The Effects of Contextual Richness on the Guessability and the Retention of Words in a Foreign Language[1]

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One of the ideas that are currently gaining ground with regard to vocabulary acquisition in a foreign language is the view that inferring the meaning of a word from its context makes an important contribution towards the retention of the word in question. A precondition for this is that the meaning be guessed correctly.

In our study we investigated (1) which contextual factors influence the guessability of words, (2) how these factors influence receptive retention (after guessing and memorizing), and (3) what is the relationship between correctly or incorrectly guessing and retention (after a learning stage). The main conclusions of this study are: (1) a specific filling-in of the factors subject, verb, and function contributes to the guessability of a word in a particular sentence context; (2) a specific filling-in of the above-mentioned factors in the process of guessing and learning has no effect on the retention (subject and verb) or a negative effect (function); (3) correctly guessing a word does not lead to an improved retention (after a learning stage) as compared with guessing a word incorrectly; for some words retention is even worse.

To summarize: the factors that are conducive to guessing are not conducive to retention, at least not when after guessing a learning stage occurs with the aid of the same context as in the process of guessing.

Until we are able to decide the ways in which various types of context help the learning of words, there will continue to be a wide variety of interpretations of the term *context* (Nation 1982: 23)

1. INTRODUCTION

What is the most efficient way of presenting words, of making clear their meaning (semanticizing), and of causing them to be learned[2] (by means of practice and/or memorizing) with a view to (long-term) retention? This central question concerning vocabulary acquisition is still to be answered, despite years of research on the subject. It is true that in the past few years increasingly more attention has been paid to the problems involved in vocabulary acquisition, as various authors have already pointed out, and as is also evident from the number of important publications that have appeared recently: Meara 1980, 1983, 1987; Nation 1982, 1987; Takala 1982, 1984; Wallace 1982; Galisson 1983; Macht and Steiner 1983; Schouten-van Parreren 1985; Schröder 1985; Gairns and Redman 1986; Beheydt 1987a; Carter 1987a, 1987b; Diller *et al.*

1987; McKeown and Curtis 1987; Carter and McCarthy 1988. Yet the large number of publications is out of all proportion to what has become known about vocabulary acquisition as a result of empirical research (for a good overview see Nation 1982). Good research appears to be scarce and is often focused on certain aspects, so that no clear overall picture emerges. As Beheydt (1987a:55) correctly points out: 'What is notably missing in the teaching of vocabulary is a systematically elaborated strategy for vocabulary acquisition that is based on the findings of linguistics and learning psychology.'

One of the more recent theories about vocabulary acquisition in which an attempt has indeed been made to combine certain findings from linguistics and learning psychology into a sytematic way of word acquisition, is the theory of Schouten-van Parreren, as expounded in her doctoral thesis (Schouten-van Parreren 1985). Her theory is based on a particular view on the receptive acquisition of words, namely that words are best learned through reading, in which process the inference of the meaning of words from the context is thought to have a clearly positive effect on retention. This theory, which is based primarily on qualitative research, has become well-known in foreign-language education in the Netherlands, and in various coursebooks attempts have been made to implement elements from her theory. It is for these reasons that for the research reported in this article we decided to take her theory as a starting-point, and to work out in more detail a few aspects of her theory by means of quantitative research. The aim of our research is to find answers to the following questions:

1. Which contextual factors influence the guessability of words?
2. What is the influence of these factors on the receptive retention of words (after guessing and memorizing)?
3. What is the relationship between correctly or incorrectly guessing and retention (after a learning stage)?

THe plan of this article is as follows. In the next section (Section 2) we shall briefly summarize the theory of Schouten-van Parreren (1985, 1986). Subsequently we shall consider in more detail those aspects of her theory that have a bearing on our research: the factors that influence the guessability of words (Section 3) and the correlation between guessing and retention (Section 4). After this theoretical part there follows a description of the experiment that we carried out (Secton 5). Finally, the conclusions and a discussion are presented (Section 6).

2. THE THEORY OF SCHOUTEN-VAN PARREREN

One of the most important conclusions of the research done by Schouten-van Parreren is that the learning of words can best be achieved by reading. The learning of words through bilingual word-lists should be rejected for the following reasons:

1. Words that have been learned from a list are easily mixed up (so-called 'lumping').

2. Words that have been learned from a list are easily forgotten because of the lack of any cognitive foothold.
3. Words that are known within the list may not be known outside the list (as a result of 'system separation').
4. The meaning(s) of a word as learned in a list is (are) often not appropriate in the contexts encountered by the pupils (cf. Reichling (1962:48–9): 'the principles of mobile and combinatorial symbolization' [our translation]).
5. The learning motivation of the pupil will be slight because he has not yet felt the need to find out the meaning of a particular word.

