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# Components of success in academic reading tasks for Swedish students

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## Abstract

In a parallel-language environment students are often required to read in a language different from the one they use in lectures, seminars, and among themselves. Relatively little research has been done on the overall reading success of such groups or on the componential make up of their L2 reading skills. This paper compares the English-language reading skills of Swedish students of biology with that of equivalent British biology students. Many Swedish readers perform within or above the normal British range on the study-reading test, but the overall average score of this sample of Swedish readers was considerably lower than that of the British sample. For the Swedes study-reading success correlates significantly with vocabulary knowledge, inferencing and newspaper reading, and at a lower level for word recognition speed. For the British informants the pattern is similar, but with no significant correlation for word-recognition speed. Multiple regression analyses show that academic vocabulary knowledge test scores can account for nearly half the variance in study-reading scores and newspaper reading test scores for about ten percent more. For the British informants the same pattern emerged, but the contributions of vocabulary knowledge was considerably greater and that of newspaper skimming rather less.

**Keywords:** academic reading, parallel-language, academic English, reading processes.

## Resumen

*Componentes de éxito de los estudiantes suecos respecto de las tareas académicas de comprensión lectora*

En un entorno de lenguas paralelas es habitual que los alumnos se vean obligados a leer en una lengua distinta a la que normalmente utilizan entre ellos o se utiliza en las clases teóricas o en los seminarios. Las investigaciones llevadas

a cabo sobre el éxito en la comprensión lectora de dichos grupos de alumnos es relativamente escasa, como también lo son los estudios sobre los componentes que conforman las destrezas de estos alumnos en cuanto a la comprensión lectora en una segunda lengua. En el presente artículo se comparan las destrezas de comprensión lectora en inglés de alumnos suecos de biología con un grupo equivalente de alumnos británicos. Muchos lectores suecos obtienen resultados de actuación similares o superiores al rango británico a tenor de la prueba de lectura y estudio, pero la puntuación promedio general de esta muestra de lectores suecos fue considerablemente inferior a la del grupo británico. En el caso de los estudiantes suecos existe una correlación significativa entre el conocimiento de vocabulario, el proceso de inferencia y la lectura de periódicos, y en un nivel inferior la velocidad empleada para el reconocimiento de palabras. Por lo que respecta al grupo de británicos el modelo es similar pero no existe una correlación significativa en cuanto a la velocidad de reconocimiento de palabras. Los análisis de regresión múltiple demuestran que las puntuaciones obtenidas en las pruebas de conocimiento de vocabulario contabilizan casi la mitad de la varianza en las puntuaciones de la prueba de lectura y estudio y casi un 10% más en la prueba de lectura de periódicos. En el caso del grupo de estudiantes británicos el modelo es análogo, pero las contribuciones en la prueba de conocimiento de vocabulario fue considerablemente superior y la de lectura selectiva de periódicos bastante inferior.

**Palabras clave:** comprensión lectora académica, lengua paralela, inglés académico, procesos de lectura.

## Introduction<sup>1</sup>

Research on second language reading can focus on either product or process. A great deal of research on L2 reading carried out in the last twenty years has focused on the processing involved in L2 reading and the processing differences between L1 and L2 readers (see Koda, 2004). A common domain for L2 reading is higher education, where students are often assigned textbooks in their L2, usually English. These textbooks are primarily produced with the L1 reader in mind, and questions about how L2 readers cope are increasingly relevant as the number of such students steadily increases (Graddol, 2006).

Clearly, L2 reading occurs in a variety of sociolinguistic environments, in which there are various factors that are likely to influence attitudes and success. In many speech communities L2 literacy in English (or another “world”/post-colonial language) is a normal part of everyone’s repertoire at

higher educational levels. The extent to which the L2 is used, however, will depend on local norm, expectations, availability, national values, and political and economic pressures. A common scenario in Europe, Latin America, and, for example, Thailand, is the use of English language textbooks with parallel lectures, seminars, and especially discussion among students conducted in the national language. The ambition is often that both languages should be usable for all academic purposes, but factors such as proficiency, group make-up, and policies constrain this in a number of ways.

Sweden exemplifies this situation well. Although Swedish students' general proficiency levels in English are known to be comparatively high, academic English can be challenging for many. They are frequently assigned the same texts as their British or American counterparts (since they are at similar subject-knowledge levels) and the expectation is that they will achieve the same comprehension product. We know, in fact, that in Sweden a substantial minority of first-year students dislike having assigned reading in English and avoid reading it (Pecorari et al., 2011). Although students commonly claim that "it makes no difference which language I use". Hellekjær (2009) shows that three-quarters of a large sample of Norwegian university students perceive reading in English as more difficult than reading in L1 and score below what is judged an acceptable level on an IELTS-type test.

