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## COMPUTER-ASSISTED REFERENCE SKILL DEVELOPMENT

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### Introduction

Amongst the many sources of linguistic means of expressing ideas available to the student in the process of writing are printed reference books which specialise in lexis and grammar. Their increasing diversity in form and content makes for an arresting choice of options — alternative words and syntactical structures which constitute the goals of a reference search — and is naturally accompanied by the diversification and growing complexity of access methods to those goals. In view of this fact, it is not surprising that a choice which is 'arresting' in the positive sense (astonishing or dazzling), can easily become bewildering, forbidding. We can then argue that the expertise of reference source compiling must be matched by student expertise in their exploitation, otherwise the result must sadly be a limiting of sources to one or two old favourites.

The latter undesirable situation can be avoided; one way is to initiate students into the arcana of printed reference book construction, and to impart to them a knowledge of the relevant specialised terminology with its 'open sesame' effect on a reference book's content. And so to talk of the dictionary's organisation, the basis for meaning ordering, meaning- or form-based entry grouping, the use of thesaural access, cross-referencing systems, canonical forms; to teach the grammar book's classification by exposing the linguistic terminology which dominates many indexes and pages of contents. A different approach is to foresee a future in which an increasing proportion of student referencing will consist in retrieving information from a computer. This paper explores the latter route.

### The Writing Process

When the underlying purpose of a written assignment is to improve written language skills in a foreign language, we would expect that in the process of writing our students would call upon at least two vital sources: a dictionary and a grammar book. We would not usually specify at what stage or stages in that process referencing should take

place; indeed, the process of writing itself has been shown to differ from one individual to another (Hayes and Flower, 1980). This fact notwithstanding, work on developing cognitive process models of writing is steadily advancing, and some useful results can be noted. Clearly, the process of writing is rarely linear, and therefore although sub-processes may be identified, they do not constitute a stage model. The major components — planning, producing, and reviewing — which themselves can be further sub-divided, have been observed to take place in an iterative or recursive fashion. Some researchers (Collins and Gentner, 1980) emphasise the distinction between the process of producing ideas and the process of producing text for those ideas. In a very recent account of narrative and descriptive writing, Sharples (1985) attempts to synthesise the research which has been done in this field. He suggests that there are three fundamental procedures of writing which may be called upon to create and modify texts. His findings indicate that the writer generates alternative text forms at the sentence level and subsequently selects one form. The selected form is then verified, and optionally transformed.

Sharples refers to the work of Cooper and Matsuhashi (1983) in making the point that the initial procedure — the generation of one or more text forms (sentences) to express a common concept — takes place in a number of steps. The first of these, 'retrieval of information from semantic memory', is 'still an ill-understood cognitive process, partly because it takes place below the level of conscious awareness' (Sharples, 1985:21). Next follows the choice of objects, and, for a selected form, the determination of the emphasis of the sentence and its links to the text which preceded it. Finally, appropriate words and grammatical forms are chosen.

Verification is next performed on the sentence, using currently operative constraints as evaluation criteria. It has been noted that during the process of composing, the writer must juggle simultaneously a very large number of constraints. These comprise selecting ideas, adhering to the linguistic conventions of written texts, maintaining the connective flow and consistency of style, ensuring the efficacy of the communicative purpose, structuring the text at paragraph, sentence, phrase and word levels, maintaining grammatical and semantic accuracy, applying critical judgement — to name but a few.

The final procedure, transformation or revision, is usually only carried out to any appreciable extent by expert writers. As a result of an experiment comparing the writing of expert and inexpert adult

writers, Sharples concludes that 'revisions by inexperienced writers are few and are confined almost exclusively to vocabulary, spelling and punctuation'. Calkins (1980) refers to these revisions by inexperienced writers as 'refining'. She states that the next stage in their development as writers is a 'transition stage', where students experience great frustration because although they can see problems, they cannot diagnose them and adequately change the text. This suggests that in Scardamalia and Bereiter's (1983) three-part model of revision (compare, diagnose, operate), students are able to compare their writing with an internal standard and can detect discrepancies, but are unable to complete the revision adequately. Jaffe-Bartlett (1982) reaches a similar conclusion when she notes that at this stage '(...) students may be able to identify a problem but produce an ineffective change'. It follows that advanced, or expert writers, are able to complete the revision effectively; moreover, they are much more likely to check for errors at higher levels: structural faults, repetitions, ambiguity, missing context and inconsistencies in the text. In a recently elaborated taxonomy of revisions, Faigley and Witte (1984) classify as 'surface changes' alterations in spelling, tense, number, modality, punctuation, etc. as well as operations like additions and deletions which paraphrase concepts but do not actually alter them. They give the label 'meaning changes' to alterations in the text's micro- or macro-structure which alter the concepts contained in the text.

