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Individual differences in undergraduate essay-writing strategies: A longitudinal study

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Abstract. Analysis of questionnaire responses describing the writing processes associated with a total of 715 essays (term papers) produced by undergraduate psychology students identified four distinct patterns of writing behaviour: a minimal-drafting strategy which typically involved the production of one or at most two drafts; an outline-and-develop strategy which entailed content development both prior to and during drafting; a detailed-planning strategy which involved the use of content-development methods (mindmapping, brainstorming or rough drafting) in addition to outlining, and a "think-then-do" strategy which, unlike the other three strategies, did not involve the production of a written outline. The minimal-drafting and outline-and-develop strategies appeared to produce the poorest results, with the latter being more time consuming. The detailed-planning and "think-then-do" strategies both appeared to result in better quality essays, although differences were small. We analysed the writing strategies for a subset of these essays produced by a cohort of 48 students followed through the three years of their degree course. We found some evidence of within-student consistency in strategy use with on average two out of every three of a student's essays being written using the same type of strategy. There was no evidence of systematic change in writing strategy from year to year.

Introduction

Efficient production of good quality argumentative and descriptive text is at the heart of successful completion of the majority of undergraduate degree programmes. The ability to write well is not only necessary if students are to demonstrate their understanding of course content but is in itself an important learning outcome. Surveys of UK employers suggest that writing ability is one of the qualities most sought after in potential graduate employees (Bulmer, McKennell and Schonhardt-Bailey 1994).

Writing ability may, broadly, be thought of as having four contributing factors. First, writers require familiarity with the content that they are to write about and the ability to reason with this content so as to present a coherent and convincing account to their audience. Second, writers require familiarity with the genre of the text that they are to produce, understanding the particular

registers and structures that are required by the community for whom they are writing. Third, writers require meta-cognitive skills for managing the interaction between content and expression and, thus, for developing argument. Finally, writers require an overarching method-of-working to provide a framework within which the detailed goal setting and decision making associated with writing can occur. Our impression is that the majority of existing undergraduate writing instruction and research has focussed on the first three of these factors (see, for example, the papers collected in Rijlaarsdam, van den Burgh and Couzjin 1996). Less attention has been given to students' broader patterns of working when producing essays.

Writing is typically thought of as comprising three core activities; planning, composing and revising (e.g., Hayes and Flower 1980). Traditionally a strict progression through these activities from plan to draft to revision has been assumed (e.g., Rhoman 1965). Observation of competent writers suggests, however, that this sequence is frequently broken and that writing processes are often highly recursive (see, for example, Hayes and Flower 1980; Levy and Ransdell 1996). Planning, drafting and revision can be organised in a large number of different ways. This means that at the most detailed level of analysis the writing process of a particular writer performing a particular task is unique. It is typically assumed, however, that there is stability across tasks and time in the ways in which a particular writer organises his or her writing process (e.g., Chandler 1992; Emig 1971; Plimpton 1965). It is also typically assumed that some ways of working are likely to be more effective than others, although there is less agreement about which approaches work best. The authors of "how-to-write" books and articles tend to come down on the side of approaches that start with detailed planning and end with the production of more than one draft (e.g., Race 1999; Williams 1989), although some acknowledge the possibility of a variety of methods (e.g., Fairbairn and Winch 1991; Rowntree 1988), and a small minority recommend writing without planning (Elbow 1981; Wason 1985).

Consistent with previous practice, we will refer to the sequence in which a writer engages in planning, composing, revising and other writing related activities as his or her *writing strategy*, although in doing this we remain agnostic as to whether or not the "strategy" has been adopted deliberately. Several schemes for describing different writing strategies have been suggested (see Chandler 1992, for a summary). Although these schemes vary in detail, most imply two dimensions along which writing strategies can be described. The first dimension concerns the stage in the writing process at which writers decide content for their text. Writers can either decide content by planning in advance of writing or they can think up content concurrently with drafting (see, for example, Spender 1952; Wason 1985; Galbraith 1992).

The second dimension concerns the extent to which writers reflect on and rework their ideas and text. Writing can be elaborate, involving extensive planning and/or revising. At the other extreme, however, if may involve the production of full polished texts at the first attempt. This unelaborated strategy is not employed exclusively for short and simple writing tasks, but is used for substantial assignments by some professional writers. Hartley and Branthwaite (1989), described writers displaying this strategy as "doers", and van Waes (1992) labelled them "non-stop writers".

