

# PhD Research Proposal: Second Language Vocabulary Acquisition and Learning Strategies in ICALL Environments

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# 1 Introduction and Motivation

Despite the fact that vocabulary is central to language and crucially important for second language learners, lexis has traditionally been the Cinderella of the field of Second Language Acquisition (SLA) research. This stands in sharp contrast to the fact that lexical errors are the most common among second language (L2) learners, as evidence from large error corpora suggests<sup>1</sup>. Moreover, not only do vocabulary errors seem to be the most serious ones for students (Politzer, 1978, as cited in Levenston, 1979), but the most disruptive ones for native speakers in terms of interpretation. As Gass (1988) observes, grammatical errors still result in understandable structures, whereas vocabulary errors may interfere with communication.<sup>2</sup>

The centrality of the lexicon to both acquisition and use is expressed in the following quote by Hatch (1983, p. 74):

...it is the lexical level that adult second language learners claim is most important. When our first goal is communication, when we have little of the new language at our command, it is the lexicon that is crucial...The words...will make basic communication possible.

Lexical acquisition is also of paramount importance in the educational domain, where studies such as (Anderson and Freebody, 1981) have demonstrated that lexical development and reading comprehension are strongly related.

This proposal is structured as follows: Section 2 reviews research on the concepts of word meaning, lexical knowledge and the related topic of vocabulary testing. Section 3 covers research on vocabulary acquisition and vocabulary learning strategies. Section 4 describes the central ideas relevant for the proposed research, and work done so far is outlined in Section 5. Section 6 gives an indication of future targets for the project, while Section 7 suggests the likely outcome of the work.

## 2 Literature Review I - Word Meanings and Lexical Knowledge

### 2.1 Lexical Semantics - Word Meanings and Concepts

#### 2.1.1 Overview

The starting point for lexical semantics is the mapping between form and meaning. Traditionally, this mapping is seen as being communicated through the medium of concepts (see Figure 1 from Ogden and Richards (1936, as cited in Singleton, 1999, p. 30)). On this view, each lexical item (form) is associated with a concept, which in turn represents a referent in the 'real world'. As Ijaz (1986) puts it, "words do not carry meaning by themselves, but only in relation to concepts".

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<sup>1</sup>Meara (1984) reports a consistent lexical-grammatical error ratio of 3-4 to 1.

<sup>2</sup>As a case in point, contrast the syntactically deviant utterance 'Can you tell me where is the train station?' with 'You look fit and weedy these days'.

This view has been subject to various criticisms, one of the most obvious being the difficulty of satisfactorily accounting for some central and pervasive problems for lexical semantics in general (e.g. *synonymy* and *polysemy*, i.e. the apparent multiplicity of semantic uses of a single word form). A more fundamental objection concerns the “atomistic view of language in which each word would be regarded as an isolated and self-contained unit” (Ullmann, 1962, as cited in Singleton, 1999, p. 30). This view was opposed by Structuralism (generally taken to be rooted in de Saussure’s work<sup>3</sup>, which emphasises the importance of system-internal relationships, claiming that “linguistic units derive both their existence and their essence from their interrelations” (Lyons, 1973, as cited in Singleton, 1999, p. 30). Relational Semantics is based on this approach, two of the most important strands being *semantic field theory*<sup>4</sup> and *componential* or *feature* analysis.

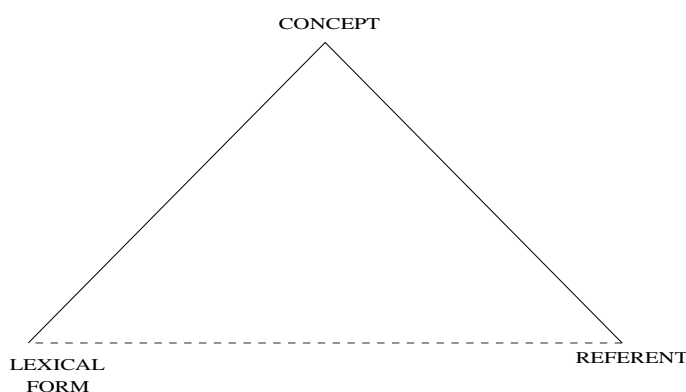


Figure 1: Ogden and Richard’s basic triangle (simplified)

In *Semantic Field Theory*, particular lexical areas (domains) can be identified where each term “helps to delimit its neighbours and is delimited by them” (Ullmann, 1962, as cited in Singleton, 1999, p. 31); vocabulary is seen as consisting of interrelating networks of relations between words. Thus Semantic Field Theory de-emphasises the idea of fixed word meanings as expressed through concepts, stressing instead the essentially differential nature of meaning. While Semantic Field Theory has led to an increased understanding of how lexemes are inter-related in sense, many criticisms have been levelled at its shortcomings, such as: the failure to account for lexical gaps or overlaps; its description of the whole vocabulary as a fully articulated, integrated system of neatly structured lexical fields; and the neglect of syntagmatic relations (cf. Geckeler (1971), Lyons (1977)).

Componential or feature analysis posits that the meanings of all lexemes can be described in terms of combinations of more basic (universal) sense components. This seems to work well for closely circumscribed domains, such as colour or kinship, but less so for complex lexical domains with overlapping meanings (cf. Evens (1988)). The existence of universal semantic primitives remains an undecided issue: the number of primitives appears to be too numerous<sup>5</sup>,

<sup>3</sup>For a critical edition, cf. Saussure and Engler (1967-71, as cited in Lyons, 1977, p. 231)).

<sup>4</sup>originally known as *Wortfeldtheorie* (lexical field theory)

<sup>5</sup>Wierzbicka (1980, as cited in Hatch and Brown, 1995), however, identified 13 basic semantic primitives that she claims cannot be further divided. These are *I, you, someone, something, world, this, want, not want, think of, say, imagine, be part of* and *become*.

respective analyses remain rather incomplete and unconvincing, and the psychological validity appears doubtful (cf. Lyons (1977), Hatch and Brown (1995, p. 115-116)).

The third important approach to relational semantics is to make the structural organisation of semantic domains explicit via lexical or semantic relations such as synonymy (a lexical relation between word forms) and hyponymy (a primarily conceptual/semantic relation between word meanings).<sup>6</sup>

An interesting alternative approach to defining word meaning might be provided by cognitive linguistics. Langacker (1988, as cited in Williams, 1992) has proposed a semantic network with hierarchical categorising relationships as the organisation scheme for polysemous word meanings.<sup>7</sup> Of course, what exactly determines the centrality of the meanings of a polysemous word remains an open question.

Ijaz's approach (Ijaz, 1986, p. 404) is based on findings by Coleman and Kay (1981), who have demonstrated that the prototypicality principle underlies the meaning structure of polysemous words and that category membership of instances can be determined by the judgment of language users. Ijaz argues for a definition of word meanings as "multidimensional networks of individually weighted semantic dimensions or components", the weight of a semantic dimension indicating the degree of membership of the meaning in the semantic category defined by that dimension. In other words, it is the combination of semantic dimensions, each contributing their variable weight, that determines the given word meaning.

Turning to a psycholinguistic point of view, notions of prototypicality also figure prominently in Williams's exploration of the hypothesis that an account of word meaning might be directly based on the mental lexicon via semantic priming. Using 'firm' as the prime, his experiments demonstrated an asymmetry in the amount of priming between central ('solid') and non-central ('strict') meanings in that "certain meanings are more privileged than others" (Williams, 1992, p. 211).<sup>8</sup>

Besides indicating that not all meanings are equal in their representation in the mental lexicon, Williams's results "show potential for providing a theoretical grounding for distinguishing ambiguity and generality" (Kilgarriff, 1997, p. 99). The caveat is that the experimental results are not yet sufficiently stable, and there is little hope for determining the numbers of senses for a substantial number of words with this method. It seems clear that a simple ambiguous/general distinction would be much too coarse-grained to serve as a basis for an account of word meaning.

## 2.1.2 Word Meanings and Concepts

Returning to the original starting point of concepts and meaning, the account so far has left out the more fundamental question whether words (or sentences, or texts) have a determinate meaning per se (mediated or supported by concepts as base units of linguistic information). The relation between signifier and signified is actually an age-old philosophical debate which cannot be done justice here; the following is but an attempt to highlight some of the aspects that might

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<sup>6</sup>As an example of a recent application, the perhaps best-known on-line lexical database, WordNet, is based on this approach (cf. Miller et al. (1990)).

<sup>7</sup>For instance, 'run' would have the global prototype "rapid two-legged locomotion" which is the most cognitively salient and can be extended both upward and downward.

<sup>8</sup>Where the context favoured the non-central reading, central targets were primed for, but not vv.

call an unreflecting adherence to this widespread belief (in both psychology and linguistics) into question.

Simplifying somewhat, the traditional view in (cognitive) linguistics sees every concept as directly or indirectly connected with every other concept in the network; to avoid regress, at least some concepts must be rooted in something outside the domain of other concepts; this grounding is generally taken to be perceptual<sup>9</sup>. Cruse (1995) assumes a finite number of established concepts plus an unlimited number of potential ad hoc concepts. As noted by Ramskar and Yarlett, the 'perceptual reference' theory requires concepts with sharp boundaries, whereas empirical research suggests that psychological categories are characterised by fuzzy boundaries (Labov, 1973), complex structures (Lakoff, 1987), or based on prototypes (Rosch, 1973, all as cited in Ramskar and Yarlett, 1999).

The problems polysemy poses for this account have already been hinted at - in a strict sense, meanings of all words vary according to context, "leading to a situation where any word must be equated with as many concepts as it has possible varieties of meaning in distinct contexts" (Ramskar and Yarlett, 1999). As it is doubtful that a language user (let alone language learner) has a priori knowledge of all possible contexts, and given the above noted nature of psychological categories, psychological validity and learnability of these concepts do not appear self-evident (but it is of course possible that contexts could be successively differentiated and refined).

The traditional account for word meaning, based on Ogden and Richard's basic triangle, has been rejected by various scholars for sometimes different reasons. For instance, Lyons criticises the ill-defined nature of 'concept': "As the term 'concept' is used by many writers, it is simply not clear what is meant by it[...] anyone who defines the meaning of a word to be the concept correlated with that word owes his readers some explanation of what kind of thing this concept might be." (Lyons, 1977, p. 113). Lewis, in line with the de Saussurean stance that meaning is defined by oppositions and contrasts, rejects the temptation "to think of a word as having a fixed meaning, and to assume that words are in some sort of one-to-one isomorphic relationship with 'reality'" (Lewis, 1993, p. 77). Wittgenstein's take on concepts can be seen as "the mirror image of de Saussure's concept" (Rivers, 1983), emphasising "a complicated network of similarities overlapping and criss-crossing" (Wittgenstein, 1953, as cited in Rivers, 1983). According to Wittgenstein, categories or concepts have no defining characteristics, only kinships or "family resemblances", and learning them involves learning instances of the *usage* of that concept and appropriate ways of using them. As observed by Ramskar and Yarlett (1999), Wittgenstein's position on words is that they do not have simple meanings in terms of concepts, but rather that these "meanings" are determined by their use (cf. Wittgenstein (1953, p. 35-36)).

In this regard, the Wittgensteinian view is very much in keeping with more recent trends in Computational Linguistics that adopt a statistically-based approach based on word usage as evidenced by corpora. According to this view, "a word is defined by its use in a wide range of contexts" (Burgess and Lund, 1997, as cited in Ramskar and Yarlett, 1999). Kilgarriff (1997), for instance, conceives of word meanings/senses as abstractions over clusters of word usages. He argues that word senses only exist relative to a task and sees word senses as corresponding to a cluster of citations for the word. Citations are clustered together where they exhibit similar patterning and meaning.

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<sup>9</sup>"At least some concepts must have a substantive core of some kind, perhaps a complex of sensory-motor images." (Cruse, 1995)

### 2.1.3 Statistical Approaches to Word Meaning

Statistical modelling approaches using a high-dimensional semantic space representation such as Latent Semantic Analysis (LSA) are based on this approach, i.e. semantically similar words are believed to exhibit similar contextual distributions. As Landauer et al. put it, “the aggregate of all the word contexts in which a given word does and does not appear provides a set of mutual constraints that largely determines the similarity of meaning of words and sets of words to each other” (Landauer et al., 1998). Using raw text as the only input, LSA produces vectors representing the frequency distribution of lexical items across a wide range of contexts. Word meaning is thus represented as an average of the meaning of the passages in which the word is contained. Semantic similarity can then be measured by vector proximity in the high-dimensional semantic space.

This approach seems to correlate well with several human cognitive phenomena (e.g. category judgments and lexical priming data) (cf. Landauer et al. (1998), Landauer and Dumais (1997)). It is worth noting that elements of the resulting vectors (or dimensions) have to be seen as abstractions without an intuitively plausible content corresponding to putative semantic features.

It is an open question whether (and to what extent) statistically-based approaches like LSA could be used to model lexical knowledge for (second) language learners. Apart from the obstacle of requiring rather large amounts of training data, i.e. huge corpora, the treatment of homonyms such as ‘bank’ appears less than ideal. Since LSA represents the meaning of a word as a sort of average of the meaning of the paragraphs/passages in which it is contained, any differences in meaning are glossed over, which might be acceptable for most polysemous words with comparatively slight differences in meaning, but is much more problematic for homonyms whose meanings are usually unrelated. Finally, while LSA seems to capture judgements of similarities of meaning quite well (cf. McDonald (1997)), it has little to say about the way in which words are related - e.g. do they stand in a syntagmatic/paradigmatic or hyponymic/antonymic relationship<sup>10</sup>. As is discussed below, this sort of information (besides usage and reference) constitutes an important chunk of lexical knowledge, i.e. what a learner has to be cognizant of in order to ‘know’ a word. As Landauer and Dumais (1997) note, “the similarity relations between words that are extracted by LSA are based solely on usage.” As reference goes, Landauer et al. speculate that LSA’s powerful inductive possibilities may enable it to infer the bulk of referential meaning from experience with words alone. The above caveats aside, given that meaning is fluid and speakers’ understanding of words changes over time, LSA does seem promising as a potential technique to measure this drift as a function of an individual’s language exposure - clearly an attractive prospect in regard to assessing lexical understanding of (second) language learners.

## 2.2 Lexical Knowledge and Vocabulary Ability

The nature of lexical knowledge, that is the question of what it actually means for a language learner to “know” a word, lies at the very heart of L2 vocabulary acquisition. As Laufer and Paribakht (1998, p. 366) observe, “no clear and unequivocal consensus exists as to the nature of

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<sup>10</sup>The semantic dimensions in the high-dimensional semantic space are of no help here, as they are *abstractions* and do not correspond to ‘real’ semantic features or dimensions.

lexical knowledge”, apart from the general agreement that it should be construed as some sort of continuum of several levels/dimensions rather than an all-or-nothing phenomenon.

The common distinction between *knowledge* and *control* (or *competence* and *performance*) is a potential source for terminological confusion. E.g. Meara (1978, as cited in Gass, 1988, p. 94), focusing on language use, describes this knowledge in behavioural terms as the ability to react to a word, whereas Henriksen (1999, p. 306) argues for a competence-based description<sup>11</sup>.

The following sections attempt to shed some light on the issues involved in vocabulary ability and word knowledge. It should be kept in mind, however, that most of the discussion below is of a mainly descriptive nature that does not tell us much about *how* such knowledge is acquired.

### 2.2.1 Breadth and Depth of Vocabulary Knowledge

Lexical knowledge can be looked at from various dimensions, notably a quantitative and qualitative angle. The former (*breadth* of knowledge) is concerned with the question “How much vocabulary does a second language learner need?” (cf. Nation and Waring (1997, p. 6)).

Clearly, “knowing a word requires more than just familiarity with its meaning and form” (Schmitt and McCarthy, 1997, p. 4). Quite which kinds of lexical knowledge are deemed necessary to master a word is the topic of the latter, *depth* of knowledge.

**Breadth of Vocabulary Knowledge** The main question for L2 vocabulary acquisition here, of course, is “How many words does an L2 learner need?”. It will come as no great surprise that the answer will be less than for “How many words does a native speaker know?”, let alone “How many words are there in the target language?” (cf. Nation and Waring (1997, p. 6)). It is also clear that answers to these questions can only be rough estimates which belie considerable individual differences.

Addressing the last question first, *Webster’s Third* has around 54,000 word families; Nagy and Anderson (1984, as cited in Nagy and Herman, 1987, p. 20) found that printed school English contains about 88,500 word families (wf)<sup>12</sup> with more than 100,000 distinct meanings. This is obviously a learning goal unattainable for L2 learners (and even most native speakers, for that matter).

As regards the number of words native speakers know, there are several studies of vocabulary size giving quite diverse results<sup>13</sup>. A conservative rule of thumb given by Nation and Waring (1997) states that university graduates master ca. 20,000 wf’s, having added about 1,000 wf’s per year up to that point.