To investigate the position of L2 readers in a parallel-language situation, we really need a comparison across subjects where the systems make the same demands on L1 and L2 readers. The project described here aims to do this, comparing a group of Swedish university students with a British control group at similar stages in their study of similar subjects. Hence our purpose is to focus on two groups both of whom are working in their home environments but where these environments are linguistically different, and ask what the differences are in their reading products and the subskills that underlie them. Thus, this paper analyses the English-language reading of Swedish students of biology who are required to use a textbook in English although all lectures, discussions and exams are in Swedish.

## Background

It is widely agreed that reading comprehension success in a second language is determined by features of the text, the reader's knowledge of the text's topic (Pritchard, 1990) and a number of component skills in the reader. These

are conceptualized by workers in the ongoing NELSON project into three groups, concerning (1) language knowledge, (2) speed of access to language knowledge, and (3) metacognitive knowledge (Van Gelderen et al., 2004). Metacognitive knowledge here stands for a variety of language-independent, higher-order cognitive processes, processing skills, and strategies which are transferable (normally with positive results) from L1 to L2 reading. This corresponds to Bernhardt's (2005) compensatory perspective on L2 reading proficiency, which argues that knowledge sources (particularly L1 literacy and L2 knowledge) are not strictly additive but interact synergistically: "the higher the L1 literacy level, the more it is available to buttress impoverished second language processes, (...) the more word knowledge is developed, the more it frees up resources to operate on more complex syntactic patterns, and so forth" (Bernhardt, 2005: 140). L2 knowledge will certainly include L2-specific word and grammatical processes, but many of these may have been transferred early from L1 processing.

Research which compares L1 and L2 reading of whole texts normally looks at comprehension and speed. Similarly, studies of subskills such as word recognition and sentence comprehension report results on speed and accuracy. Nearly all comparative studies show that L2 reading is slower than L1 at both subskill and whole-task levels.

Studies of this kind may be within-subject or across-subject. Within-subject research compares L1 and L2 reading from a product point of view, thus controlling the psycholinguistic conditions but comparing reading in two different sociolinguistic conditions, "home" and "foreign". For example, Segalowitz, Poulsen and Komoda (1991) found that advanced French-English bilinguals read considerably slower in L2 than in L1. Fraser (2007) compared Chinese speakers reading in L1 and in English and found that they read significantly more slowly in L2 over a range of tasks from scanning to study-reading. Similar results emerged from Hellekjær's (2009) comparison of Norwegian students' perceptions of reading in English and Norwegian. However, a less researched and equally relevant question is how different L2 readers in a given environment are from comparable L1 readers. Presumably the difference depends on the status of the L2 in the given educational environment. Our aim here therefore is to carry out an across-subject investigation, comparing Swedish and British readers of English, rather than to compare Swedes reading Swedish with the same individuals reading English. A number of parameters are relevant to such a comparison and we review them below.

The slower whole-skill rates usually found for L2 readers in the within-subjects studies are often regarded as implying that L1 users have more automatized decoding that requires less attention and thus leaves more capacity free for higher cognitive processing (Perfetti, 1985; Geva & Ryan, 1993), although the notion “automatized” is often ill-defined (Paradis, 2009). Fraser (2007) points out, however, that taking more time may be a strategic choice. Following Carver (1990) she identifies five speed-oriented levels of reading: scanning; skimming; normal casual reading, or “rauding”, which is what Hulstijn (2007) calls “core reading”; reading to learn; and reading to memorize. She suggests that a task which a more proficient user can handle as core reading might become study-reading for a less proficient reader, so that the slower reading is due to a strategic decision. However, slower whole-skill reading seems also likely to be associated with slower low-level processing. It is a very robust finding of word recognition studies that L2 users process individual uncontextualized words more slowly.

Among the skilled adult L1 readers (second and third year university students) studied by Jackson (2005), there is little correlation among measures of word decoding accuracy, reading speed, and text comprehension accuracy (and grade-point average is only correlated with the last of these, and then only modestly). Independence of lower-order speed and comprehension has been found in a range of studies for L1 readers (Aarnoutse & Van Leeuwe, 1988; Walczyk, 1995 & 2000). Some studies of L2 readers have shown correlations between a variety of lower-order measures and success on reading-comprehension tasks (Haynes & Carr, 1990; Nassaji & Geva, 1999). However, Van Gelderen et al. (2004) found no independent contribution to explanation of variance in comprehension scores from speed of word recognition or sentence comprehension in 13-14 year-old Dutch readers of English. It remains to be seen whether the same lack of correlation is to be found in adult advanced L2 readers.