Anecdotal evidence of individual differences in writing strategy has traditionally been interpreted as indicating the existence of different "types" of writer (see, for example, Spender 1952; Wellek and Warren 1963). More recently, research has moved some way towards developing an empirical rather than an anecdotal description of writing strategies. This research has typically entailed either asking writers to report on how they normally write (e.g., Hartley and Branthwaite 1989; Norton 1990) or asking them to describe – or by independently observing – the production of a single piece of text (Torrance, Thomas and Robinson 1994; van Waes 1992). However, because of the lack of a longitudinal dimension in these studies, the impression of strategy stability (and, therefore, of different "types" of writer) may be illusory: it is possible that writers construct their writing process on an *ad hoc* basis to meet specific task demands. Exceptions are studies by Branthwiate, Trueman and Hartley (1980) and Torrance, Thomas and Robinson (1999) who collected data on the writing of two essays written by the same small samples of undergraduate students and found a fair degree of cross-task consistency. Levy and Ransdell (1996) have also found within-writer stability across a number of short writing tasks in the frequency of transition between different writing sub-processes although it is difficult to interpret these transition frequencies in terms of the more general writing strategy types reported elsewhere. The present research goes beyond these studies to describe the writing processes of a cohort of students writing several essays spread out over the course of a three year degree programme.

Previous research has produced a confused picture of the relationship between strategy and writing success. Studies of writing in school children and in college students have linked non-stop or polished-draft strategies with immature writers and poor text (e.g., Flower and Hayes 1980; Bereiter and Scardamalia 1987, pp. 13–23). In contrast, some of the more productive expert writers surveyed by Hartley and Branthwaite (1989) reported using an apparently similar single-draft strategy to good effect. There is some evidence that post-graduate writers who both plan and revise extensively worry more about their writing and are less productive than their peers (Torrance, Thomas and Robinson 1994). There is also uncertainty over the likely effects

on the quality of the finished text of planning versus strategies involving a combination of unplanned rough-drafting and revising. Some experimental evidence suggests that plan-centred strategies, in which the organisation of essay content is outlined in note form before drafting, result in the production of better quality text than do non-outlining strategies (Kellogg 1987, 1988; Glynn et al. 1982). However, there does not appear to be strong experimental evidence in support of the benefits of either mental planning (planning without the production of an outline) or of "mindmapping" techniques in which content is represented as non-linear idea structures (Kellogg 1990). Survey-based studies of undergraduate students writing essays as part of their normal coursework have found little or no relationship between essay grade and either number of drafts written or approach to planning (Branthwaite, Trueman and Hartley 1980; Norton 1990).

The research that we report in this paper focuses on the writing strategies of undergraduate students. There is obvious pedagogic utility of developing an understanding of the writing habits of this group. More theoretically, undergraduate students are interesting because they are no longer novice writers, having accumulated considerable experience of both argumentative and descriptive writing through school work and examinations, but typically have yet to develop expertise to match that of successful professionals.

A primary aim of the research that we report in this paper, therefore, was to provide descriptions of the strategies that undergraduate students use and the extent to which these vary across task and time. The research we report is correlational in design, and necessarily relied on measures of the students performance that were available as part of their normal assessment. However, with this qualification, we feel our study also provides a clearer picture than has previously been available of the relationships between writing strategy, students' subjective experience of the writing process, and the quality of the resulting essays.

Participants

All participants were undergraduate students studying for a degree in psychology at the University of Birmingham, UK. The median age of the students in our samples at the start of their degree course was 19 years. Their school results were slightly above the national average for entry into degree courses in the UK. All were either native or fluent English speakers.

The longitudinal sample consisted of 48 students all of whom completed questionnaires describing their normal writing strategies before starting their course and their writing strategy for a minimum of one essay in each of their three years of study. We collected data on between five and nine essays per

student in the longitudinal sample (median of six). Variation in the number of essays per student was in part due to variations in the assessment requirements for the different optional courses that the students took. Participants in this group were self-selected volunteers representing about half of that year's intake of students. General ability measures taken at the start of their course showed no difference between these students and other students in the same year who were not included in the sample. Students in our longitudinal sample did, however, receive slightly (and significantly) higher final degree marks. All but five of the students had left secondary education less than eighteen months before starting their degree course and only one of the students had been out of secondary education for more than five years.