Taking frequency into account, Francis and Kucera (1982, as cited in Nation and Waring, 1997, p. 9) have shown that with a vocabulary size of about 2,000<sup>14</sup>, a learner knows 80 % in a text. Research such as (Laufer, 1988b, Liu and Nation, 1985, as cited in Nation and Waring, 1997, p. 10-11) has demonstrated that this ratio is insufficient for successful guessing of

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<sup>11</sup>To be precise, Henriksen refers to the term *depth* of knowledge.

<sup>12</sup>A word family is usually taken to include a base word, its inflected forms and regular derived forms (Nation and Waring, 1997, p. 8).

<sup>13</sup>These differences are mainly due to different definitions of ‘word family’ and which items are included.

<sup>14</sup>lemmas, not wf’s (a lemma is a base word and its inflected forms.)

unknown words or reasonable text comprehension, identifying 95 % as the minimum ratio to achieve these goals.

With these results in mind, Nation proposes to focus on the ca. 3,000 high frequency words as an immediate priority. The classic list of high frequency words is the 2,000 word *General Service List* (West, 1953), whose usefulness for modern-day language teaching purposes has been doubted because of its age (Richards, 1974) and non-optimal selection (Engels, 1968, both as cited in Nation and Waring, 1997, p. 14-15).

**Depth of Vocabulary Knowledge** More interesting from an L2 vocabulary acquisition research point of view than mere quantitative aspects of lexical knowledge is the concept of *depth* of word knowledge, described by Read (1993, p. 357) as “the quality of the learner’s vocabulary knowledge”. Many researchers have stressed the complex and dynamic nature of this knowledge; Gass (1988) describes various distinctions to be taken into account, e.g. *reception* vs *production* and *knowledge* vs *control*.

The first and oft-cited attempt to list the various types of lexical knowledge is usually attributed to Richards (1976), who was more concerned with applicability to pedagogical practice than the underlying theoretical issues per se. The main assumptions<sup>15</sup> of Richards’s “Vocabulary Knowledge Framework” are as follows<sup>16</sup>:

**Frequency** Knowledge about the degree of probability of encountering that word in speech or print

**Register** Knowledge on limitations on use according to function and situation

**Position** Knowledge about syntactic behaviour associated with the word

**Form** Knowledge about about underlying form and derivatives (morphological processes)

**Associations** Knowledge about network of associations between that word and other words in the language

**Meaning-Concept** Knowledge about the semantic value of a word

**Meaning-Associations** Knowledge about the different meanings associated with the word

Nation (1990) elaborated on Richards’s list by adding a receptive/productive distinction. His main categories are *form* (spoken/written), *position* (grammatical patterns/collocations), *function* (frequency/appropriateness), and *meaning* (concept/associations), each of which is described in terms of receptive and productive aspects. The taxonomy proposed by Laufer (1990a), while by and large similar, is slightly different from Richards’s in that she dispenses with ‘frequency’, conflates Richards’s 3 meaning-related components (incl. ‘register’) into a single ‘meaning’ component (referential, affective and pragmatic), and adds components about morphological knowledge (‘word structure’) and common collocations.

Given that the thrust of Richards’s paper was explicitly pedagogical, it would be unfair to criticise his paper for failing to provide some sort of model, or even systematic account of word

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<sup>15</sup>leaving out the first assumption which does not directly relate to lexical knowledge

<sup>16</sup>See (Meara, 1996b) for an analysis of how each of these points except the last relates to and arose out of research in theoretical linguistics at the time.

knowledge. At any rate it is clear that both his and Nation's list are purely descriptive, falling far short of yielding a theoretical construct, or model, of lexical competence. According to Schmitt and Meara (1997), what is needed (and lacking from these lists) is an exploration of links and interrelationships between the different kinds of word knowledge.

In a similar vein, Henriksen's main criticism is that lists such as Richards's lack the necessary precision and tend to lump together knowledge components and learning processes, failing to address the "nature of and interrelationships among various aspects of lexical competence" (Henriksen, 1999, p. 304).

Meara (1996b) draws attention to various shortcomings of Richards's list, arguing that it boils down to "a short review of current themes in linguistics which might be relevant to vocabulary teaching", focusing merely on descriptive linguistic concerns while neglecting psycholinguistic or pedagogical ones. First, Meara notes the "odd ordering" of Richards's knowledge components, where frequency appears high but associated meanings low in the list. More importantly, he identifies various gaps, such as the problem of active vs passive vocabulary, vocabulary growth/attrition, and the conditions of acquisition. Finally, Meara notes that each assumption actually contains quite a few hidden problems, the "real" assumptions not acknowledged as such by Richards<sup>17</sup>.

On a more fundamental level, Meara questions the word-centred nature of Richards's approach, noting that "if we are dealing with a "word" which has many different meanings, then the number of basic questions gets very large very quickly." Schmitt and Meara (1997), noting the impossibility "to design a study that could capture all of the word knowledge categories", call for an exploration and better understanding of links and interrelationships between different kinds of word knowledge, which they see as missing from traditional accounts. From a vocabulary testing perspective, even if such a huge battery of tests could be devised, most L1 (let alone L2) speakers would fail it, as "partial knowledge of words seems to be the norm in L1 as well as in L2."<sup>18</sup>

## 2.2.2 Vocabulary Ability and Lexical Competence

In order to overcome the above mentioned problems with taxonomies of components such as Richards's and Nation's, some alternatives have been suggested in the literature. First, the concept of lexical knowledge in Richards's sense seems limiting in that it does not account for the ability to put acquired vocabulary knowledge to use in context. Therefore, Chapelle (1994) has proposed to use the broader construct of vocabulary ability, which consists of the following 3 components:

- 1 The context of vocabulary use;
- 2 Vocabulary knowledge and fundamental processes;
- 3 Metacognitive strategies for vocabulary use.

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<sup>17</sup>By way of an example, Meara identifies the following assumptions to be hidden in the 'associations' assumption: each word in a language enters into network of associations with other words, which is broadly similar for all speakers; the network is fixed and stable and can in principle be specified; and so on.

<sup>18</sup>For some interesting approaches to measure degree of knowledge, see the section on vocabulary tests below.

As regards (1), there are various ways in which context can influence lexical meaning, e.g. differences across generations, or in interpretation across language varieties (Read, 2000, p. 31). Chapelle subdivides (2) in four components, the first 2 of which (*vocabulary size* and *knowledge of word characteristics*) roughly correspond to breadth and depth of lexical knowledge, respectively<sup>19</sup>. The other two are *lexicon organisation* (referring to the way in which lexical items are organised in the mental lexicon), and *fundamental vocabulary processes*, which language users apply to access their lexical knowledge. Finally, (3) is also sometimes called ‘strategic competence’, and plays a role both in language production (e.g. avoidance or paraphrase), and reception (try to guess meaning, ask teacher, consult dictionary etc).

The second alternative concerns the representation of lexical knowledge as a continuum. Faerch et al. (1984, as cited by Laufer and Paribakht, 1998, p. 367) propose a continuum starting with an only vague familiarity with the word, and ending with the ability to use the word correctly in production. Paribakht and Wesche’s (1993, as cited by Melka, 1997, p. 98) ‘Vocabulary Knowledge Scale’ is similar, except that its first stage corresponds to total unfamiliarity with the word. Exhibiting a slightly different approach, Palmberg’s (1987) continuum begins with ‘potential’ vocabulary, i.e. words as yet unencountered but comprehensible on first encounter<sup>20</sup>, and ranges over ‘passive real’ to ‘active real’ vocabulary.

A fundamental question is whether a global, learner-centred description, which would look at the properties of the learner’s lexicon as a whole, or a “local”, word-centred one should be adopted.

Meara (1996a, as cited in Meara, 1996b) advocates the first as a viable alternative, suggesting that a small number of significant dimensions, namely three, is sufficient to adequately characterise learners’ lexical competence. He proposes the following dimensions, only the first of which has been studied in reasonable detail so far (e.g. Nation (1990), Meara (1994)):

1. Size - How big learners’ lexicons are (breadth)
2. Speed of access as indicator of fluency
3. Structure - How rich a lexical structure links the words in the lexicon

In a similar vein, Henriksen (1999, p. 304) suggests three dimensions as “a balanced position between the global and separate trait view”. These are: the *partial-precise* dimension (relating to different levels of comprehension), the *depth of knowledge* dimension (including knowledge of syntagmatic and paradigmatic relations), and the *receptive-productive* dimension (for all but the best known words, their “word knowledges” exist somewhere on a receptive to productive continuum)<sup>21</sup>. Roughly speaking, Meara’s structure dimension would be a subpart of Henriksen’s depth dimension, while accessibility aspects would belong to her *receptive-productive* dimension.

As a first attempt to investigate how different kinds of word knowledge are related, Schmitt and Meara (1997) designed a study based on Nation’s (1990) framework to explore how two vocabulary knowledge components - grammatical (affix) knowledge and word associations -

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<sup>19</sup>Chapelle points out, however, that in order to do justice to the communicative approach, vocabulary size should be assessed in relation to particular contexts of use, rather than in absolute terms.

<sup>20</sup>due to e.g. cognate status

<sup>21</sup>Since Henriksen adopts a competence-based approach, she does not consider word use to be a part of word knowledge.

relate to each other, overall vocabulary size and general language proficiency<sup>22</sup>. They found that a relationship exists in each case, and conclude that to advance further, measures capturing partial knowledge should be developed (both receptively and productively), and the apparently considerable individual variability examined.

### 2.2.3 Factors of Word Difficulty

There are numerous factors that determine how difficult a word is for a learner (bearing in mind that difficulty in language is a somewhat elusive concept). They are usually categorised as *intralexical* factors (intrinsic properties related to the word's form and meaning) and *interlexical* factors<sup>23</sup> (pertaining to the relationship between the word and familiar words either in L2 or other languages.)<sup>24</sup>. However, Swan (1997, p. 161) and Singleton and Little (1991, p. 74) point out that this deceptively straightforward distinction suffers from the so-called 'attribution problem', that is certain error types resist simple classification in either or/terms. For example, a given L2 error may be due to either cross-lingual interference, an intralingual cause such as overgeneralisation of an L2 rule, or both. Another aspect of this classification problem is that many intralexical factors, such as pronounceability, are not necessarily intrinsically difficult but only in relation to the corresponding L1 factor.

**Intralexical Factors** The following is a summary of comprehensive surveys on intralexical factors, which can be found in (Laufer, 1990b, 1997, Ellis and Beaton, 1995)<sup>25</sup>.

- Phonological factors (Pronounceability)

These seem to particularly affect less-than-advanced learners who tend to experience acoustic coding interference<sup>26</sup>. Of course, pronounceability is hardly a purely intralexical factor - Ellis and Beaton (1995) point out that the degree of difficulty is determined by the overlap between the articulate feature set of L1 and L2. As Laufer (1990a) notes, research evidence points to the conclusion that phonological difficulty not only affects production, but comprehension as well.

- Orthographic factors

These include sequential letter probabilities and sound-script incongruence. Again, it has to be noted that in a sense these are not really intrinsic factors as difficulty arises only by comparison with corresponding L1 values.

- Morphological factors

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<sup>22</sup>as measured by the TOEFL test.

<sup>23</sup>Besides these, some researchers also mention factors relating to the learning experience (cf. Higa (1965), Nation (1990)).

<sup>24</sup>Thus *interlexical*, contrary to *intralexical*, is not just a more specific L2 vocabulary acquisition term than the corresponding SLA term *interlingual*, but a qualitatively different one, as it is not restricted to transfer from other languages.

<sup>25</sup>Although Ellis and Beaton do not explicitly refer to *intralexical* factors, their list is quite comparable to Laufer's, as interlingual aspects inevitably crop up in Laufer's account.

<sup>26</sup>This was shown by Henning (1973, as cited in Ellis and Beaton, 1995, p. 109), who found lower proficiency learners' errors to indicate acoustic rather than semantic clustering exhibited by advanced learners.

These include inflexional and derivational complexity, notably ‘deceptive transparency’<sup>27</sup>.

- Synformy

Taking a cue from Henning (1973) and Meara (1982), who demonstrated interference from similar sounding, already known words, Laufer (1988a, as cited in Laufer, 1997, p. 147) carried out a study of similar lexical forms (synforms) to investigate their error-inducing potential and classify them into categories (10), each representing a different kind of similarity. Results demonstrated the most difficult synforms to be those differing with respect to suffixes (*industrial/industrious*) and synforms identical in consonants but different in vowels (*adopt/adapt*).

- Grammatical factors

These relate to different parts-of-speech. Research evidence seems to suggest the order of difficulty is *nouns* < *verbs*, *adjectives* < *adverbs*. Ellis and Beaton (1995) speculate this may be due to differences in imageability. However, Laufer (1997) cautions that results of most studies may have been influenced by confusion with other factors, and suggests to regard grammar (part-of-speech) as a factor with no clear effect.

- Semantic factors

According to Laufer (1997), the main factors affecting word learning in this area are *specificity and register restriction*, *idiomaticity* and *multiple meaning*. Specificity and register restriction refer to the fact that general words are less problematic than register-specific ones, as the high frequency of register-related L2 mistakes attests. Idiomatic expressions, being both frequent and opaque by nature, place a considerable learning burden on the L2 speaker. They present a difficulty even for closely related L1 and L2 with similar use of idiom. Kellerman (1978, as cited in Laufer, 1997, p. 151) found that Dutch learners only transferred idioms involving core meanings into English, even when the transfer of peripheral meanings would have yielded a correct L2 expression. Multiple meaning refers to the phenomenon of homonymy and polysemy, i.e. the problem of “discriminating between the different senses of the same form and using each sense correctly” (Laufer, 1997, p. 152). Abstract words are often claimed to be more difficult than concrete words because of their intrinsic complexity. However, as Laufer (1997) points out, learning of many abstract words simply requires relabeling of familiar concepts, whereas concrete words may be rendered difficult by other factors.

**Interlexical Factors** It is worth pointing out that lexical transfer is not always negative or direct. In fact, it is generally more beneficial than transfer at the level of phonology or syntax. Ringbom (1983) notes that cognates<sup>28</sup> can be extremely helpful to L2 learners, leading to positive transfer which affects reception in particular. Transfer can also manifest itself in indirect forms such as avoidance and underrepresentation of lexical expressions.

Many factors pertaining to interlingual influence have already been noted above. Apart from these, the important factors to take into account are *language distance*, *cognate status* and *conceptual classification/semantic boundaries*.

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<sup>27</sup>Words that look as if they were combined of meaningful morphemes, e.g. *discourse*, *without direction*.

<sup>28</sup>Cognates are words with similarly formed translation equivalents in the L2.

The factor language distance relates not only to actual but also to perceived distance. Singleton and Little (1991) cite evidence such as (Kellerman, 1977, 1979, Ringbom, 1987) indicating that the perceived degree of similarity between L1 and L2 will strongly influence the extent of transfer. Kellerman (1978, as cited in Lightbown and Libben, 1984, p. 393) showed that in addition to perceived overall distance, perceived uniqueness is another influence on transferability. The more peripheral and non-salient a cognate is in the L1, the more it is perceived as unique to L1, and the less likely it becomes as a candidate for transfer. In short, “learners do not generally adopt a strategy of wholesale borrowing” (Lightbown and Libben, 1984, p. 407).

In a similar vein, Ijaz (1986) argues for the principle of prototypicality to be “influencing the degree of difficulty in acquiring word meanings.” She found that “noncentral members of semantic categories were classified differently across languages, whereas typical members were not.” She showed that, at least for seemingly corresponding words, L2 learners tend to rely on a ‘semantic equivalence hypothesis’ which ignores crosslinguistic differences in conceptual classification and semantic boundaries. The results of Ijaz’s study supported her hypothesis that advanced ESL<sup>29</sup> learners differ from native speakers in the semantic boundaries they ascribe to English words, and that these boundaries are influenced by L1 conceptual patterns and constraints. The difficulty of L2 word meanings seems to be determined by the amount of conceptual restructuring required. Ijaz found meanings involving a different linguistic categorisation in L2 to be particularly difficult, while similarly categorised meanings with higher differentiation in L2 prove also difficult but to a lesser degree. It is therefore not surprising that in her study, learners experienced the greatest difficulty with figurative meanings and idioms. Ijaz hypothesises that “the conceptual restructuring required in such instances is closely akin to the acquisition of an entirely new concept”, which seems to be harder than restructuring an existing one.