These objections to presenting isolated words would apply to a slightly lesser extent to the presentation of words in isolated sentences. Yet there appears to be no essential difference (Schouten-van Parreren 1985:67). Nevertheless, isolated sentences can play a part in the learning of words. Thus, for the consolidation of word knowledge Schouten-van Parreren (ibid.:65) recommends working with 'context cards', i.e. cards on the front of which is the foreign word, while on the back there is the translation and the original sentence context, which can be used as a cognitive foothold. In addition it became clear from her research that test-subjects remembered the meaning of words because the word-form called to mind a brief combination of words, usually a combination that they had come across a number of times already, and/or very pregnant (see Section 3) combinations (ibid: 74).

As stated above, Schouten-van Parreren advocates the presentation of words in texts. This is because texts provide many points of reference for the retention of new words, as the language material itself shows all sorts of relationships; furthermore, this material can also be dealt with in different ways. These two kinds of points of reference are said to be of essential importance for the ability to retrieve information from one's memory. According to Schouten-van Parreren the presentation of new words in texts leads to good results especially if (1) certain textual conditions and (2) conditions with respect to the psychology of learning are met. As far as the textual conditions are concerned it is essential that attention should not be devoted to all the unknown words occurring in a text. A selection has to be made of words that (a) lie in the frequency area that just about reflects the pupil's mastery level, and that (b) occur in a suitable, so-called pregnant context. The conditions with respect to the psychology of learning concern the actions the pupils have to perform on the unknown words. Just reading through a text that contains unknown words—as in the case of reading for pleasure, or for the purpose of studying or developing one's reading ability—can in some cases lead to the retention of those words (if they occur a number of times, for example), but this will certainly not always be effective. Schouten-van Parreren therefore concentrates on reading with the primary aim of vocabulary acquisition, and she argues that a combination of three actions (guessing, verifying, and analyzing) for each word that has to be learned is very effective for this purpose. The first action, guessing, consists in the inference of the meaning of an unknown word from the context and the

word-form (which we take to be the morphological structure of the word, both lexical and inflectional, following Matthews 1974:41). This action is thought to contribute to a great extent to the retention of new words. The second action is looking up words in a dictionary, and here it is important that a clear, often specific meaning is being sought. The third action, the analysis of the word-form, comprises the recognition of relationships between new words and already known words in the target language, the mother-tongue, or other languages, involving, *inter alia*, knowledge of word formation and etymology. As a follow-up to this series of actions there may be, for the purpose of consolidation, a practice stage or a learning stage. For the latter Schouten-van Parreren mentions two possibilities. The first possibility is the noting of the discovered (and verified) meanings of the new words in the margin, so that in the process of learning the context will be readily accessible if a word (that is marked in the text) is not known. The second possibility is the use of the above-mentioned context cards. This method has the advantage that the learner himself is able to determine the order of words to be learned, and thus he can concentrate on those words that pose the most problems for him (cf. Atkinson 1972). Having to make such cards, however, requires the investment of extra time.

3. THE GUESSABILITY OF WORDS

The fundamental assumption in the theory of Schouten-van Parreren is that the inference of the meaning of words from the context and the word-form (henceforth we shall speak of 'guessing' or 'inferring from context') is conducive to retention. This implies, incidentally, that guessing wrongly should be prevented as far as possible, as incorrectly guessed meanings also tend to stick in the mind. Therefore the guessability of words should be optimal. Ideally there should be a so-called 'pregnant context' (Van Parreren 1967). This is 'a context that offers ample clues for finding the meaning of the new word' (ibid.: 167, our translation). Elaborating this idea, Schouten-van Parreren (1985:50) argues: 'The more "pregnant" (compelling) the context is, the easier it is to guess the word' (our translation). Finally we may quote Beheydt (1987b:16): 'Pregnant semantic contexts provide sufficient contextual clues to call up the target words. They require the target word and make the meaning inferable.' Thus the pregnancy of a context is to all intents and purposes the guessability of a word in that context.

What factors actually determine the guessability? First of all, of course, the contextual factors, like the redundancy of the context, the occurrence of synonyms and antonyms or words that are typically associated with the word concerned. Within the scope of this article it is not possible to fully review all the contextual factors that may influence the guessing of words. For this the reader is referred to Seibert (1945), Ames (1966/67), Rankin and Overholser (1969), and Sternberg and Powell (1983). In the description of our experiment (Section 5) we shall come back to contextual factors and will discuss those that have a direct bearing on the experiment. In so doing, we shall dissociate ourselves from the literature and make an attempt to distinguish, systematically and on the basis of linguistic criteria, a number of different levels of pregnancy. In addition to