In addition to the longitudinal sample, we collected writing strategy data from two cross-sectional samples, one of students in their first year of study (N = 77) and one of students in their third (final) year (N = 75). Each student in the cross-sectional samples completed strategy questionnaires for just one essay. To help derive an adequate classification of the different strategies used, we also collected one or more strategy questionnaires from a further 122 students who were from the same course but not included in other samples. This gave us information on the strategies adopted in the writing of a total of 715 essays produced by a total of 322 students.

Method

As part of their degree course students were required to produce a number of essays. All essays required a critical description and discussion of psychological themes and all required reference to one or more books or journal articles. The length limit for most of these essays was 1500 words, although the very first essay written in the first year had a limit of 1000 words, and the length limit for essays completed in the third year was 3000 words.

Very shortly after completion of an essay participants were given a fifteen item writing-strategy questionnaire. The questionnaire items, which are shown in the first column of Table 1, were adapted from those in questionnaires used previously by Kellogg (1986), Hartley and Branthwaite (1989), and Torrance, Thomas and Robinson (1994). They dealt with the way in which the essay had been written, exploring when and why students planned, drafted and revised. Students responded on a scale from 1 = "definitely not true [of the way I wrote my essay]" to 5 = "definitely true [of the way I wrote my essay]". In addition to the questions listed in Table 1, students were asked to estimate how many drafts they produced in writing their essay and to report how many hours they spent working on the essay (in total, includ-

Table 1. Writing strategy questionnaire items, mean rating across all essays (N = 715, standard deviation in parenthesis), and factor titles and loadings. Participants responded on a scale from 1 = definitely not true to 5 = definitely true. Coefficients of < 0.35 are omitted

Questionnaire item	Mean score for all essays	Factor loading
DEVELOPMENT DURING WRITING		
1b. Before starting to write out my essay, I had a fairly clear idea of how I was going to organise it.	4.0 (0.99)	–0.79
1e. When I started to write out my essay, I didn't have a clear idea of either its content or how I was going to organise it.	1.6 (0.85)	0.78
1a. Before starting to write out my essay I decided most of the points that I would include in my essay.	4.2 (1.0)	–0.74
1d. The organisation of my essay developed as I wrote.	3.2 (1.2)	0.67
1c. My ideas developed as I wrote.	3.6 (1.1)	0.55
OUTLINING		
2d. I wrote a few rough notes but not a detailed outline before starting to write out my essay in full.	2.9 (1.4)	–0.83
2e. I wrote out a full outline of what I was going to say and in what order before I started to write out my essay in full.	2.9 (1.5)	0.75
When writing your essay, how often did you stop and read over what you had written (1 = at end of draft to 6 = every few words)	2.9 (1.1)	0.43
2c. I had an outline of what I was going to write and in what order in my head before starting to write out my essay in full. However, I didn't bother to write it down.	2.0 (2.0)	–0.35
MULTIPLE DRAFTING		
3c. I wrote a rough draft of my essay, read it through and then wrote one or more further drafts. However, the content and organisation of the final draft was not substantially different from the first.	3.4 (1.5)	0.87
3b. I wrote a single draft of my essay, and corrected minor errors before handing it in.	2.3 (1.5)	–0.77
3a. I only wrote a single draft of my essay and handed it in without making any changes.	1.5 (1.0)	–0.64
EXPLORATION		
2b. During the writing of my essay I spent some time mind-mapping: jotting ideas down on paper and drawing lines between them to show how they are associated.	2.2 (1.4)	0.78

Table 1. Continued

Questionnaire item	Mean score for all essays	Factor loading
2a. During the writing of my essay I spent some time brainstorming: quickly jotting a lot of different ideas down on paper.	3.2 (1.4)	0.70
3d. I wrote a rough draft of my essay, read it through and then wrote one or more further drafts. The content and organisation of the final draft was substantially different from the first.	1.8 (1.1)	0.49

ing library research). Participants were also given a six item questionnaire asking them about their experiences of writing the essay and how satisfied they were with the finished product (see Table 6). At the start of their three year course, students in the longitudinal sample completed a general ability test with verbal, spatial and numeric reasoning subscales (AH2; Heim, Watts and Simmonds 1978). At this point we also gave students writing strategy and experience questionnaires to be completed with reference to the way in which they wrote their last substantial piece of text prior to starting their degree course.

