academic list: core, quoted, passive and paragraph. Knowledge of this academic list (on top of the 2,000 most frequent words in English) would have thus reduced the unfamiliar words in that paragraph to a mere ten.

A preoccupation with vocabulary size, however, overlooks the importance of vocabulary depth. Vocabulary knowledge is not an all-or-nothing phenomenon, that is, a case of either knowing a word or not knowing it. Consider, for example, these different degrees of ‘knowing’ in my own knowledge of Spanish, using words taken randomly from the Q section of the dictionary:

- *queso* (cheese) can understand and produce it (both in speaking and writing) without effort
- *querer* (want) can understand it and produce it, though need to think about past irregular forms
- *quedar* (stay) can understand it and produce it, but only in its main non-idiomatic senses
- *quirófano* (operating theatre) can understand it in context only, and can produce it if prompted (e.g. with first letter) but not confident about correct word stress
- *quiebra* (bankruptcy) can understand it in context only, and can’t produce it even if prompted
- *quicio* (hinge) probably wouldn’t understand it even in context, and certainly can’t produce it

This suggests that, at the very least, estimates of vocabulary size must take into account productive and receptive knowledge. Then there is knowledge of spelling and pronunciation, of derivative forms and of different shades of meaning. Finally, there is the degree of control over word knowledge: is the word readily accessible, or does it require prompting? (Think of how you answer crossword clues: some words come only when several letters have been filled in; others require no prompting at all.) Again, these different aspects of ‘knowing’ suggest that the task of acquiring a functional lexicon is more complicated than simply memorising words from lists.

In the end, however, exactly which words a learner needs to know is a very personal matter. It is not easy either to predict learners’ needs nor to ensure that the words that have been selected for teaching will be learned. Nor will there be time, especially in non-intensive language courses, for all the words that the learners need to be explicitly taught. A good part of vocabulary acquisition has to be incidental. Incidental learning is facilitated through exposure to language input, in the form of extensive reading, for example. Input from the teacher and from other learners is also an important resource for incidental learning (see Chapter 3).

Most important of all, perhaps, is that the teacher encourages an enthusiasm for vocabulary acquisition, and provides learners with the strategies for self-directed learning – strategies that will be discussed in Chapter 9.
How are words remembered?

To achieve the kind of outcomes described in the last section, the learner needs not only to learn a lot of words, but to remember them. In fact, learning is remembering. Unlike the learning of grammar, which is essentially a rule-based system, vocabulary knowledge is largely a question of accumulating individual items. There are few short cuts in the form of generative rules: it is essentially a question of memory. How, then, does memory work? And what are the implications for teaching vocabulary?

Researchers into the workings of memory customarily distinguish between the following systems: the **short-term store**, **working memory**, and **long-term memory**.

The **short-term store** (STS) is the brain's capacity to hold a limited number of items of information for periods of time up to a few seconds. It is the kind of memory that is involved in holding in your head a telephone number for as long as it takes to be able to dial it. Or to repeat a word that you've just heard the teacher modelling. But successful vocabulary learning clearly involves more than simply holding words in your mind for a few seconds. For words to be integrated into long-term memory they need to be subjected to different kinds of operations.

Focussing on words long enough to perform operations on them is the function of **working memory**. Many cognitive tasks such as reasoning, learning and understanding depend on working memory. It can be thought of as a kind of work bench, where information is first placed, studied and moved about before being filed away for later retrieval. The information that is being manipulated can come from external sources via the senses, or it can be ‘downloaded’ from the long-term memory. Or both. For example, a learner can hear a word (like *tango*), download a similar word from long-term memory (like *tanga*), and compare the two in working memory, before deciding if they are the same or different. Material remains in working memory for about twenty seconds.

This capacity is made possible by the existence of the **articulatory loop**, a process of subvocal repetition, a bit like a loop of audio tape going round and round. It enables the short-term store to be kept refreshed. Having just heard a new word, for example, we can run it by as many times as we need in order to examine it (*tangi ... tangi ... tangi ... tangi ...*) — assuming that not too many other new words are competing for space on the loop. The holding capacity of the articulatory loop seems to be a determining factor in the ability to learn languages: the longer the loop, the better the learner. Or, to put it another way, the ability to hold a phonological representation of a word in working memory is a good predictor of language learning aptitude. Likewise, any interference in the processes of subvocal repetition — e.g. distracting background talk — is likely to disrupt the functioning of the loop and impair learning. Another significant feature of the articulatory loop is that it can hold fewer L2 words than L1 words. This has a bearing on the length of chunk a learner can process at any one time.