contextual factors there are, however, two other groups of factors that remain implicit in much research into the guessing of word meanings, but whose importance should not be underestimated. These are the word factors and the factors that are determined by the person who is guessing: the reader/learner factors. The word factors may include such categories as part of speech, the degree of concreteness or abstraction, the transparency of the word structure, the likelihood of interference, the degree of correspondence between the referential meaning of the foreign word and that of the word in the reader's mother-tongue, the extent to which the word-form (i.e. the 'phonological' or 'orthographical word' (Matthews 1974: 26)) and the meaning bear with each other, and the frequency of the equivalent word in the reader's mother-tongue (cf. Carpay 1975: 167–72; Van Parreren and Schouten-van Parreren 1978: 34 – 6). The reader/learner factors concern the knowledge and the skills of the person who is guessing. In this connection the following are useful: knowledge of the words that occur in the context, the ability to analyse the word-form (with the aid of knowledge of morphology and etymology), the ability to make use of the syntactic and semantic (and possibly stylistic) context, 'knowledge of the world', a good knowlege of words in one's mother-tongue (notably cognates), and a good knowledge of words in other foreign languages (notably related languages) (cf. Schouten-van Parreren 1985; 50–1; Van Esch 1987: 45). In the process of guessing there is a distinct interaction between contextual factors, word factors, and reader/learner factors; in this interaction the relative importance of the factors with respect to one another may vary considerably. Therefore, anyone wanting to carry out research on one of the factors mentioned will have to carefully control the other factors; in practice this does not always happen (cf. Nation 1982).

4. GUESSING AND RETENTION

As stated above, the fundamental assumption underlying Schouten-van Parreren's theory is that one learns words by guessing their meaning with the aid of the context. In other words: guessing is conducive to retention. On what principles of learning theory is this assumption actually based? The first explanation is that in the process of guessing, the reader performs a mental action on the word-form, making associations between the context and his own personal knowledge (both linguistic knowledge and knowledge of the world), and thus establishing a cognitive foothold. The second explanation is that guessing results in a strong affective involvement on the part of the guesser, notably if the guessing is followed by the verification of the meaning (Schouten-van Parreren 1985). The assumption that guessing leads to retention seems to be plausible also from the viewpoint of the acquisition of one's mother-tongue. The greatest part of our own vocabulary has been acquired as a result of encountering words in a certain context or situation, from which we have inferred the meaning (Sternberg 1987).

What are the results of empirical research? Sinica (1955, cited by Schouten-van Parreren 1985: 59), found that guessing the meaning of new words from the

context by fifth- and sixth-formers of primary school (i.e. aged between 10 and 12) yielded better results in a composition test in which words had to be used actively, than in the two other conditions, in which words were semanticized by means of pictures or through synonyms.

Schouten-van Parreren (1980) carried out an investigation with pupils from the second and third forms of secondary education (VWO) (i.e. aged between 13 and 15). These pupils were required to read a text in their own mother-tongue (Dutch), containing 52 quasi-words that occurred at least 5 times and at most 12 times. Half of the pupils had to guess the meaning of these words from the context, while the other half were given the meaning in the margin and in a word-list. The (receptive) testing was done via an immediate and a postponed test (after three weeks). In both cases half of the 52 quasi-words were tested. The second-form pupils were eliminated from the statistical analysis because their guessing skills turned out to be insufficiently developed. For the third-form pupils it was found that the results of the guessers were slightly lower than the results of the pupils in the margin condition, in the case of both the immediate and the postponed tests (14 per cent and 8 per cent, respectively). The differences were not significant, however. The interaction between guessers/ non-guessers and immediate test/postponed test did turn out to be significant, though ($p < .05$); in the case of the postponed test the guessers had forgotten relatively fewer words than the pupils in the margin condition. This might indicate that guessed words are less quickly forgotten.

Gershman (1970), in an experiment with graduate students who had to learn 15 simulated foreign words productively, investigated the effects of seven different conditions, including different guessing conditions with the aid of isolated sentences, as well as various types of paired-associates learning. She found no significant differences between the various conditions, neither for testing with a context-sentence test form, nor for testing with a paired-associates test form, irrespective of whether the testing was done immediately or two days later. Guessing did not result in better retention than types of paired-associates learning.

Saragi *et al.* (1978) required 20 well-educated subjects to read a novel in which 241 mock words occurred 15 times on average. A few days later the subjects were given a receptive multiple-choice test, without any prior warning, in which 90 of the new words were tested. The mean score was 76 per cent. It thus appears that as a result of reading extensively, words that occur repeatedly can be learned incidentally.

Carpay (1975) carried out a series of experiments in which he required students of psychology to learn Russian using texts. The results showed that through the inference of meanings from the context, words could indeed be learnt receptively.

Li (1988) carried out an experiment in which well-educated subjects had to guess the meaning of unknown foreign words with the aid of a sentence context. It was found that of the words that were guessed with the aid of a good cue in the reading condition, 74 per cent were known in the (receptive) retention test.

Here it should be noted, however, that (1) the retention test was not foolproof because the target word was cued by another word from the same sentences that had been used for inferring the meaning of the target word, (2) the retention test followed the guessing test almost immediately, while (3) the order of the target words in the retention test was the same as in the guessing test.