We recorded the marks that the students received for their essays. Marks were awarded on a fifteen point, linear scale from F = fail to A+ = distinction. For ease of analysis and interpretation these were then converted to percentage scores. Marking was undertaken by different course teachers for each assignment and no further analysis of text quality was made. The decision not to further analyse text quality was made partly on pragmatic grounds. However, it was also felt that attempts at rating quality by judges who were not expert in the subject area of the essay, whilst allowing demonstration of reliability, would compromise validity. We were able to collect the marks awarded for 384 of the 493 university essays.

Analysis and results

This section is divided into three parts. First we report analysis that describes the different strategies used by the students. Next we look at data from just the longitudinal sample to explore the extent to which students were consistent in their strategy use. Finally we explore the relationship between writing strategy and the students' writing experiences and success.

Description and categorisation of writing strategies

Looking at the responses to the strategy questionnaires for all of the essays for which we collected data we found several features that were common across most students' writing strategies. For the vast majority of essays, drafting was preceded by planning both of content (Question 1a: 86% of essays had responses of "true" or "definitely true") and of how this content was to be structured (Question 1b: 78% of essays). Students reported writing a rough draft without first having formulated a clear idea of what to say for only 5% of the essays (Question 1e). This is not to say, however, that content was completely fixed from the start. Students frequently reported that their ideas developed during writing (Question 1c: 66% of essays) and rather less frequently that structure developed during writing (Question 1d: 49%). It was rare for students to report making substantial content changes once a first draft had been written (Question 3d: 10% of essays).

In order to draw general conclusions about the students' writing strategies it was necessary first to reduce the strategy data to a smaller number of dimensions and then to categorise writing processes in terms of their scores on these dimension. The best solution to a principal components analysis of the fifteen writing strategy items, chosen using Cattell's scree test criterion (Cattell 1978), identified four factors. Factor loadings for each item after orthogonal rotation are shown in the third column of Table 1. These factors represent four different kinds of activity that may or may not have been present in the writing of a particular essay: multiple drafting (writing of several drafts), development during writing (the extent to which content and structure are allowed to develop once writing has begun), outlining (whether or not the student produced a written plan), and use of what we have loosely described as "exploration" (some combination of mindmapping, rough drafting and brainstorming). Factor scores were calculated using the regression method.

To identify groups of essays that were written using broadly similar strategies we used cluster analysis, following the precedent of previous researchers (e.g., Hartley and Branthwaite 1989; van Waes 1992). Each case in this analysis was the writing process for one of the 715 essays for which we collected data, including essays written prior to starting university, with each essay represented by its scores for the four writing activity factors. This allowed any one student in our sample to be the author of essays in more than one of the resulting clusters. We were thus able to test for, rather than assume, within-writer consistency in writing behaviour: if writing behaviour was stable within writers across tasks and time then we anticipated that most of a student's essays would be classified within the same cluster. Hierarchical cluster analysis with clusters defined in terms of within-group linkages

Table 2. Characteristics of strategy clusters. + (or –) indicates that the mean factor score for that cluster was above (or was below) the mean score for that factor across all essays

Strategy cluster	Activity factors			
	Multiple drafting	Development during writing	Outlining	Exploration
Outline-and-develop (n = 232)	+	+	+	–
Detailed-planning (n = 168)	+	–	+	+
Minimal-drafting (n = 140)	–	–	+	–
Think-then-do (n = 175)	–	–	–	–

Table 3. Numbers of students reporting producing 1, 2, or 3 or more drafts, by cluster membership. Within-cluster percentages are shown in parenthesis

Strategy cluster	Number of drafts		
	1	2	3 or more
Outline-and-develop (n = 232)	3 (1%)	123 (53%)	106 (46%)
Detailed-planning (n = 168)	6 (4%)	82 (49%)	80 (48%)
Minimal-drafting (n = 140)	78 (56%)	58 (41%)	4 (3%)
Think-then-do (n = 175)	34 (19%)	89 (51%)	52 (30%)

and with a Euclidean measure of between-case distance suggested four broad patterns of writing.

Table 2 summarises the characteristics of each cluster. As we have noted, the writing of most essays was preceded by the production of an outline. This was true for essays in three of the four clusters. Essays in the largest cluster (the *outline-and-develop strategy*) were written from an outline but content and / or structure was allowed to develop during drafting. In almost all cases, more than one draft was produced (Table 3). The *detailed-planning strategy* involved students using not only an outline but also one or more other idea exploration strategies before producing a final draft. Although scores for essays in this cluster were below the mean for the "development during writing" factor, as we noted above most students reported that their ideas developed during writing, and this was true for essays written in this cluster, with 66% showing true or definitely true for Item 1c. As with the outline and develop strategy, almost all of the essays in this cluster were written using two or more drafts. This cluster, therefore, appeared to represent a strategy

similar to the outline-and-develop strategy but with students making greater deliberate effort to sort out ideas prior to drafting.

