One of the ways to investigate the mental lexicon is to use word association tests. Empirical studies comparing associations by children and adults have indicated a tendency for children to give syntagmatic responses, whereas adults give paradigmatic responses. In order to investigate lexical development in L2 acquisition of Swedish we collected data from two groups of students, one in Malmö, Sweden and one in Melbourne. Part of the Melbourne group also took the association test in their L1 six months later. Native speakers were used as a control group. The results demonstrate that learners in general tend to focus more on form than content compared to native speakers. This trend was particularly strong for the L2 group in Melbourne who also exhibited more variation in their responses compared to the L2 group in Sweden and the NS control group.

This study is part of the research project ‘Swedish inside and outside Sweden’ funded by the Swedish Research Council for the period 2003–2005. The main objective of the project is to compare acquisition of Swedish as a second language by learners residing in Sweden and foreign language learners living outside Sweden. The project aims at describing morphosyntactic, lexical and pragmatic development in the two learner groups. In particular we are interested in the effect the different learning environments have on the informants’ second language development. In the following we will report on the results of a word association test, which forms part of the lexical analysis.
BACKGROUND

To ask people what word they come to think of when they see or hear a certain word is a frequently used method in studies of the organisation of the mental lexicon. Pioneering work in this field was published almost a hundred years ago by Kent and Rosanoff (1910). They constructed a list of 100 English words, representing different parts of speech, with the original aim of finding a method for differentiating between normal and abnormal associations. However, the list has been translated into many languages and has been employed to shed light on language and culture specific differences in lexical organisation. In language acquisition research, word associations have also played an important role. Association tests have been used to investigate how words are stored in networks, both relating to form and to meaning (Viberg 2004). For example, studies have demonstrated systematic differences between children and adults. Younger children tend to give syntagmatic associations, i.e. words that can co-occur syntactically with the given word, whereas older children and adults tend to favour paradigmatic associations, i.e. words from the same part of speech (Ervin 1961; Entwisle 1966; Moran 1974). The shift from syntagmatic to paradigmatic associations occurs somewhere between the age of five and ten years and means that the mental lexicon is reorganised according to the grammatical class (noun, adjective and so on) words belong to. Such a reorganisation could be a result of the environment and sufficient exposure (Entwisle 1966) or it could be a question of maturity, either linguistic (Clark 1970) or cognitive (Moran 1974).

Word association tests have also been frequently used in studies of second language acquisition to shed light on lexical development in learners (see Singleton 1999 for discussion). One hypothesis is that the lexicon develops gradually from being based on form to being semantically based (e.g. Ellis 1996; Meara 1978, 1984, 1996; Namei 2002). Namei’s study of Persian-Swedish bilingual children demonstrated that the shift from form-based to semantically based associations was implemented word by word rather than constituting a total reorganisation of the lexicon in one step, which has often been assumed to be the case (for discussion see Wolter 2001). Furthermore, Namei’s study indicated that each word followed the development from phonological to syntagmatic and finally to paradigmatic categorisation.

Several studies have concluded that the word associations of L2 learners are different from those of native speakers (e.g. Meara 1984, reported in Schmitt and Meara 1997; Söderman 1993). Second language learners have been found to have greater variation in their responses compared to native speakers who tend to conform to a smaller number of responses (Meara 1996). One explanation for such differences is that learners are
unsure of the meaning of the given word. At an early stage of language acquisition learners might have only a very vague idea of the meaning of a word, but over time they develop a more precise meaning (Haastrup and Henriksen 1998). This suggests that there is a correlation between proficiency level and the types of associations. For example, Söderman (1993), who investigated groups of Finnish learners of English at different proficiency levels, found that the most advanced learners had a higher level of semantically based associations, while phonological associations decreased with increased proficiency. Schmitt and Meara (1997) also discovered a relationship between association and the size of the learner’s vocabulary and proficiency as measured by the TOEFL test. It has also been found that low frequency words, i.e. words that can be expected to be lesser known, tend to trigger more phonological and unclassifiable responses also in native speakers, which suggests that there is a link between associative patterns and how well an informant knows a word (Wolter 2001). A further possibility why learners and native speakers differ in their associations is that native speakers, and learners at a high level of proficiency, make use of collocations, phrases and idioms, whereas learners who have not yet learnt such expressions associate more freely.

