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CALL and Vocabulary Teaching
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The first five papers in this issue of *Computer Assisted Language Learning* are about the psychology of vocabulary in second language -- its acquisition, representation and use. This might seem an unusually specialist and marginal topic, even for a special issue. However, vocabulary acquisition is one of the key processes involved in learning a language, and fluency with words is one of the central skills which people need to develop if they are to speak a second language well. We also believe that vocabulary acquisition is an area where computer assisted language learning (CALL) has a particularly important role to play. Unfortunately, most of the vocabulary teaching programs available now seem to have been developed without much awareness of recent research in the psychology of words. We have put the special issue together in the hope that it will help CALL experts to become more aware of these recent developments, and perhaps lead to an altogether more sophisticated approach to teaching words to language learners.

It is perhaps not surprising that a very large proportion of the CALL materials currently available on the market seem to deal with the learning of words. Most 'ordinary' language learners identify vocabulary learning as the biggest single problem they face when they learn new language. Indeed, many learners seem to think that learning a language involves not much more than learning a very large number of words. There is a serious mismatch here between the use of professional language teachers who have often been trained to think in terms of structures and functions, and the way most learners approach the task of learning a language. It is hardly surprising, then, that a number of people have responded to the perceptions of ordinary learners, and developed vocabulary learning programmes that exploit their anxieties.

However, there is another reason why vocabulary teaching programs are so much in evidence. For reasons which will be obvious to any programmer, vocabulary teaching programs are very easy to write. At one level, a lexicon can be viewed as not much more than an unordered collection of words. These collections of words don't have to be very large, and they don't have to be put together on a principled basis. Almost any reasonable list of words will serve, and there are a number of non-copyright lists which can be borrowed or pillaged easily. Each word in the basic vocabulary list is accompanied by a small number of other data fields -- a meaning in English, perhaps a grammatical code, possibly an illustrative sentence or two. All this information can be captured in a simple text file, or a database. Deciding which additional fields you want to use may pose some problems, but once these decisions are made, constructing the database is not demanding or intellectually challenging, merely tedious and time-consuming. Once the database has been assembled, all that is needed is a suite of simple driver programs which can repeat a small number of basic operations on each of the entries in the database. In the simplest case, all the driver programs need to do is to present each of the words in turn, and wait for the user to produce an expected response. The addition of a few bells and whistles, and some careful screen design can quickly produce a programme looks quite sophisticated. The additional bonus is that when your driver programs are working, they will work with other databases as well. It is then a simple matter to turn *Mils Mots Français* into *Mil Palabras Españolas* or into *Yi qian ge han zi.*

Readers of this journal will no doubt be able to think of several suites of CALL materials that match this general description -- some of them among the CALL all-time bestsellers. Our view, and no doubt

that of most readers, is that programs of this sort represents a very limited view of what vocabulary instruction is all about. There is a place for paired-associate learning in language teaching, particularly in the early stages of learning a language, and computers have a useful role to play in this stage. But simply using the computer as a replacement for a set of flash cards doesn't strike us as an effective or an imaginative use of a powerful technology. It is also important that CALL programs take into account research on the acquisition of vocabulary.

View s about how people acquire and handle words have changed considerably over the last ten years or so. Again, most readers of this journal will probably be aware that structural linguists, who had an enormous influence on language teaching in the 1940s and 1950s, also had a rather limited view of the lexicon. They will also be aware that the linguistics of the 1960s and 1970s, if anything, took the lexicon even less seriously than earlier periods did. The lexicon at this period was just a way of handling irregularities that could not be handled within the current grammatical framework. In the linguistics of the 1990s, however, this view of the lexicon is changing very rapidly, and many more linguists -- including Chomsky -- are prepared to reconsider the role of the lexicon. For many of them, indeed, the lexicon is beginning to assume a central role in linguistic description.