In many environments, then, L2 readers will take longer but may be able to reach a level of comprehension equivalent to that of truly comparable L1 readers. The research on speed does not relate to parallel-language environments such as those arising in Europe, and its results cannot be extended by analogy to all environments. It is an empirical question whether L2 readers in these kinds of high-exposure environment – of which the European parallel-language university in small-language countries is one – read worse or slower than L1 readers, and if they do, how great the differences might be.

Vocabulary size has often been found to correlate highly with reading proficiency in both L1 and L2 (Alderson, 2000; Landi, 2010). Presumably, however, the nature of the relationship differs (McMillion & Shaw, in preparation). L1 vocabulary is an index of exposure to print (Martin-Chang & Gould, 2008) and hence literacy skills, while L2 vocabulary says nothing about transferable literacy skills. This makes it interesting to know how far the presumably smaller vocabularies of advanced L2 readers relate to their reading proficiency. The implication of threshold theories (Bernhardt, 2005) would be that once L2 readers have reached a level where they can read effectively, linguistic proficiency of this kind is less important. But recent work by Nation and his group (Nation, 2006) shows that the vocabulary size required for reading many types of texts is quite high, so that the threshold may be at a level above many L2 readers' actual vocabulary size.

The higher-order skills transferable from literacy in one language to literacy in another include skills in applying existing knowledge to text content. Hannan and Daneman (2001: 105) devised an instrument that measures

... individual differences in four components of reading comprehension: the ability to access prior knowledge from long-term memory, to integrate accessed prior knowledge with new text information, to make inferences based on information provided in the text, and to recall the new text information from memory.

They showed that for L1 readers it accounted for a high proportion of the variance in reading-comprehension test results not accounted for by vocabulary knowledge. An instrument of this type seems to operationalize a plausible component of transferable literacy.

As noted above, reading success is also dependent on the type of text tackled. This can be approached via Cummins' (1986) distinction between Basic Interpersonal Conversational Skills (BICS), which are rather language specific skills for everyday interaction, and Cognitive-Academic Linguistic Proficiency (CALP), which is essentially a kind of cultural capital (Bourdieu, 1986), acquired through long schooling but transferable between languages. Hulstijn (2007) suggests using the term "core reading proficiency" for the type of reading any literate speaker of a given language can be expected to do, such as reading newspapers and magazines. This could correspond to Cummins' BICS, while his CALP may be the more demanding types of literacy involved in the texts which provide evidence of transfer of skills or "metacognitive knowledge" from L1 literacy. If this distinction is valid, one

would expect study-reading skills to be less affected by L1/L2 status than core-reading proficiency.

## Our investigation

As ours seems to be the first study to examine reading performance quantitatively and across subjects in this environment, we must be selective about the parameters we investigate. We have decided to focus on the following research questions (RQ):

- RQ 1. Are L2 readers in a parallel-language environment equivalent to counterparts in an L1 English environment in study-reading (as defined by Carver, 1990, or Fraser, 2007) proficiency?
- RQ 2. Are L2 readers in a parallel-language environment equivalent to counterparts in an L1 English environment in (1) core-reading proficiency (Hulstijn, 2007; Carver's "reading"), (2) vocabulary size, (3) word-recognition speed, and (4) inferencing capacity in the L2?
- RQ 3. For both groups, how is study-reading proficiency related to (1) core-reading proficiency, (2) vocabulary size, (3) word-recognition speed, and (4) inferencing capacity?

## Method

### Participants and definition of L1 and L2 in this context

In modern West European countries a substantial minority of university students have a (parental) home language that is not the national language. These home languages come from all over the world and often have a non-Latin writing system. In Britain, for example, many have an Indian or West African language or Cantonese as home language, in Sweden Spanish, Persian, Kurdish, Arabic, South Slavic, and Finnish are common. Some of these students may have quite large gaps in their competence in English/Swedish, while others have been linguistically integrated in the majority-language community from birth. It seemed to us unrealistic to restrict our investigation to "pure" L1 speakers of the national languages involved. Students who have received their secondary education in the national language are treated by the university systems as L1 users of that language and we have decided to follow this line, while collecting demographic data on language knowledge to allow us



to interpret results in terms of nativeness if necessary. Accordingly, this is more a study of British and Swedish university students than of narrowly defined L1 and L2 users of English.