Essays in the smallest cluster were typically written using a *minimal-drafting strategy*. Again, the writing processes for these essays often involved outlining, although this was less likely than for the previous two clusters. However many more essays in this cluster were written using only one draft, with 71% of essays in this cluster reported as having been written using one draft with only minor error correction (Item 3b).

The final cluster grouped writing processes that typically did not involve outlining or other content-exploration methods. These strategies also involved less drafting than either the outline-and-develop or the detailed-planning strategies. The most salient feature of writing processes in this cluster was the scarcity of outlining, with 82% of essays reported as being written from a few rough notes and not from an outline (Item 2d). When students used this kind of strategy they were, however, more likely to report having a clear idea of essay structure. This suggests, perhaps a *think-then-do strategy* in which students gave thought to their essay, but did not adopt explicit planning techniques or engage in extensive re-drafting.

As a means of exploring the validity of the cluster analysis, we looked at the number of drafts that students in each cluster reported writing, a variable that was not included in the initial cluster analysis. These data are reported in Table 3 and show a significant, and predictable, relationship ($\chi^2 = 238$ with 3 *d.f.*, $p < 0.001$). This "external variables" validation (Aldenderfer and Blashfield 1984) provides some evidence that the cluster analysis was meaningful.

Cross-task stability in strategy use

To explore the extent to which students were consistent across essays in the strategies that they adopted we looked just at data from students in the longitudinal sample. We determined for each student their most frequently used strategy and the percentage of essays for which they had used this strategy. As the findings in the first two columns of Table 4 indicate, the majority of students (41 out of 48) had a single most-used strategy. This accounted for, on average, the writing of 69% of the student's essays. The remaining seven students used with equal frequency one of two different strategies and these two strategies accounted for, on average, 88% of their essays. This level of consistency, whilst suggesting a fair degree of within-writer stability in strategy use, indicates that majority of students did not, regardless of task, strictly adhere to a single strategy.

As can be seen from Table 5 there did not appear to be any systematic change in strategy use as the students progressed through their course.

Table 4. Most frequently used writing strategies for students in the longitudinal sample. Mean mark is for all essays and not just those written using the most frequent strategy (standard deviations in parenthesis). Percentage of essays for students who used two strategies with equal frequency (shown in parenthesis) indicates the percentage of essays written using one or other of these strategies

Strategy	Number of students for whom this was the most frequently used strategy	Mean percentage of essays for which this strategy was used by these students	Mean mark
Outline-and-develop	18	71%	64.7 (10.0)
Detailed-planning	8	63%	69.3 (12.7)
Minimal-drafting	5	71%	57.3 (6.7)
Think-then-do	10	69%	68.7 (10.7)
Two strategies used equally	7	(88%)	69.3 (6.1)

Table 5. Strategy use by year for students in the longitudinal sample (n = 48). Results for years one and two based on the writing of one essay, completed by all students. Results for year 3 based upon students' most frequently used strategy across one or more essays. Seven students did not have a single most frequent strategy in Year 3

Strategy	Pre-university	Year 1	Year 2	Year 3
Outline-and-develop	15	17	17	14
Detailed planning	14	10	6	7
Minimal draft	4	7	8	10
Think and do	15	14	17	10

As a check that multiple testing did not influence the strategies adopted by students in the longitudinal sample we compared the strategies adopted by the longitudinal sample in Year 3 with those of a cross sectional sample also in their final year and found no significant differences. There was also no evidence of a relationship between strategy use and general ability, as measured by any of the three AH2 subscales.