Word association tests have also been employed to test the relationship between culture and language. For example, Jiang (2000) found that native speakers of English and native speakers of Chinese differed considerably in the ways they associated to the same words; the items given by the Chinese informants conveyed Chinese culture and the items filled in by the English-speakers expressed English culture, thus lending support to the view that language and culture are intrinsically connected.

AIMS AND HYPOTHESES

The overall aim of this article is to compare the results of the association test in two groups of second language learners who study Swedish formally in different contexts, i.e. either as foreign language learners outside Sweden (in Melbourne, Australia) or as second language learners in Sweden (in Malmö). To our knowledge such a comparison of the possible effect of language learning environment has not been undertaken before. The following two hypotheses will be tested in this study:

Hypothesis A. Second language learners differ from native speakers by having a higher number of syntagmatic associations and a lower number of paradigmatic associations than native speakers. This hypothesis will be tested in two ways. Firstly, we compare the results of the two learner groups with the results of a control group of native
speakers of Swedish. Secondly, we compare first language (English) and second language (Swedish) associations in a small sample of learners in Melbourne.

**Hypothesis B.** The results for the second language learners in Malmö will be similar to those of the NS control group since they all live in the target language environment. The results for the foreign language learners, however, will be different from NS associations, since the foreign language learners have very few opportunities to interact in and engage with Swedish outside the language classroom.

**DATA AND METHODOLOGY**

A total of 57 informants participated in the word association study. The foreign language learner group consisted of 19 university students studying Swedish at the University of Melbourne. The second language learner group was made up of 18 university students who studied Swedish at Malmö University. All students had studied Swedish formally for approximately 150 hours prior to participating in the project. At least in theory this means that their level of proficiency should be comparable, but of course this does not preclude individual variation among the learners. In case of the learners in Sweden, they had lived in Sweden for 1–3 years and were native speakers of different languages (14 languages were represented). The foreign language learners had English as their first language, and although some of the informants had visited Sweden none had lived there for an extended period of time. The NS control group consisted of 20 linguistics students at Lund University.

Kent and Rosanoff’s list of 100 words was distributed to all participants. For the Swedish language association test we used Namei’s (2002) Swedish translation of the list. The participants were instructed to write down the first word that came to mind when reading a specific word. In other words, they were asked to complete the task as quickly as possible, based on their first, spontaneous reactions to the words they were reading. The foreign language learners in Melbourne who also took the test in English (8 participants) did so six months after completing the Swedish test. Because of the considerable time between the test occasions, we expect that the test words would have been forgotten and hence would not have impacted on the results of the second test.

A common method, which we followed, is to divide associations into three main categories:

1. **Phonological associations,** sometimes referred to as clang associations (e.g. Namei 2002), focus on the form, or the sound of the word. An English example is *bite* in response to *white.*
2. Syntagmatic associations are associations to words that might co-occur with the prompt word, i.e. there is a sequential relationship between them. An example is house in response to white.

3. Paradigmatic associations focus on the semantic relationships between words, and are words from the same part of speech as the prompt word. They may be of the following types: coordinates (e.g. white in response to black), superordinates (e.g. colour in response to black), subordinates (e.g. apple in response to fruit) and synonyms (e.g. lass in response to girl).

To these three basic categories we added a fourth: translations, where a respondent translates the word in question to either L1 or another language.

RESULTS

First we will discuss the results of the Swedish association test and compare the results of the learner groups with the NS control group. The data consist of 5223 associations given in response to the 100 words. Of these 97% could be analysed following the four categories outlined above. (The remaining 3% were illegible or incomplete.) As can be seen from Table 1, the number of responses and level of analysable responses are comparable in the three groups:

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of participants</th>
<th>Total no. of associations</th>
<th>Analysed entries</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS Control group</td>
<td>20</td>
<td>1914</td>
<td>1856 (97%)</td>
</tr>
<tr>
<td>Second language learners (Malmö)</td>
<td>18</td>
<td>1709</td>
<td>1657 (97%)</td>
</tr>
<tr>
<td>Foreign language learners (Melbourne)</td>
<td>19</td>
<td>1600</td>
<td>1556 (97%)</td>
</tr>
</tbody>
</table>

Table 1 Total number of respondents and total number of responses analysed in each group.