Also linked to working memory is a kind of mental sketch pad. Here images — such as visual mnemonics (or memory prompts) — can be placed and scanned in order to elicit words from long-term memory into working memory (see Chapter 9 for more on mnemonics).
Long-term memory can be thought of as a kind of filing system. Unlike working memory, which has a limited capacity and no permanent content, long-term memory has an enormous capacity, and its contents are durable over time. However, the fact that learners can retain new vocabulary items the length of a lesson (i.e. beyond the few seconds’ duration of the short-term store) but have forgotten them by the next lesson suggests that long-term memory is not always as long-term as we would wish. Rather, it occupies a continuum from ‘the quickly forgotten’ to ‘the never forgotten’. The great challenge for language learners is to transform material from the quickly forgotten to the never forgotten. Research into memory suggests that, in order to ensure that material moves into permanent long-term memory, a number of principles need to be observed. Here is a brief summary of some of the research findings that are relevant to the subject of word learning:

• Repetition: The time-honoured way of ‘memorising’ new material is through repeated rehearsal of the material while it is still in working memory – i.e. letting the articulatory loop just run and run. However, simply repeating an item (the basis of rote learning) seems to have little long-term effect unless some attempt is made to organise the material at the same time (see below). But one kind of repetition that is important is repetition of encounters with a word. It has been estimated that, when reading, words stand a good chance of being remembered if they have been met at least seven times over spaced intervals. (Are you still in any doubt, for instance, as to the meaning of tāngi?)

• Retrieval: Another kind of repetition that is crucial is what is called the retrieval practice effect. This means, simply, that the act of retrieving a word from memory makes it more likely that the learner will be able to recall it again later. Activities which require retrieval, such as using the new word in written sentences, ‘oil the path’ for future recall.

• Spacing: It is better to distribute memory work across a period of time than to mass it together in a single block. This is known as the principle of distributed practice. This applies in both the short term and the long term. When teaching students a new set of words, for example, it is best to present the first two or three items, then go back and test these, then present some more, then backtrack again, and so on. As each word becomes better learned, the testing interval can gradually be extended. The aim is to test each item at the longest interval at which it can reliably be recalled. Similarly, over a sequence of lessons, newly presented vocabulary should be reviewed in the next lesson, but the interval between successive tests should gradually be increased.

• Pacing: Learners have different learning styles, and process data at different rates, so ideally they should be given the opportunity to pace their own rehearsal activities. This may mean the teacher allowing time during vocabulary learning for learners to do ‘memory work’ – such as organising or reviewing their vocabulary – silently and individually.
• **Use:** Putting words to use, preferably in some interesting way, is the best way of ensuring they are added to long-term memory. It is the principle popularly known as *Use it or lose it.* In Chapter 6 we will look at ways of putting words to work. Meanwhile, the following points all relate to ways of manipulating words in working memory.

• **Cognitive depth:** The more decisions the learner makes about a word, and the more cognitively demanding these decisions, the better the word is remembered. For example, a relatively superficial judgement might be simply to match it with a word that rhymes with it: e.g. *tango/mango.* A deeper level decision might be to decide on its part of speech (noun, adjective, verb, etc). Deeper still might be to use it to complete a sentence.

• **Personal organising:** The judgements that learners make about a word are most effective if they are personalised. In one study, subjects who had read a sentence aloud containing new words showed better recall than subjects who had simply silently rehearsed the words. But subjects who had made up their own sentences containing the words and read them aloud did better still.

• **Imaging:** Best of all were subjects who were given the task of silently visualising a mental picture to go with a new word. Other tests have shown that easily visualised words are more memorable than words that don’t immediately evoke a picture. This suggests that – even for abstract words – it might help if learners associate them with some mental image. Interestingly, it doesn’t seem to matter if the image is highly imaginative or even very vivid, so long as it is self-generated, rather than acquired ‘second-hand’.

• **Mnemonics:** These are ‘tricks’ to help retrieve items or rules that are stored in memory and that are not yet automatically retrievable. Even native speakers rely on mnemonics to help with some spelling rules: e.g. *i* before *e* except after *c.* As the previous point suggests, the best kinds of mnemonics are often visual. The most well-attested memory technique is the **keyword technique**, which is described in Chapter 9.

• **Motivation:** Simply wanting to learn new words is no guarantee that words will be remembered. The only difference a strong motivation makes is that the learner is likely to spend more time on rehearsal and practice, which in the end will pay off in terms of memory. But even unmotivated learners remember words if they have been set tasks that require them to make decisions about them.