Writing strategy, writing experiences and essay grade

Table 6 gives mean scores across all essays for the writing experience questionnaire items. Principal components analysis and orthogonal rotation of scores for these items indicated two independent factors. Accordingly, the

Table 6. Items in the writing experience questionnaire, with mean scores for all essays sampled. Standard deviations in parenthesis. Items were scored from 1 = definitely not true to 5 = definitely true

Item		Mean
1.	I found writing my essay a tedious experience	3.0 (1.6)
2.	I enjoyed the process of writing my essay	2.9 (1.0)
3.	My essay writing went smoothly	3.0 (1.0)
4.	I was satisfied with my finished essay	3.2 (1.0)
5.	I found writing my essay challenging	3.7 (0.89)
6.	I found writing my essay hard work	3.6 (0.97)

Table 7. Standardised regression coefficients for writing activity factors as predictors of writing enjoyment, writing difficulty, and essay mark

Writing activity	Enjoyment	Difficulty	Essay mark
Development-during-writing	–0.18**	0.13**	–0.04
Outlining	0.12**	0.01	–0.07
Multiple-drafting	0.05	0.09*	0.01
Exploration	0.04	0.20**	0.14**

Note: *p < 0.05, **p < 0.005

first four items in Table 6 were summed, with Item 1 reversed, to give a single measure of what might be described as positive writing experience or, more succinctly, "enjoyment". The remaining two items were summed to give a measure of how hard the student found the writing process. We will refer to this as "writing difficulty".

Writing enjoyment was not correlated with essay mark (contrary to findings of Norton 1990) and nor, interestingly, were scores on the individual item relating to satisfaction with the finished product. There was a very weak, positive relationship between essay mark and reported writing difficulty ($r = 0.18$, $p < 0.001$). Reported length of time to complete the essay was unrelated to the mark that the essay received.

We looked first at the relationship between the writing activity factors and measures of writing success. Analyses in this section are based on just those essays written during the students' time at university ($n = 493$). Regression analysis indicated that, taken together, the four writing activity factors (detailed in Table 1) significantly predicted writing enjoyment ($R = 0.22$, $p < 0.001$), writing difficulty ($R = 0.25$, $p < 0.001$) and the mark that the

Table 8. Writing experience, reported time spend writing, and essay mark by strategy cluster for all university level essays (N = 493 for writing experience and time spent writing. N = 384 for essay mark)

Strategy cluster	Enjoyment	Difficulty[a]	Median hours working on essay[b]	Mean essay mark[c]
Outline-and-develop	11.7 (3.4)	7.4 (1.6)	13.0	66.7 (14.6)
Detailed-planning	12.6 (3.3)	7.7 (1.5)	15.0	71.3 (13.3)
Minimal-drafting	11.5 (4.1)	7.0 (1.6)	9.0	65.3 (15.3)
Think-then-do	11.7 (3.3)	7.2 (1.5)	10.5	70.0 (14.0)

[a]means differ significantly: $F(3,489) = 3.2$, $p = 0.03$.
[b]medians differ significantly: Kruskal-Wallis $\chi^2(3) = 27.4$, $p < 0.001$.
[c]means differ significantly: $F(3,380) = 3.5$, $p = 0.02$.

essay received ($R = 0.16$, $p < 0.05$). In all cases, however, the relationships were weak. Regression coefficients (β values) for these analyses are shown in Table 7. These findings suggest that outlining was positively related to enjoyment whereas students who developed content and structure while writing had a more negative experience of the writing process. Multiple-drafting, development-during-writing and use of mindmapping, brainstorming or rough drafting techniques were all associated with finding the writing process hard and challenging. Only use of content exploration methods was significantly (and positively) related to essay mark.

Writing activities do not, however, occur in isolation, but in association with patterns of other activities. This may in part explain the poor explanatory power of these analyses. Rather than asking whether, for example, multiple drafting benefits writing quality, it is probably more appropriate to ask whether some combinations of writing activities result in greater writing success that others. Looking, therefore, at differences among strategy clusters we found small but significant effects on writing success variables. These are detailed in Table 8.

Reported difficulty was greatest for essays in the detailed-planning cluster. However, this strategy was also associated with the longest working time and the highest mark. At the other end of the scale, the minimal drafting strategy appeared to be associated with the least difficulty, be completed in the least time and to be associated with the poorest essays. Conservative post hoc tests indicated no significant pair-wise differences, however, and so this interpretation of the effect of cluster membership on writing success should be treated with caution.