On average the total number of responses is almost identical in the NS control group and in the second language learner group (an average of 96 responses to the 100 words in the NS group and 95 in the learner group). The foreign language learners have a somewhat lower response rate with an average of 84 associations to the 100 words. This could mean that there were words which (at least some) students did not know, or only
had a very vague idea of their meaning, and hence they could not associate them to anything. The overall results are shown in Figure 1:

Firstly, translations (into English or another language) feature almost exclusively in the foreign language group – they have 13% translations, compared to 0.5% for the second language group in Sweden and 0% for the NS control group. Secondly, phonological associations are also mainly restricted to the foreign language learners in Melbourne, where 5% of their associations are of this type. Again the NS group has no such associations, and in the second language learner group in Malmö such associations are almost non-existent (0.2%). For the syntagmatic associations the Malmö group has the highest level, 46%, whereas the Melbourne group has 29% syntagmatic associations. The difference between the groups is explained by the higher use of translations and phonological associations in Melbourne. The NS control group has 38% syntagmatic associations, which means that the majority of their associations (62%) are of the paradigmatic type. With regard to paradigmatic associations the two learner groups have almost identical results (53% and 52% respectively). The overall results confirm hypothesis A, i.e. that native speakers have higher levels of paradigmatic associations than L2 speakers.

**PHONOLOGICAL ASSOCIATIONS – OR GRAPHOLOGICAL ASSOCIATIONS?**

There are a total of 88 phonological associations in the database of over 5,000 words so it is a limited strategy, but as 82 of them are found in the Melbourne group it is
something that distinguishes this group from the other two. Also, the phonological associations are not simply a result of one or two individuals favouring such associations – about half of all Melbourne informants use them sometimes. Furthermore, we find phonological associations to more than half of all the words in the test, so they are not linked to just a few words. As pointed out above, phonological associations feature almost exclusively in Melbourne. For example, the following associations were given to the word *flicka* (‘girl’) in the Melbourne group (a number after an entry indicates how many informants gave that answer):

*pojke* (‘boy’) 8, *tjej* (colloquial for ‘girl’), *barn* (‘child’), *lilla* (‘little’),
*flätor* (‘plaits’), *flickor* (‘girls’), *dricka* (‘drink’), *ficka* (‘pocket’), and the English words *to flick* and *girl*.

Three of the associations are phonological – *dricka*, *ficka*, *to flick*. As *flicka* belongs to the central vocabulary, learnt early on, the phonological associations cannot simply be explained as a result of the informant not understanding, or only having a vague idea of the meaning of a word. However, there seems to be one factor that plays some role for triggering phonological associations, which we outline below.

It could be argued that phonological associations should be labelled graphological, as the test was delivered in the written mode, where participants were asked to read the word and then write their association, i.e. there was a focus on the script rather than the sound. Furthermore, the fact that words which contain the Swedish letters å, ä and ö – diacritic symbols that are not present in the L1 (English) of the Melbourne group – yielded a higher proportion of phonological associations than words without these letters could be taken as an indication of students focussing on the graphic form of the words. In total there were 30 words in the list, which included these letters, and 21 of these words occasioned phonological associations. Some examples are given in Table 2:

<table>
<thead>
<tr>
<th>Prompt word</th>
<th>Associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>örn (eagle)</td>
<td>öl (beer)</td>
</tr>
<tr>
<td>mörk (dark)</td>
<td>mjölk (milk)</td>
</tr>
<tr>
<td>slät (even)</td>
<td>åta (eat)</td>
</tr>
<tr>
<td>sång (bed)</td>
<td>sång (song)</td>
</tr>
<tr>
<td>smör (butter)</td>
<td>små (small)</td>
</tr>
</tbody>
</table>

