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**LA THÈSE A ÉTÉ
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**Effect of levels of processing and controlled processes
in second language performance**

Johanne Proulx

A Thesis

in

The Department

of

Psychology

**Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts at
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Abstract

Effect of levels of processing and controlled processes
in second language performance

Johanne Proulx

The purpose of the present study was to investigate the role of surface and meaning information in the processes underlying second language performance. A group of 16 Anglophones and 16 Francophones were asked to listen to a set of English sentences, and were later unexpectedly asked to do a recognition test. Type of processes and levels of processing were manipulated in order to assess the importance of each on incidental learning. It was hypothesized that all the conditions favoring the activation of controlled processes and semantic analysis would result in a higher recognition performance. In particular, it was hypothesized that second language users of English would be more dependent on controlled processes in difficult conditions than would native speakers, and hence would show more of these effects. A five-way analysis of variance conducted on d' values revealed that the conditions favoring controlled processes did not produce a higher recognition performance. Semantically processed sentences, however, were recognized more often as were sentences with an unchanged syntax. However, the results did not support the hypotheses regarding the advantageous effect of controlled processes and are interpreted in terms of possible difficulties in lexical

lookup which might have subsequently interfered with efficient semantic analysis. The results did support, however, the hypotheses regarding the superior effect of semantic analysis over shallow analysis for later recognition, and the role of meaning in recognition performance. The results are discussed in terms of the role of surface and meaning information in second language acquisition.

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**Effect of levels of processing and controlled processes
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The acquisition of a second language is a highly complex phenomenon. In order to fully understand the mechanisms involved, one should consider theories emerging from many different areas of research such as linguistics, sociolinguistics, social cognition, psychology and psycholinguistics. As Neufeld (1979) points out, however, it is very difficult, at this time, to amalgamate all the different approaches to form a comprehensive theory. Our knowledge of second language acquisition is limited to hypotheses still undergoing criticisms: language aptitude (Carroll, 1958); critical period hypothesis (Lenneberg, 1967); developmental null hypothesis (Neufeld, 1979).

When acquiring a second language, people are acquiring a new communication system. A message is not only transmitted through the words chosen by the speakers but also through their attitudes, gestures, facial expressions, intonations and various speech markers.

Speech markers are cues which permit the speakers to reveal themselves in terms of biological, social and psychological states, and listeners to categorize their interlocutors accordingly (Giles, Sherer, & Taylor, 1979). Moreover, speech markers serve to signal ethnic identity. There is, in fact, a very strong correlation between language and ethnicity (Dorian, 1980). Accordingly, people can adjust their speech style to signify their approval or rejection of others,

or to demonstrate their wish to integrate or stay distinct from another community.

In his theory of speech accommodation, Giles (cf. Giles, Bourhis, & Taylor, 1977) demonstrates that people are constantly changing their speech with others in order to reduce or stress the linguistic differences between them depending on the interaction taking place. On some occasions, therefore, people will converge and show a tendency to be more alike in their speech, and, at times, people will diverge and accentuate the differences in their language. In both cases, accent is certainly one of the most frequently encountered speech marker. As a consequence, learners of a second language are often faced with the same language, the same phonemes but spoken in a variety of ways. Therefore, they often have to show a versatile auditory ability to understand their second language.

Acquiring a second language implies much more than developing the aptitude to handle a new phonological system. It also means acquiring a new semantic code. New words are used to designate familiar items and concepts. First, however, people have to remember the new words and their corresponding meaning in order to use them later. Therefore, they need to encode and store this new information in memory before retrieving it for future use.

We know, therefore, that the acquisition of a second language involves learning at least at two different levels: phonetic where the individual has to learn and recognize new sounds, and semantic where new words need to be acquired. In a monolingual context, Mason and Sala (1978) considered these two levels simultaneously. They

looked at the importance of the semantic and surface information in reading and recognizing sentences. They concluded that semantic and surface information are interacting components of comprehension and memory processes. Furthermore, they concluded that this interaction of operations may be either automatic or controlled. Based on Masson and Sala's paradigm, the present study examines the importance of semantic and surface information with reference to automatic and controlled processes while listening to sentences presented in the subjects' first and second language.

Levels of processing

The importance of semantic processing for comprehension and memory performance is well covered by the levels of processing theory. Craik and Lockhart (1972) suggested that the deeper the analysis performed on some items, the higher the likelihood of recalling and/or recognizing those items later on. Basically, the theory involves a hierarchy of processing levels, ranging from perceptual to semantic, where deeper analysis refers to a greater degree of semantic analysis. Memory is conceptualized as the by-product of the processing taking place.

In addition to their memory system, Craik and Lockhart suggested two different types of rehearsal mechanisms. Type I, or maintenance rehearsal, simply serves to maintain the items at a particular level without leading to improved memory performance. When attention is taken away from the item, the information is lost at the rate corresponding to its level of processing, that is, slower rates for

4

deeper levels. This position was later challenged by Nelson (1977), Baddeley (1978) and Glanberg and Adams (1978) who showed that maintenance rehearsal can lead to better retention. This new proposal challenges a nice distinction between Type I and Type II as proposed by the original authors. The second type of rehearsal mechanism, type II, or elaborative rehearsal, leads to improved memory performance because it involves deeper analysis of the stimulus. The authors do not specify, however, whether the deeper analyses are the cause or the result of controlled processing. Presumably, the concept of automatic versus controlled processing can be introduced in the model at this point. Moreover, the effect of levels and controlled processing seem to be undifferentiated.

