of words cited three to ten times in Shakespeare's plays, according to Slater's table 1 in 'Word Links', 159. Expected percentages reckoned from the total number of different words ('types') per poem, as given in M. Spevack, *A Complete and Systematic Concordance to the Works of Shakespeare*, 9 vols. (Hildesheim, 1968–80), would be similar: 29.4 for *Venus*, 58.8 *Lucrece*, and 11.8 for *Complaint*.

23 'Expected' frequencies were calculated using Slater's method in *Problem*, 158–96. Slater relies on Alfred Hart's counts of the numbers of different words per play. The data are not available for a more 'correct' calculation, and Slater's approximations are adequate for the purpose. Presentation of the calculations and tables on which the results reported in this and the next paragraph are based would take up more space than is warranted, but the relevant data may all be extracted from the Hieatt–Prescott article.

John (1594–6), which in the Riverside chronological order falls in between the other two plays, and which Chambers dated 1596–7, exhibits a less startling, but still statistically significant, excess, as does *Othello* (1604).²⁴ The high numbers of links with *A Midsummer Night's Dream*, *Henry V*, and *Othello* are partly due to the fact that the word 'muse', which in the dramatic canon occurs only in these three plays, is used no fewer than fourteen times within Sonnets 1–103. But even if we were to disregard all instances of 'muse', the excess of links with *A Midsummer Night's Dream* and *Henry V* would still be statistically significant, though that with *Othello* would disappear. It is perhaps not surprising that love sonnets should have close affinities in their vocabulary with a romantic comedy such as *A Midsummer Night's Dream*, but *Henry V* belongs to an altogether different genre, as does *King John*, so that these data would hint at a period of composition for the main body of the sonnets to the Young Man of, say, 1596–9. For each of the last eleven plays, from *All's Well That Ends Well* to *Henry VIII*, the number of links is below expectation, which suggests little, if any, Shakespearian involvement with this portion of the sequence during the last quarter of his playwriting career.

The Dark Lady sonnets (127–52), in contrast, have statistically significant links with *2 Henry VI* (1590–1), *The Comedy of Errors* (1592–4), and *Richard II* (1595). For the cluster of plays comprising *2 Henry VI*, *3 Henry VI*, *Richard III*, and *The Comedy of Errors* there are forty-two links, where twenty-five would be expected. The relative earliness of Zone 4 thus seems confirmed. For Zone 3 (104–26) there are no statistically significant results: the links are fairly evenly distributed.²⁵

Hieatt, Hieatt, and Prescott freely admit that the borders between their zones are doubtful, and that even 'within a given zone one can speak of no more than a tendency. Individual sonnets probably have histories of their own' (pp. 91–2). I have already noted the cluster of 'middle rare words' in Sonnets 77–87, which include those on the theme of the Rival Poet. The Sarrazin links for this series run 2:6:2:0. Eight of the ten links are with plays between *1 Henry IV* (1596–7) and *Measure for Measure* (1604). The complete set of Hieatt–Prescott links between Sonnets 77 and 87 and my four chronological groups runs 55:59:64:25. This also suggests a 'middle' period of composition, and a closer inspection of the results, play by play, strengthens the

24 The chi-square values are 26.586 for *A Midsummer Night's Dream* (58 links instead of an expected 29.836) and 25.771 for *Henry V* (72/39.924). *King John* yields 6.45 (52/36.629), and *Othello* 6.857 (53/38.068). These values cannot, strictly speaking, be translated into statistical probabilities, but the two higher ones, especially, are extremely unlikely to have occurred by chance. For a professional statistician's review of Slater's methods see M. W. A. Smith, 'Shakespearian Chronology: A New Approach to the Method of Word-Links', *Notes & Queries*, 235 (1990), 198–204.

25 Total Hieatt–Prescott links relating zones to my four groups are: Zone 1: 169:189:151:166; Zone 2: 195:186:161:89; Zone 3: 87:82:81:72; Zone 4: 78:68:41:46. These gross figures succeed only in blurring most of the significant points. But the relatively even distribution in Zones 1 and 3 is notable, as is Zone 2's marked dearth of links with Group 4. The totals at least confirm that Zones 2 and 4 are earlier, or contain a much larger proportion of early material than Zones 1 and 3.