Where such a distinction is made, the terms “bilingual” and “monolingual” are used to distinguish those with a different home language from their national language, from those with the same language in both functions. This means that a “bilingual” Swede actually knows at least three languages pretty well, since all have reached at least an intermediate level in English, and that a “monolingual” British informant may well have good school French or Spanish as well as native English. The numbers of monolingual and bilingual informants can be seen in Table 1.

Subsample	Female	Male
All Swedish	62	18
Bilingual	14	05
Monolingual	48	13
All British	21	09
Bilingual	08	05
Monolingual	13	04

Table 1. Subgroups within the All Swedish and All British informant groups.

This paper is based on studies conducted at a major Swedish university and a long-established British university during 2007-2008. The informants were 80 first-year Swedish biology students and 30 British first year biology students. This is a subset of the informants in a larger study (77 in Britain, 164 in Sweden). All the subjects for these studies had roughly the same educational background, in that all had completed secondary education to similar levels, none had much tertiary education and all were in the early stages of study of the same subject. All were in fact required to read textbooks at the same first-year university level, mostly Sadava et al. (2008). They were of similar ages, although the Swedish subjects were typically a year or so older than the British, and the gender mix (predominantly female) was the same. All were volunteers who were paid for participation. All subjects had taken secondary education in the official local language.

Materials

*Questionnaire*

To allow for potential social factors in reading proficiency to some extent, we administered a questionnaire which elicited information on languages

known at various proficiencies, literacy in these languages, parental education, age band, gender, and self-perception of reading skills.

### *Study-reading comprehension test (hereafter RC)*

We wanted a test that would discriminate among quite advanced readers and would allow L2 users of English to use all the strategies which they would employ in normal study-reading. We assume that such strategies use background knowledge and that the extent of this will be a factor differentiating within the groups, but not between them.

With this in mind, we used a research measure, rather than a standardized test, so that it could be adapted to the specific needs of the situation. We devised and validated a test with ten short texts from sources like *The Economist* and *The Guardian* on international or neutral topics, each followed by four five-choice questions. Full details of the test, the characteristics of texts and the piloting process are to appear in McMillion and Shaw (in preparation) and the texts used are available at URL: <http://www.english.su.se/pub/jsp/polopoly.jsp?d=4413&a=18230>. The informants were given 25 minutes to complete the test. Concurrent validity was established by comparing the results of 30 British and 42 Swedish University biology students (in both cases a different subsample from the one described here) on this test with their results on the standard Nelson-Denny test. For all 72 informants the correlation between overall Nelson-Denny score and overall score on our test was 0.75, with a correlation for the British informants alone of 0.76 and for the Swedes alone of 0.70. It should be noted that both the Nelson-Denny as administered and the RC test are timed tests, and many informants failed to finish, so that scores reflect reading speed (fluency) as well as comprehension ability. An estimate of untimed reading proficiency can be obtained taking the scores for the items that all informants completed, in this case the sixteen items relating to the first four texts.

### *Skimming news stories test*

As a foil to the academic reading test we wanted a test of something close to Hulstijn's (2007) notion of core-reading proficiency – that is what any L1 user can reasonably be expected to do, such as reading the newspaper. For this purpose we adapted a well-tried test used in Bonnet (1988) and Bonnet (2004). It involves simply reading short newspaper stories and matching

them with summary sentences under time pressure, a task close to core competence which one would expect L1 readers to perform uniformly well. The stories present familiar situations from newspapers: accidents, petty crime, narrow escapes, brave rescues, unusual events. Informants read five such stories and had to relate 16 sentences, with four minutes to do it.

### *Inferencing*

This test was identical in format to that proposed by Hannan and Daneman (2001), but did not attempt to distinguish subtypes of inferencing as their test did. It was used to test the inferencing skills of readers without requiring extensive knowledge of the L2 – that is the construct of such skills assumes that they are language-independent in principle. Informants had ten minutes to complete four short items; the aim was to exclude the speed/fluency variable by giving ample time.

### *Vocabulary test*

The standard receptive vocabulary test for L2 users of English, Nation's (1990) Vocabulary Levels Test (VLT) cannot be used for native speakers, indeed it is designed so that native speakers will achieve near full marks. We therefore devised (by means of repeated piloting) a research instrument intended to discriminate both among the Swedish and the British subjects. This test (which we refer to as VOC) consisted of two parts. One (based on Luton, 2001) tested knowledge of words from the Academic Word List (Coxhead, 2000) in a way further towards the productive end of the receptive-productive scale (Henriksen, 1999), the other (adapted from Krulik, Kaufman & Shostak, 1965) tested receptive knowledge of highly infrequent words occurring less than 5 times per million in the British National Corpus (BNC). Full details of the test are to appear in McMillion and Shaw (in preparation).