To summarize: the empirical research on the hypothesis that guessing is conducive to retention has so far provided no convincing evidence for the superiority of this method with respect to other ones. Moreover, it should be remembered that the possibilities for guessing in the practice of teaching foreign languages are more limited than in a simulated foreign-language experiment: on account of the greater uncertainty about the meaning of the context—by no means do pupils know all the words they have learned (Saragi *et al.* 1978)—the chance of guessing is smaller, which has consequences for the retention.

5. THE EXPERIMENT

On the assumption that guessing from context contributes towards retention, we have carried out an experiment to trace (1) the effect of pregnancy of context on guessing, (2) the effect of pregnancy of context on (receptive) retention (after guessing and memorizing), and (3) the effect of correctly or incorrectly guessing on retention (after a learning stage). For this experiment we decided to make use of a real classroom situation, because the transfer of results from a laboratory situation to the concrete classroom situation can be problematical (Oskarsson 1975: 19–20). For the foreign language we chose French, because pupils in the Netherlands are confronted with this language least of all outside school, and consequently the unfamiliarity of the words to be learnt could be better controlled.

For our experiment we chose to restrict the context to a single sentence. The use of a whole text as context, although recommended by Schouten-van Parreren (1985), would make the systematic variation of the pregnancy impossible. In choosing target words we limited ourselves to concrete nouns that the pupils did not know in the foreign language (this was verified by going over the coursebooks they had used in the schools concerned), but with which they were familiar in their own mother-tongue. We intentionally chose a homogeneous class of target words in order to be able to vary the context systematically by working with a standard sentence structure, and in order to reduce the risk that the target words might behave differently with respect to one another. We decided to use concrete nouns because with this type of word the meaning can be conveyed relatively easily by means of a word-by-word translation, while the same referent can be referred to in a relatively unambiguous way[3] (cf. Quirk *et al.* 1985: 247). For the variation of the pregnancy of context on the basis of linguistic criteria, we chose three factors: subject, verb, and function (of the target word). Subject and verb were chosen because there are indications (Seibert 1945: 306; Pearson and Studt 1975[4]) that these factors influence the guessability of a word. In addition, these factors form a standard part of most sentences. The factor of function was chosen on the basis of a study

by Ramsey (1981), as well as on the basis of Lyons (1977: 209–10), who argues that the role or function of objects appears to be more important for determining the denotation of lexemes than a description of the denotata. At the same time the factor of function can conveniently be combined within a sentence with the factors of subject and verb.

Our investigation was carried out as follows. For each of the 8 target words selected by us we made 8 sentences of the form: *subject* + *verb* + *target word* + *function of the target word*, by choosing the factors of subject, verb, and function as being either pregnant or non-pregnant. In so doing we called a factor 'pregnant' if there was a strong relationship with the word to be guessed. By way of example, a specification of the 8 different types of context for the target word *arrosoir* ('watering can') is presented in Table 1.

Table 1: Specification of the 8 types of context for the target word arrosoir

condition	Contextual factors			
	subj.	verb	func.	
1	+	+	+	Le jardinier remplit un arrosoir pour donner de l'eau aux plantes.
2	+	+	−	Le jardinier remplit un arrosoir pour finir son travail.
3	+	−	+	Le jardinier cherche un arrosoir pour donner de l'eau aux plantes.
4	+	−	−	Le jardinier cherche un arrosoir pour finir son travail.
5	−	+	+	Je remplis un arrosoir pour donner de l'eau aux plantes.
6	−	+	−	Je remplis un arrosoir pour finir mon travail.
7	−	−	+	Je cherche un arrosoir pour donner de l'eau aux plantes.
8	−	−	−	Je cherche un arrosoir pour finir mon travail.

+ = pregnant; − = non-pregnant.

For the other 7 target words contexts were similarly constructed. Eight contexts of the same type, but each with a different target word, together constituted a condition. In all there were 8 conditions.

We formulated the following hypotheses:

1 The translation of a target word is more often correctly guessed when the sentence contains:
   (a) a pregnant subject than when the sentence contains a non-pregnant subject;
   (b) a pregnant verb than when the sentence contains a non-pregnant verb;
   (c) a pregnant function than when the sentence contains a non-pregnant function.

2 The translation of a target word (after guessing and memorizing) is more often remembered when the sentence contains:
   (a) a pregnant subject than when the sentence contains a non-pregnant subject;

(b) a pregnant verb than when the sentence contains a non-pregnant verb;

(c) a pregnant function than when the sentence contains a non-pregnant function.

3 The correct guessing of the translation of a target word followed up by learning more often leads to retention, while incorrect guessing followed up by learning the correct translation less often leads to retention.