Much the same can be said for psycholinguistics. Although there was a very large amount of material produced on 'verbal learning' in the 1950s and early 1960s, not much of this work was ever applied to second language learners, largely because it was seen as belonging to an old-fashioned behaviourist way of thinking. Later psycholinguistics was resolutely monolingual, and almost entirely based on English. Only a small handful of people were working at this time on the psychology of bilingualism. Most of these people were based in Canada, where the political situation meant that bilingualism had a higher profile and than in other parts of the English-speaking world. Interestingly, much of this early Canadian work was concerned with words, and the ability of bilinguals to manipulate words in both their languages. Again, however, because of the specialised nature of this work, little of it seemed to be taken on board by language teachers.

More recently, all this has changed. Demographic developments in the USA have meant that Spanish is now spoken by a very large proportion of the population of that country, and the result of this is that bilingualism is firmly placed on the educational research agenda of the USA. Similarly, changing patterns of migration, and changing attitudes towards multiculturalism in the English-speaking world at large mean that far more people are aware of the 'bilingual phenomena' than would have been the case even 20 years ago. In Europe, official encouragement to international research collaboration has had a similar effect. The result has been a considerable growth in the number of people working on 'the problems' of bilingualism. A great deal of this work has been concerned with developing models of the way bilinguals manage to control their two languages: how they manage to keep their two languages from interfering with each other; how they switch from one language to another; how the structural properties of one language affect the way words are processed in the other; how people process items which are cognate in two languages; how people manipulate languages which use different scripts; how bilinguals who suffer from strokes or other traumas recover their two languages; how languages are lost when people become long-term migrants, or grow old, and so on. Almost all of this work is concerned with the lexicon in one way or another, and the result is that we now have a number of interesting and competing models of the lexicon in an L2.

Some of these models are based on existing models for monolingual speakers in which the 'lexicon' is decomposed into many subsystems. There are for instance, separate input lexicons (for recognising spoken and written words) and these are separable from the output lexicons for producing words in speech or in writing. But it is becoming increasingly obvious that monolingual models are really only a

special case of more general bilingual models. It is also becoming obvious that models that work for one pair of languages don't always transfer easily to different pairs of languages: learning to be bilingual in English and Chinese just isn't the same as being bilingual in Finnish and Swedish or Spanish and Catalan.

Few insights from this research have been taken up by people writing CALL programs. Two examples illustrate this point. A substantial part of the research literature on bilingual lexicons is concerned with automaticity -- that is the ability of a bilingual speaker to process words quickly. Various factors affect the time it takes for a speaker to recognise a word. It is easy to show that weak bilinguals are in general slower than good bilinguals at recognising words. It is also easy to show that the factors affecting word recognition in monolinguals don't have the same effect on weak bilinguals -- for instance, you get relatively small frequency effects with fluent monolinguals, but very large frequency effects with weak bilinguals, who react much more slowly to unfamiliar, infrequent words than monolingual speakers do. It seems to us that it ought to be relatively easy to devise CALL programs that take advantage of the computer's inbuilt ability to provide very accurate reaction times, and to use these as a way of measuring progress in a second language. As far as we are aware, however, no programs of this sort are available commercially. Our feeling is that there is the range of tasks (e.g. translation tasks, picture naming tasks) which have been developed for research purposes which could be profitably recruited to provide online measures of change in vocabulary skills in L2 learners.

A second example concerns the way lexicons are represented in CALL programs. Most CALL programs still seem to treat their lexicons as mere list of words. But one of the really powerful things that computers can do is to turn lists of items into more highly structured networks, simply by adding pointers to the representation of the words in a database. Network structures of this kind have interesting properties which simple lists of words don't have. For instance, they are dynamic, not static, and they more accurately mirror what we believe goes on in real lexicons, which are certainly not just lists of words, but structures which represent various relationships among words. Again, we know only one or two CALL programs that have attempted to model lexical networks, or to exploit the possibilities inherent in them for teaching vocabularies.

To sum up, then, this collection of papers is intended to introduce to CALL enthusiasts some of the interesting things that psychologists are currently thinking about words, and the way people operate their lexicons. We think that learning to handle words is THE key process in becoming a fluent L2 speaker, and we think that this view is shared by many CALL enthusiasts too. We very much hope that putting these two sets of ideas together might be the start of an interesting cross-fertilisation and lead to a new generation of vocabulary teaching CALL programs.

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