To establish concurrent validity, 19 British and 24 Swedish informants took both this test and the VLT. Overall scores correlated at 0.78, which is acceptable given the ceiling effect for British informants on the VLT and our test's position further along the productivity continuum than the VLT.

### *Rapid word identification (Words identified in two minutes)*

As noted above, reading speed is associated with word recognition speed, at least for less skilled readers. To test whether this applied to our non-native

readers, we devised a simple pencil-and-paper test of word recognition speed. Informants were given a list of 100 five-letter sequences, all of them possible orthographic and phonological words of English. Fifty were frequent real words, fifty were non-words. Subjects had to mark the real words and had two minutes to perform the task. The number of real words marked and the number of non-words unmarked up to the last marked word was the score.

## Results

### Overall skills of subjects: role of L2 status

To give a picture of the overall differences between Swedish undergraduate student readers and their British counterparts, Figure 1 gives data for the whole sample examined (all 241), broken down by nationality and reported knowledge of a second/third language “better than/as well as /nearly as well as” English. Those who gave such a language normally named the typical “immigrant” languages mentioned above; a few gave German, French, or Italian, suggesting a different type of bilingualism. Swedish informants score lower on English reading tests than equivalent British readers on average, but there is a great deal of overlap. All but the two lowest bands, that is the informants who scored at chance levels or little more, include both “monolingual” and “bilingual” informants from both national groups. Many

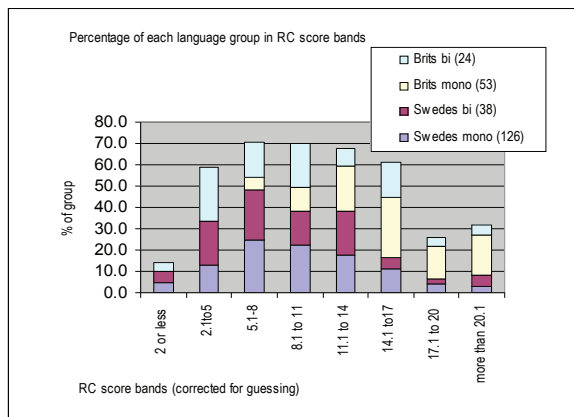


Figure 1. Study-reading test scores for the whole sample (N= 241), by nationality, language status, and test score band.

Swedes score higher than many British informants. There is, however, some kind of overall native-speaker advantage. Apparent “monolingual” speakers of English score significantly higher on average ( $p<.001$ ) than other groups with more varied English-language proficiency, but there are no other significant differences among groups. There were no significant differences or correlations involving the index of parental education (proxy for social class) elicited in the questionnaire.

**The subsample discussed here**

Descriptive statistics for the 110 subjects who took the battery described above are given in Table 2.

Descriptive statistics by nationality: 6 tests	Sweden		Britain		Significance (unpaired t-test)
	Mean	SD	Mean	SD	
Study-reading comprehension (max 40)	9.30	4.90	12.28	6.17	**
Study-reading comprehension (first 16 items)	6.58	3.02	5.78	3.37	- (ns)
Skimming news stories (max 32)	18.81	7.80	26.20	6.39	**
Words identified in two minutes (out of 100)	88.54	9.87	98.0	2.73	**
Inferencing (max 20)	16.03	3.54	16.07	2.45	(ns)
AWL vocabulary (max 30)	12.84	8.64	22.50	5.89	**
Infrequent vocabulary (max 30)	5.93	6.32	15.53	6.05	**

Table 2. Comparative scores for the subsample.

The Study-reading test scores for this group of British (English-educated) informants are actually rather low (for all 77 informants including these 30 the mean score was 13.72) Nevertheless, it can be seen that they have significantly higher scores on all tests except Inferencing and the first 16 questions of the study-reading test than the Swedish (Swedish-educated) ones. A way of assessing the degree of difference between the groups is to examine how many Swedish informants have scores which fall within or above 1 standard deviation of the mean for the British informants. Table 3 gives these data for the relevant tests.

Test	Range for UK (= mean +/- 1 SD)	Number of Swedish informants scoring within or above UK range
Study-reading comprehension (max 40)	6.25-18	30 (38%)
Skimming news stories (max 32)	20-32	38 (47%)
Words identified in two minutes (max 100)	95-100	16 (20%)
AWL vocabulary (max 30)	17-28	34 (39%)
Infrequent vocabulary (max 30)	10-22	16 (20%)

Table 3. Numbers of Swedish informants meeting British norms in five tests.