The *test-subjects* were 139 Dutch pupils from six third-forms of two secondary (Havo/Atheneum)[5] schools. The age of the pupils was 14–16 years, and all of them had been receiving French lessons for three hours every week for at least two and a half years. The 8 different conditions were assigned at random to the pupils in each form, without their prior knowledge, with school type and sex being controlled.

The experiment, which took place during two regular French lessons that the pupils attended, consisted of three stages: (1) a guessing stage followed up by (2) a learning stage and, two or three days later, by (3) a test stage.

During the *guessing stage* pupils, in each condition, had to guess the translation of the 8 target words. In addition, to control the equivalence of the groups, all pupils had to guess the meaning of 8 control words, also unknown to them (this was verified by going over the coursebooks they had used in the schools concerned), which had been placed in sentences in such a way that each of the 8 different types of context was represented once. A guessing sheet (different for each of the 8 conditions) that contained the 8 guessing sentences (varying per condition) and the 8 control sentences (the same for all conditions) was used for the purpose. The even numbers formed the guessing test, the uneven numbers the control test. The target and control words that had to be guessed were always underlined. In those cases where there was some doubt as to whether the pupils would know the words occurring in the sentence (this was verified as before[6]), the translation of the words concerned was given between brackets. The guessing stage lasted for fifteen to twenty minutes. For exemplification the guessing sheet of Condition 1 is included as Appendix 1.

During the *learning stage* pupils had to learn the translation of the 8 target words. The reason for including also a learning stage is that the guessed translations could thus be confirmed or corrected (cf. Carpay 1975: 255 for the importance of giving feedback on this point). This correction of wrongly guessed translations is necessary to prevent their retention, a problem that Schouten-van Parreren (1980) encountered with her experiment. In addition there are indications that a learning stage is useful for increasing the learning effect (cf. Carpay 1975: 255; Schouten-van Parreren 1985); this was especially important because in our experiment the pupils were confronted with the target words in only one context. The learning sheet used during this stage was different for each condition and each time contained the 8 guessing sentences of the guessing sheet, but in this case with the translation of the target words given in the margin. In addition the target words were no longer underlined. This was done for one thing to prevent the pupils from exclusively paying attention to the

word pair to be learned without paying any attention to the context, and for another to prevent the pupils from immediately substituting the translation of the target word, which would be at the expense of the attention for the word-form (cf. Anderson and Faust 1967; Carpay 1975: 207; Schouten-van Parreren 1985: 59). The time available for the learning stage was ten minutes. The learning sheet for Condition 1 is given as Appendix 2.

During the *test stage* pupils were asked to give the translation of the 8 target words (retention test). The test sheet used during this stage was the same for all conditions and contained the 8 target words in 8 new, non-pregnant sentences having the same pattern as the guess and control sentences. We took new sentences because one can only speak of word knowledge when words are known also in unfamiliar contexts (cf. Carpay 1975: 178; Bogaards 1980: 280). We took non-pregnant sentences because the test was intended exclusively to measure word knowledge without simultaneously measuring guessing skill as an interfering factor. To eliminate the effects of ranking order, the order of the sentences on the test sheet was reversed *vis-à-vis* that on the guessing and learning sheets. The time available for taking the test was 10 minutes. The test sheet is included as Appendix 3. For a summary of the design see Table 2.

Table 2: Design of the experiment

Condition	guessing stage		learning stage	delay	test stage
1	GT1	CT	L1	D	RT
2	GT2	CT	L3	D	RT
3	GT3	CT	L3	D	RT
4	GT4	CT	L4	D	RT
5	GT5	CT	L5	D	RT
6	GT6	CT	L6	D	RT
7	GT7	CT	L7	D	RT
8	GT8	CT	L8	D	RT

GT1–GT8 =guessing tests, CT =control test, L1–L8 =learning stages, D =delay, RT =retention test.

Scoring was done by two professional students of French, who had not been involved in the experiment. Independently of each other and without any context, they judged the correctness of the answers provided by the pupils, assigning 1 point to those answers which agreed with the meanings fixed by us and 0 points if that was not the case. Inflexional forms were treated as lexemes. Agreement between judges was .98 (product-moment correlation). Differences between judges were resolved by discussion. Thus we arrived at a guessing score, a control score, and a retention score for each pupil, the maximum score each time being 8.

Results

The equivalence of the 8 groups was controlled through the scores on the control test,[7] and also on the basis of the most recent grades for French. It turned out that there were no significant differences between the groups (One-way ANOVAs, F(d.f. 7,131) = 1.03, p = .42 and F(d.f. 7,131) = 0.77, p = .62 respectively). The mean score on the control test was 3.37 (N = 139), the average grade was 6.53 (on a ten-point scale, N = 139).