impression. The total of links with Group 1 is swollen by the large number (fourteen) with *A Midsummer Night's Dream*, which is the last play in the group. With all other Group 1 plays the links are below, or (in three cases) virtually at, chance expectation, but for *A Midsummer Night's Dream* they are three times as great as chance would dictate. This excess is only partly explained by the fact that the noun *muse* four times links these sonnets with *A Midsummer Night's Dream*.²⁶ Positive sums for 'observation minus expectation' tend to predominate in plays of the second and, especially, third groups—in Group 3 only one of the eight plays has a number of links slightly below expectation—and then with every one of the Group 4 plays the number of links is lower than expected. There are appreciably more links than would be expected with *King John* and with *Henry V*, but statistically the greatest excess of observed over expected links, apart from that for *A Midsummer Night's Dream*, is with the three-play cluster *Othello*, *All's Well That Ends Well*, and *Timon of Athens*, which form a sequence in Wentersdorf's chronology (1603–4 to 1604–5).²⁷ Again, statistical significance would remain even if we were to discount the four links formed by the presence of *muse* in *Othello*. Certainly the period bordered by *A Midsummer Night's Dream* (1595–6) and *Timon of Athens* (1606–7) is clearly indicated.²⁸ This is broader than the range implied by the more sensitive Sarrazin indicators, but supports their evidence, so that some time between 1596 and 1604 seems probable for the composition of Sonnets 77–87. The pattern of links is particularly notable in certain of these sonnets. For example, sixteen of Sonnet 77's twenty links are with plays between *A Midsummer Night's Dream* and *Timon of Athens*, as are twenty-two of Sonnet 87's thirty, while thirteen of Sonnet 83's sixteen are with plays between *A Midsummer Night's Dream* and *All's Well That Ends Well*.

As noted above, the Sarrazin links for the 'marriage sonnets' (1–17) relate to my four chronological groups as follows: 3 : 5 : 2 : 2. The Hieatt–Prescott links fall into a similar pattern: 50 : 60 : 36 : 52. The total of links with Group 1 as a whole closely matches chance expectation (51). For the thirteen plays extending from *Romeo and Juliet* (1594–5) at the beginning of Group 2 to *Hamlet* (1600–1), the third of Group 3, there is a marked excess of observed links over expected links (81/58), and this is followed by a marked deficit of links (17/34) in the plays from *Troilus and Cressida* (1601–2) to *King Lear* (1605–6) at the beginning of Group 4.²⁹ For the remaining plays in Group 4,

26 When a word occurs once in a sonnet and more than once in a play, Hieatt, Hieatt, and Prescott count only one contact with that play, whereas if one instance of one of Sarrazin's thrice-used words occurs in a sonnet and two instances in a play this constitutes two 'Sarrazin links' between sonnet and play.

27 The total of links with this group is 29, instead of the expected 16.149, yielding a chi-square value of 10.227.

28 The *Timon of Athens* date is the Riverside's. Wentersdorf's chronology would place it in 1604–5.

29 In this paragraph, dealing with my four chronological groups based on Wentersdorf's

Macbeth (1605–6) to *Henry VIII* (1613), the number of links is slightly, but only slightly, above chance expectation (50/43). This suggests that these sonnets were written in the *second* half of the 1590s.

Hieatt, Hieatt, and Prescott consider, very tentatively, the evidence for dating other short series of sonnets or individual sonnets. The series 66–70 they judge to be early. The Hieatt–Prescott links support this view: 42:43:30:18. But again the ‘earliness’ seems not to be extreme earliness, since the largest number of links, though only just, is with Group 2 plays. The sole evidence from Sarrazin link-words comes in Sonnet 66, which has *strumpeted* linking with *The Comedy of Errors* and *restful* linking with *Richard II*, and Sonnet 68, with *tresses* linking to *1 Henry VI* and *King John*; so each has a Group 1 and a Group 2 link.³⁰ Hieatt, Hieatt, and Prescott think that the presence in Sonnet 67 of ‘seven rare words, of which two are early, five general . . . suggests composition in the first half of the nineties’ (p. 95). But a closer scrutiny of their data casts doubt on this deduction. The four-group pattern runs 10:17:8:4. One of the two ‘early’ words, *exchequer*, occurs only in *The Two Gentlemen of Verona* (1594), *Richard II* (1595), *The Merry Wives of Windsor* (1596–7), *1 Henry IV* (1596–7), and *Henry V* (1599), and the other, *bankrupt*, occurs only in *The Rape of Lucrece* (1593–4), *The Two Gentlemen of Verona*, *Richard II*, *A Midsummer Night’s Dream* (1595–6), and *Henry V*. So even these ‘early’ words are associated more firmly with the second half of the 1590s. Five of the sonnet’s seven Hieatt–Prescott contact-words are found in *Henry V*,³¹ which also affords the only Shakespearian parallel (in the Epilogue) to the sonnet’s opening rhyme of *live* with *achieve*. Neither of the two earliest instances of the Sonnet 67 contact-word *lace* as a verb (in *The Taming of the Shrew* and *The Two Gentlemen of Verona*) is used, as in all the others, in the figurative sense of ‘adorn’: in the former the lacing is literal, of a boot, and in the second the reference is to ‘laced mutton’, a cant term for a prostitute.