To provide a longitudinal perspective on the efficacy of different writing strategies, we calculated for each student in the longitudinal sample the percentage of essays written using each of the four strategies, and then used these percentages to predict mean essay mark (averaged across all essays). Regression coefficients from this analysis (using ridge regression because of the interdependence of the predictor variables) showed a significant negative relationship between mean essay mark and tendency to use the minimal drafting strategy ($\beta = -0.24$, $p < 0.05$) and a positive relationship between mean essay mark and tendency to use the think-and-do strategy ($\beta = 0.26$, $p < 0.05$). The detailed planning strategy and the outline-and-develop strategy were, respectively, positively and negatively related to average mark, although neither of these results reached significance. These findings suggest, therefore, that students who consistently use the minimal drafting strategy are likely to perform less well than other students and students who use the think-then-do strategy are likely to be more successful. Analysis of mean marks for students grouped by most frequently used strategy (shown in the final column of Table 4) showed a pattern consistent with the regression analysis. However, differences failed to reach significance.

Discussion

Our findings suggest, therefore, four distinct writing strategies that vary on four dimensions (correspondence between the number of dimensions and the number of clusters is coincidental). There appeared to be a degree of stability within students as to the strategy that they adopted with on average approximately two thirds of a student's essays being written using strategies that fell in the same cluster. We also found definite, if relatively weak relationships between writing strategy and students' subjective experience of writing the essay and, unlike Norton (1990), between strategy and essay quality.

Before discussing our findings in detail it is worth addressing three methodological issues. One possible criticism that could be levelled at the research reported in this paper concerns the use of retrospective self reports as evidence of writing behaviour. It is difficult to conceive feasible alternative methods of exploring writing strategy that are consistent with collecting data from a sample of the size required for research of this kind. It is possible, though, that there were systematic inaccuracies in students' reporting of their writing activities. It may also be that retrospective self-reports exaggerate cross-task consistency in students' strategies. These possibilities cannot be discounted. However, elsewhere, we have reported data from a smaller sample of student writers who described their writing activities at very regular intervals during the writing process (Torrance, Thomas and

Robinson 1999). We found both a similar degree of cross-task stability to that reported in this study, and that these concurrent reports were broadly consistent with the same writers' retrospective descriptions of their writing processes.

A second issue concerns the generalisability of the findings of the present research. Undergraduate writing tasks tend to be highly constrained in terms of both genre and audience (e.g., Shaugnessy 1977). It is also possible that the demands of writing in psychology differ from those of other disciplines. Given this, we do not want make strong claims about the extent to which findings from this study might be generalised to other writers. We anticipate that the writing-activity dimensions (Table 1) and, perhaps, the writing strategy clusters (Table 2) that we have described would also be present in different populations. There may, however, be considerable variation among different disciplines in the relative efficacy of these strategies. Further research looking at different disciplines and different writing tasks is required.

A third methodological issue concerns our operational defining of "writing strategy" to include just those activities that take place within what the students perceived as the "writing period" for their essay. Performance on a particular writing task will, of course, be affected by a broader range of factors including the extent to which students have read around the subject, attendance at lectures, and engagement in seminar discussion. All of these activities might be included in a broad definition of the writing process. Exploration of these factors was beyond the scope of the present study but may be required in the development of a comprehensive account of the correlates of undergraduate writing success.

Interpreting writing behaviour, and the relationship between writing behaviour and writing experience and success, is complex for two reasons. First, it is not always clear whether a particular student's approach to a task was deliberate and pre-planned or whether their sequence of activities developed as writing progressed. Second, a student's approach to a particular task will be mediated by a number of factors including their understanding of the relevant content, their motivation, the amount of that time they have available, and their perception of the importance of gaining a good grade for that particular piece of work. These factors may in themselves directly influence both strategy choice and essay quality. Correlation between strategy and performance may be better interpreted as artefacts of these factors rather than as evidence of a causal relationship. It is worth noting, however, that problems with disambiguating causal relationships in this context are not restricted to the correlational design adopted in the present study. Experimental studies that contrast, for example, outlining with multiple-drafting strategies (e.g., Kellogg 1988) whilst controlling for factors affecting strategy

choice are necessarily confounded by the fact that the majority of students in the non-outlining condition will be writing using a non-habitual strategy.

Bearing these methodological issues and difficulties with interpretation in mind, we believe that there is sufficient detail in our findings to tentatively offer the following explanation. Of the four kinds of writing strategy identified in the cluster analysis, the minimal drafting and outline-and-develop processes appeared to be least successful in terms of essay grade. We suspect that the reasons for the apparent (relative) inefficacy of these two strategies are quite different. Essays written using the minimal drafting strategy were completed relatively quickly and with relatively little perceived difficulty. They also appeared to be written with relatively little enjoyment, although this last finding did not reach significance. The emerging picture is of writers who lack either motivation or a full appreciation of task demands. A contrast can be made here with the professional academic writers identified elsewhere as "doers" (Hartley and Branthwaite 1989). These writers appeared to adopt a broadly similar approach to writing, taking relatively little time over their work and writing few drafts. However, unlike the writers in the present study, they were more successful, in terms of publication production than writers with other strategies. Although this strategy may be functional when writers are expert in both the genre and content-area in which they are writing, our findings suggest that it is less effective at lower levels of expertise.