The effect of the factors of subject, verb, and function on the *guessing scores*[8] was significant or highly significant (2×2×2 ANOVA, $p < .05$ for the factor 'verb'. $p < .01$ for the factors 'subject' and 'function') (see Table 3). The trend of these effects appeared to be in conformity with our hypothesis **1** (see Table 4 in which are represented the mean guessing scores which were successively achieved in conditions with a non-pregnant subject, a pregnant subject, a non-pregnant verb, etc.). In other words, the presence of a pregnant subject, verb, or function in a sentence results in a word being guessed correctly more often than when the subject, verb, or function is non-pregnant. Notably, the factor of function appears to have a crucial influence on the guessability of an unknown word. This is a confirmation of our hypothesis **1**. The two-way and three-way interactions appeared to be non-significant with the exception of the interaction between 'subject' and 'function' ($p < .01$): the combination of a pregnant subject

Table 3: Analysis of variance of guessing scores

Source	SS	d.f.	MS	F	p
Subject (S)	70.920	1	70.920	47.285	.000
Verb (V)	7.338	1	7.338	4.893	.029
Function (F)	286.829	1	286.829	191.240	.000
S × V	2.586	1	2.586	1.724	.191
S × F	13.641	1	13.641	9.095	.033
V × F	2.248	1	2.248	1.499	.223
S × V × F	3.961	1	3.961	2.641	.107
Explained	399.680	7	57.097	38.069	.000
Residual	196.479	131	1.500		
Total	596.158	138	4.320		

Table 4: Mean guessing score for the 8 target words, as per factor

Factor	−pregnant	+pregnant	Total
Subject	2.35 (n = 69)	3.87 (n = 70)	
Verb	2.87 (n = 70)	3.36 (n = 69)	
Function	1.66 (n = 70)	4.59 (n = 69)	
Total	2.29	3.94	3.12 (N = 139)

with a pregnant function has a lesser effect on the guessing scores than might be expected on the basis of the separate effects of these factors (see Table 5). The analysis of variance for the *retention scores*[9] (2×2×2 ANOVA) is shown in Table 6.

Table 5: Mean guessing score for the 8 target words, specified according to the different combinations of the factors 'subject' and 'function'

| | | Function | | Total |
		−pregnant	+pregnant	
Subject	−pregnant	.67 (n = 36)	4.18 (n = 33)	2.35 (n = 69)
	+pregnant	2.71 (n = 34)	4.97 (n = 36)	3.87 (n = 70)
Total		1.66 (n = 70)	4.59 (n = 69)	3.12 (N = 139)

Table 6: Analysis of variance of retention scores

Source	SS	d.f.	MS	F	p
Subject (S)	.480	1	.480	.149	.700
Verb (V)	2.529	1	2.529	.785	.377
Function (F)	22.993	1	22.993	7.136	.009
S × V	.042	1	.042	.013	.909
S × F	3.205	1	3.205	.995	.321
V × F	.024	1	.024	.008	.931
S × V × F	2.515	1	2.515	.780	.379
Explained	32.179	7	4.597	1.427	.201
Residual	373.781	116	3.222		
Total	405.960	123	3.300		

N = 124[10]

From Table 6 it appears that there are no significant effects for 'subject' and 'verb' ($p > .05$). The hypotheses **2a** and **2b** are therefore not confirmed. There does appear to be a highly significant effect for 'function' ($p < .01$). The effect is opposite to what one would expect, however: in the case of pregnancy the mean score for the test sentences is lower than in the case of non-pregnancy (see Table 7). Hypothesis **2c** is therefore to be rejected. The two-way and three-way interactions appeared to be non-significant.

The correlation between the correct/incorrect guessing and the correct/incorrect retention of the translation is shown in Table 8. In this table the different conditions have been added together. The product-moment correlation between guessing and retention is −.06 (incorrect=0; correct=1). The results therefore do not support our hypothesis that the more often a word is correctly guessed, the more often it will be remembered. If there is any relationship at all between

Table 7: Mean retention score for the 8 target words, as per factor

Factor	−pregnant	+pregnant	Total
Subject	5.13 (n = 61)	5.27 (n = 63)	
Verb	5.35 (n = 63)	5.05 (n = 61)	
Function	5.65 (n = 60)	4.78 (n = 64)	
Total	5.37	5.03	5.20 (N = 124)

guessing and retention, there is a tendency in the opposite direction. From Table 8 it appears that of the words that have been guessed correctly, 61 per cent (244:397) are remembered correctly, while of the words that have been guessed incorrectly, 67 per cent (401:595) are remembered correctly. So hypothesis 3 is not confirmed by our findings.

Table 9, finally, shows the correlation between guessing and retention for each word separately. In this table too the conditions have been added together.