#### 2.2.4 Receptive vs Productive Vocabulary

Productive word knowledge (P) is usually defined as what one needs to know about a word in order to use it in speaking or writing; receptive word knowledge (R) is the word knowledge needed to understand a word while reading or listening. Other terms used more or less synonymously include *active/passive vocabulary/word knowledge*<sup>30</sup>, *production/reception*, *productive/receptive vocabulary* and *comprehension*<sup>31</sup>. Nation (1990, p. 94) sees R as including P plus “unmotivated” vocabulary, which consists of (i) words not known well enough to be used productively, and (ii) words not needed in daily communication.

A commonly held notion is that P is “more elusive, more difficult to learn, and possibly more fragile”(Waring, 1997). Another typical assumption is that R always precedes P, and that accordingly a word is either receptively or receptively and productively known. However, there is agreement in the literature that this picture is rather too simplistic: the boundaries between R and P are not fixed, and each of the different types of word knowledge is arguably known to

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<sup>29</sup>English as a Second Language

<sup>30</sup>As Crow (1986) cautions, it would be wrong to assume that readers or listeners play a passive role. Therefore, the terms P and R are preferred in the following as the more neutral terms.

<sup>31</sup>*Comprehension* can be defined in a narrow sense (decoding of linguistic information) and a broad sense (including extra-linguistic contextual information), see Clark et al. (1974, as cited in Melka, 1997, p. 91). As Melka observes, in the latter case the gap between R and P will seem larger than it actually is.

different receptive and productive degrees. This led many researchers to invoke the notion of a bi-polar continuum of word knowledge ranging from R to P<sup>32</sup>.

No clear picture emerges from the literature as regards the distance, precedence and passage between R and P, and their respective sizes. It seems clear that (i) the passage from R to P involves some overlapping phases, (ii) the relationship between R and P is not static, (iii) P requires a “more complete set of information” (Melka, 1997)<sup>33</sup>, (iv) R usually precedes P, and (v) the distance in size between R and P diminishes over learning time but R remains larger. Melka (1997) suggests that the distance between R and P should be interpreted as numerous degrees of word familiarity (which she regards as tightly related to word knowledge). Of course, the crucial question here would be: at what point is familiarity such that knowledge is no longer receptive but productive?

As for the possible shape of the continuum, Melka tentatively proposes the following stages:

1. Imitation (or reproduction without assimilation)
2. Comprehension
3. Reproduction with assimilation
4. Production

In a similar vein, Laufer (1991) suggests the ability to understand what a word means in a given context, and the free use of a word in an expression as the respective polar points.

The concept of a continuum, although the majority view in the literature<sup>34</sup>, is not unchallenged. As Melka (1997) observes, it basically involves the following assumptions: (i) R usually precedes P, (ii) the gap between R and P is not large and subject to variation, (iii) R and P are not qualitatively different and rely on the same underlying base. It is (iii) in particular, i.e. the notion of a unique underlying system used in two different ways, that is the bone of contention.

A minority view (e.g. Clark (1993), Meara (1990)) argues for two dependent, but separate and qualitatively different R and P systems. On this view, R necessarily precedes P, the gap between R and P is large and a principled one, and R and P do not rely on identical information but are asymmetrical, different systems depending on different mental processes. Meara (1990) only accepts the notion of a continuum for P, while insisting that R is qualitatively different. He illustrates his point with a hypothetical graph structure (see Figure 2), where each word is represented as a node, and each (directed) association between words as an arc. Meara points out that in this example, node H, while clearly part of the overall network, is qualitatively different from all the other nodes in that it only has arcs pointing away from it, i.e. is inaccessible from anywhere else. Thus H would correspond to an R item, which only responds to external stimuli, whereas P words can be activated by other words.

Meara notes an interesting implication of this for teaching methodology: instead of trying to practice R items as much as possible, which may only serve to reinforce already existing links,

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<sup>32</sup>Belyayev (1963, as cited in Melka, 1997, p. 89) suggests reproduction (described as active reconstitution of what has been read or heard) as an intermediary stage, which is close to P but less creative.

<sup>33</sup>For example, Crow (1986) lists denotations and connotations, syntactic constraints, derivations and register as knowledge areas prerequisite to P only.

<sup>34</sup>Proponents include Crow (1986), Laufer (1991), Palmberg (1987), Melka Teichroew (1982), Melka (1997), Henriksen (1999).

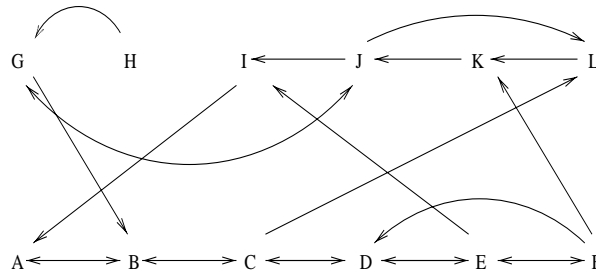


Figure 2: Meara's hypothetical association network

a more effective strategy would be to stress associations from already (productively) known words to new or R items.

To sum up, there is no complete, universally agreed upon description of R and P as yet, but it seems clear that it would have to account for the apparent lack of a neat divide between receptive and productive aspects of word knowledge.

### 2.2.5 Word Associations

It has been noted above that one of the pillars of lexical knowledge is the associative structure of vocabulary, i.e. knowledge of the interconnections in the lexicon. Word associations are used both as tools for L2 vocabulary measurement and testing on the practical front, and in theoretically-oriented L2 vocabulary acquisition as indicators about the structure of the mental L2 lexicon. The former will be discussed in the account of vocabulary testing below.

### 2.2.6 Vocabulary Testing

Turning to the pedagogical/practical aspects of lexical knowledge, a central issue is how to test it, i.e. which sort of test is the most useful in terms of reliability and information-richness to assess the status of lexical proficiency or word knowledge (synchronously), or the development thereof over time (diachronically). Many vocabulary tests reflect a general trend in SLA in that they favour integrative and communicative formats emphasising contextualisation. On this view, vocabulary should only be assessed in the context of a language-use task, and as part of other components of language knowledge. Compared to conventional vocabulary tests that measure knowledge of meaning and usage of words as independent (semantic) units, the role of vocabulary knowledge has been downgraded: it is only interesting to the extent that it has an influence on the performance of (communicative) language tasks.

Read (2000, p. 8) has proposed a framework of 3 dimensions to further differentiate this dichotomy, and delineate the scope in which vocabulary tests can exist (see Table 1). The traditional/integrative dichotomy is roughly reflected in the division of *discrete*, *selective*, and *context-independent* tests on the one hand, and *embedded*, *comprehensive*, and *context-dependent* tests on the other hand. In between, however, there are intermediate forms. For instance, if learners are given a suitable reading passage and asked to choose a multiple-choice item for selected content words (or phrases), this test would be classified as *discrete*, *selective*, but

*context-dependent*<sup>35</sup>.

|   |   |
|---|---|
| <p><b>Discrete</b><br/>A measure of vocabulary knowledge or use as a distinct, independent construct</p>  | <p><b>Embedded</b><br/>A measure of vocabulary which forms part of the assessment of some other, larger construct</p>   |
| <p><b>Selective</b><br/>A measure in which specific vocabulary items are the focus of assessment</p>  | <p><b>Comprehensive</b><br/>A measure which takes account of the whole vocabulary content of the input material (reading/listening tasks) or the test-taker's response (writing/speaking tasks)</p> |
| <p><b>Context-independent</b><br/>A vocabulary measure in which the test-taker can produce the expected response without referring to any context</p> | <p><b>Context-dependent</b><br/>A vocabulary measure which assesses the test-taker's ability to take account of contextual information in order to produce the expected response</p>                |

Table 1: Dimensions of Vocabulary Assessment (adapted from Read (2000))

The close association between lexical knowledge and reading comprehension has been widely acknowledged (Anderson and Freebody, 1981, Nation and Coady, 1988), so that drawing a dividing line between the two for testing purposes seems difficult (as pointed out by Read (1997)). A case in point is the TOEFL test (TOEFL sample test, as cited in Read, 1997, p. 309), whose reading section often probes for understanding of word meanings.

An example for an embedded, selective, and context-dependent test is the (multiple-choice) cloze test, and its derivative known as C-test<sup>36</sup>. Evidence shows that a significant proportion of cloze items relates to lexical components, which seems to support the use of cloze tests as contextualised vocabulary measurements (Jonz, 1990, Henning, 1991, both as cited in Read, 1997, p. 309). The question whether C-tests are valid measures for lexical knowledge was addressed by Chapelle (1994), who found arguments both for and against this validity. While at least some aspects of lexical knowledge for certain C-items seem necessary for successful performance, separating out the influence of other sources tends to prove difficult.

The most straightforward classification of vocabulary tests mirrors the quantitative/qualitative distinction of lexical knowledge discussed above: tests estimating vocabulary size (breadth) and quality (depth) of word knowledge.

Size-related tests relating to comprehension generally take the form of checklists of various degrees of sophistication, ranging from very simple yes/no-type lists to computerised, frequency-based lists including non-words (to counterbalance potential overestimation of lexical knowledge) (e.g. Meara and Buxton (1987, as cited in Read, 1997, p. 312)). An alternative approach is exemplified by the Vocabulary Levels Test and involves the task of matching words and definitions (cf. Read (2000, p. 118-126)).

<sup>35</sup>As Read (2000, p. 11) points out, the degree of context-dependence depends on the extent to which test-takers *have to make use of* contextual information in order to give a correct response.

<sup>36</sup>The C-test is created by choosing several short texts and deleting the second half of every second (or xth) word in each text.

Turning to tests of depth of lexical knowledge, these can broadly be classified into two categories: (a) tests attempting to analyse the different aspects of lexical knowledge, and (b) ‘developmental’ tests “identifying levels of knowledge that may be interpreted as stages in the acquisition of the word.”(Read, 1997, p. 315). Due to the above noted difficulty of designing tests that accurately assess the complex multidimensional construct of lexical knowledge, existing tests mainly fall in category (b), typically using some sort of rating scale, such as the Vocabulary Knowledge Scale (VKS) mentioned above. The VKS has the following five steps, or categories<sup>37</sup>:

I I don’t remember having seen this word before.

II I have seen this word before, but I don’t know what it means.

III I have seen this word before, and I think it means \_\_\_\_\_ (synonym or translation)

IV I know this word. It means \_\_\_\_\_ . (synonym or translation)

V I can use this word in a sentence: \_\_\_\_\_ . (Write a sentence)

*(If you do this section, please also do Section IV.)*

Despite being “a workable instrument, allowing coverage of a reasonable number of words” (Read, 1997, p. 317), and “sensitive to increases in vocabulary knowledge that result from reading activities” (Read, 2000, p. 135), various aspects of its validity have been questioned (cf. Read (1997, 2000)). First, it is not clear that the levels in the scale correspond to acquisition stages. Second, multiple meanings of a word are one aspect of lexical knowledge that the VKS in its present form does not account for. While the introduction of additional scales might be a remedy, it would run counter to the VKS’s original intention of providing a practical single scale. Of course, the general problem seems to be the attempt to reduce the complex, multi-dimensional construct of vocabulary knowledge to a fixed linear scale. Read (1997) concludes that a rating scale test “requires considerable refinement to improve its validity.”

As far as measuring P in written production is concerned, various comprehensive measures of *lexical richness* have been employed, such as lexical variation (type/token-ratio), lexical density (percentage of ‘content’ words), lexical sophistication (percentage of rare words), and lexical originality (percentage of words unique to one writer). Pointing out various shortfalls of these measures, Laufer and Nation (1995) propose the Lexical Frequency Profile as a more detailed and reliable alternative. The Lexical Frequency Profile shows the relative proportion of words from four different frequency levels<sup>38</sup>. Although showing some potential, it is yet unclear whether the Lexical Frequency Profile is a sufficiently stable measuring index, and what aspects of lexical knowledge it actually measures.<sup>39</sup>

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<sup>37</sup>Strictly speaking, the VKS consists of two scales, one for eliciting responses and one for scoring them. For details, see (Paribakht and Wesche, 1997).

<sup>38</sup>The first and second thousand words, the University Word List and remaining words.

<sup>39</sup>See also (Laufer, 1994) for the use of the Lexical Frequency Profile to track long-term vocabulary development of advanced L2 learners.

**Word Association Tests** As a measure to test (receptive) depth of knowledge, word association tests have been devised. As Schmitt (1998a) stresses, word association responses potentially convey more useful information about a learner's word knowledge than simple item type tasks<sup>40</sup>.

Since the standard version employed in L1 tasks - single free unrestricted response - proved unworkable for L2 due to instability of the learners' responses (cf. Read (1993)), Read has developed an alternative format which presents subjects with a stimulus word and a group of other words. Some of the words are related (syntagmatically<sup>41</sup>, paradigmatically<sup>42</sup> or analytically<sup>43</sup>) to the stimulus and some not, the task being to identify the related words. Although Read concludes that the test as a whole functioned well, he cautions that it is not clear to what extent the goal of measuring *depth* of knowledge has been achieved. Possible improvements of the test include distinguishing between a lack of response and incorrect responses, and using more homogeneous subsets of words to improve consistency.

The general usefulness of word association tests as L2 research tools and a measure for language proficiency has been judged differently in the literature. Schmitt and Meara (1997), whose study examined how two types of lexical knowledge - word associations and grammatical suffix knowledge - changed over time both receptively and productively, are optimistic, concluding that association knowledge has "a relationship to the overall size of the learner's vocabulary and general language proficiency as measured by the TOEFL test". Kruse et al. (1987) on the other hand failed to find a clear difference in the scores of learners and native speakers. They interpret their results as "an indication that factors other than language proficiency influence performance on the association test" and "something different is being measured". It seems uncontroversial, however, that a suitably sophisticated study of word association responses can shed at least some light on the developmental processes in the learners' mental lexicon.

**Multi-state Models** Multi-state models are a relatively recent alternative to traditional vocabulary tests such as probing breadth or depth of lexical knowledge, and rating scales such as the VKS (cf. Waring (1999)).

Instead of arranging levels of knowledge on a linear scale, multi-state models represent them in interconnected states "with no necessary assumption that one State is higher or lower in knowledge than another along a continuum" (Waring, 1999, chapter 4) (see 3). While there may be empty states, all words should be in a particular state (see 4). Since lexical development in multi-state models is not represented along a continuum, or cline, but rather as the movement between (or addition to) states, vocabulary acquisition is conceptualised as *change*, rather than *growth* as the traditional scale models imply (thus vocabulary attrition can also be accounted for). Furthermore, as all states are interconnected, there is no assumption that a given word has to pass through a state B on its way from A to C (one of the potential problems of a rating scale). Meara (1996b) describes a method of tracking the global development of a learner's vocabulary based on a matrix of transitional probabilities. In order to perform the analysis and provide a

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<sup>40</sup>For instance, Schmitt's example of a Japanese learner's responses to *commit - together meeting people* reveals a confusion between *commit* and *committee*, rather than simply showing the word is not known.

<sup>41</sup>Collocates, e.g. *occur-phenomenon*

<sup>42</sup>Synonyms, e.g. *adjust-modify*

<sup>43</sup>representing part of the meaning of the word, e.g. *electron-tiny*

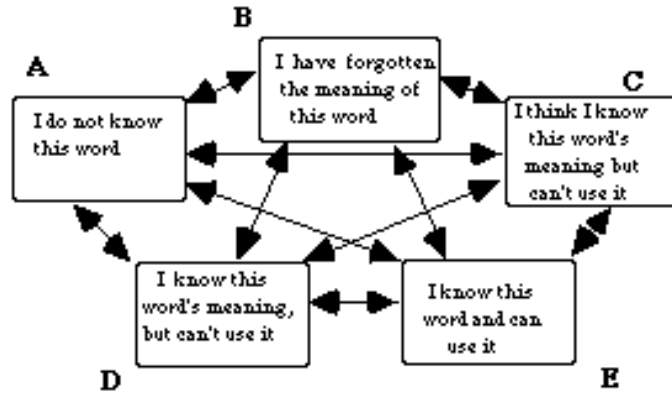


Figure 3: An example Multi-state model with 5 states (adopted from Waring (1999))

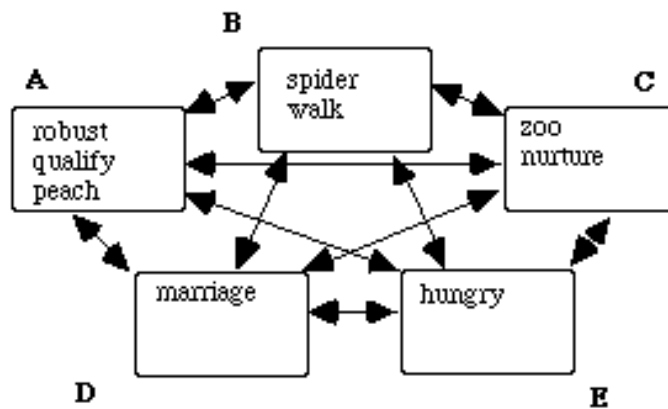


Figure 4: An example for several words (adopted from Waring (1999))

basis for probability calculations, data is gathered twice in the form of learners reporting on the state of their knowledge of a large set of words for a small number (four) of categories. Thus, in contrast to the VKS which aims to assess the development of individual words, multi-state models seem more geared to a macro-level, global view of the learners' lexicon.