Table 2: Examples of phonological/graphological associations in the data
As can be seen from Table 2 there are examples of the same vowel being reused in the association, but sometimes another of the three vowels in question is used. The list also demonstrates that both frequent words (säng, smör, mörk) and more unusual ones (örn, slät) give rise to this type of association. It is possible to discern a few subgroups of phonological (graphological) associations in the data:

- They form rhyming words (e.g. vit (‘white’) – dit (‘there’); flicka (‘girl’) – dricka (‘drink’).
- They are formed from part of the given word (e.g. törstig (‘thirsty’) – torsdag (‘Thursday’)).
- They recycle the first element of the given word (e.g. sjukdom (‘sickness’) – sju (‘seven’)).
- They recycle the second element in a given word (e.g. soldat (‘soldier’) – datum (‘date’)).

SIMILARITIES BETWEEN THE LEARNER GROUPS: SYNTAGMATIC, WORD-FORMING ASSOCIATIONS

Another finding is that syntagmatic associations of the word-forming type (i.e. they form compound words) are fairly frequent in both L2 groups. In the NS control group there are no such examples. This indicates that the learners are indeed more form-focussed than the native speakers. Table 3 illustrates the syntagmatic associations of this form-focussed type in both learner groups:

<table>
<thead>
<tr>
<th>Prompt word</th>
<th>Association</th>
<th>No of responses in:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Melbourne</td>
</tr>
<tr>
<td>kvadrat (square)</td>
<td>meter (metre)</td>
<td>3</td>
</tr>
<tr>
<td>lejon (lion)</td>
<td>hjärta (heart)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>kungen (the king)</td>
<td>–</td>
</tr>
<tr>
<td>grov (coarse)</td>
<td>malen (ground)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>bröd (bread)</td>
<td>–</td>
</tr>
<tr>
<td>bad (bath)</td>
<td>rum (room)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>kar (tub)</td>
<td>–</td>
</tr>
<tr>
<td>jord (earth)</td>
<td>gubbe (man; jordgubbe = strawberry)</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3 Examples of form-based syntagmatic associations in the learner groups
These findings support hypothesis A, i.e. that the learners will have a higher frequency of syntagmatic associations. As pointed out above (see Figure 1), paradigmatic associations are more frequent overall in the native speaker control group. The division between paradigmatic and syntagmatic associations in the learner groups is however also influenced by what part of speech a given word belongs to. In particular, adjectives tend to result in more syntagmatic associations in the learners compared to the NS group. This is illustrated by the responses to the word *tyst* (‘quiet’) in all three groups, see Table 4:

<table>
<thead>
<tr>
<th>Group and no. of responses</th>
<th>Association type</th>
</tr>
</thead>
</table>

*Table 4* Associations to the prompt word *tyst* (‘quiet’)

This example illustrates the differences between the learners compared to the NS control group. The native speakers predominantly give paradigmatic associations, whereas both learner groups have a much higher incidence of syntagmatic relations. In some cases the relation expressed is purely syntactic, as is the case with *vara* (‘to be’) in response to *tyst*. As expected, a difference between the learner groups is that translations and phonological/graphological associations only occur in the Melbourne group.

**SIMILARITIES BETWEEN THE LEARNERS IN SWEDEN AND THE NS CONTROL GROUP**

Despite the overall similarities between the learner groups, there are also many examples of parallels between the L2 speakers in Sweden and the NS control group. For some words, both groups in Sweden tend to cluster around the same associations. The foreign
language learners, however, often stand out in the sense that they give totally different
associations from the other two groups, and when there are associations to the same
words their frequency is usually quite different from the groups residing in Sweden. As
an illustration of this, we have included all associations entered for the prompt word nål
(‘needle’) in the three groups in Table 5:

<table>
<thead>
<tr>
<th>Group and no. of responses</th>
<th>Associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS Control group (18)</td>
<td>tråd (thread) (12), sy (sew) (4), vass (sharp) (2)</td>
</tr>
<tr>
<td>Malmö (16)</td>
<td>sy (sew) (8), tråd (thread) (3), sticker (pierce), saxon (scissors), vass (sharp), symaskin (sewing machine), kläder (clothes)</td>
</tr>
<tr>
<td>Melbourne (14)</td>
<td>hammare (hammer) (3), tråd (thread), skarp (sharp), vass (sharp), sy (sew), finger (finger), bord (table), nagel (finger nail), nil, nånning (something), pengar (money)</td>
</tr>
</tbody>
</table>