Table 8: Correlation between guessing and retention (for all conditions together; in numbers of words)

		Retention		*Total*
		incorrect	correct	
Guessing	incorrect	194	401	595
	correct	153	244	397
Total		347	645	992

N = 992 (124 pupils × 8 words)

Table 9: Correlation between guessing and retention (per word)

Target word	r
arrosoir	−.39
bouillotte	.06
échantillon	.05
étoffe	−.01
menottes	−.06
glaise	−.04
serpillière	−.22
coffre-fort	−.12

N = 124

Of these correlations only those for *arrosoir* (−.39) and *serpillière* (−.22) appear to be anything like substantial (i.e. bigger than .20 in an absolute sense). These correlations are negative, however: the more often the word is correctly guessed, the less often it is remembered.

6. CONCLUSIONS AND DISCUSSION

The following conclusions emerge from our investigation:

1. The pregnancy or non-pregnancy of a subject, verb, and function in a sentence influences the correct or incorrect guessing of the meaning of a word. Notably the factor 'function' plays an important part in this. Hypotheses **1a, 1b**, and **c** are thus confirmed.

2. The influence of the context on retention (after guessing and memorizing) is not what had been expected, however (hypothesis **2**). The pregnancy of subject and verb has no effect on retention. The pregnancy of function has a negative effect on retention.

3. The correlation between guessing and retention also turns out to be different from what had been expected (hypothesis **3**). The words were not remembered any more often when they were correctly guessed more often. With 6 of the 8 target words there was no correlation between guessing and retention. With 2 of the 8 target words there was a negative correlation: the more often the word was correctly guessed, the less often it was remembered:

To summarize: a pregnant context does result in improved guessing, but not in improved retention, at least not when after the guessing stage a learning stage occurs with the aid of the same context as for guessing.

How is our finding that a pregnant context does not lead to improved retention to be accounted for? Starting from the assumption that the learning effect in our experiment is the result of three causes, namely (1) correctly guessing the meaning[11] (incidental learning); (2) confirming the answer guessed (incidental learning); (3) imprinting with the aid of context (intentional learning); the following explanations are possible.

As a first explanation we may submit that pupils who succeeded in correctly guessing the meaning of a word with the aid of context, had the idea at imprinting that they knew the word already, as a result of which they have not made a maximal effort. (Compare with this the 'state of shock' that wrongly guessing a word can bring about.)

As a second explanation we may submit not only that pregnant contexts may hamper imprinting because they may induce pupils to think that they know the word already, but also that, because of the strong association of context and meaning, insufficient attention is paid to the association of word and meaning.

As a third explanation we may submit that the inherent difficulty of guessing in highly pregnant contexts is too low to bring about a positive learning effect. To remedy this situation guessing should have a higher degree of difficulty. On the other hand, it should not be too high, if the words are to be guessed at all.

These explanations may help to account for the fact that the advantage pupils have in more pregnant conditions—on the basis of (1) their better guessing and (2) the bigger cognitive foothold the context provides them with—is lost in the retention test (new, neutral contexts). The negative effect of the factor of function on retention may be accounted for along similar lines. For it was this factor that made a considerable contribution to the pregnancy of the context (cf. Table 4), which appeared to be disadvantageous at imprinting.

These ideas are mere suppositions. No further conclusions can be drawn at the moment, because with the design that we have used it is not possible to separate the influence of guessing from the influence of imprinting. Further experiments should help us to gain a deeper insight into these problems. What our experiment does make clear—and this has not been shown by any earlier research—is that when words are guessed and learned with the aid of the same context, pregnant contexts do indeed lead to improved guessing but not to improved retention.

(Revised version received July 1990)

NOTES

[1] The authors should like to express their gratitude to Mik Van Es for his helpful comments and criticisms of earlier drafts of this article.

[2] In this article, when we speak about the learning of 'words', we actually mean 'lexemes' (Matthews 1974: 22).

[3] Here it should be remembered that the choice of certain types of words can influence both the guessing and the retention, and that in this connection the relative level of difficulty of a certain type of word in the guessing process is not necessarily the same as the relative level of difficulty in the process of learning. Thus, Liu Na and Nation (1985) found that verbs were the easiest to guess, followed by nouns, adverbs, and adjectives, in that order. With regard to retention, Rodgers (1969: 332) found that nouns were the easiest to learn, followed by adjectives, adverbs, and verbs, in that order.

[4] Although in the investigation carried out by Pearson and Studt (1975) (later, with a different target group, repeated by Perkins and Brutten (1983)) the factors of subject and verb are not mentioned explicitly, the important role of these factors is evident from the examples given. Moreover, it is interesting to mention that in their research Pearson and Studt originally tried to generate different 'levels of context' (i.e. levels of pregnancy), with the aid of 'well-formed syntactic and semantic rules'. As they did not succeed in this, however, they switched over to a validation technique on adult subjects to establish the levels.

[5] Havo/Atheneum: types of Dutch secondary education, roughly corresponding to 'secondary school' and 'grammar school' (but without the classical languages) respectively.

[6] Although this did not ensure that all the pupils did indeed know the words (cf. Saragi *et al.* 1978), this is a real-life situation, considering classroom practice.