Table 3 shows that it was the rapid word recognition test and the infrequent vocabulary test that best distinguished the two groups, while on the other tests more than a third of the Swedish informants performed at a level comparable with the British informants. For both groups, but especially the UK informants, there is a ceiling effect for the Skimming test. Thus one can say that the UK group shows a greater comparative advantage in the rapid word recognition test and the infrequent vocabulary test than in the others.

### Correlations

Table 4 shows the correlations of the various test scores with one another for the Swedes.

	Study-reading comp. (out of 40)					
Study-reading comp. (first 16 items)	0.82	Study-reading comp. (first 16 items)				
Skimming news stories	0.65	0.53	Skimming news stories			
Words identified in two minutes	0.43	0.37	0.42	Words identified in two minutes		
Inferencing	0.38	0.44	0.38	0.30	Inferencing	
AWL vocabulary	0.66	0.60	0.57	0.38	0.51	AWL vocabulary
Infrequent vocabulary	0.56	0.39	0.52	0.25	0.31	0.68

Table 4. Correlations of test scores: Swedish subgroup (N= 80).

These are Pearson parametric correlations: Spearman non-parametric tests show the same pattern. All measures correlate significantly with one another at the .01 level apart from that between infrequent and academic vocabulary

knowledge, which is at the .05 level, quite likely because of the floor effect in infrequent-vocabulary scores. The strongest correlation is naturally that between the first part of the study-reading test and the whole of it. Otherwise the strongest correlations are the modest ones between the two vocabulary tests, between the two reading tests and between the score for the study-reading test and that for the test of academic vocabulary. The relatively lower correlation of reading comprehension and infrequent vocabulary knowledge is associated with the floor effect. Word-recognition speed correlates only modestly with reading comprehension and weakly with measure of vocabulary knowledge. Scores on the analytic-metalinguistic Inferencing test correlate only weakly with others, apart from the academic vocabulary knowledge test. Scores on the first part of the study-reading test are intended to measure reading accuracy with less influence from reading fluency. Correlations of first-part scores are indeed rather lower with speed-oriented and proficiency-oriented measures than those of the whole-test scores. However, these lower correlations could be due simply to lower variance in the scores for the first part, so it is more meaningful that correlation with the inferencing scores is rather higher. This result is meaningful because the inferencing test is intended not to test speed and language proficiency, and so should correlate more highly with a measure less dependent on speed like the first-part score. Table 5 shows the correlations of the various test scores with one another for the UK informants.

	Study-reading comp. (out of 40)					
Study-reading comp. (first 16 items)	0.76	Study-reading comp. (first 16 items)				
Skimming news stories	0.63	0.61	skimming news stories			
Words identified in two minutes	ns	ns	ns	Words identified in two minutes		
Inferencing	0.58	0.58	ns	ns	Inferencing	
AWL vocabulary	0.75	0.71	0.56	ns	0.66	AWL vocabulary
Infrequent vocabulary	0.54	0.56	Ns	ns	0.52	0.69

Table 5. Correlations across the test scores for UK informants. No. of valid cases = 30

All measures correlate significantly with one another apart from those involving word-recognition speed, on which these subjects mostly received the maximum possible score, and those of newspaper skimming with infrequent-vocabulary knowledge and inferencing. All are significant at the .01 level. The strongest correlations are those between the two vocabulary tests, between the score for the study-reading test and that for the test of academic vocabulary, and between the inferencing test and the test of academic vocabulary<sup>2</sup>. It is striking that there is no significant correlation between the core-literacy (Hulstijn 2007) task of newspaper skimming and the analytic-metalinguistic task of inferencing.

## Regression

Multiple regression analyses were carried out with Study-reading scores as the dependant variable and Skimming news stories, Words identified in two minutes, Inferencing, AWL vocabulary and Infrequent vocabulary as independent variables. A stepwise multiple regression (see Table 6) showed that for the Swedish subgroup there were two significant models (ANOVAR  $p < .000$ ); in the first only AWL vocabulary accounts for 44% of the variance in the Study-reading scores; in the second AWL vocabulary and Newspaper skimming account for 55%. No other variable contributed significantly.

Model	R	R Square	Adjusted R square	Std. Error of the Estimate
1 AWL words	0.671	0.450	0.443	3.78997
2 AWL words, Skimming	0.750	0.563	0.552	3.40071

Table 6. Multiple-regression models for Swedish informants: Study-reading as dependant variable.

A parallel analysis of the British data (see Table 7) shows the same pattern but the contributions of the two significant components are greater. In the first model, despite its relatively low variance, AWL vocabulary predicts 55% of the variance in Study-reading. In the second AWL vocabulary and Newspaper skimming together predict 60%.