**Future Directions for Vocabulary Tests** In keeping with the general trend in L2 teaching focusing on communication and use in context, integrative test formats which investigate the broader area of communicative lexical ability (rather than mere lexical knowledge) seem to be the direction of the future. In particular, the multifarious ways in which context can influence lexical meaning have to be taken into account<sup>44</sup>. As far as the purely lexical knowledge aspect is concerned, the shortcoming of current tests to assess aspects of partial word knowledge in sufficient detail will need to be addressed. From a psycholinguistic point of view, investigating and accounting for (metacognitive) compensation strategies of learners is an important task of future vocabulary tests.

<sup>44</sup>Read (1997), for instance, calls for a "much richer conceptualization of context."

## 2.3 The Mental Lexicon - Access and Retrieval

The mental lexicon - generally taken to be an autonomous component of the human processing system - is a central issue for cognitive linguistics in general and L2 vocabulary acquisition in particular. The huge number of words known to humans, coupled with the apparent efficiency of retrieving them, suggests an organisational structure of the mental lexicon more sophisticated than random heaps or even alphabetic listing. Whereas cognitive linguistics is primarily interested in the organisation of the mental lexicon of a native speaker, i.e. the way in which lexical knowledge is internalised and organised, the research interest of L2 vocabulary acquisition goes beyond that: apart from the corresponding question of the organisation of the mental lexicon of the L2 speaker, the main concern here is the way the L1 and L2 mental lexicons relate to each other. This research agenda is aptly summarised by Söderman (1989): “What does a learner’s mental lexicon look like, how does it develop and in what respects is it similar to or different from that of a monolingual native speaker?”

For the purposes of the proposed research project, discussion of the mental lexicon will be limited to the issue of access and retrieval, and more specifically on the cohort model as an example of word recognition models.

### 2.3.1 Word Recognition Models - The Cohort Model

With regard to the question of how the language understanding system is organised, models can be classified into two general groups: (a) serial (or autonomous, indirect) models, and (b) parallel (or interactive, direct) models. Type (a) assumes a one-way flow of information through the system, with lexical access unaffected by syntactic or semantic analysis. Type (b) assumes the possibility of an “on-line” access and information exchange between any two of the processing levels.

Of the three most widely cited models - Morton’s logogen model and Marslen-Wilson’s cohort model as examples of (a), Forster’s Search Model as an example of (b) - only the cohort model is briefly sketched here (for a more detailed discussion, see Singleton (1999)).

Unlike the logogen model, the cohort model (Marslen-Wilson, 1973, 1975, as cited in Harley, 1995, p. 58) aims to state precisely for each word where the critical activation level occurs. The central idea is that a (word-initial) cohort of possible items the word could be is activated by spoken input (*access stage*). The cohort size then gradually shrinks as more and more input is heard, with contextual information and phonological evidence being taken into account (cohorts actively seek to eliminate themselves, as opposed to the logogen system, where logogens just passively accumulate evidence, and context effects only come into play indirectly via the ‘cognitive system’ component). Cohort reduction continues until the uniqueness point is reached, i.e. the point where a word can be distinguished uniquely from all similar words<sup>45</sup> (*selection stage*). Finally, the *integration stage* utilises the semantic and syntactic properties of the chosen word for an integration into a representation of the whole sentence.

In later versions of the model (Marslen-Wilson, 1987), context does not affect the pre-lexical selection stage, but serves to deactivate candidates inconsistent with the context. Instead of all-or-none elimination, the revised model allows for gradual decay, which “also better accounts for the effects of frequency on word recognition” (Harley, 1995, p. 62). Other features of the cohort

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<sup>45</sup>Note that due to interactionism, the recognition point can be reached before the uniqueness point.

model, which had come under criticism, have undergone a certain relaxation as well. Singleton (1999, p. 98), for example, notes that Marslen-Wilson now “accepts that input continues to be monitored beyond uniqueness points and that the deactivation of word candidates is reversible.”

A version of the cohort model for visual word recognition is described in (Johnson and Pugh, 1994).

### **3 Literature Review II - Vocabulary Acquisition and Learning Strategies**

Before embarking on a discussion of various aspects of vocabulary acquisition, it is useful to bear some terminological caveats in mind: different interpretations of acquisition as an end-point or a process, i.e. development (Gass, 1999), and the distinction between *acquisition* and *comprehension*, which is not always clear in the literature<sup>46</sup> (Huckin and Coady, 1999). For the purposes of the following discussion, the latter distinction will not be made.

#### **3.1 Developmental Aspects of L2 Vocabulary Acquisition**

As for the ‘acquisition as development’ interpretation, Singleton (1999), citing Anglin’s (1970) findings, gives the following main characteristics of L1 lexical development:

1. Syntagmatic → paradigmatic shift
2. Progression towards a more abstract relationship between words
3. Development of lexico-semantic classification of world (in terms of hyponymy)

Of these shifts, only (1) is reflected in L2 vocabulary acquisition (as is the general struggle of both L1 and L2 learners to isolate meaningful units out of the speech stream or written text). That aside, L2 vocabulary acquisition differs considerably from its L1 counterpart in that it lacks a pre-speech dimension and takes place against the backdrop of an already existing mental lexicon (Singleton, 1999). This also means that, unlike L1 vocabulary acquisition, initial L2 learning does not usually involve the learning of new concepts (Hague, 1987). The assumption of conceptual equivalence of L1 and L2 lexical items is sometimes also referred to as *Naive Lexical Hypothesis*. In terms of development of lexical knowledge, learners move from mere word recognition to partial to complete lexical knowledge, although - as has been noted above - no native speaker ever attains complete knowledge of the full word meaning potential (Henriksen, 1999).

In the absence of a general theory of L2 vocabulary acquisition, much of vocabulary acquisition research has focused on lexicon size and growth. Apart from agreeing that acquisition of a new lexical item is a complex process (Ellis et al., 1994, Hague, 1987), however, there is still scant understanding of how individual words are acquired diachronically (Schmitt,

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<sup>46</sup>Lawson and Hogben (1996, p. 132) argue that “the difference between learning and comprehension processes is more one of degree than of kind”, as both require learners to build a representation of word meaning in memory.

1998b). Having measured four kinds of lexical knowledge in his study<sup>47</sup>, Schmitt found no evidence of a developmental hierarchy or implicational scale for different lexical knowledge types. Kojic-Sabo and Lightbown (1999) identify four other main areas without consensus: the role of individual differences in vocabulary acquisition, the importance of direct vocabulary learning techniques, the effectiveness of various vocabulary learning strategies (all central issues for vocabulary strategy research), and the role of context.

Henriksen (1999) draws attention to the fact that the acquisition of word meaning actually involves two interrelated processes, *item learning* (adding to the lexical store by creating extensional links, i.e. form-meaning mappings) and *system changing* (re-ordering/changing the lexical store via network building). The tendency in L2 vocabulary acquisition research has been to neglect the latter and focus on the former, which is much easier to test and assess than the slow, “tortoise-like” (Aitchison, 1994) process of network-building, which happens much later in language development.

### 3.2 Processes of Vocabulary Acquisition - Implicit vs Explicit Learning

Far from being uniform and monolithic, L2 vocabulary acquisition is a very complex phenomenon involving several different learning processes (Ellis, 1995b). The most commonly drawn and pervasive distinction is that between implicit and explicit learning. Implicit (or incidental) learning is often defined in negative terms, e.g. as “accidental learning of information without the intention of remembering that information” (Hulstijn et al., 1996); for a survey of possible other definitions see (Gass, 1999). Explicit Learning, on the other hand, refers to the application of vocabulary learning strategies on the part of the learner, which are discussed in greater detail below. It would be dangerous to infer from this, however, that incidental learning is a completely ‘subconscious’ process - Huckin and Coady (1999), for example, point out that implicit learning cannot be totally incidental as at least *some* attention must be paid to the input by the learner.

The extreme positions regarding vocabulary acquisition processes are expressed by the *Implicit Vocabulary Learning Hypothesis* and *Explicit Vocabulary Learning Hypothesis*, respectively. The former has its roots in Krashen’s seminal *Input Hypothesis* (Krashen, 1989) and states that meanings of new words are acquired subconsciously as a result of repeated exposures in a range of contexts, where the conscious focus is not on form, but on the message. The latter holds that the employment of a range of vocabulary learning strategies can greatly facilitate and enhance vocabulary acquisition; on this view, learners are seen as active processors of information (Ellis, 1995b).<sup>48</sup>

Ellis (1995b) contends that both hypotheses are true, but apply to different aspects of vocabulary acquisition. According to him, the Implicit Vocabulary Learning Hypothesis holds true for simple pattern recognition of surface forms, i.e. “shallow processing” of I/O. Explicit Learning, on the other hand, is necessary for the *mapping* of those surface I/O forms to their corresponding semantic/conceptual representation - in other words, the recognition of word meanings via

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<sup>47</sup>Spelling, associations, grammatical information and meaning.

<sup>48</sup>Both hypotheses also exist in a weak version, which only postulates *some* benefit of Vocabulary Learning Strategies in the case of the Explicit Vocabulary Learning Hypothesis, and concedes that vocabulary acquisition may not be possible without at least noticing the novelty status of a word in the case of the Implicit Vocabulary Learning Hypothesis (Ellis, 1995a).

“deep processing” (see below for a detailed discussion of deep and shallow processing).

### 3.3 Input, Interaction, and Negotiation of Meaning

Krashen’s Input Hypothesis has been extended in the form of the *Interaction Hypothesis*. *Input* refers to the linguistic forms used, *interaction* to the function served by those forms (Long, 1981, as cited in Heimbach, 1993). The basic claim of the Interaction Hypothesis is that L2 acquisition is promoted if learners have to solve communication problems by means of conversational modification (Ellis et al., 1994). Similar to the Implicit and Explicit Vocabulary Learning Hypotheses, the Interaction Hypothesis comes in a strong and a weak version: the former claims that interactional adjustments are necessary and sufficient for acquisition to occur, the latter just postulates they are necessary (Heimbach, 1993).

Strictly speaking, the Interaction Hypothesis consists of two different parts (see Figure 5). Part (a) claims that modifying conversational structure while negotiating solutions to communication problems helps make input comprehensible to learners. Part (b) has its roots in the Input Hypothesis: in addition to simplified input and contextual support, negotiated interaction has been found to be equally important (Long, 1981, as cited in Heimbach, 1993). (For a more detailed discussion of the Interaction Hypothesis, see Ellis et al. (1994).)



Figure 5: Model of Interactive Hypothesis (adapted from Ellis et al. (1994))

While part (a), i.e. the claim that meaning negotiation promotes comprehension, is strongly supported by empirical evidence<sup>49</sup>, e.g. (Ellis et al., 1994, as cited in Pica et al., 1987, p. 189), part (b) is much less secure without direct empirical support. One of the few studies addressing this gap is (Ellis et al., 1994), who have been able to show that interactionally modified input facilitates vocabulary acquisition at least in the area of concrete nouns. A confirmation of this finding for other parts of vocabulary acquisition, as well as clarifications as to what exactly makes this type of input beneficial for acquisition, remain as questions to be tackled by further research.

### 3.4 Depth-of-Processing (DOP) Hypothesis

It has been mentioned above that incidental and explicit learning are connected to notions of ‘deep’ and ‘shallow’ processing, terms that are rooted in memory research of cognitive psychology.

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<sup>49</sup>Ellis et al. (1994) mention two studies that have challenged the purported relationship between negotiated interaction and comprehension on the grounds that it is quantity rather than quality of input that is important, therefore elaborate input may not always aid comprehension.

The DOP hypothesis (DOPH) was proposed by Craik and Lockhart (1972) to question the then prevailing notion of multi-store memory models. In view of the numerous modifications that the DOPH has undergone since its introduction in 1972, one has to keep in mind that Craik & Lockhart never intended it as a full-blown memory theory, but as a conceptual framework in need of fleshing out.

The central idea of the DOPH is that ‘deeper’ analysis of a stimulus leads to a more persistent memory trace, with ‘depth’ referring to a greater degree of semantic involvement. For instance, the task of copying words or answering questions about their typescript constitutes a very shallow type of processing. The task of crossing out vowels, or comparing words in terms of rhymes, requires a slightly deeper level of processing. The task of judging the degree to which a word is an instance of a given concept is an example of ‘deep’ semantic processing. In a later article, Craik (1979, p. 458) acknowledges that the term ‘depth’ allows for quite a few different, only loosely related interpretations, such as: greater expertise, more effort or processing capacity expended, and order of processing or conscious access.

Since its introduction the DOPH has proved to be extremely influential, despite being subjected to various criticisms and modifications. Subsequent research (e.g. Craik and Tulving (1975)) has shown that the kind and amount of *elaboration*<sup>50</sup>, as well as *distinctiveness* of processing, are important too. Depth, elaboration and distinctiveness are related, but not synonymous notions. Both *depth* and *elaboration* refer to processing (operations during encoding), *distinctiveness* to the result of these operations. *Depth* differs from *elaboration* in that it refers to qualitative changes in processing, *elaboration* to greater processing of the same type (Craik, 1979). Whether the notion of *depth* is rendered superfluous by the two other terms, whether it is complemented or explicated by them, remains a bone of contention.

One of the main criticisms levelled at the DOPH has been that DOP is such a loose and general concept that operationalising it, and ultimately falsifying DOPH, is well-nigh impossible. In particular, there seems to be a danger of circularity which arises from the purported lack of an independent index of DOP<sup>51</sup>: well-remembered events must have been deeply processed because they are well-remembered (Craik and Tulving, 1975, Lockhart and Craik, 1990).

In response to these criticisms, Lockhart and Craik (1990) contend that the ‘danger of circularity’-argument is only partly justified as it arises only in relation to within-domain differences of phonemic and semantic encoding. By the same token, they concede that their original notion of DOP is too simple a term when further processing within a given domain is involved. As regards the lack of an independent DOP index, Johnson-Laird et al. (1978) have attempted to operationalise the term as the number of components a word has in common with a target category that have to be checked by the subject, i.e. the number of decisions that have to be made. On the other hand, Laufer and Hill (2000), investigating the relationship between look-up patterns in a CALL dictionary and retention, found that the number of look-up selections of the learners did not correlate well with retention. Accessing a greater variety of information, i.e. the quality of attention, seemed to be more important than the number (quantity) of look-ups<sup>52</sup>.

Another reservation against Craik & Lockhart’s original proposal concerns the implied claim that minimal semantic analysis is necessarily superior to maximal structural analysis.

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<sup>50</sup>E.g. manipulated by complexity of sentence frame

<sup>51</sup>Craik and Tulving (1975) acknowledge that longer processing time is not always a reliable indicator.

<sup>52</sup>Laufer and Hill (2000) discovered a beneficial effect of a combined L1 and L2 lookup, but remain on the fence whether this is due to a) richness in semantic encoding, b) prolonged attention, or c) both.

Laufer and Hill (2000), for instance, note that just one encounter with a new word - however deep it may be - is not likely to lead to long-term memory retention, yet it remains unclear just how many encounters are necessary. There is substantial empirical evidence (e.g. Kolers and Ostry (1974, as cited in Craik, 1979, p. 448) to demonstrate that repeated “shallow” operations can have quite impressive facilitative memory effects. Craik himself admits that the relationship between DOP and subsequent memory performance is more complex than he had originally envisaged, and concedes that “extensive “sensory” analysis *can* lead to higher levels of retention than minimal semantic analysis” (Craik, 1979, p. 458).

The DOPH can provide a potential framework for comparing different strategies of (explicit) vocabulary learning (Brown and Perry, 1991). As examples of ‘deep processing strategies’, Ellis (1995b) mentions: imagery mediation, semantic mediation and metalinguistic strategies for inferencing. The question whether DOP also affects implicit/incidental learning is answered differently in the literature; a closer look reveals those differences to be due to divergent notions of the term incidental learning. To wit, Ellis (1995b) claims that incidental learning is unaffected by DOP, whereas Hulstijn et al. (1996) take the finding that inferred meanings are remembered slightly better than given ones to imply that deep elaboration positively affects incidental learning. This apparent contradiction resolves itself when one considers that Ellis restricts incidental learning to refer to the shallow activity of pattern recognition of surface forms, as opposed to Hulstijn’s view of inferring meanings (this would fall under ‘explicit learning’ in Ellis’s terms).