• **Attention/arousal:** Contrary to popular belief, you can’t improve your vocabulary in your sleep, simply by listening to a tape. Some degree of conscious attention is required. A very high degree of attention (called arousal) seems to correlate with improved recall. Words that trigger a strong emotional response, for example, are more easily recalled than ones that don’t. This may account for the fact that many learners seem to have a knack of remembering swear words, even if they’ve heard them only a couple of times.
• **Affective depth:** Related to the preceding point, affective (i.e. emotional) information is stored along with cognitive (i.e. intellectual) data, and may play an equally important role on how words are stored and recalled. Just as it is important for learners to make cognitive judgements about words, it may also be important to make affective judgements, such as *Do I like the sound and look of the word? Do I like the thing that the word represents? Does the word evoke any pleasant or unpleasant associations?* In this vein, Christopher Isherwood, continuing his discussion about *table* and *Tisch* (see page 19), makes the point that 'the difference between a table and ein Tisch was that a table was the dining-table in his mother's house and ein Tisch was ein Tisch in the Cosy Corner [a low-life bar in Berlin].'

Similarly, the reforming educationalist Sylvia Ashton-Warner, who taught reading and writing skills to underprivileged children in New Zealand in the 1960s, used the affective value of words as the basis of what she called her 'key vocabulary' approach. Her primary school children chose the words they wanted to learn. These often had a strong emotional charge, such as *Mummy, Daddy, kiss, frightened, ghost.* In teaching early literacy one of Ashton-Warner's basic principles was that 'First words must be made of the stuff of the child himself, whatever and wherever the child' (from Ashton-Warner S, *Teacher, Virago*).

**Why do we forget words?**

Even with the best will in the world, students forget words. As a rule, forgetting is rapid at first, but gradually slows down. This is true in both the short term (e.g. from lesson to lesson) and in the long term (e.g. after a whole course). It has been estimated that up to 80 per cent of material is lost within 24 hours of initial learning, but that then the rate of forgetting levels out. And a study of learners' retention of a foreign language (Spanish) over an extended period showed that – in the absence of opportunities to use the language – rapid forgetting occurred in the first three or four years after instruction, but then levelled out, with very little further loss, even up to 50 years later. Two factors seemed to determine retention. First, those words that were easy to learn were better retained. (See the following section for a discussion of what makes a word easy or difficult to learn.) Secondly, those words that were learned over spaced learning sessions were retained better than words that were learned in concentrated bursts – consistent with the principle of distributed practice (see page 24).

Forgetting may be caused both by interference from subsequent learning and by insufficient recycling. With regard to interference, most teachers will be familiar with the symptoms of 'overload', when the price for learning new language items is the forgetting of old ones. This seems to be particularly acute if words are taught that are very similar to recently acquired words. The new words have the effect of 'overwriting' the previously learned material. This is an argument *against* teaching words in lexical sets where words have very similar meanings (see Chapter 3).

More important, perhaps, as a remedy against forgetting, is recycling. Research shows that spaced review of learned material can dramatically reduce the rate of forgetting. But it’s not enough simply to repeat words, or
to re-encounter them in their original contexts. Much better is to recycle them in different ways, and, ideally, at successive levels of depth. Research suggests that if learners see or use a word in a way different from the way they first met it, then better learning is achieved. For example, study this sentence (in Maori), and its translation:

E Hōhepa e tangi, kāti ra te tangi!
(Joseph, you are crying, but you have cried enough!)
(from The Penguin Book of New Zealand Verse)

Even if you can’t make much sense of the grammar, the novel encounter with tangi, in its sense of ‘crying’, is further reinforcement of tangi = funeral.

**What makes a word difficult?**

Anyone who has learned a second language will know that some words seem easier to learn than others. Easiest of all are those that are more or less identical, both in meaning and form, to their L1 equivalents. When this is due to the fact that they derive from a common origin, they are called cognates. Thus Catalan vocabulari, French vocabulaire, Italian vocabolario and English vocabulary are all cognates and hence relatively easily transferable from one language to the other. The global spread of English has also meant that many English words have been borrowed by other languages. Examples of such loan words in Japanese are shampoo (shampoo), shopping (shopping), and snack (snack). Cognates and loan words provide a useful ‘way in’ to the vocabulary of English, and are worth exploiting (see page 35). However, as we have seen, there are a number of traps for new players, in the form of false friends. Knowing that actually and aktualnie are false friends may make the learning of actually difficult for a Polish speaker (or a French or Spanish speaker, for that matter), since they may tend to avoid using it altogether.