### **Writing in a foreign language**

The work which has been summarily outlined here refers to the process of writing in one's native language. It is perhaps not surprising that no explicit mention is to be found of the operation of consulting external reference works in the course of writing. It is assumed that the necessary information exists in the writer's memory, and will usually be retrieved from that source. The sole exception may be synonyms and spelling corrections as part of the revision procedure — significant is the fact that recent powerful general-purpose word processing systems incorporate those particular types of aid. In foreign language writing, however, the usual demands of written prose, such as accuracy of meaning and aptness of form, can be satisfied only through reference to a number of external works, on account of the student writer's limited knowledge of the language. This external referencing may need to take place in the course of selection of text forms, in the course of verification, or revision — in short, during any of the procedures of

the writing process. It is worth noting that even when a student is writing in a foreign language, the activity of 'planning' — generating ideas, organising and goal-setting — may well take place in the native language. The generation of sentences or sentence fragments may also be effected in the native language, accompanied by translation into the foreign language. Alternatively, sentences may be generated directly in the foreign language, with gaps at word or phrase level being filled by means of a quick search in a bilingual dictionary. Reference book consultation interrupts the writing process for a significant length of time, and therefore tends to be kept to a minimum.

The main difference between writing in one's native language and in a foreign language, however, might well reside in the process of revision, which in the latter case becomes a more prominent feature of writing. In the case of student writing in particular, it is possible to observe the inclination to use reference books with the aim of substituting 'unusual' words and expressions for more commonplace ones, not necessarily constituting an improvement, but resulting from the wish to impress. A particularly conscientious student might also seek out sophisticated sentence structures, sometimes found in the examples given in reference books. This 'surface' paraphrasing sometimes appears to represent the full extent of a student's revision strategy. An even more conscientious student, however, will additionally use reference works to check the precise meanings of words and will also check syntactical structures. If, as a result of these checks, changes are operated, they may constitute either surface alterations, or they may occasion alterations in conceptual meaning.

It is clear that a more thorough investigation of the foreign language writing process is necessary in order to bring about a full understanding of the methods and purposes of reference book consultation during that process. The above remarks are intended as signposts to experimental research in this area. There is reason to believe that referencing plays a particularly prominent role in writing in a foreign language. A clearer definition of this role will ensure that future computer-based aids to writing can properly enhance that process. Should they include a lexical and grammatical reference database, its content and structure as well as its interface to the word processing system will then be rightly determined by the exigencies of the foreign language writing process.

**Referencing as a Skill**

The process of writing may be regarded as a skilled activity, or an activity which involves a number of skills, including the skill of reference book consultation. Bereiter (1980), who has carried out numerous studies related to writing development, observes that mature writing 'involves a large number of skills at different processing levels. Adequate mature functioning can be possible only when many of the skills are highly automated and when they are well enough coordinated to permit efficient time-sharing'. His model of skill system integration in writing development identifies a progression from 'unskilled' associative writing, through to writing which becomes performative, then communicative, unified, and eventually epistemic. The skill involved is the writer's ability to shift the focus of writing from process to product, and to the reader. In this model, the notion of 'skill' is applied to the writing process as a whole, and component skills are not analysed. The general term 'skill', as used in the expression 'writing skill', may also be used to encompass a number of different skills (subskills), where the latter are defined in terms of predetermined goals. Whiting (1975:6) defines skills as complex, intentional actions which 'through the process of learning have come to be organised and coordinated in such a way as to achieve predetermined objectives with maximum certainty'. Although Whiting's research deals predominantly with perceptual-motor skills, he emphasises that there is an overlap in the traditional differentiation between sensory-motor skills and mental skills. Since the skill of reference book consultation would in fact appear to combine these two, there is much in this work that is directly relevant to research into the skill of referencing.

Whiting points out that the impression of simplicity given by a highly skilled person's behaviour obscures the actual complexity of the procedure; he then suggests that a lack of awareness of this fact explains why many highly skilled people are poor teachers of skills. It is, of course, vital for skilled performance to become simple, automatic, routine, such that all attention can be directed towards the outcome, the goal of the skilled activity. The decisions which must be made in the course of the activity are constrained by time; skilled decision-makers have the ability to amass very quickly the necessary information to deal with the demands of an activity.