Model	R	R Square	Adjusted R square	Std. Error of the Estimate
1 AWL words	0.748	0.560	0.544	4.29155
2 AWL words, Skimming	0.791	0.626	0.598	4.03101

Table 7. Multiple-regression models for British informants: Study-reading as dependant variable.



## Discussion

RQ 1. Are L2 readers in a parallel-language environment equivalent to counterparts in an L1 English environment in study-reading (as defined by Carver, 1990, or Fraser, 2007) proficiency?

These L2 readers do study-reading more slowly on average than their L1 counterparts. About a third were found to score in timed tests at comparable levels to competent British readers, in line with Hellekjær's (2009) survey findings of perceived greater difficulty with L2 reading. There is, however, no evidence here that they read less accurately, given enough time. This corresponds to the findings of Walczyk (2000) (concerning poor L1 readers) and Biancarosa (2005). It suggests that the focus of EAP reading instruction, at least for Swedes, should be fluency rather than cognitive strategies.

RQ 2. Are L2 readers in a parallel-language environment equivalent to counterparts in an L1 English environment in (1) core-reading proficiency, (2) vocabulary size, (3) word-recognition speed, and (4) inferencing capacity in the L2?

It might be expected that the L2 readers would transfer study-reading strategies from their L1 to the L2, while core-reading would simply depend more on language proficiency. These two factors would make study-reading more similar, and core-reading less similar, between the groups. However, our instruments are unable to show a comparative advantage for L1 readers in core-reading. The results indicate that the L1 advantage is the same in both types of reading. There are three possible explanations. First, this particular group of L2 readers actually does a great deal of leisure reading in L1 (novels, on-line material, magazines – Mezek, McMillion & Shaw, in preparation), so their strategies for core-reading in L2 may be as well-developed or as transferable as those for study-reading. Unlike learners in many second-language environments they may not be mainly exposed to artificial classroom reading in L2. Second, the contribution of automaticity and strategies may in fact be the same for both types of reading. Third, the ceiling effect in the British informants' scores may have reduced the sensitivity of the instrument to the extent that it could not detect a difference that actually exists, in which case the difference must not be very large.

The Swedish sample had smaller English vocabularies at both the levels examined. To some extent it is surprising that markedly different vocabulary

sizes can be associated with much less different reading scores, in view of the strong association usually found between these two measures. Further investigation of this issue is reported in McMillion & Shaw (in preparation).

The L2 readers responded slower on average in the word recognition (lexical decision) task than the L1 readers. Although this suggests that word recognition in holistic reading tasks should also be slower, it need not be so in proportion. Such factors as collocational and structural associations, as well as other contextual, pragmatic, and discourse factors (for instance, enhancement and suppression, Gernsbacher & St. John, 2000), are involved in word recognition in continuous reading. These factors, however, should benefit the L1 readers to a greater extent than the L2 readers, making observed differences on the word recognition task the minimum possible difference between the groups, with differences in realistic tasks probably greater. However there is no reason to recommend word-level fluency tasks in EAP courses, since word-recognition speed is not closely related to comprehension scores, even in speeded tests.

There was no significant difference in the scores of L2 and L1 readers on the test of inferencing. For both groups the test was somewhat compromised by a ceiling effect, so all that can be said is that any difference is relatively small.

RQ 3. For both groups, how is study-reading proficiency related to (1) core-reading proficiency, (2) vocabulary size, (3) word-recognition speed, and (4) inferencing capacity?

The correlation coefficient of study-reading to core-reading was somewhat higher for the L2 than for the L1 readers. This may suggest that transfer is about the same for both tasks, but that language proficiency is a relatively important factor. Both reading test scores correlate with language proficiency, which varies more for the Swedish than for the British readers. This type of result throws some doubt on the practice of teaching “reading skills” in EAP courses; students who have appropriate skills in L1 will transfer them, those who have not acquired them in L1 are not likely to do so in L2. Instead, it suggests a focus on (academic) language proficiency.

For the UK sample, AWL vocabulary scores, in particular, correlate more highly with study-reading than with newspaper skimming, suggesting that core-reading draws on different resources than study-reading. The pattern is less marked for the Swedish sample; presumably, for them all three scores are strongly influenced by language proficiency.

If word recognition speed was an important contributor to reading speed at this level, word recognition scores would be more closely correlated with success in timed (core or study) reading tasks than in untimed ones. The word recognition test was much easier for the UK informants than for the Swedish, so it was clearly measuring something associated with exposure as well as education in a particular language. It generated a good deal of variance in the Swedish scores, so statistically it could easily have correlated. It is therefore quite striking that it correlated only weakly with the reading comprehension and inferencing measures, and the difference in correlation between the word recognition task and the reading comprehension measures (timed and untimed) was very low. Whatever it is that makes Swedish readers slower than British ones, it is not uncontextualized word recognition speed. The findings for L1 readers and younger L2 readers discussed above are confirmed for this group. Word-recognition speeds are lower for less experienced users of the language, but in this case speeds are not crucial for effective comprehension.