There have not been many attempts to verify the DOPH via empirical evidence for L2 vocabulary acquisition (possibly due to the above mentioned difficulties to operationalise DOP). One of the most notable attempts in this direction was made by Hulstijn (1992, as cited in Ellis, 1995b, p. 113), who found that inferred word meanings are retained better than those obtained through the use of marginal glosses. Of course, a full-scale verification attempt of the DOPH for L2 vocabulary acquisition would have to be much more extensive, consider a broad range of different vocabulary learning strategies and address the problem of finding an independent index for DOP.

To summarise, although there are numerous problems regarding Craik & Lockhart’s original DOPH (many ideas have evolved and changed over the years, some even proved untenable or at least questionable, such as the crucial issue of an independent DOP index), as a whole their proposal has proved to be widely influential (it is cited in the majority of papers on vocabulary learning strategies/L2 vocabulary acquisition) up to the present day. In particular, the idea that the *nature* of mental processing is crucial for long-term memory retention and memory performance is generally agreed upon today.

### **3.5 Incidental Learning**

There is widespread agreement in the literature that much of L2 vocabulary acquisition occurs incidentally, epitomised by the pithy title of Sternberg’s (1987) article “Most vocabulary is learned from context”. An oft-cited argument in favour of this view is also the default explanation for learning from context in L1 vocabulary acquisition (Laufer, 1991) and goes like this: because there are many more words in a native speaker’s language (especially low-frequency ones) than a child could ever possibly learn through direct instruction, it follows that the large number of words that are at the command of native speakers can only be accounted for by

implicit means (learning from context). Since L2 learners are basically in the same situation (possibly in an even worse one, since their opportunities for direct instruction are usually much more limited), the same reasoning would apply for L2 vocabulary acquisition. Because it is much harder for L2 learners to glean relevant vocabulary information from the speech streams of their (native) interlocutors than it is for (children) L1 learners, it can be safely assumed that the bulk of incidentally acquired vocabulary in L2 stems from reading.

Even though there is empirical evidence that incidental learning occurs through reading (Zimmerman, 1997), it seems improbable that this type of learning occurs to a significant degree (Hague, 1987). Groot (2000, p. 63) points out that, apart from the high-frequency words which tend to be known to most learners anyway, “there is not enough repetition for an incremental learning process in which the various features of the words are picked up from the contexts, resulting in a solid embedding in the mental lexicon, as in L1 acquisition.” In a similar vein, Meara (1997, p. 112) denies that substantial gains in L2 vocabulary acquisition can be made from mere exposure to texts, calling the experimental evidence in favour of this “weak”. As a case in point, Hulstijn (1992, as cited in Chun and Plass, 1996) found retention of word meanings in incidental learning tasks (where the goal is reading comprehension) to be low. On the other hand, Chun and Plass (1996) discovered a higher incidental learning rate than expected (25 % accuracy on production, 77 % on recognition tests); in Rott (1999)’s study, only 2 exposures to an unknown word resulted in modest receptive as well as productive word gain. Perhaps not surprisingly, both Rott and Knight’s study indicate that incidental learning has a stronger effect on receptive than on productive vocabulary knowledge.

One of the main problems for incidental vocabulary acquisition is that word meanings are often not inferable from context, or lead learners to make wrong inferences, as not all contexts are equally conducive to making informed guesses (Duquette et al., 1998). As a case in point, Hulstijn et al. (1996) found evidence that the ‘frequency effect’<sup>53</sup> is more pronounced when external information (marginal glosses, dictionaries etc.) about unknown words is available, than in the ‘pure’ incidental learning condition. The following seem to be prerequisites for successful incidental acquisition to occur (Schmitt and McCarthy, 1997, Groot, 2000):

- Level of language proficiency (ability to accurately decode orthographic form of new words)
- Learner must have large L2 vocabulary (deducing the meaning of an unknown word requires a thorough understanding of the context, which in turn presupposes a large vocabulary)
- Strategic knowledge of inferencing process
- Context must be rich enough with cues

Furthermore, a single encounter with a new word, even if it is correctly inferred from context and therefore comprehended at the time of encounter, does not guarantee acquisition, and the degree of exposure (how many and what kinds) necessary for acquisition to occur remains unclear (Huckin and Coady, 1999). This has led researchers such as Duquette et al. (1998), Lawson and Hogben (1996) to conclude that lexical inferencing is basically a comprehension procedure

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<sup>53</sup>i.e. frequency of occurrence will foster incidental vocabulary learning.

that only has *potential* for learning/vocabulary acquisition. Laufer and Shmueli (1997) point out that “incidental vocabulary acquisition will not occur if unfamiliar words are not attended to: not noticed or not processed deeply.”

In sum, it seems safe to arrive at the conclusion that incidental learning in L2 to any great extent is rather unlikely, but only occurs incrementally and in small quantities (Hague, 1987, Hulstijn et al., 1996).

### 3.6 Language Learning Strategies

Vocabulary learning strategies constitute a subclass of language learning strategies (which in turn are a subclass of learning strategies in general). Before focussing specifically on vocabulary learning strategies, therefore, possible definitions/characterisations, as well as categorisations, of general language learning strategies will be considered.

#### 3.6.1 What are Language Learning Strategies?

First off, there is no consensus on a definition of the term *language learning strategies*, not least due to different interpretations of the terms *strategy* and *learning* in the literature<sup>54</sup>. Ignoring all the different theoretical approaches to learning, and following Rubin’s (1987) (broad) definition of learning as “the process by which information is obtained, stored, retrieved, and used” (p. 29), as well as her assumption that language learning is like other kinds of learning, Language Learning Strategies could be any set of operations, steps, plans, routines used by the learner which affect this process. In the following<sup>55</sup>, ‘use’ will be restricted to vocabulary practice, i.e. interactional communication strategies will not be considered.<sup>56</sup>

Wenden (1987, p. 6) points out that language learning strategies have to consider different aspects of the language learning process. She identifies three areas in particular that language learning strategies refer to: (a) the actual *behaviour* of learners (what do learners do to learn an L2), (b) strategic knowledge (what do learners know about the strategies they use?), and (c) knowledge about aspects (other than strategies) of the L2 learning process, such as personal/motivational factors<sup>57</sup>. These areas are summed up by Rubin (1987) as “what learners *do* to learn and *do to regulate* their [language] learning”.

Language learning strategies are applicable to a wide variety of language learning tasks, ranging from rather discrete and isolated tasks such as vocabulary and pronunciation over grammar to integrative tasks like oral communication and reading comprehension.

#### 3.6.2 Categorising Language Learning Strategies

Initially research on language learning strategies was conducted in the discipline of Second Language Acquisition and consisted of attempts to identify strategies of successful learners,

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<sup>54</sup>Strategies have been variously referred to as “techniques”, “tactics”, “learning skills”, “potentially conscious plans”, “cognitive abilities” etc. (Wenden, 1987, p. 7).

<sup>55</sup>as well as in taxonomies of vocabulary learning strategies such as Schmitt’s, see below

<sup>56</sup>As Rubin (1987, p. 26) notes, “although use of communication strategies may lead to learning, the purpose for their use is better communication”.

<sup>57</sup>(b) and (c) are often also characterised as metacognitive knowledge (see below).

assuming such strategies could be identified and made available to less successful learners (Rubin, 1975). However, it subsequently transpired that good learners in particular exhibit a greater variety and quantity of learning behaviours, with many of these behaviours occurring together (Wesche, 1975, as cited in Rubin, 1987, p. 20). Thus, it seems safe to arrive at the conclusion that language learning strategies are not inherently ‘good’, but depend on the context in which they are used and their combination with other strategies (Schmitt and McCarthy, 1997). In addition, studies such as (Poltzer and McGroarty, 1985, as cited in Rubin, 1987, p. 22) have shown that the usefulness of (complexes of) strategies also depends on level of proficiency and frequency of use.

One of the first attempts at establishing a typology of language learning strategies was made by Rubin (1981, 1987). She describes a typology of three major kinds of strategies (based on fairly extensive empirical data collection in various settings): *learning*, (interactional) *communication*, and *social* strategies. This classification framework - with minor alterations<sup>58</sup> - has also been championed by Chamot’s study (1987).

Learner strategies “contribute to the development of the language system [...] and affect learning directly” (Rubin, 1987, p. 23). They are further categorised in *cognitive*<sup>59</sup> and *metacognitive*<sup>60</sup> strategies. Rubin’s cognitive strategies include: *clarification/verification*, *guessing/inductive inferencing* (using previous knowledge to derive explicit hypotheses about a specific linguistic form or meaning), *deductive reasoning* (learner is looking for and using more general rules), *practice* (focus is on accuracy of usage - e.g. repetition, rehearsal, experimentation, application of rules, imitation, attention to detail), *memorisation* (focus is on the storage and retrieval process - e.g. drill and repetition, but also mnemonic strategies), and *monitoring*. Social strategies are described by Rubin as activities affording them opportunities to be exposed to and practice their knowledge. They include: questions to fellow students/teachers/native speakers, initiating conversations, listening to L2 media etc.

Parallel to the work in SLA, research on language learning strategies started to emerge that was rooted in cognitive psychology. In contrast to Rubin’s classification, which was entirely empirically based (e.g. observations and interviews with good language learners), O’Malley and Chamot’s (1990) typology, emerged from interviews with experts and novices and theoretical analyses of reading comprehension and problem solving. In (O’Malley and Chamot, 1990, O’Malley et al., 1985) language learning strategies are differentiated into the three primary categories *cognitive*, *metacognitive* and *social mediating*. Due to the different approach, and the lack of a metacognitive strategy component in Rubin’s classification scheme, while some overlap between the identified strategies exists, there are also some differences, sometimes even with respect to classification under primary categories<sup>61</sup> (see Table 2, without social/affective categories).

As Rubin’s typology lacks a metacognitive component, and is neither systematic nor satis-

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<sup>58</sup>Social categories *social-affective* categories, and some strategies (*clarification*) are classified differently.

<sup>59</sup>According to Rubin, these require direct analysis, transformation, or synthesis of learning materials.

<sup>60</sup>Metacognitive strategies “involve a conscious overview of the learning process and making decisions about planning, monitoring, or evaluating the best ways to study” (Schmitt, 1997, p. 205). They had not been explicitly considered by (Rubin, 1981). As basic subprocesses of metacognitive strategies, Sternberg (1987) mentions *selective encoding* (separating relevant from irrelevant information), *selective combination* (combining relevant cues into a workable definition) and *selective comparison* (relating new information to information already existing in memory).

<sup>61</sup>e.g. monitoring had been classified as cognitive by Rubin.

factory in terms of minimising overlap between categories<sup>62</sup>, O'Malley and Chamot's scheme can be considered a definite improvement. As regards metacognitive strategies, O'Malley et al. (1985) report the greatest differentiation and heaviest use in the subcategory of planning strategies.

| Rubin (1981, 1987)  | O'Malley/Chamot (1990)                                    |
|---|---|
| Guessing, inductive inferencing, deductive reasoning [ <i>Cognitive</i> ] | Inferencing [ <i>Cognitive</i> ]                          |
| Deductive Reasoning [ <i>Cognitive</i> ]                                  | Deducing [ <i>Cognitive</i> ]                             |
| Practice (Rehearsal, Repetition...) [ <i>Cognitive</i> ]                  | Rehearsal [ <i>Cognitive</i> ]                            |
| Analogy (Deductive R.) [ <i>Cognitive</i> ]                               | Transfer [ <i>Cognitive</i> ]                             |
| Monitoring [ <i>Cognitive</i> ]   | Monitoring [ <i>Metacognitive</i> ]                       |
| Memorisation (incl. Imagery) [ <i>Cognitive</i> ]                         | Imagery [ <i>Cognitive</i> ]                              |
| Clarification/Verification [ <i>Cognitive</i> ]                           | Questioning for clarification [ <i>Social/Affective</i> ] |
| Synthesis (Deductive Reasoning) [ <i>Cognitive</i> ]                      | Summarising   |
| Memorisation (Associations/ Grouping) [ <i>Cognitive</i> ]                | Organisation [ <i>Cognitive</i> ]                         |
| ?   | Elaboration [ <i>Cognitive</i> ]                          |
| -   | Selective Attention [ <i>Metacognitive</i> ]              |
| -   | Planning [ <i>Metacognitive</i> ]                         |
| -   | Evaluation [ <i>Metacognitive</i> ]                       |

Table 2: Typologies of language learning strategies

One of the first attempts at providing a truly comprehensive overview complete with a (hierarchical) ordering of language learning strategies can be found in (Oxford, 1990). She identified two distinct approaches to language learning, *direct* (memory<sup>63</sup>/cognitive/compensation) and *indirect* (metacognitive/affective/social) strategies. However, as Oxford herself concedes, there is no agreement on the basic definitions of the terms 'direct' and 'indirect', nor on "exactly what strategies are; how many strategies exist; how they should be defined, demarcated, and categorized..." (p. 17).<sup>64</sup> As regards direct strategies, the reader will notice that Oxford has separated *memory* from *cognitive* strategies, the goal of both being to help recall words through some form of language manipulation (a distinction that is retained in Schmitt's taxonomy of vocabulary learning strategies - see below). Oxford defines memory strategies as those "helping students store and retrieve new information" and cognitive strategies as "enabl[ing] learners to understand and produce new language by many different means" (p. 37). Schmitt (1997) elaborates on the dividing line between memory and cognitive strategies (for vocabulary

<sup>62</sup>As O'Malley et al. (1985) note, *repetition* could be classified as *memorisation* or *practice*.

<sup>63</sup>traditionally known as *mnemonics*

<sup>64</sup>The general caveat about the inevitability of classification conflicts applies equally to Vocabulary Learning Strategy taxonomies (see below).

learning strategies) in the following way: strategies that are more obviously linked to mental manipulation and either organise mental information together or transform it in a suitable way are classified as *memory* strategies.

In sum, although considerable headway has undoubtedly been made, language learning strategies classification systems clearly need further development and standardisation. In particular, a consensus on definitions of particular strategies (even if these are generally recognised as language learning strategies), and the hierarchic relationship/ordering among them, remains elusive.

### 3.6.3 Language Learning Strategies vs Vocabulary Learning Strategies

Interestingly, studies such as (Chamot, 1987) report the most strategy use for vocabulary together with pronunciation (but not grammar). Unlike these relatively discrete language tasks, integrative tasks such as oral communication and (listening) comprehension appear to be getting rather short shrift in terms of strategy use. Studies such as (O'Malley and Chamot, 1990, O'Malley et al., 1985) not only confirm that most language learning strategies are used for vocabulary (followed by pronunciation) tasks, thus generally for less complex language tasks, but also indicate that the most popular language learning strategies require little (or shallow, in terms of DOP) cognitive processing of learning materials.

The importance and popularity of vocabulary learning strategies in the group of language learning strategies in terms of actual use is reflected by the fact that the vast majority of language learning strategies listed in taxonomies such as Oxford's are either vocabulary learning strategies (all strategies in the *memory* category), or can be used for vocabulary learning tasks. In spite of this, research into language learning strategies has tended to neglect vocabulary learning strategies, preferring to focus on language learning as a whole.

## 3.7 Vocabulary Learning Strategies

Most research on vocabulary learning strategies has focused on various methods of vocabulary presentation, and their effects on retention, i.e. the most studied vocabulary learning strategies are *memory strategies* (Gu and Johnson, 1996). The great majority of learners seem to favour some form of mechanical strategy such as repetition over deeper, more complex ones (Schmitt and McCarthy, 1997, Lawson and Hogben, 1996), a finding that is disappointing in the light of the DOPH predictions which have been borne out by several studies.<sup>65</sup> For instance, Gu and Johnson (1996) investigated the vocabulary learning strategies used by L2 Chinese learners of English and the relationship between vocabulary learning strategies use and learning outcomes as measured in terms of vocabulary size and general language proficiency. They found the 'shallow' strategy of visual repetition to be the strongest negative predictor of learning outcome, as opposed to deeper strategies such as contextual guessing, dictionary use, note-taking and metacognitive strategies. In the same vein, Lawson and Hogben (1996) discovered that vocabulary learning strategies involving elaborate processing are more useful than repetition-based ones.

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<sup>65</sup>Even though shallower strategies seem especially suited for beginners, more experienced L2 learners favour them as well.

Individual learner differences are a crucial aspect in vocabulary learning strategies, as good learners in particular vary enormously in their choice of strategies and tend to use a wide variety of strategies in combination (Ahmed, 1989, Gu and Johnson, 1996, Ridley and Singleton, 1995); which particular strategies are used depends heavily on the learner type and individual differences in learning style (Heimbach, 1993). A more promising research agenda than investigating effects of individual strategies is therefore the following (Gu and Johnson, 1996, Schmitt and McCarthy, 1997):

- How do different learners combine different strategies (pattern of usage of vocabulary learning strategies), and how does this affect their learning (retention)?
- Do strategies which are good for vocabulary retention also foster the development of general L2 proficiency?
- How do patterns of strategy usage and their respective helpfulness evolve and change over time as learners mature?