Reference book consultation in the course of writing is a complex, intentional activity, which involves a motor component as well as cognition, and shows learning effects over a protracted period of time,

eventually becoming a fully automated procedure. Its efficiency is assured by quick decision-making and by dextrous coordination with the other skills of writing. Its complexity increases over time as the individual gains confidence in one part of the referencing activity and goes on to explore new possibilities, in this way mastering subsequent components of the skill. While attention is being focused on a new component, overall performance may be negatively affected for a limited period of time.

### **Reference Skill Development**

To develop the skill of referencing, in the context of developing foreign language writing skills at tertiary level, it would appear necessary to devote attention to the above components. Of primary importance is a clear vision of the objective or intention of the search, which may mean a change in current search habits. For example, instead of asking 'What is the word for x in French?', it may be more appropriate to ask 'What word would normally be used in context x to designate a given object, state or process y?'. Finding the answers to questions posed in this way is very difficult when using traditional sources. At the very least, the paths to the answer — to the goal — can prove to be quite complex, and therefore time-consuming in their execution. This probably accounts for why the simpler question is more frequently asked, even though the result it yields often falls short of the mark. Sometimes there is a requirement for a 'pool' of associated words and expressions, or a need for examples of sentences which contain a certain expression, or for a list of words conveying a particular sentiment. Often a key word search could potentially provide the answer.

It should be noted that appropriate questions need not always be complex ones: on the basis of research into students' errors in a given foreign language, simple questions can be formulated which can greatly enhance the process of revision. To give just one example, a knowledge of the difficulty that learners of French have with the gender of French nouns (Buteau, 1974) can prompt students to question noun gender in their revision strategies.

There appears, therefore, to be a need for the education of students in the new component skill of goal definition (question posing), a skill which they are gradually acquiring through the querying of computer databases to gain information, for example of the bibliographical type, but one which is not specifically taught in the context of writing. In the

field of computerised information retrieval, it has been recognised for some time now that, 'as a necessary condition to satisfying the need to obtain information, we must be able to formulate our informational needs' (Wessel, 1975:4). Needs or questions should be formulated on the basis of experience of the field of application, which in this instance is writing in a foreign language.

### **Computer Assistance**

Bridwell, Nancarrow and Ross (1984) have expressed the view that despite the word processor's most obvious characteristic, that of a facility for revising text, 'few studies have been made of how use of the machines might alter the revising strategies of students or experienced writers'. It appears that fully automatic editing programs, such as those included in *Writer's Workbench* — checking for split infinitives in English, spelling mistakes, unbalanced quotes or brackets, and so on — are not sufficiently sophisticated to take over the revising process completely (and this is likely to be the case for a very long time to come). In view of this fact, it is essential that proper computerised tools should be available to assist the writer in the process of revision, and to encourage the use of reference sources throughout the process of writing. We have established that reference sources for lexis and grammar constitute an important tool in the process of writing in a foreign language, but that currently existing printed sources may not be suitable for answering the sorts of questions that students might want to ask. We have also observed that one of the reasons for the reluctance of student writers to use reference sources during the writing process was likely to be the lengthy interruption of the flow of writing.

It is therefore important to realise that the computer can be of assistance in many respects. It can be programmed to pursue the paths which lead to a goal, forcing the writer to focus his attention on formulating appropriate questions. It disciplines the student writer to improve his questions by bringing to the level of conscious decision-making the actual process of formulating questions. It can also potentially cut down the duration of the period of interruption when a search is taking place, provided that there is a very tight integration between the computerised information database and the word processing program.

The first step to this integration is to ensure that the database is accessible at all times during writing on the same computer system as the word processor, and that questions can be typed on-screen without



the need to remove the display of text. This is an essential prerequisite. Thereafter proper integration will mean taking into account the reasons for reference consultation at various stages of the writing process, and ensuring that the most appropriate aid is given. A stand-alone database system can be very usefully employed for the learning of vocabulary and grammar, but for successful productive use as a writing tool it needs to be tightly integrated with the word processing program. It seems that ideally, the design of the database should aim at accommodating the information provided by dictionaries and grammar books of a given language in one notional database, with one method of querying. It remains to be seen whether such a step forward will be taken in practice.

At the start of this paper the point was made that the expertise of reference book construction was not always matched by student writers' expertise in their exploitation. The characteristics of a computer database are such that, if need be, its complexity can be hidden from the user. More important, however, is its ability to act as an educator in the skill of appropriate question-posing, which has been shown to be a vital component of the skill of referencing.

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