[7] The α-reliability of the control test is .13. This low value may be due to either (1) the short length of the test (8 items) or (2) the highly variable p-value of the items (.00; .99) (caused by the intentional variation in pregnancy within the control test) or both, the highly variable p-value limiting the maximally possible inter-item correlation. The reliability of the control test does not matter for our investigation though, as it was the purpose of the

control test not to measure differences between individual subjects but to establish whether groups of subjects assigned to different conditions were equivalent.

[8] The α-reliability of the 8 guessing tests is on average .13. If this is low, possibly as a result of the short length of the test (8 items), it is not really relevant to our investigation, as the test was not meant to measure differences between subjects but differences between groups. Furthermore, it appears from the significant results yielded by variance analysis that the poor test reliability is not problematical.

[9] The α-reliability of the retention test is .55, which is reasonable for a test of this length (8 items).

[10] When the retention test was administered 13 pupils were absent.

[11] We do not know of any research on the effects of the motoric moment in the guessing stage—the writing down of the translation of the foreign words—on receptive retention. It is known that writing down a foreign word does have a positive influence on productive retention (Thomas and Dieter 1987: 250).

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APPENDIX 1

Guessing sheet for condition 1*

1　Le vieil homme marche à l'aide (with the aid of) d'*une canne* pour ne pas tomber.　　　　　　　　　1　...

2　Le jardinier (gardener) remplit (fills) *un arrosoir* pour donner de l'eau aux plantes.　　　　　　　　2　...

3　Les voyageurs regardent *l'horaire* pour s'informer.　　3　...

4　Quelqu'un qui (someone who) a froid met de l'eau chaude dans *la bouillotte* pour réchauffer (warm) son lit.　4　...

5　Le marchand a *un éventaire* pour étaler ses produits.　　　　　　　　　　　　　　　　　　　5　...

6　Le fabricant donne *un échantillon* aux clients pour faire (to let them) essayer ce nouveau produit.　6　...

7　Le garçon de restaurant a *un tire-bouchon* pour servir les clients.　　　　　　　　　　　　　7　...

8　La couturière (dressmaker) coupe (cuts out) *l'étoffe* pour en faire un pantalon.　　　　　　　8　...

9　Je mets les pieds dans *les étriers* pour rester assis (remain seated) au cheval.　　　　　　　9　...

10　L'agent de police met *les menottes* autour (around) des mains pour ne pas laisser fuir (flee) le voleur.　　　　　　　　　　　10　...

11　Je monte (climb up) *l'échelle* pour faire mon travail.　　　　　　　　　　　　　　　　11　...

12　Le potier (potter) modèle *la glaise* pour en faire une statue (statue).　　　　　　　　12　...

13　J'achète *un poêle* pour mettre dans le salon.　　　13　...

14　La femme de ménage (cleaning woman) met *la serpillière* dans l'eau pour laver le plancher (floor).　14　...

15　J'ai *une pelle* pour faire un trou (hole).　　　　15　...

16　Le banquier (banker) ferme *le coffre-fort* à clé pour mettre l'argent en sécurité (in safety).　　16　...

APPENDIX 2

Learning sheet for condition 1

1 Le jardinier (gardener) remplit (fills) un arrosoir pour donner de l'eau aux plantes.	1 watering can
2 Quelqu'un qui (someone who) a froid met de l'eau chaude dans la bouillotte pour réchauffer (warm) son lit.	2 hot water bottle
3 Le fabricant donne un échantillon aux clients pour faire (to let them) essayer ce nouveau produit.	3 sample
4 La couturière (dressmaker) coupe (cuts out) l'étoffe pour en faire un pantalon.	4 fabric
5 L'agent de police met les menottes autour (around) des mains pour ne pas laisser fuir (flee) le voleur.	5 handcuffs
6 Le potier (potter) modèle la glaise pour en faire une statue (statue).	6 clay
7 La femme de ménage (cleaning woman) met la serpillière dans l'eau pour laver le plancher (floor).	7 floor-cloth
8 Le banquier (banker) ferme le coffre-fort à clé pour mettre l'argent en sécurité (in safety).	8 safe

APPENDIX 3

*Test sheet**

1 J'achète *un coffre-fort* pour suivre le conseil de mon père.	1	. . .
2 Je prends *une serpillière* pour aider ma soeur.	2	. . .
3 J'achète *de la glaise* pour m'amuser.	3	. . .
4 Je prends *des menottes* pour assister les hommes.	4	. . .
5 Je vends *de l'étoffe* pour gagner de l'argent.	5	. . .
6 Je présente *un échantillon* pour faire choisir les gens.	6	. . .
7 Je prends *la bouillotte* pour suivre le conseil de ma mère.	7	. . .
8 Je cherche *un arrosoir* pour aider mes parents.	8	. . .

*NOTE The words in italics are the target and control words which were underlined in the original texts.