With regard to the relationship between L2 proficiency/strategy use hinted at in the second question, the observation that overall frequency of strategy use is associated with higher levels of L2 proficiency (Halbach, 2000) seems to hold for a variety of learning contexts (Harley and Hart, 2000, p. 79), but not necessarily for all strategies - “some ‘bedrock strategies’ may be common across proficiency levels” (Green and Oxford, 1995, as cited in Harley and Hart, 2000, p. 80). In a study investigating the strategy use of Japanese university students, Mochizuki (1999) found that more proficient students use cognitive and metacognitive strategies more frequently than less proficient students. With regard to the question of causality of the strategy use/L2 proficiency relationship, Green and Oxford (1995) suggest a causal relationship but see it as an indirect “ascending spiral” rather than a straight arrow, i.e. active use strategies lead to higher proficiency which in turn makes it more likely students will choose these strategies.

The finding that the use of a wide variety of strategies is characteristic for good learners means that learners should be aware of different vocabulary learning strategies and how to use them. However, the question remains as to whether strategies can be taught in the first place, as well as whether some strategies are primarily short-term ones (as the DOPH would suggest).

### **3.7.1 Taxonomies of Vocabulary Learning Strategies**

Although even recent publications in the area of vocabulary learning strategies mention a lack of taxonomy development (Kojic-Sabo and Lightbown, 1999, p. 191), work in this direction, although tentative and few and far between, does exist.

While far from a full-blown taxonomy of vocabulary learning strategies, Sanaoui (1995) identified two distinct approaches to vocabulary learning: a *structured* and an *unstructured* approach which differ along 5 dimensions. The main differences can be seen in Table 3:

Schmitt’s (1997) goal was to develop a comprehensive inventory of individual vocabulary learning strategies and classify them along two dimensions, thereby providing a first attempt of a serious and comprehensive taxonomy of vocabulary learning strategies.

| <i>Dimension</i>                             | Structured Approach             | Unstructured Approach                    |
|--|---------------------------------|--|
| <i>Opportunities for learning vocabulary</i> | self-created, independent study | reliance on course, minimal independence |
| <i>Range of self-initiated activities</i>    | extensive                       | restricted                               |
| <i>Records of lexical items</i>              | extensive, systematic           | minimal, ad hoc                          |
| <i>Review of lexical items</i>               | extensive                       | little or no review                      |
| <i>Practice of lexical items</i>             | self-created opportunities      | reliance on course                       |

Table 3: Structured vs Unstructured Approach (Sanaoui, 1995)

The first classification dimension was adopted from Oxford (1990), who grouped learning strategies into four<sup>66</sup> categories (social (SOC), memory (MEM), cognitive (COG), and metacognitive (MET)). In order to account for the case where meanings of new words are discovered without recourse to other people's expertise, Schmitt introduced a fifth category, *determination* (DET) strategies. These seem to be roughly equivalent to the "guessing intelligently in listening and reading" part of Oxford's *compensation* strategies.

The second classification dimension was proposed by Nation (1990) and reflects the distinction of initial discovery of word meanings (*discovery* strategies - DISCOV) and remembering (*consolidation* strategies - CONS).

Schmitt's taxonomy is listed below and groups vocabulary learning strategies into 6 main categories (according to combinations of possible values of the two dimensions) with 58 individual strategies in total. The reader will notice that not all possible 10 category combinations are actually realised in existing vocabulary learning strategies - this is because discovery is the primary purpose of only a small range of strategies (determination and social strategies). A caveat to bear in mind is some strategies could be classified under several headings, so some extent of arbitrariness in the classification scheme could not be completely avoided.

- **DISCOV-DET** (Analyse part-of-speech, analyse affixes and roots, check for L1 cognate, analyse pictures/gestures, guess from textual context, consult bilingual/monolingual dictionary, use word lists/ flash cards)
- **DISCOV-SOC** (ask teacher for: L1 translation, paraphrase/synonym, sentence including new word, ask classmates for meaning, discover word meaning through group work activity)
- **CONS-SOC** (group study and practice, teacher checks students' flash cards/ word lists for accuracy, interact with native speakers)
- **CONS-MEM** (study word with pictorial meaning representation, image of word meaning, connect word to personal experience, associate word with its coordinates, connect to synonyms/antonyms, use semantic maps, use 'scales' for gradable adjectives, peg-word method<sup>67</sup>, loci method<sup>68</sup>, group words together: to study them/spatially on a page,

<sup>66</sup>Actually, Oxford's scheme consists of six top-level strategy groups (see above) - Schmitt does not include *affective* and *compensation* strategies here.

<sup>67</sup>memorising lists of facts by linking them to familiar words or numbers by means of an image

<sup>68</sup>remembering lists by picturing them in specific locations

use new word in sentences, group words together within a storyline, study word spelling, study sound of word, say word aloud, image of word form, underline initial letter, configuration, use keyword method, affixes and roots/parts-of-speech (remembering), paraphrase word meaning, use cognates in study, learn words of an idiom together, use physical action, use semantic feature grids)

- **CONS-COG** (verbal/written repetition, word lists, flash cards, note-taking, use vocabulary section in textbook, listen to tape of word lists, put L2 labels on physical objects, keep vocabulary notebook)
- **CONS-MET** (use L2 media, testing oneself with word tests, use spaced word practice, skip/pass new word, continue to study word over time)

Although validation by factor analysis of Schmitt's taxonomy as a whole is still pending, Kudo's (1999) study of vocabulary learning strategies used by Japanese learners largely supports Oxford's (1990) classification scheme (which served as a basis for Schmitt's taxonomy). Kudo classified his strategies into two main categories, direct and indirect strategies. The former included cognitive and memory strategies, the latter social and metacognitive strategies. In addition, many findings of Schmitt's questionnaire "turned out to be quite congruent with those of Schmitt's (1997) descriptive studies" (Kudo, 1999, p. 30).

Another investigation of vocabulary learning strategies as a whole was conducted by Stoffer (1995, as cited in Kudo, 1999, p. 6)), who developed a Vocabulary Learning Strategy Inventory (VOLSI) containing slightly fewer items than Schmitt's taxonomy (53 compared to 58). Using factor analysis, Stoffer found that the 53 VOLSI items clustered into the following nine categories:

- Strategies involving authentic language use
- Strategies used for self-motivation
- Strategies used to organize words
- Strategies used to create mental linkages
- Memory strategies
- Strategies involving creative activities
- Strategies involving physical action
- Strategies used to overcome anxiety
- Auditory strategies

### 3.7.2 Usefulness and Change of Usage of Vocabulary Learning Strategies Over Time

A number of interesting findings have arisen in Schmitt's (1997) research relating to his proposed taxonomy.

Schmitt asked a total of 600 Japanese students and company employees with regard to actual strategy use and perceived helpfulness. The 'winner' in both categories proved to be consulting a bilingual dictionary; other popular vocabulary learning strategies were (in descending order) written and verbal repetition, study spelling of a word, and guessing from context. In contrast, strategies such as using semantic maps, physical action, L1 cognates and the keyword method were the least commonly used. The results of Kudo's (1999) study, whose subjects were Japanese senior high school students, tie in with these findings.

Another interesting issue relates to the use of strategy over time: Schmitt's study confirms that usage patterns of vocabulary learning strategies change as (Japanese) learners mature/grow older, the general trend being moving away from shallow, mechanical repetition to deeper methods like the keyword method and word association. Schmitt cautions, however, that these results may not necessarily be generalisable, as patterns of strategy use are likely to be culture-specific at least to some extent, and his subjects comprised Japanese learners only.

In the following, the most important strategies will be discussed in further detail, notably guessing from context, the keyword method as the most well-known memory strategy using imagery mediation, dictionary look-up, and use of vocabulary/multimedia (hypermedia) glosses.

### 3.7.3 Guessing From Context (GFC)

In a sense, GFC is the mirror image of incidental acquisition on the strategy side, so much of what was said in that section is relevant here as well. For instance, the fact that GFC is classified in Schmitt's taxonomy in the DISCOV-DET group reflects the fact that it is not so much a retention as a comprehension strategy.

The probability that a word will be learned successfully via GFC depends mainly on two factors: word frequency, and, even more importantly, its usefulness for understanding the text (Paribakht and Wesche, 1999, p. 199).

Kelly (1990) distinguishes two types of GFC: *formal guessing* and *contextual guessing*. The former is based on formal (morphological) word features and relies in its simplest form on assessing word resemblance. Although this can be dangerous in the case of 'false friends'<sup>69</sup>, it is usually a promising strategy as true cognates outnumber false ones by a considerable margin. On the other hand, contextual guessing, i.e. GFC in its purest form that relies solely on context, stands a poor chance of succeeding when unaided by formal clues (Kelly, 1990).

Nation has championed GFC as the "undoubtedly most important vocabulary learning strategy" (1990, p. 130), and recommends GFC especially for low-frequency words as their rarity does not afford the learning effort. In the same vein, Gu and Johnson (1996) claim that research has demonstrated that vocabulary can be acquired through reading or fully contextualised activities. However, the consensus verdict in the bulk of GFC literature seems to be that it is no substitute for learning due to its drawbacks (Kelly, 1990).

A list of the most serious problems of GFC is given in (Huckin and Coady, 1999):

- it is inherently imprecise;

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<sup>69</sup>E.g. German *Gift* = English *poison*.

- it takes time (far more so than formal guessing);
- it requires accurate word recognition;
- the context must be well understood, which in turn requires previous lexical knowledge - Laufer (1988b) gives a figure of 95 % coverage of already known words to enable effective GFC of new words;
- even if it leads to comprehension, it may not translate into acquisition;
- it requires good reading strategies;
- it is not effective for the acquisition of multi-word items.

Lawson and Hogben (1996) found a lack of association between GFC and recall of word meaning, which they interpret as emphasising the need to distinguish the use of GFC for the *generation* of new word meanings, and their *acquisition* for subsequent recall. Another interesting conclusion that could be drawn from this finding relates to the DOPH: it may be the case that the very richness of context that enables successful GFC for comprehension militates against successful GFC for acquisition, as it makes the task of inferring word meanings too “easy” for the learner and prevents him from employing deep processing. This hypothesis is supported by Laufer and Shmueli’s (1997) study which suggests that “mental elaboration [...] may not necessarily take place when words are encountered in texts. On the other hand, bilingual lists may be conducive to such elaboration”. Laufer and Shmueli conclude that “focus oriented methods of presenting new vocabulary are more effective than context oriented reading methods as the former yield better long term retention scores while at the same time requiring less learning time.” In extreme cases of rich context, no GFC may be employed at all because the learner is able to comprehend the text even without knowing the word (Nation and Coady, 1988, p. 101).<sup>70</sup>

In summary, although GFC obviously has an important role to play in the overall scheme of vocabulary learning strategies (74 % of Schmitt’s (1997) intermediate level L2 learners of English used GFC, and 73 % found it helpful), it cannot solve all reading comprehension, let alone acquisition, problems and needs to be supplemented by other vocabulary learning strategies.

### 3.7.4 Imagery Mediation - Keyword Method

Mediation strategies - involving the new L2 word in some form of meaningful association - come in two varieties, *imagery mediation* and *semantic mediation*, and are examples of ‘deep’ strategies. As should be expected from the DOPH predictions, the usefulness of both in terms of long-term memory retention has been confirmed (Bower and Winzencz, 1970, as cited in Ellis, 1995b, p. 111).

Imagery mediation in its simplest form involves visualising a mental picture or image of the L2 word in question; the most interesting variant of imagery mediation, however, is the *keyword*

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<sup>70</sup>This hypothesis seems to be borne out by Mondria and Wit-De Boer’s (1991) study. They compared comprehension and retention of word meanings guessed in ‘pregnant’ (= offering a range of clues) and ‘non-pregnant’ contexts and found that pregnant contexts led to better comprehension, but non-pregnant contexts to better retention (after 2-3 days).

*method* (KW). KW has been mainly positively evaluated in the literature and can boast some impressive evidence of superiority over other direct or mnemonic strategies (Gu and Johnson, 1996).

KW consists of two association stages: in the first, the learner imagines/remembers a native L1 keyword which sounds similar to the L2 word. The second stage involves accessing an interactive image, which should be as striking and memorable as possible, containing both the (referent of the) keyword and its associated L2 object. For instance, an English L2 learner of German trying to learn the word *Nagel* (nail) could use the similar-sounding keyword *knuckle* to form a (suitably gory) mental image of a nail piercing a knuckle of a human finger (see Figure 6)<sup>71</sup>. The two-stage route of KW can be envisaged as a crutch; the intention is that with enough use the link L1-L2 word becomes a direct one (Ellis, 1995b), i.e. the association via the 'bizarre' mediator is meant to exist only temporarily.

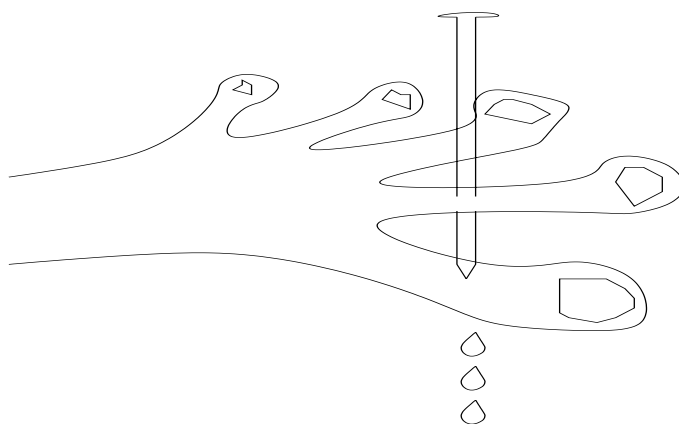


Figure 6: Keyword Method for *Nagel*

There has been some impressive empirical evidence to show the superiority of KW as one of the most useful vocabulary learning strategies. Atkinson and Raugh (1975, as cited in Ellis, 1995b, p. 115) compared KW-mnemonics with control conditions (subjects using their own vocabulary learning strategies) and found that the advantage of KW was maintained up to six weeks later. Brown and Perry (1991) compared KW with a semantic processing method<sup>72</sup> and a combined KW-plus-semantic condition, which yielded the best retention results.

Despite positive evaluations and empirical evidence of its usefulness, KW also been criticised on various counts:

- As the keyword is merely an approximation of the L2 form, 'proper' learning of correct L2 phonology and orthography is unnecessarily delayed (although Hulstijn (1997) points out that there are no theoretical reasons to assume KW plays an inhibiting role).
- It strongly depends on nature of words (KW can only be used for concrete nouns, rarely for abstract ones).

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<sup>71</sup>This example assumes that the native speaker reader will not fall prey to the possible confusion between the sense of nail as device as used in the keyword image, and nail as fingernail which happens to be depicted as well.

<sup>72</sup>The semantic condition presented the new word, its definition, two examples of the word's use in sentences, plus a question which had to be answered using the new word.

- It is much less effective for *productive* purposes.
- It suffers from the fundamental assumption that vocabulary acquisition largely means list learning.
- Especially in the case of polysemous words, it only helps establish *one* of the necessary meaning links.
- It may be effective in laboratory-like conditions, but has questionable naturalness.
- It may not provide necessary grammatical information (such as morphophonemic clues) to successfully use the word.

To sum up, although the applications of KW (and other mnemonic techniques, for that matter) are limited, its effectiveness has been sufficiently proven. It is perhaps best seen as a helpful addition, but not a substitute to, other vocabulary learning strategies.

### 3.7.5 Dictionary Look-Up

As Ellis (1995b) observes, traditional dictionaries (especially bilingual ones) fall far short of providing complete coverage of word meanings, which means vocabulary learning from dictionaries is an error-prone process which requires cognitive sophistication. Research findings are inconclusive as regards the benefit of dictionary look-up for vocabulary acquisition/comprehension. Knight (1994), confirming Luppescu and Day (1993)'s findings for a bilingual dictionary, showed that access to a (computerised) dictionary led to increased lexical knowledge after reading<sup>73</sup>. On the other hand, Bensoussan and Laufer (1984, as cited in Zimmerman, 1997), for instance, demonstrated that the use of bilingual dictionaries does not significantly increase reading comprehension.

The goal of Hulstijn's (1993) study was to investigate the relationship between look-up behaviour and vocabulary knowledge on the one hand and inference ability on the other hand, taking into account the influence task variables such as reading goal, word relevance and word inferability. The result was that learners did not look up all unfamiliar words, with look-up behaviour most strongly related to the perceived relevance of the word, but only modestly to readers' vocabulary knowledge. Interestingly, the ability to infer word meaning from context was not related to look-up behaviour at all, which suggests that a substantial proportion of good guessers may have been inclined to check their guesses subsequently. A general counter-argument to the use of (bilingual, electronic) dictionaries relates to the DOPH: because word meaning is given away too easily (shallow processing), dictionary look-up may be detrimental to vocabulary acquisition/retention (Laufer and Hill, 2000).