Table 5 Total number of analysable answers to the prompt word nål(‘needle’)

The clear majority of the NS control group writes tråd (‘thread’), which appears in
collocation with the given word (nål och tråd, ‘needle and thread’). The second most
frequent reply is sy (‘sew’). Predominantly, the Malmö group also associates in this
manner, but with sy (‘sew’) as the most frequent entry. The foreign learner group behaves
differently, and although the words tråd and sy appear as responses, they are far from
common. Instead, the associations of the foreign language group include words never
used by the other two groups. Some are the result of misunderstandings: hammare
(‘hammer’), nagel (‘finger nail’) and nail all suggest that the informants believe that the
given word means nail in English and not needle as is the case. We also see further ex-
amples of graphological associations in this group (nil, nånning). Overall, there is more
variation in the Melbourne group. The difference is particularly great when the foreign
language learners are compared to the native speakers: 14 informants in Melbourne
come up with a total of 12 different lexical items, whereas 18 NS informants only have
3 items. This trend in the data supports earlier findings that second language learners
show more lexical variation in their associations than native speakers (e.g. Meara 1996).
Particularly, this seems to be the case in foreign language learners.

The similarities between the groups in Sweden are sometimes explained by shared
culture specific associations. Some examples of the associations to the word problem
(‘problem’) testify to this. Here both groups in Sweden enter responses such aslösning
(‘solution’), lösa (‘solve’), jobbigt (‘difficult’), i.e. there is a tendency to favour problem
solving. Turning to the foreign language learners in Melbourne we see another cultural aspect: a frequent reply is *ingen* (‘no’), which can be attributed to the phrase *no problem*, frequently used in Australian English.

Another obvious example of culture specific associations is found in response to the word *vitkål* (‘cabbage’), which often triggers very similar responses in Malmö and in the control group (see Table 6):

<table>
<thead>
<tr>
<th>Group and no. of responses</th>
<th>Associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melbourne (11)</td>
<td><em>rödkål</em> (red cabbage), <em>grönsaker</em> (vegetables), <em>blomkål</em> (cauliﬂower), <em>mat</em> (food), <em>vit</em> (white), <em>ost</em> (cheese), <em>eld</em> (ﬁre), <em>sauerkraut</em>, <em>cauliflower</em>, <em>weisse kohle</em> (German for ‘cabbage’), <em>tåg</em> (train)</td>
</tr>
</tbody>
</table>

Table 6 Total number of analysable answers to the prompt word *vitkål* (‘cabbage’)

The fact that pizza in Sweden is always served with a salad made from shredded cabbage is reﬂected in the associations in the NS and Malmö groups where *sallad* (‘salad’) is the most frequent association, and where also *pizza* and *pizzasallad* feature in the responses. Other associations in these two groups that can be explained by everyday Swedish culture are *kåldolmar* (‘cabbage dolmades’) and *soppa* (‘soup’). Both cabbage soup (*kålsoppa*) and cabbage dolmades feature regularly on the menu in Swedish lunch restaurants and in Swedish homes. In the Melbourne group, however, we see a total lack of associations, which are culturally speciﬁc to Sweden. Overall, the number of associations in the foreign language group is fewer (only 11 have entered a response) and again we find both graphological associations (*vitkål – tåg* (‘train’)) and translations. It is also the case that all associations in Melbourne are single occurrences, i.e. these respondents do not cluster around a few associations, which is the case with the other two groups. The lower number of informants who wrote a response in the Melbourne group could be an indication that *vitkål* (‘cabbage’) is unknown to several informants. The fact that
all associations entered are single occurrences supports the view of greater lexical variation in the foreign language learners.