Inferencing test scores were the same for both groups, suggesting that it was measuring something independent of language proficiency, as Hannan and Daneman (2001) argue, and as the very weak correlations with vocabulary size measures suggest. Variance was rather low for both groups, so potential real correlations may be concealed by the weakness of the test. For the Swedes correlations are weak throughout, suggesting that language proficiency is a more important determinant of reading success than inferencing ability. For the UK informants there was a modest correlation with study-reading scores and none with other measures, suggesting that the type of metalinguistic inferencing tested here is indeed associated with study-reading ability, but not with core-reading when acquired in an L1 environment.

The regression analyses showed that for both groups knowledge of Academic Word List words and ability to skim newspaper texts were the only measures that predicted study-reading scores. These can be regarded as measures of vocabulary size and core reading proficiency respectively. We can speculate that for both groups the abilities underlying these tests derive from exposure to print in English in general, and exposure to study-reading in English in particular. The fact that the same measures predict to the same extent for both groups suggests that the process is not dissimilar for them. The higher proportion of variance predicted by these two measures for the British than for the Swedish informants (even though the sample is smaller

and one would therefore expect more “noise”) confirms that for the Swedish informants a factor derived from reading in Swedish is also active.

## Conclusions

We can conclude that many students in Sweden read English as well as or better than British counterparts, although many students in both environments read poorly. Furthermore, where time is not a factor, the smaller vocabularies of Swedish students do not result in less successful study-reading. It is clear, nonetheless, that Swedish students read substantially slower than British counterparts. Although they are considerably slower at word recognition, this is not the main reason for the difference, which must be due to slower processing at higher levels, including probably more inferencing about word meaning. This may well account for a sense that reading in an L2 such as English is more difficult than in an L1 (Hellekjær, 2009; Pecorari et al., 2011).

However, the Swedish education system continues to flourish and produce graduates who are internationally competitive. The level of receptive proficiency among Swedish students must be quite high in order for them to be able to adequately comprehend and benefit from the textbooks. The sociolinguistic situation is such that teaching methods and expectations can be targeted at the particular proficiency combination of the students (though this may not be the optimum approach from purely pedagogic considerations). Although the Swedish students read more slowly than their British counterparts, the evidence is that they understand at similar levels (see also McMillion & Shaw, 2009). Jackson (2005) shows that reading proficiency is in any case only a modest contributor to grade-point average; other skills can outweigh minor weaknesses in reading proficiency. As a consequence, the implicit assumption that most Swedish students can successfully use the same texts as British students is probably a realistic one, particularly if pedagogy is adapted appropriately.

From the point of view of general understanding of reading processes, it is a limitation of this study that it compares readers in a monolingual environment with counterparts in a parallel-language environment, not L1 and L2 readers within the same environment. But from the point of view of understanding the conditions of readers in a parallel-language environment, this is undoubtedly a strength. Students in a monolingual environment are

not uniformly L1 readers and it is impossible to assess whether choice of textbooks in English is differentially problematic in an environment like Sweden unless comparisons are with the real situation in the monolingual environment.

Even in a parallel-language environment, therefore, choice of textbook language must take account of the task demands it implies. Students reading in a second language will have to work longer to achieve the same results, and LSP course design and pedagogy must take account of this. Using the lecture to give the content of the textbook rather than presupposing reading is probably a common strategy but not a desirable one. Where students may have difficulty with speed and with vocabulary, it would be better to guide reading actively, set realistic targets, and point out terminological difficulties in advance. LSP teachers have a role to play in advising lecturers on appropriate strategies. They should also ensure that reading courses recognize that students who read effectively in L1 need to develop fluency and LSP code knowledge rather than cognitive strategies. Students on such courses who lack L1 reading fluency after an education in L1 are probably not ready to benefit from L2 reading strategy instruction.

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## NOTES

<sup>1</sup> We gratefully acknowledge the financial support of the Bank of Sweden Tercentenary. This project is part of the Advanced Second Language User program.

<sup>2</sup> Knowledge of academic vocabulary appears to correlate more highly with reading and inferencing measures for the UK group than for the Swedish group, but this is actually a consequence of the relatively large number of low-proficiency readers in this particular UK sample: data for a larger UK sample show similar levels of correlation to the Swedish data given here.