Other factors that make some words more difficult than others are:

- **Pronunciation:** Research shows that words that are difficult to pronounce are more difficult to learn. Potentially difficult words will typically be those that contain sounds that are unfamiliar to some groups of learners – such as regular and lorry for Japanese speakers. Many learners find that words with clusters of consonants, such as strength or crisps or breakfast, are also problematic.

- **Spelling:** Sound–spelling mismatches are likely to be the cause of errors, either of pronunciation or of spelling, and can contribute to a word’s difficulty. While most English spelling is fairly law-abiding, there are also some glaring irregularities. Words that contain silent letters are particularly problematic: foreign, listen, headache, climbing, bored, honest, cupboard, muscle, etc.

- **Length and complexity:** Long words seem to be no more difficult to learn than short ones. But, as a rule of thumb, high frequency words tend to be short in English, and therefore the learner is likely to meet them more often, a factor favouring their ‘learnability’. Also, variable stress in
polysyllabic words – such as in word families like *necessary, necessity* and *necessarily* – can add to their difficulty.

- **Grammar**: Also problematic is the grammar associated with the word, especially if this differs from that of its L1 equivalent. Spanish learners of English, for example, tend to assume that *explain* follows the same pattern as both Spanish *explicar* and English *tell*, and say *he explained me the lesson*. Remembering whether a verb like *enjoy, love, or hope* is followed by an infinitive (*to swim*) or an *-ing* form (*swimming*) can add to its difficulty. And the grammar of phrasal verbs is particularly troublesome: some phrasal verbs are separable (*she looked the word up*) but others are not (*she looked after the children*).

- **Meaning**: When two words overlap in meaning, learners are likely to confuse them. *Make* and *do* are a case in point: you *make breakfast* and *make an appointment*, but you *do the housework* and *do a questionnaire*. Words with multiple meanings, such as *since* and *still*, can also be troublesome for learners. Having learned one meaning of the word, they may be reluctant to accept a second, totally different, meaning. Unfamiliar concepts may make a word difficult to learn. Thus, culture-specific items such as words and expressions associated with the game cricket (*a sticky wicket, a bat trick, a good innings*) will seem fairly opaque to most learners and are unlikely to be easily learned.

- **Range, connotation** and **idiomaticity**: Words that can be used in a wide range of contexts will generally be perceived as easier than their synonyms with a narrower range. Thus *put* is a very wide-ranging verb, compared to *impose, place, position*, etc. Likewise, *thin* is a safer bet than *skinny, slim, slender*. Words that have style constraints, such as very informal words (*shook for throw, swap for exchange*), may cause problems. Uncertainty as to the connotations of some words may cause problems too. Thus, *propaganda* has negative connotations in English, but its equivalent may simply mean *publicity*. On the other hand, *eccentric* does not have negative connotations in English, but its nearest equivalent in other languages may mean *deviant*. Finally, words or expressions that are idiomatic (like *make up your mind, keep an eye on …*) will generally be more difficult than words whose meaning is transparent (*decide, watch*). It is their idiomaticity, as well as their syntactic complexity, that makes phrasal verbs so difficult.

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**What kind of mistakes do learners make?**

Given the kinds of difficulty outlined above, it is not surprising that learners make mistakes with words. In fact, the researcher Paul Meara estimates that lexical errors outnumber other types of error by more than three to one. Here is a sample of lexical errors (underlined):

1. I hope after *beginning* English studying I shall not have a free time at all.
2. I’d like to spend a couple of week somewhere on a peopleless island.
3. I like watching flowers and inhaling their lovely smell.
All lexical errors are instances of a wrong choice of form — whether a spelling error (e.g. biggening, shell), or a suffix error (peopleless), or the wrong word altogether (hope, watching, inhaling). However, for convenience we can categorise errors into two major types:

- form-related
- meaning-related

**Form-related** errors include **mis-selections, misformations, and spelling** and **pronunciation errors**. A mis-selection is when an existing word form is selected that is similar in sound or spelling to the correct form — the equivalent to a native speaker’s malapropism (see page 16). For example: *My girlfriend was very hungry with me* (for angry). Or, *He persuaded me to have a noise operation* (for nose).