Since Sonnet 107 has one late rare word, Hieatt, Hieatt, and Prescott are inclined to accept the arguments for supposing that it refers to the historical events of 1603. The full set of Hieatt–Prescott links has the following relation to my four chronological groups: 5:9:12:9. This is certainly consistent with 1603, and the three Sarrazin links are with *Othello* (1604, *balmy* twice) and *The Winter’s Tale* (1610–11, *incertainties*). Hieatt, Hieatt, and Prescott point out that the powerful Ovidian treatment of mutability, Sonnet 60, has no fewer than ‘four late rare words represented in all three quatrains’ and no early rare words (p. 94). The links to each chronological group work out at 7:5:14:13, which clearly indicates seventeenth-century composition, and the two Sarrazin

chronology, the dates are necessarily Wenersdorf’s. The Riverside edition would place *Romeo and Juliet* in 1595–6, *King Lear* in 1605, and *Macbeth* in 1606.

30 However, in *1 Henry VI*, *tresses* comes in the third line, and Act I may well have been written by Thomas Nashe. (See Taylor, as in n. 42 below.) This would leave two of the three links falling within the chronologically adjacent *King John* and *Richard II* in the period 1594–6.

31 No other play or poem has more than three of the seven words.

links (*delve* linking with *Hamlet* (1600–1) and *Cymbeline* (1609–10)) add further support.

This is important, because Sonnet 60's numbering bears an unmistakable relationship to the content of its opening lines, as René Graziani pointed out: 'Like as the waves make towards the pebbled shore, | So do our minutes hasten to their end'.³² He assumed that Shakespeare, having written fifty-nine numbered sonnets, headed up the next with a '60', and that the figure prompted the idea of minutes in an hour. Katherine Duncan-Jones, noting other cases of the appropriateness of the head number to the material, judges it far more likely 'either that sonnets already written were subsequently carefully located, or that some were specially written or revised for particular positions in the sequence'.³³ Since Sonnet 60, in its present form, was probably written in the seventeenth century, and many of the Young Man sonnets that follow (as well as many of those in the Dark Lady section) were probably written several years earlier, Duncan-Jones seems right to draw a firm distinction between the order of original composition and 'the order of the sonnets as finally arranged in Q',³⁴ even within the Young Man section, and to argue for Shakespeare's involvement in the arrangement of the sequence at a fairly late stage.

We must beware, however, of exaggerating the efficacy of the vocabulary evidence adduced so far. Hieatt, Hieatt, and Prescott rightly caution against placing much faith in even fairly decisive-seeming data for single sonnets: mere fourteen-line units are subject to far too much random fluctuation. Also, different sonnet themes necessarily call forth different vocabularies, which will be linked to different groups of plays: genre, subject-matter, tone, and so on, can all be seen to influence inter-play links, and doubtless also affect the statistics for various groups of sonnets.³⁵ Sonnet 60 is one of the strongest in the sequence, and when Shakespeare was writing at the height of his powers he may well have tended to use a more inventive diction that would recur in later works. Slater's tables show *Hamlet*, for example, linking, in its rare-word vocabulary, with later rather than earlier plays. They also show several instances of a kind of pattern of links exemplified by *Measure for Measure* (1604). It has statistically significant associations, in 'two- to six-fold link words', with the tight chronological series (1600–3), *Hamlet*, *Troilus and Cressida*, and *All's Well That Ends Well*. But it also has a highly significant excess of observed over expected links with *The Winter's Tale* (1610–11). We are not, however, forced to conclude that Shakespeare revised *Measure for Measure* towards the end of his playwriting career.³⁶ *The Taming*

32 R. Graziani, 'The Numbering of Shakespeare's Sonnets: 12, 60, and 126', *Shakespeare Quarterly*, 35 (1984), 79–82.

33 *Shakespeare's Sonnets*, ed. Duncan-Jones, p. 16.