Finally, there seems to be no significant difference in lexical knowledge between 'maximalists' (subjects who looked up many words) and 'minimalists' (Hulstijn, 1992, Chun and Plass, 1996).

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<sup>73</sup>especially for low-ability learners.

### 3.7.6 Glosses and Multimedia Environments

In general, there is a consensus among researchers that glosses<sup>74</sup> facilitate reading comprehension and short-term vocabulary retention (Kost et al., 1999). Textual glosses have been used for a long time to facilitate L2 reading; other forms of glosses include pictorial (visual) and aural glosses, and various combinations thereof.

As for textual glosses, there is a choice of language and form (single-choice or multiple-choice) glossing. Some studies have investigated the effectiveness of the different options: Laufer and Shmueli (1997) found that glosses in L1 (Hebrew) led to better retention than L2 (English) glosses. Multiple-choice glossing, while encouraging deeper processing, suffers (in the printed form) from the lack of immediate feedback to student errors. This problem can be addressed by using computers, however; Nagata (1999) found multiple-choice glossing with immediate feedback to be more effective than single-choice glossing.

Computers and multimedia environments (hypertext links, animations etc.) provide the opportunity for highly textured linguistic and extralinguistic environments, and multiple forms of glosses (e.g., visual glosses could also include videos). This raises the interesting question of whether such environments could stimulate and generally positively affect L2 vocabulary acquisition. A good survey of recent studies of multimedia annotations can be found in Laufer and Hill (2000).

An important related question given the broad range of available glosses (especially in multimedia environments) is what form (or combination of forms) is the most effective for vocabulary acquisition. Kost et al. (1999) have found that the combination of textual and pictorial glosses is superior to both gloss conditions alone for vocabulary retention after 2 weeks. This result is in keeping with Paivio's (1986, as cited in Chun and Plass, 1997, p. 65-66) dual-coding theory. This theory postulates two distinct storage systems for information - a verbal system storing symbolic representation, and a non-verbal system storing analog representation. Extending the dual-coding theory to multimedia learning, Mayer and Sims (1994, as cited in Chun and Plass, 1997, p. 66) found that a contiguous presentation of verbal and visual material was beneficial for the building of referential connections between verbal and visual representations in short-term memory.

Chun and Plass (1996) investigated the effectiveness of annotations with three different media types, with the result that annotations with pictures and text yield better results than annotations with text and video, or text only (thus supporting Kost et al.'s findings). This result, however, is at least somewhat surprising in the light of the dual-coding theory, according to which a combination of modes or media should contribute to greater learning success, thus predicting a similar success rate for pictures+text and video+text conditions. In keeping with the dual-coding theory, Duquette et al. (1998) found that multimedia environments stimulate learning when they adopt a mixed approach. In sum, it seems safe to conclude that "annotating lexical items with different modes of information presentation has positive effects on vocabulary acquisition" (Chun and Plass, 1997, p. 70).

Laufer and Hill (2000) focused in their study on the relationship between look-up patterns and retention. They found that accessing a multiplicity of information (using multiple dictionaries) reinforces retention, and that individual look-up preferences apparently play an important role. However, they could not discover a uniform relationship between retention and look-up

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<sup>74</sup>A gloss is a translation or brief explanation of difficult or technical text (e.g. unusual words).

preferences.

Touching on the relationship between primary categories of language and vocabulary learning strategies, and learning success in a multimedia environment, Duquette (1999) argues that the highly cognitive nature and richness of materials necessitate well-developed (skills of using) metacognitive strategies on the part of the students<sup>75</sup>.

One of the main research topics in this area still awaiting investigation is the establishment of a typology/taxonomy presenting vocabulary learning strategies in the multimedia environment (Duquette et al., 1998). Other interesting questions relate to follow-up exercises and the ‘unlearning’ of wrongly perceived meanings (Laufer and Hill, 2000), such as:

- What are the conditions in which students can be helped to unlearn wrongly perceived meanings (an analysis of the look-up log might shed light on this)?
- Can particular types of follow-up exercises better aid retention?
- What is the relationship between look-up behaviour, reinforcement/follow-up exercises, and long-term memory retention?

### 3.8 Summary

The gist to be taken from the previous discussion is that the process of vocabulary acquisition and learning varies at different stages of language proficiency and learning development, and for different kinds of words. Individual learner differences play an important role in both rate and type of vocabulary acquisition, and preferred vocabulary learning strategies or strategy combinations. However, as Read (2000, p. 46) notes, there is as yet no model of the process of vocabulary acquisition allowing us to be much more precise than this. Quite a few questions remain to be investigated by future research, for example, which variables affect the probability of acquisition of particular words (and to what extent), and how do learners process (unknown) words psycholinguistically as they read?

As regards the implicit/explicit learning discussion, the consensus seems to be to acknowledge the necessity of adopting a mixed approach to vocabulary acquisition, i.e. supplementing incidental acquisition by a range of explicit vocabulary learning strategies that preferably engender deeper processing.

It remains a major challenge to trace, test and assess the nature and progression of learners’ interlanguage semantic network. The ultimate goal could be some sort of multidimensional theory or model capable of accommodating the various processes of vocabulary acquisition along the different dimensions.

## 4 Central Ideas

### 4.1 Overview

In my thesis, I plan to investigate L2 vocabulary learning strategies with the goal to develop a taxonomy that builds on the taxonomy proposed by Schmitt (1998). Schmitt’s taxonomy is one

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<sup>75</sup>“La nature même de l’hypermédia imposerait donc l’emploi de stratégies métacognitive.” (Duquette, 1999, p. 303)

of the most recent and comprehensive attempts to provide a classification scheme for a wide range of L2 vocabulary learning strategies, revising and expanding on Oxford's (1990) classification scheme in several important respects: (a) it is especially geared to vocabulary learning, and (b) compared to Oxford's typology the potential overlap/multiple classification of strategies is minimised. Schmitt's taxonomy is organised along 2 dimensions (the discovery/consolidation distinction, and Oxford's (1990) categories of general language learning strategies), comprising a total of 58 strategies.

Whereas Schmitt based his taxonomy on a 'traditional' classroom-type language learning environment, the taxonomy to be developed will concentrate on vocabulary learning in a CALL/multimedia environment, where learners reading a text will have the opportunity to 'click' on unknown words and choose between several explanation options, ranging from simple translations to L2 paraphrases, to hints such as morphological clues, related words in a semantic network, example sentences containing the word, mnemonic devices like the keyword method, and multimedia glosses such as pictorial representations etc.

A central question not yet decided is whether a 'broader', more comprehensive type of learning environment should be chosen, which in addition to providing texts with glosses/online help functions, would also give learners the opportunity to consolidate, reactivate and/or review vocabulary knowledge with tools such as note-keeping, net-building etc. (for the implications of this decision on the revision/development of the taxonomy, see section 4.2).

The goal of the thesis will be to develop Schmitt's taxonomy further in a way that takes the different requirements of this type of learning environment into account, and to validate the resulting taxonomy by factor analysis. Also, several factors that are not an explicit part of Schmitt's taxonomy, but seem to be essential issues for vocabulary acquisition, such as depth-of-processing (relating to the degree of semantic elaboration of the learning task), and strategies relating to 'unlearning' of wrongly perceived meanings, will be considered. In order to investigate whether depth-of-processing as a crucial variable for successful vocabulary acquisition will constitute an additional dimension in the final taxonomy, it is first necessary to establish an independent DOP index for each learning strategy (see section 6.1.3). The introduction of DOP as a separate taxonomy dimension would then depend on the extent to which DOP strategy clusters (strategies with a similar DOP index) cut across the existing strategy group boundaries.

Another envisaged addition to Schmitt's taxonomy is based on the cohort model of the mental lexicon, which predicts that formal similarities<sup>76</sup> (not just semantic ones) between words could be exploited as a discovery (DISCOV) strategy (an explicit strategy of this kind is missing in Schmitt's taxonomy). Apart from contributing to filling in gaps in the taxonomy, this addition raises the following issue: arguably, the classification would be as a memory (MEM) strategy (as linking with prior knowledge is obviously involved), but at the same time - being primarily a recognition/discovery strategy - as a discovery (DISCOV) strategy. DISCOV-MEM, however, does not figure as a major strategy group in Schmitt's classification, lending further support to the need to re-analyse Schmitt's major classification scheme for this investigation and learning environment.

A side issue to be investigated relates to the potential ambiguousness of visual glosses - pictures can be more or less ambiguous, depending primarily on the context in which they appear. The degree of ambiguity of visual/pictorial annotations could be empirically assessed

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<sup>76</sup>dubbed by Laufer (1988a) as 'synforms', i.e. words with similar pronunciation and/or surface forms

by evaluation of students, and the effects on vocabulary acquisition investigated. This could be a first step towards an automatic generation of visual glosses/pictures in this type of learning environment.

Another side issue pertains to the provision of example sentences explaining the usage of the word in question. A statistical approach such as a modified version of Latent Semantic Analysis (LSA) could provide the tool to choose example sentences, by comparing different possible sentences (to be taken e.g. from a suitable corpus) to an appropriate 'landmark', such as e.g. WordNet's synonym set of the word to be explained. This modified version of LSA is based on a combination of the LSA knowledge representation with a constraint-satisfaction model of comprehension introducing an element of contextual modification. The approach is described in more detail in (Kintsch, in press).

The resulting sentences could be evaluated by experts (L2 teachers) in terms of their usefulness as example sentences, and eventually be compared (in terms of outcome in learning results/successful acquisition) to a simple choice of sentences as provided by dictionaries.

The choice of suitable texts is another side issue that the proposed research seeks to investigate. More specifically, it is planned to investigate different readability formulae/indices, the aim being to adapt/develop a sufficiently effective readability index for the given language background (see Section 6.1.6).

Finally, the issue of whether the use of metacognitive strategies influences the use of cognitive, memory etc. strategies (as suggested by Bull (1997, p. 256)) could be investigated for the proposed learning environment.

The process of taxonomy-building will be interleaved with an evaluation process: initial adjustments/modifications to Schmitt's taxonomy based on introspection will be subjected to evaluations of both language teachers and language learners. The resulting taxonomy will be a) validated by a factor analysis, b) judged in terms of its usefulness for providing a basis for developing a sequence of (CALL/multimedia) teaching (reading) materials by experienced language teachers.

Furthermore, the empirical study is envisaged to investigate the a) actual usage of individual strategies, b) objective and subjective success/usefulness of the strategies, as determined by some form of vocabulary assessment (see section 4.3) and learner evaluation in terms of perceived helpfulness, respectively.

## **4.2 Revising Schmitt's Taxonomy**

As, to the author's knowledge, all existing major typologies of language/vocabulary learning strategies (including Oxford's and Schmitt's) are based on a traditional classroom, group or self-study type of language learning environment, they are not directly applicable to a computer/CALL/multimedia-type of environment. This means that Schmitt's taxonomy has to be revised and updated in several respects, most of which are to do with the change in learning environment and conditions.

Looking at Schmitt's 6 major strategy types, it becomes apparent that DISCOV-DET (discovery and determination) strategies keep their relevance in the new learning environment, even though quite a few new strategies might find their way into this category.

If, and to what extent, the remaining strategy types will still be applicable depends on the precise form of the learning environment chosen. As the learning environment is envisaged

to be a collaborative one, social strategies (DISCOV-SOC and CONS-SOC) would retain their relevance, although to what extent will presumably depend on the degree of collaborativeness of the system. If one opts for an essentially 'reading'/discovery learning-type of environment with online glosses/help functions, it is hard to imagine that CONS-COG functions play a role under these conditions. Similar arguments apply for CONS-MEM functions, although probably to a lesser extent. It is conceivable that a few strategies using imagery, or links to prior knowledge, could be employed in a basically discovery-based reading environment, even if they are not the most obvious choices of online help (examples include a visual gloss showing a keyword image, or a textual gloss showing a word as part of a multi-word item, in addition to a "proper" gloss).

In case a broader 'vocabulary learning' type of environment is chosen, which in addition to reading glossed texts provides learners with tools for note-keeping and net-building etc., all of Schmitt's remaining six major categories would keep their relevance, though each could be considerably amended by strategies particular to this type of environment. In this type of environment, two different ways of combining the two main components - discovery and consolidation, to adopt Schmitt's terminology - can be envisaged. The first would be to offer two separate subsystems, where learners are given the choice either to read or perform some consolidation task of their choice. The other would be an integrated system, where after having received online help about an unknown word, learners are offered the opportunity (or even prompted to) use a consolidation strategy. It is also conceivable that both versions are used to be compared in terms of a) usage patterns of consolidation strategies, and b) respective effectiveness thereof.

To a much lesser degree than type of learning environment, the choice of a different L2 (English in Schmitt's study, German in the proposed investigation, see Section 6.1.5) can also be expected to have an influence on the applicability of specific strategies in Schmitt's taxonomy. For instance, German being a morphologically richer language than English, strategies involving internal morphological decomposition (such as analysing affixes and roots) can be hypothesised to play a more significant role in L2 German than in L2 English.

It will also be interesting to investigate the role of metacognitive strategies in this type of learning environment. Although in Schmitt's typology they appear only as consolidation strategies, an analysis of patterns of learners' strategy usage (use of online help) might reveal usage patterns that could justifiably be classified as metacognitive.

CALL/multimedia environments are also conducive to investigations of a language learning aspect neglected in major language learning typologies up to now, the unlearning of wrongly perceived meanings. This is because misconceptions about a word's meaning can not only be discovered and logged via some form of online vocabulary assessment, but also linked to a learner's prior strategy use (or usage patterns). The issue of detecting misconceptions, as well as successful 'unlearning' of them, is of course closely linked to the choice of vocabulary assessment format (see section 4.3). Since misconceptions in the area of lexical knowledge can occur along several dimensions and in different degrees, a decision about what constitutes a misconception, will have to be made within the framework of the chosen vocabulary assessment apparatus. Specific questions that may be investigated include: (a) Are particular strategies/types of glossing/follow-up exercises, or combinations thereof, particularly effective at the task of unlearning wrongly perceived meanings, and if so, (b) can they be related to particular types of misconceptions? If (a) is the case, factor analysis might shed some light on the question whether this subset of strategies is to be elevated to the status of a primary strategy dimension.

Another dimension not explicitly mentioned in typologies of language/vocabulary learn-

ing strategies so far is depth-of-processing. As there is consensus in the literature that depth-of-processing is a crucial variable in vocabulary retention, it seems worthwhile to investigate whether it constitutes a valid dimension in the resulting typology. The main problem here seems to be finding an independent index for DOP, i.e. operationalising the concept.

In sum, it is envisaged that the resulting revised taxonomy will not only consist of added and amended strategies within Schmitt's category types, but the primary classification itself may undergo considerable revision as well.

### 4.3 Evaluation of Vocabulary Acquisition

Since the main goal of the thesis is not to investigate vocabulary testing, some existing measurement of lexical knowledge will have to be chosen. It should be remembered that a single objective vocabulary test, which could satisfactorily address crucial questions such as "What does it mean to know a word?", or "When has a word been learned?" does not exist. Bearing this in mind, the following test formats could serve as a basis for evaluating acquisition success (see section 2.2.6):

- (i) The simplest definition refers basically to *breadth* of knowledge, which considers a word acquired when it is recognised, or its meaning recalled. Acquisition could then be measured as the percentage of (new) words the subjects were able to recognise or recall a word (or provide a definition, synonym/paraphrase, or translation for).
- (ii) Some kind of multiple-choice or cloze exercise, i.e. applying learned words to gaps in a novel text.
- (iii) A broader definition would refer to Richards's dimensions of knowledge (i.e. it would acknowledge the *depth* of knowledge).
- (iv) Some sort of rating scale like the VKS could be used. These scales are designed to measure progressive degrees of word knowledge, starting with total unfamiliarity with the word, over 'potential' vocabulary (word is recognised but meaning only partially known), to 'full' knowledge (ability to use word in a sentence).
- (v) Instead of arranging levels of knowledge on a linear scale, multi-state models of vocabulary (see Section 2.2.6) provide an interesting alternative.