Craik and Tulving (1975) conducted a series of 10 experiments to illustrate the levels of processing model. The subjects were given a perceptual-reaction time test followed by an unexpected recognition test. To control the level at which subjects would process information, Craik and Tulving asked questions requiring a relatively shallow level of processing, such as "Is the word in capital letters?", and a deep level of processing such as "Is the word a type of fish?" The questions were read to the subject and after a two-second delay, a word was presented through a tachistoscope for 200 msec. Subjects had to press one of the two response keys as fast and as accurately as they could. Craik and Tulving hypothesized that memory performance would vary according to the depth at which the word had been processed. More specifically, they expected a higher retention rate for the words on which a deeper analysis had been

performed.

They consistently found that when semantic questions (deep analysis) were asked about a particular word, its retention was always better than words judged on their typescript. In Experiment 3, subjects were asked to recall as many words as they could instead of recognizing them and, in another situation, subjects were told at the very beginning that there would be a free recall test at the end (Experiment 4). The previous results also applied to recall and were also true for both incidental and intentional learning. The semantic task, however, always took longer to execute than the nonsemantic one. The longer processing time rather than the deeper analysis of the material could have accounted for the higher retention rate. Craik and Tulving, then, introduced a shallow task which took longer to perform than an easy semantic task (Experiment 5). The nonsemantic task consisted of identifying the pattern of vowels and consonants making up the word. The results were similar to the previous ones. The task requiring the deeper analysis produced a better memory performance. The qualitative nature of the task, therefore, and not the amount of processing time determines memory performance. Processing time, consequently, could not be utilized as a measure of level of processing. This conclusion was also confirmed by Season and Murray (1976).

When proposing their model, Craik and Lockhart (1972) had already reexamined existing data and translated the results into levels of processing language. For instance, they reported experiments on incidental learning of sentences. Rosenberg and

Schiller (1971) had shown that performance on a recall test following a semantic task was superior to recall of words from sentences which were not processed semantically. Once again, no distinction was made between automatic and controlled processes. In reporting Treisman's (1964) study on selective attention, however, Craik and Lockhart mentioned that the further processing needed to shadow the message in one ear was sufficient to increase the durability of the memory trace. Treisman had presented two messages dichotically and instructed her subjects that one was not relevant and should thus be ignored. The subjects' task consisted of shadowing the relevant message. The deliberate act of selecting information required more processing than is ordinarily the case while listening to a message. If we consider shadowing a message to be an uncommon activity on the subject's part, we can then assume that it is a task requiring attention, concentration, and effort from the subject. Shadowing a message, therefore, requires controlled processing and in such a situation, although they do not specifically say so, Craik and Lockhart appear to believe that the durability of the memory trace is increased. Controlled processing, then, from the levels of processing view, has the same effect as semantic processing.

Craik (1981) later commented on the quality of the encoding processes and drew a line between degree of effort involved and controlled processes. He maintained that cognitive effort by itself, contrary to what Tyler, Hertel, McCallum, and Ellis (1979) proposed, is not responsible for higher rates of retention. Kellogg (1984) has also supported this hypothesis in reporting correlations between

measures of effort and measures of learning that did not significantly differ from zero. Craik maintained that the level at which this effort is deployed is what makes the difference. In general, deeper semantic processes require more effort than perceptual ones, accounting for the positive correlation between effort and retention. Craik and Tulving's (1975) fifth experiment is a good illustration of a task requiring more cognitive effort without producing a higher retention rate. In an experiment where recognition of attended and unattended visual material was examined, Kellogg (1980) showed that attention is useful but not essential for long-term storage. Degree of effort alone, then, just like processing time, is unlikely to explain or predict better retention rates. As a result, the degree of effort invested in learning something new, might not be the most important factor in the learning process.

Elaboration

The original formulation of the levels of processing theory had proposed a strict hierarchical model where cognitive analyses ranged from perceptual to semantic. The model as it was, however, could not explain all the results obtained in different experiments, and, accordingly, was modified. According to this model, positive and negative answers to same-level questions should be remembered alike. Craik and Tulving (1975) noticed, however, that words responded to positively were better remembered than words to which a negative answer was made. The concept of elaboration or richness of encoding was then introduced to the original model in order to explain this