34 Ibid.

35 Slater's tables in *Problem*, 158–96, clearly reveal associations by genre as well as chronology.

36 However, Gary Taylor and John Jowett argue in *Shakespeare Reshaped 1606–1623* (Oxford,

of the *Shrew* (1593–4) is firmly linked to several of the earliest plays, but also to *1 Henry IV* (1596–7).

The case of *The Phoenix and Turtle* is instructive. We know that Shakespeare had finished work on it by 1601, because in that year it was published as one of several 'new compositions' appended to Robert Chester's *Love's Martyr*. It is usually assumed to have been written shortly before it reached print. The vocabulary is heavily weighted towards Shakespeare's seventeenth-century plays. For example, usages that have only one or two parallels in the canon are as follows: *obey to* occurs only in *Troilus and Cressida* (1601–2); *surplice* only in *All's Well That Ends Well* (1602–3); *requiem* only in *Hamlet* (1600–1); *gender* meaning 'race' or 'kind' only in *Hamlet* and *Othello* (1604); *commence* as an intransitive verb only in *Timon of Athens* (1607–8) and *Macbeth* (1606); and *twain* substantively to mean 'pair' or 'couple' only in *Antony and Cleopatra* (1606–7) and *The Tempest* (1611).³⁷ In relation to my four chronological groups, this works out as 0:0:6:3. The links are predominantly with plays written after *The Phoenix and Turtle*. The poem, with its curious mix of intense abstraction, Cock Robin bird lore, incantation, wordplay, paradox, and personification of Property and Reason (not to mention its Chinese-box narrative structure), is so concentrated in thought and feeling that it is not surprising to find Shakespeare employing for the first time several words that he was later to reuse. Among *The Phoenix and Turtle*'s Hieatt–Prescott contact words, which include only those that also occur within the sonnets, are two 'late rare words' (*session* and *rarity*) and six 'generally rare words'. On this kind of evidence, Hieatt, Hieatt, and Prescott would tend to pronounce a sonnet or group of sonnets 'late', meaning to imply composition or revision beyond the first few years of the seventeenth century. The Hieatt–Prescott links might seem to support such a conclusion concerning *The Phoenix and Turtle*, since they fall into the four-group pattern: 6:6:8:11. But it was in print by 1601.

For these reasons, I am unsure whether Hieatt, Hieatt, and Prescott are right in suspecting that Shakespeare continued to work on his sonnet sequence right up until 1609, with the implication that he authorized Thomas Thorpe's Quarto publication. Evidence for Shakespeare's substantial involvement with the sequence in the plague years 1603–4 is much more compelling.

However, if I am correct in thinking that the 'marriage sonnets' are no earlier than the second half of the 1590s, they cannot have been commissioned to overcome any reluctance of Henry Wriothesley, earl of Southampton, to marry. As John Padel has demonstrated, 'there is no time after 1590 appropriate for their composition' in the interests of such a project.³⁸ On

1993), 107–236, that Thomas Middleton made small contributions to the text after Shakespeare's death.

37 I have relied on A. Schmidt, *Shakespeare Lexicon* (Berlin, 1902; repr. New York, 1971).

38 J. Padel, *New Poems by Shakespeare: Order and Meaning Restored to the Sonnets* (London, 1981), 16. Padel's reordering of the sequence is unconvincing, but he makes some good points on the Southampton versus Pembroke debate.

Southampton's sixteenth birthday, 6 October 1589, his guardian William Cecil, Lord Burghley, proposed that the youth marry Burghley's eldest granddaughter, Elizabeth Vere. Southampton refused, and, despite pressure as he turned 17, continued in his refusal, knowing that when he came of age Burghley, to whom he meanwhile had to submit in all matters concerning the management of his estate, would exact a large sum in compensation, as he duly did. Payment of £5,000 impoverished Southampton for several years. Before he was 22 he had fallen in love with Elizabeth Vernon, whom he married in 1598. As Padel points out, if the marriage sonnets belonged to the four-year period in which Southampton and Burghley were estranged, 'the young man, still a minor, could marry nobody without his guardian's consent and was awaiting Burghley's savage bill of 1594. Shakespeare could have written them only advocating marriage with Elizabeth Vere and there would have been no surer way to alienate Southampton', who would have reviled the poet as Burghley's hireling. On the other hand, 'If they belonged to 1594–5, it would have been a mockery of the young Earl, who could not now afford to marry and before his twenty-second birthday was in love with Elizabeth Vernon'.³⁹ As recipient of Sonnets 1–17, Henry Herbert, eventual earl of Pembroke, notoriously unwilling to accept as bride Elizabeth Carey in 1595–6, Bridget Vere in 1597, or a niece of Charles Howard in 1599, and even in 1600–1 refusing to marry Mary Fitton, whom he had made pregnant, would—if we are willing to believe that there is any sort of biographical base to the sonnets' cast of characters—provide a much better chronological fit.⁴⁰

Similarly, if the Rival Poet sonnets were written some time between 1596 and 1604, they cannot in any literal way relate to Christopher Marlowe, who was dead by 1593, but might have something to do with Samuel Daniel, George Chapman, or Ben Jonson.