The lower marks for essays written under the outline-and-develop strategy cannot, however, be explained in this way. When this, the most frequent strategy, was used, students reported experiencing a higher degree of difficulty and taking longer over the task. Perhaps what is tending to happen in this case is that students are motivated to produce a good essay. They create a written outline but then find, once drafting has begun, that what they had planned was not adequate to support the production of successful text. They then were forced to revise what they planned to write as they went along. Previous research has identified a similar pattern of writing behaviour (Torrance, Thomas and Robinson 1994) with research students writing in this way proving to be less productive than others.

The development of content by students using the outline-and-develop strategy did not, therefore, tend to occur through the use of a deliberate rough-drafting strategy (as discussed, for example, by Kellogg 1988 and Wason 1985). The outline-and-develop strategy therefore contrasts with what we have called the detailed-planning strategy. This way of writing appeared to be genuinely strategic in that writers engaged in specific content exploration strategies (mind-mapping, brainstorming or rough-drafting) in addition to writing an outline. Students using this strategy tended to report similar difficulty when using this strategy to students using the outline-and-develop

strategy, and taking even longer over their essays, but in contrast to the outline-and-develop strategy, essays received higher marks. A possible interpretation is that students adopting this strategy started off with an appropriate appreciation of the demands of the task and a commitment to sort out their thinking and the structure of their text before attempting to produce a finished draft. Whether or not this is an accurate understanding of the detailed planning strategy, we did find that, consistent with previous research (Piolat and Roussey 1996), essay quality benefited from the use of content-exploration methods.

The picture we are painting is confused somewhat by the group of processes that we labelled the think-then-do strategy. This strategy differed from the others in that it did not typically involve the production of a written outline, with students reporting instead that they produced a few rough notes. Essays written using this strategy tended to receive good marks, with a positive relationship between use of this strategy and average mark for the longitudinal sample. It may simply be that students adopting this strategy tended to have a better grasp of the course content, although there is no evidence of higher general ability on entering the programme. Alternatively, it may be that the production of an outline, in and of itself, is not particularly helpful, and perhaps lulls students into a false sense of security. Outlining *per se* did not appear make a unique contribution to essay mark (Table 5), whereas use of other exploration methods did. We found as part of the study reported here that the majority of students in our sample had at some point been taught that producing an outline is good writing practice. It is possible that, as a result, some students place excessive confidence in the act of producing a written outline at the expense of engaging in careful thought about their topic. These interpretations of our findings are conjectural and require convergent supporting evidence.

Three more general features of our results are worth noting. First, the effect sizes that we describe are small. This is, in part, due to the approximation that is entailed by the necessary step of describing complex behaviour in terms of a limited number of dimensions and categories. However, even given this, there is nothing in the data we report to suggest that any of the four broad strategy types we identified were particularly successful or seriously dysfunctional. Second, we found no general shift in the kinds of strategy used by the longitudinal sample during the course of their three years of study. Third, although we observed some stability in strategy use, which might be attributed in part to habit, the majority of students appeared to be able to use a range of strategies.

Given these findings, the students' ways-of-working when producing essays, to the extent that these were adopted strategically, are probably best

thought of as adaptive behaviours that make the best of their understanding of the topic, the time they have available, their perception of the importance of the work, and their perception of the task demands (see for example, Hayes and Nash 1996; Hounsel 1984; Levy and Ransdell 1995; Piolat 1999). This understanding of students' writing behaviour is consistent with finding relatively little variation in performance across strategy, but a fair degree of variation in the strategies that any particular student uses. It suggests a degree of sophistication that should not be ignored in the provision of support and instruction aimed at developing undergraduate writing skills. Promotion of particular writing strategies should therefore perhaps be tempered by the recognition both that what works well for experts in a content area does not necessarily work well for undergraduate writers and, more generally, that writing expertise may involve the ability to vary strategy with context rather than habitually adopting particular writing routines.

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