**COMPARISON OF ASSOCIATIONS IN L1 AND L2**

We distributed an English version of the association test six months later to eight of the Melbourne informants to test if their associations would differ in their L1 (English) and L2 (Swedish). When we compare the Melbourne group’s associations in Swedish with their L1 associations clear differences are discernible. The results are summarized in Figure 2:

![Figure 2](image)

The level of paradigmatic associations in L1 is at a much higher level (70%), and more comparable with the result of the Swedish control group (62%). As could be expected there are no translations or phonological associations when tested in their L1. When we compare the results of the individual students who participated in both tests, the trend is towards having syntagmatic associations in Swedish and paradigmatic ones in English. For the adjective *mjuk* (‘soft’) three informants give the following syntagmatic associations: *kuddar* (‘pillows’), *moln* (‘clouds’) and *djur* (‘animals’, i.e. *mjuka djur*, lit. ‘soft animals’, i.e. ‘soft toys’). The same informants provide paradigmatic associations

*GIRL – LASS OR CURL? ARTICLES*
to the English counterpart, soft: tender, fluffy and easy. Not only adjectives, but also nouns display this difference between the languages. In the Swedish test hus (‘house’) occasions the syntagmatic association röd (‘red’), as in ett rött hus (‘a red house’), while the same informant associates the English version house paradigmatically to roof. Further examples of this difference between associations in the L1 and L2 are: sitter (‘sit’) in response to stol (‘chair’), but table in response to chair; spindel (‘spider’) leads to the association svart (‘black’) but spider in English is associated with animal. There are also examples where the informant provides a phonological/graphological association in Swedish but a paradigmatic one in English: sömn (‘sleep’) – hämn (a nonsense word), but sleep – bed in English. The fact that the Melbourne informants behave quite differently in their native language and their learner language is strong support for Hypothesis B, where we postulated that the associations of native speakers differ from learners.

The importance of cultural background and shared environment is also underscored by the results for the Melbourne informants who took the test in English. We illustrate this by showing all associations in response to the word cottage in both languages (see Table 7):

<table>
<thead>
<tr>
<th>L2 (Swedish) associations</th>
<th>L1 (English) associations</th>
</tr>
</thead>
<tbody>
<tr>
<td>sommar (summer) 3, skog (forest) 3, lilla (little) 2, Småland (a Swedish province), hus (house), mysigt (cosy), skönt (nice), fåtölj (armchair), lounge, spis (stove)</td>
<td>house, forest, stone, tiles, small, cosy, peaceful, cheese</td>
</tr>
</tbody>
</table>

Table 7 L1 and L2 associations to the prompt word cottage/stuga

Again some culture specific differences can be discerned – e.g. stone and tile are present only in the English version, whereas in the L2 situation several associations allude to the quintessential Swedish summer cottage: always wooden and most often small (lilla). Obviously, the image of a cottage in an English/Australian and a Swedish environment is different and this is supported by the variation in the associations. Since at least some learners produce culture specific associations also in the Swedish test, this indicates that culture specific knowledge can indeed be learnt in the foreign language classroom, at least to some extent. The little red cottage in the countryside is often promoted as the dream of all Swedes and a powerful symbol of a simple life, close to nature. This image is promoted not least in tourist information aimed at overseas visitors, but also plays a role in teaching materials. In one of the textbooks, which the Melbourne students have studied early on in their Swedish language studies, there is indeed a chapter devoted to
this theme, which might explain the informants' culture specific associations also in Swedish.

**DISCUSSION**

Hypothesis A predicted that informants give qualitatively different associations in their native language and in a second language. This was borne out in two ways in the results. Firstly, both the second language learners in Sweden and the foreign language learners in Australia have fewer paradigmatic associations than the native speakers. The learners, irrespective of environment, had more syntagmatic associations, and a characteristic feature was the word forming type: e.g. *kar* (‘tub’) in response to *bad* (‘bath’), which reveals a certain preoccupation with the surface form of words. Secondly, the results demonstrate that those informants who participated in the test in both their native language (English) and in the learner language performed quite differently in the respective languages. They favour paradigmatic associations in their first language while syntagmatic associations are more frequent in their Swedish test results, as are phonological/graphological associations and translations. This difference between L1 and L2 responses to the same words indicates that second language learners have to reorganise their mental lexicon when acquiring a new language. Furthermore, the results demonstrate that paradigmatic associations are not directly linked to cognitive maturity, but rather are explained by the developmental level in the language in question (cf. Ervin 1961; Moran 1974).