There is a good deal more that might yet be done by way of analysis of the sonnets' vocabulary. Eliot Slater's words 'occurring from two to ten times in more than one Shakespeare play'—of which he gives a complete list—might be traced within the sonnets and related to particular groupings.⁴¹ More significantly, attempts might be made to identify words like *particular* and *goodness* that occur quite frequently within the canon but are strongly associated with (though not confined to) one chronological half of it or with a restricted period. Also, with the help of Schmidt's *Lexicon*, it is possible to make distinctions between senses and kinds of usage that are included under a single headword. The verb *invite*, for example, is common, but it is used absolutely only in Sonnet 124, *A Lover's Complaint*, and *Othello*, with *Othello's* 'an inviting eye' more closely paralleling the sonnet's 'the inviting time'. The noun *child*, also

39 Ibid.

40 Padel's discussion (ibid. 17–21) may be supplemented by J. Dover Wilson, *An Introduction to The Sonnets of Shakespeare* (Cambridge, 1963), 59–74, and *Shakespeare's Sonnets*, ed. Duncan-Jones, pp. 53–69.

41 For the list see Slater, *Problem*, 136–57.

very common, is used figuratively only in Sonnet 124, *Love's Labour's Lost*, *1 Henry IV*, *Macbeth*, *Antony and Cleopatra*, and *Henry VIII*. Statistical analysis of phrasal collocations, methodically collected with the help of a concordance, can also be revealing, as Gary Taylor demonstrated in an article on *1 Henry VI*.⁴² Even very common ones can have value for dating. For example, the phrase *cannot choose but*, used in the couplet of Sonnet 64, appears nineteen times in the plays, in the four-group pattern 3:6:6:4; moreover, there is a close parallel between the sonnet's 'cannot choose | But weep' and Ophelia's memorable 'I cannot choose but weep to think they would lay him i'th' cold ground' in *Hamlet*, IV. v. 69–70.

Meanwhile, the vocabulary evidence put forward in this article supports and clarifies some of the Hieatt–Prescott findings and muddies others. The main conclusion, which is unlikely to be overturned, is that the majority, if not all, of the last twenty-odd of the sonnets to the Friend were written in the seventeenth century.⁴³ A few other sonnets, in both the Friend and the Dark Lady series, may have been written equally late, but the bulk of them belong to the 1590s. Except that Sonnets 104–26 include many that are among the latest, the sonnets to the Friend are less likely to be in exact chronological order of original composition than to intermingle clusters of relatively early and relatively late work. The Dark Lady sonnets are mostly to be associated with the earliest among those to the Friend. The traditional notion that the sonnets were essentially completed in the period 1593–6 is certainly mistaken: the time-span, even for Sonnets 1–103 and 127–54, must be extended forwards at least another three or four years, and it is probable that very few were composed as early as 1593. Evidence for 'early' original writing and 'late' revision or supplementation of Sonnets 1–60 is somewhat ambiguous, and in any case the vocabulary data link this portion of the sequence, considered as a whole, predominantly with plays of the second quarter of Shakespeare's career.⁴⁴

University of Auckland

42 G. Taylor, 'Shakespeare and Others: The Authorship of *Henry the Sixth, Part One*', *Medieval and Renaissance Drama in England*, 7 (1995), 145–205, esp. pp. 189–94 and 198.

43 This conclusion was foreshadowed in Jackson, *Shakespeare's 'A Lover's Complaint'*, 13 n. 15, where he also declared that the sonnets had been 'written over a long period'.

44 D. W. Foster, 'Reconstructing Shakespeare Part 2: The Sonnets', *Shakespeare Newsletter* (Fall 1991), 26–7, reaches somewhat different conclusions, based on his research with the electronic database SHAXICON. He assigns Sonnets 97–115 to 1602–4 and Sonnets 116–26 to 1608; but he also assigns the remaining sonnets, divided into groups, to periods from 1598–9 to 1608. But he has not yet published full details of his evidence.