All of these options are not without problems. Adopting (i) would essentially be tantamount to probing for *remembering* a word, rather than the *acquisition* of it. As Jiang (2000) points out, remembering a word (or even knowing its meaning in the sense of being able to provide a translation, or synonym) does not give much (if any) information about the ability to use the word, or any of the other traditional dimensions of lexical knowledge - in other words, the *depth* of lexical knowledge would be neglected. A similar criticism could be levelled at (ii). While approach (iii) takes care of this problem, it has its own drawbacks, chief among which is the lack of practicability due to the gigantic battery of tests that would have to be devised and administered. In other words, (iii) would allow only a few words to be assessed in a given time. Furthermore, it is not very clear what role the different dimensions would play in the resulting assessment, nor which weight should be assigned to them for a possible combination

into an overall assessment. Approach (iv) provides a solution for these problems, and the VKS's proclaimed purpose to "track the early development of specific words in an instructional or experimental situation" (Wesche and Paribakht, 1996, as cited by Read, 2000, p. 33) seems to fit quite nicely with the assessment purposes of the proposed research project. However, there are also drawbacks: adopting a linear scale (assuming that the usual procedure of assigning ordinal numbers to the levels and then adding them up into an overall score is followed) does not seem to reflect the nature of lexical knowledge very well. This makes it difficult, if not downright impossible, to relate a given increase in score to a specific dimension, or level, of lexical knowledge.

Seeing as all these traditional methods of assessing lexical knowledge suffer from different kinds of problems, a very interesting alternative could be provided by (v), i.e. the use of multi-state models of vocabulary. Multi-state models avoid many problems associated with traditional rating scale methods, most notably the deficiency of the underlying assumption of a receptive-productive continuum (see Section 2). However, the global, holistic view taken by multi-state models (i.e. it is the whole learner lexicon, rather than individual lexical items, that are indicative of patterns of lexical development) appears to make them less suitable for the purposes of the proposed research. What is more, in contrast to multi-state models, traditional scales provide a more straightforward (if imperfect) rating scheme.

In sum, rating scales such as the VKS appear to be the most attractive candidates for the assessment of vocabulary acquisition in the context of the proposed research. Multi-state models, however, may still have their place as a complementary assessment tool in the project. They seem best suited for an investigation of global effects of the employed vocabulary learning strategies on the overall development of learners' vocabulary knowledge.

#### **4.4 Evaluation of the Taxonomy**

The process of taxonomy-building will be interleaved with an evaluation process: initial adjustments/modifications to Schmitt's taxonomy based on introspection will be subjected to evaluations of both language teachers and language learners. It is envisaged to carry out an empirical study to evaluate the pedagogical usefulness of the resulting taxonomy. This could be done by asking experienced language teachers to judge the taxonomy in terms of its usefulness for providing a basis for developing a sequence of (CALL/multimedia) teaching (reading) materials.

An important aspect to bear in mind when evaluating the taxonomy pertains to the very comprehensiveness of taxonomies such as Schmitt's (and Oxford's), which the envisaged taxonomy is envisaged to update and expand on. Both typologies seem to attempt to encompass as many strategy instances as possible, which may be both a blessing and a curse. While it is certainly desirable to not leave existing strategies out of the picture, the downside of such comprehensiveness may be the failure to prioritise among strategies in terms of importance, and maximise the danger of generating overlaps between subcategories. Therefore, the resulting taxonomy will have to be carefully evaluated with respect to this trade-off between comprehensiveness and informativeness.

Another improvement on Schmitt's taxonomy might be to run a factor analysis on the classified strategies to validate Schmitt's basic classification scheme for the CALL/multimedia environment - as Kudo (1999) observes, failure to do so in Schmitt's taxonomy calls into question whether the primary categories really share the common underlying factors.

## 5 Work So Far

Most of the time so far has been spent absorbing aspects of the many different subareas of the SLA literature via extensive reading, in order to focus on a promising starting point for the proposed research project. These issues range from more theoretically oriented research on SLA theories and the mental lexicon, to more applied topics like research into language learning and acquisition strategies.

After having gained a reasonably thorough overview of the Second Language Acquisition literature, a decision to focus on L2 vocabulary acquisition was made. An extensive literature review of this area has been written, providing an overview of the areas of lexical knowledge, the concept of word meaning in both traditional and modern, statistically-based accounts, the mental lexicon, and vocabulary acquisition and learning strategies.

Based on this literature review, a decision was made to focus on an investigation of vocabulary learning strategies in a CALL/multimedia-type of environment. A relatively comprehensive taxonomy of vocabulary learning strategies (for a traditional classroom-type learning environment) was identified and evaluated with respect to several important dimensions of vocabulary acquisition. This taxonomy seems promising as a starting point, but needs further development to accommodate the needs of the different learning environment, as well as important issues such as depth-of-processing and ‘unlearning’ of wrongly perceived meanings.

One of the main problems was how to deal with the concept of lexical knowledge, a central issue in L2 vocabulary acquisition research. In particular, the possibility of using a statistical-based approach such as LSA to model/represent L2 lexical knowledge was investigated. However, the potential drawbacks of using LSA for an analysis of students’ lexical knowledge seemed to outweigh its advantages. For instance, too many of the traditional concerns of lexical semantics, such as the distinction among lexical semantic relations, are still outside the scope of LSA. Therefore, it was decided that the role of a statistically-based approach should be restricted to the provision of example sentences illustrating the word’s usage.

## 6 Future Targets

### 6.1 Designing The Learning Environment

The first goal will be to decide on the nature of the learning environment: should it be a tool primarily geared to incidental, discovery<sup>77</sup>-based learning, or a truly comprehensive vocabulary learning tool also including opportunities for consolidation? As has been argued in Section 4.2, only the latter option would allow the full range of vocabulary learning strategies (comparable to the scope of Schmitt’s or Oxford’s taxonomies) to be considered. Although it would certainly be desirable to develop a comprehensive taxonomy of vocabulary learning strategies for this type of learning environment, practical and time constraints may militate against this option. Once this top-level decision has been made, a number of design and implementation issues on a lower level will have to be looked at. Design issues to be considered include choice of strategies to be implemented, as well as choice of target language, texts, and target words.

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<sup>77</sup>in the sense of Schmitt’s taxonomy dimension

As an important basis for the design of the learning environment, the following issues in particular await consideration.

### **6.1.1 Review of Existing CALL Environments for Vocabulary Learning**

Existing computer assisted word learning programmes, especially the ones dealing with vocabulary learning strategies and/or the L2 in question, will have to be looked at in the beginning stages of the proposed project, in order to decide how they might inform the design of the learning environment. Especially interesting in this respect - especially if the target language indeed turns out to be German (see Section 6.1.5) - may be *CyberBuch*, “a hypermedia application that provides students reading German texts with (a) advance organizers in the form of a movie clip designed to facilitate global comprehension and (b) a variety of glosses for words in the form of text, graphics, video, and sound intended to facilitate and reinforce acquisition of vocabulary.” (Chun and Plass, 1995).

### **6.1.2 LSA and the Provision of Example Sentences**

The envisaged approach is described above in Section 4.1.

### **6.1.3 Operationalising DOP**

This involves determining an independent index of DOP in the proposed learning environment. This could be done in the following fashion: first, the learning strategies are classified into broad DOP categories, where this can be done in a reasonably self-evident, straightforward way. For instance, it is obvious that rote repetition would be assigned to a lower DOP category than the keyword method. Since the difficulty of operationalising DOP arises not across, but within these broad categories, a second step could consist of an empirical evaluation to differentiate the DOP index within categories. This could take the form of having teachers and/or learners rate the subjective degree of DOP for each learning strategy on a scale.

### **6.1.4 Implementation of Strategies**

The choice of what strategies are going to be implemented in the learning environment, i.e. what types of glossing/annotations/note-keeping etc. will be provided, is of course closely bound up with the process of initial taxonomy revision (see Section 4.2). The resulting set of strategy candidates may be pruned due to considerations of practicability (in terms of implementation effort/difficulty).

### **6.1.5 Choosing the Language**

For the proposed PhD work, a decision will have to be made about both L1 and L2 of the language learners, bearing both practical and methodological considerations and restrictions in mind. The more important decision is obviously the one about the target language L2, as it is the subject of the vocabulary learning strategies to be investigated. L1 only comes into play in the restricted subset of strategies dealing with analogy, transfer and cognates.

As for L2, the two primary candidates are English and German, due to the author's familiarity with both languages. Practical considerations favour English as the language of choice, as a much bigger pool of potential subjects would be available compared to German learners. Furthermore, the availability of suitable (online) learning materials (such as dictionaries in an electronic form) in German has not yet been investigated, and could possibly militate in favour of English as well. Methodological considerations, however, give the edge to German: first and foremost, English learners would be exposed to L2 on a daily basis in a multitude of ways, which would render next to impossible the task of disentangling extraneous influences and those of the actual learning environment on the development of vocabulary acquisition. Second, available L2 learners of German are likely to be of a homogenous L1 background (English), as opposed to L2 learners of English who are apt to be extremely heterogeneous as regards their mother tongue. This means that in the first condition transfer/cognate-related strategies lend themselves much better to investigation. Since these methodological considerations appear to outweigh the practical advantages of English, German appears to be the likely choice of target language (providing that a sufficient number of subjects will indeed be available).

### 6.1.6 Choosing the Texts

The most obvious requirement for a text is that it be at a suitable level of difficulty to roughly match the learners' ability. Ideally, it should be slightly higher than the subjects' L2 proficiency. There is widespread agreement in the literature that vocabulary is the most important contributing factor to reading comprehension, more so than grammatical structures or discourse markers (cf. Read (2000, p. 190))<sup>78</sup>. Therefore, it would seem to make sense to use one of the commonly used readability formulas (see Read (2000, p.191-194) for a description) in order to choose suitable texts. However, most of these formulas - the simplest ones tend to focus on just vocabulary frequency and sentence length as an indicator of grammatical complexity - have been developed for L1 reading and may not necessarily be transferable to an L2 context. Studies that have tried to develop/adapt a more effective readability index for L2 are unfortunately few and far between and tend to exist only for certain language pairs (e.g. for Japanese EFL learners (Brown, 1997, as cited in Read, 2000, p. 192)). Therefore, an interesting contribution of the proposed project could be to investigate readability indices for the given language background (L1 English, L2 German), something which to the author's knowledge has not as yet been done.

Another general requirement is that in order for the texts to be suitable for an investigation of inferencing/guessing from context-strategies, they should contain a) familiar words with an extended, metaphorical, or otherwise non-standard meaning, and/or b) low-frequency words that are inferrable on the basis of contextual clues. Finally, the texts should be thematically restricted to a certain domain in order to restrict the scope of vocabulary to be dealt with. This domain should not be too trivial (e.g. asking for directions), in which case too few interesting words may be contained, nor should it be too scientific or technical<sup>79</sup>. The final decision will also depend on practical considerations such as availability of suitable texts.

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<sup>78</sup>A range of evidence has been marshalled in the literature in support of the concept of a threshold vocabulary for reading comprehension, even though the threshold level is still subject to debate.

<sup>79</sup>in this case, not only may the difficulty of the subject matter turn out to be a hampering factor, but it is also to be expected that (for L2 German) too many words in question are English cognates of a Graeco-Latin origin, or English loanwords.

### **6.1.7 Choosing Target Words**

This could be done in a variety of ways, taking into account the criteria of difficulty and relevance for the target group. As regards difficulty, having eliminated function and high-frequency words, the rest could be evaluated by experienced language teachers on a difficulty scale. Alternatively, following a suggestion from Groot (2000), the most difficult words could be identified based on a contrastive analysis with L1 words: target words would be those for which there is no context-independent L1 translation, or no one-to-one relationship with their L1 counterparts in terms of usage or meaning.

Many foreign language readers come with preselected target words (words that are glossed because they are assumed to be unfamiliar to the learner at the given proficiency level). If such a text is available and suitable according to above criteria, these preselected words could form the basis of the target word vocabulary, but would most likely have to be amended manually. The latter could be done in one of the following ways: teachers could be asked to modify the list according to their perception of the learners' general vocabulary knowledge, and the words' presumed relevance; some form of pre-test could be administered to subjects to confirm their unfamiliarity with the words; or the target words could be cross-referenced with the students' textbook in order to ensure the vocabulary had not been previously taught. Of course, some combination of the above methods is also possible.

## **6.2 Revising the Taxonomy**

This process will likely be interleaved with an introspection-based initial revision of Schmitt's taxonomy for the new environment, which will subsequently be evaluated by language teachers and/or learners. It is envisaged that the resulting taxonomy will be validated by factor analysis. The process of taxonomy revision is described in more detail above (see section 4.2).

## **6.3 Implementing the Learning Environment**

A decision regarding the implementation language has not yet been made, though the Java and MetaCard languages appear to be likely candidates. It is envisaged that prior to the actual implementation of the prototype, a period of 2-3 months is required for the author to familiarise himself with the programming language.

## **6.4 Designing the Empirical Study**

In the next phase, the design and exact parameters of the empirical study to be undertaken will have to be considered. Subjects (likely L2 learners of German) will be using the vocabulary learning environment and in a later stage be assessed with respect to their respective progress in lexical knowledge. The following design decisions in particular are awaiting consideration:

- Deciding whether the study is going to be qualitative or quantitative in nature - given that lexical knowledge is difficult to measure in purely quantitative terms (and of the vocabulary testing methods under consideration, only rating scales provide a straightforward, if flawed, quantitative measurement), adopting a qualitative approach seems a viable alternative.

- Deciding on the exact format of vocabulary assessment. As has been argued in section 4.3, the choice here will arguably be between a rating scale and a multi-state model of vocabulary.
- Deciding on when to administer vocabulary tests. Taking a cue from Kost et al.'s (1999) test design, it seems sensible to administer at least two tests, one immediately after reading in order to test short-term memory of vocabulary, and one after about a fortnight to test vocabulary retention<sup>80</sup>. This of course would have to be supplemented by another test set-up, as the above test a) would be based on the assumption that a single encounter with an unknown word has a measurable effect on vocabulary acquisition, and b) only checks for the effectiveness of discovery-type strategies used when reading L2 texts for comprehension. Therefore, a second test could be based on varying the parameters of time of usage (both within a session and across sessions), and frequency of target word exposure.
- Choosing the subjects - level of proficiency is probably the paramount parameter here. Complete beginners are unlikely to be ideal subjects, as for the task of reading even simple texts a certain amount of syntactic knowledge is required. Even for more advanced learners, a critical issue will be to make sure that the syntax involved is a) not too difficult and b) kept to a roughly constant level of difficulty, even as the required lexical knowledge may vary greatly between reading tasks.

A second type of study in the intermediate to final stages of the project will then have to be devised with regard to an evaluation of the taxonomy. For this study, likely subjects will be experienced L2 teachers judging the usefulness of the resulting taxonomy with respect to providing a basis for developing a sequence of (CALL/multimedia) teaching or reading materials.

## 6.5 Approximate Time Sequence

|  |                   |
|--|-------------------|
| Learning Java/MetaCard                               | Feb-Apr 2001      |
| Review of vocabulary-oriented CALL systems           | Feb-Mar 2001      |
| LSA and the provision of example sentences           | Feb-May 2001      |
| Initial taxonomy revision                            | Mar-Apr 2001      |
| Operationalising DOP                                 | Jun-Jul 2001      |
| Choosing the texts                                   | May-Aug 2001      |
| Choosing target words                                | Jul-Sep 2001      |
| Implementation of the prototype learning environment | May-Sep 2001      |
| Designing empirical study                            | Oct-Dec 2001      |
| Empirical study                                      | Jan-Mar 2002      |
| Evaluation of study                                  | Apr-Jun 2002      |
| Second study: Pedagogical implications               | Jul-Aug 2002      |
| Final evaluation                                     | Sep-Oct 2002      |
| Writing up of thesis                                 | Nov 2002-Mar 2003 |

<sup>80</sup>Perhaps a third test could be administered to examine vocabulary retention over a longer period of time.

## 7 Likely Outcome

The proposed research project will provide a better understanding of the use of vocabulary learning strategies in a CALL/multimedia environment. Through a process of interleaved evaluation of vocabulary acquisition and taxonomy building, the investigation will provide a taxonomy especially geared to vocabulary learning strategies used in this environment. The final taxonomy, validated by factor analysis, will also be judged by experienced language teachers in terms of being able to serve as a basis for providing teaching (CALL/multimedia) materials. It is hoped that, in addition to revising and updating existing taxonomies of vocabulary learning strategies for the new environment, the resulting taxonomy will reflect important issues and dimensions not having received explicit attention in the building of taxonomies of vocabulary learning strategies so far. These include the depth-of-processing hypothesis, and unlearning of wrongly perceived meanings.

The proposed investigation into various vocabulary testing techniques as a prerequisite to evaluate vocabulary acquisition is also hoped to provide new insights into the issue of vocabulary assessment in multimedia-type language learning environments.

Another contribution will be an investigation into the usefulness of a broad range of vocabulary learning strategies, both in terms of perceived helpfulness and assessed growth of lexical knowledge, for the proposed learning environment and language learner subjects.

Finally, the research project is expected to shed light on the issue of whether - and how - a statistical, LSA-based approach could be put to use for a particular task in a multimedia-type vocabulary learning environment, namely the provision of example sentences explaining an unknown word's usage.

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