Misformations often result from misapplying word formation rules (see page 5), producing non-existent words, as in *a peopleless island*, or *his bopeness of peace*. Sometimes these misformations will show a clear influence from the learner’s mother tongue, as in *the people looked emocionado* — from the Spanish emocionado (excited). Whole words may be combined wrongly to form non-existent combinations: *Most of time I just watch shops’ window* (for go window-shopping). Idioms and fixed expressions are vulnerable to this kind of mix up: *A strike could kill the gold eggs goose and cause the ruin of a country.*

Spelling mistakes result from the wrong choice of letter (*shell* for *shall*), the omission of letters (*studing* for *studying*), or the wrong order of letters (*littel* for *little*). Pronunciation errors may result from the wrong choice of sound (*leave* for *live*), addition of sounds (*eschool* for *school*), omission of sounds (*poduk* for *product*) or misplaced word stress (*comFORTable* for *comfortable*).

**Meaning-related** errors typically occur when words that have similar or related meanings are confused and the wrong choice is made. Thus: *I hope ... I shall not have a free time* (instead of I expect ...). And I like *watching flowers and inhaling* their lovely smell. While *watching* belongs to the set of verbs related to *seeing* it is inappropriate for relatively static objects like flowers. Similarly, *inhaling* tends to be used for smoke or gas, and not smell. That is to say, *inhaling* doesn’t *collocate* with *smell*. Many ‘wrong word’ mistakes are in fact wrong collocates. For example: *I have fifteen years experience as a particular professor* (rather than a private teacher).

Meaning-related wrong-choice errors may derive from the learner’s L1, where the meaning of an L1 word may not exactly match its L2 equivalent. A common example made by Spanish speakers is: *I’m live with my fathers in Mexico city*. In Spanish, the plural of padre (father) means parents.

Learners may also be unaware of the different **connotations** of related words, causing wrong-choice errors such as: *I have chosen to describe Stephen Hawking, a notorious scientific of our century*. Wrong choice may result in clashing styles, as in this letter by a Japanese student to the accommodation bureau at my place of work:
Dear Sirs/Madams,
I'm so sorry because I may leave Japan at the end of January.
I'm gonna stop by NY and go to España. Please get busy!

Indiscriminate dictionary use may be the cause of this stylistic error by a Russian learner: *May be I'll stay here and keep on my biweekly work* (where *biweekly* is an archaic synonym for *day-to-day*).

Sometimes errors can be both form- and meaning-induced. That is, a similar-sounding form is selected because it has a similar meaning to the target one. For example: *I went to a party for see my friends. It was very funny.* (Instead of *It was a lot of fun.*) Or, *I have friends who speak English as their nature language* (for *native language*). The occurrence of this kind of error is not surprising, given the way words are stored and accessed in the mind, with form and meaning modules overlapping and interconnected.

What are the implications for teaching?

In this chapter we have looked at how the mental lexicon is structured and the way it develops, in both first and second languages. What then are the implications of these findings for the teaching of vocabulary?

- Learners need tasks and strategies to help them organise their mental lexicon by building networks of associations — the more the better.
- Teachers need to accept that the learning of new words involves a period of "initial fuzziness".
- Learners need to wean themselves off a reliance on direct translation from their mother tongue.
- Words need to be presented in their typical contexts, so that learners can get a feel for their meaning, their register, their collocations, and their syntactic environments.
- Teaching should direct attention to the sound of new words, particularly the way they are stressed.
- Learners should aim to build a threshold vocabulary as quickly as possible.
- Learners need to be actively involved in the learning of words.
- Learners need multiple exposures to words and they need to retrieve words from memory repeatedly.
- Learners need to make multiple decisions about words.
- Memory of new words can be reinforced if they are used to express personally relevant meanings.
- Not all the vocabulary that the learners need can be ‘taught’: learners will need plentiful exposure to talk and text as well as training for self-directed learning.

Conclusions

In this chapter we have surveyed the principles underlying the acquisition of vocabulary in a second language, and sketched some possible implications for teaching. Perhaps the most important points to be emphasised are these:

- learners need a critical mass of vocabulary to get them over the threshold of the second language
• achieving this critical mass requires both intentional and incidental learning
• the first language is a support but can also be a potential block to the development of a second language lexicon
• vocabulary learning is item learning, and it is also network building
• vocabulary learning is a memory task, but it also involves creative and personalised use, i.e. learning and using
• learners have to take responsibility themselves for vocabulary expansion

Looking ahead
Having sketched out some implications for teaching, the rest of the book will explore these implications in more detail. One key issue is the relation between teaching and learning. What is the teacher’s role in vocabulary development? And how useful are other possible sources of vocabulary input? In the next two chapters we will review and evaluate some of the main potential sources of vocabulary input, including the teacher.