Hypothesis B postulated that the learners who live in Sweden would behave in a similar fashion to native speakers in Sweden as a result of shared everyday context, whereas the foreign language learners outside Sweden would differ considerably from the NS control group due to lacking such shared environment. Our results confirm this hypothesis: the informants in Melbourne tend to demonstrate a higher degree of variation in their responses compared to both groups in Sweden, who tend to cluster around fewer (shared) items in their responses. The Melbourne group behaves differently in the sense that they make use of phonological/graphological associations and they lack certain culture specific associations, which are shared by the two groups in Sweden.

It has often been assumed that phonological associations are typical of children; for example in Namei's study (2002) of Persian-Swedish bilingual children the number of phonological associations decreased as the children got older. In the age group 17-20 years the phonological associations only represented 1% in the Persian test and 2% in the Swedish test, i.e. both results were lower than for the foreign language learners in
our study. One possible explanation introduced in this article is that they are grapho-
lological rather than phonological associations. It is important to keep in mind that the
learners in Melbourne receive most of their input in the written form, not in the spoken
mode, a fact that might influence their results somewhat. Here one can draw some par-
allels to how children learn to read. In a model developed by Høien and Lundberg (2000)
the first step consists of a purely visual analysis where the actual letters are decoded by
the reader. In a second step the lexicon is focussed, and the semantic properties of the
words are activated. Previous research has highlighted the existence of two methods for
recognising words while reading: either directly via the visual impression of the word,
or indirectly where one grapheme at a time is decoded and transformed to phonemes
(Danielsson 2003). The indirect method is used to read new, unknown words or nonsense
words. Accordingly, the phonological/graphological associations in our study might be
explained by the informants applying indirect strategies, i.e. they do not make the con-
nection to the semantic organization of the lexicon, but stop at a surface level where the
grapheme is salient. This line of reasoning is also supported by the fact that a large
number of these associations concern words containing the letters å, ä or ö which are
not present in the informants’ first language, and therefore might be particularly striking.

Another possible explanation for the high level of phonological associations in the
Melbourne group is that the Swedish vocabulary is not activated. The informants in
Namei’s study all lived in an environment where both Swedish and Persian were used
regularly, whereas the Melbourne students have very few opportunities to use Swedish
outside the classroom context. Consequently, the restricted use of Swedish might entail
that the informants have trouble finding their way in their Swedish mental lexicon. The
fact that the number of phonological associations is no higher for infrequent, unusual
words than for highly frequent words suggests that the learners find it difficult in general
to retrieve and activate the words, not that certain words are peripheral or difficult. The
general tendency towards form-based associations in the foreign language learner group
could also be a reflection of an overall greater preoccupation with formal aspects of the
language, as they seem to ‘play’ with the language, and its sounds and script rather than
focussing on content.

Finally, our findings demonstrate that word associations are culture specific to a
certain extent. The learners who live in Sweden share many cultural references with the
NS control group, a fact which is borne out clearly in the results (see discussion of e.g.
vitkål (‘cabbage’) above). This is only to be expected since the groups in Sweden share
many day-to-day experiences. In the foreign language learner group, who live about as
far away from Sweden as one possibly can, the culture specific associations relate to
Australian society (e.g. the response no to the word problem) and their associations in Swedish do not cluster around a few typical responses, which is often the case in the other groups, but tend to display more variation both in terms of types of associations (phonological, syntagmatic etc) and actual words entered (i.e. there are many more single occurrences in the Melbourne data).

We hope to have demonstrated that word association tests offer a promising route to a greater understanding of the mental lexicon of second language learners and how they differ from first language users.

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ENDNOTES

1 We use the term ‘second language acquisition’ as the superordinate term for languages acquired after the first language. At the next level we differentiate between acquisition in the target language environment (second language acquisition) and acquisition outside the country/countries where the language is spoken (foreign language acquisition).

2 This article is an expanded and revised version of a previous publication in Swedish (Håkansson and Norrby 2005).

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