kind of result. Positive answers "fit" the question and thus form an integrated unit. The importance of semantic or depth of analysis is maintained but the authors stress that elaboration or spread of encoding contributes to a "richer" memory trace. Craik and Tulving further manipulated encoding elaboration more directly by using very simple and very complex sentences. Subjects read the sentences on a card and, after a ready signal, were presented a word on the tachistoscope. The subjects' task consisted of pressing the "yes" key if the word was appropriate for the sentence and the "no" key if it was not. They found that the more complex the sentence, the better the recall of words but only for positive responses. They finally concluded that along with depth of processing, other factors had to be considered to account for memory performance. The complexity of the sentence, the degree of compatibility between the target word and sentence context, and the presence or absence of cues were all important elements contributing to the performance of their subjects. Adding more elaborations, however, does not guaranty a better memory performance. In fact, it can sometimes have the opposite effect (Eich, 1985). In order to be efficient, therefore, elaborations need to be associatively related to the information to be retrieved (Fisher & Craik, 1980). Stein and Bransford (1979) showed that semantic congruity of elaborations, as tested by Craik and Tulving (1975), does not necessarily lead to a better retention. The subjects in Craik and Tulving's experiment, therefore, probably had the required level of skill and knowledge to understand the meaning of the sentences they were asked to learn (Bransford, Stein, Vye, Franks, Auble, Mezynski, &

Perfetto, 1982). Semantic processing remains essential in the model for a high retention rate but other factors, although not entirely circumscribed, are also playing an influential role.

Lockhart, Craik, and Jacoby (1976) kept the original idea of depth of processing but abandoned the rigid and strict series of layers. Craik and Jacoby (1975) had already clarified this point by specifying that a certain ascending order remained important, that is, some sensory processing must precede semantic analysis but the term "domains" of processing was more appropriate since further processing within a level was possible. They proposed that a "lateral spread of encoding" may better represent further processing than the original hierarchical series of levels. They were introducing the idea of levels of processing within a given level.

Klein and Saltz (1976) found evidence for the occurrence of processing within the semantic level. They found that processing a concept on two semantic dimensions (e.g. fast-slow and happy-sad, or big-little and pleasant-unpleasant) led to better recall of the concept than processing it on one semantic dimension. Stevenson (1981) also found evidence for degrees of semantic processing. She asked her subjects to do a sentence continuation task for sentences containing either transitive or intransitive verbs. She found that transitive sentences were recalled better than intransitive sentences. For instance, sentences like "The door was opened" were recalled better than sentences like "The door opened". Moreover, transitive sentences were recalled better if a causative continuation was produced. That is, when subjects added "by John" instead of "very

suddenly" to "The door was opened", they remembered better. The qualitative difference (causative-noncausative) of the same semantic task (sentence continuation) produced different degrees of semantic processing. Johnson-Laird, Gibbs, and de Mowbray (1978) found that the greater the number of dimensions a word has in common with a target category, the better it will be recalled. They also specified that processing a word did not necessarily mean processing all the dimensions of that word. Meaning, therefore, is not an all-or-none phenomenon.

Distinctiveness

The fact that some items when meaningfully dealt with are better remembered than others can already be explained better by the updated model. Jacoby and Craik (1979) further refined the model by elaborating on the distinctiveness of encoding. By distinctiveness, Jacoby and Craik pointed to the role of the "contrastive value of information" in encoding and, later, in retention. The more an item differs from others, the easier it can be remembered. The less a target item differs from others, the harder it is to remember it because its relevant information overlaps with that of the other items. More specifically, distinctiveness refers to the similarity among traces created by encoding mechanisms (Nelson & McEvoy, 1979). Packman and Battig (1978) interpreted their results in terms of distinctiveness of the memory trace. They found that both recall and recognition were superior when words had been analyzed by "pleasantness" processing as opposed to six other semantic dimensions.

(concreteness, imagery, categorizability, meaningfulness, familiarity, and number of attributes). They believed that pleasantness processing produced a better memory performance because there is more uniqueness or distinctiveness in pleasantness encodings.

Distinctiveness is always relative to some background information and is always directly related to meaning. When a word is being processed, therefore, the meaning that is extracted from that word depends on how similar or different this word is compared to the other ones presented with it. From this assumption arises the importance of original context. The more accurately the original context is recreated at retrieval, the better the memory performance. Smith, Glenberg, and Björk (1978) had found, however, that environmental context influences recall but not recognition. Jacoby and Craik (1979), nevertheless, kept the original idea of depth of processing and added the importance of context. They also suggested that semantic processes are more abstract and generally require more attention and effort to execute. They also emphasized that the greater the depth and degree of elaboration of an item, the more unique and discriminable the memory trace (as opposed to more durable).

Craik (1981) later reaffirmed the importance of semantic analysis but also stressed that considering only depth of analysis to account for memory performance was an oversimplification of the reality. Despite the fact that other factors have to be considered to explain retention such as the elaboration of the cognitive processes,

the degree of cognitive effort at work in a particular level, the conditions prevailing at encoding and their similarity at retrieval, it nevertheless remains that semantic analysis is of crucial importance. Consequently, 'a second language learner is likely to benefit from semantic analysis to encode new words since it appears to facilitate a good memory performance.

Recognizing the importance of semantic analysis for successful memory performance does not mean accepting the levels of processing model in its totality or without acknowledging its weaknesses. Many experiments supported the conclusions of the model: in the verbal domain (e.g. Epstein, Phillips, & Johnson, 1975; Treisman & Tuxworth, 1974) as well as with nonverbal material such as recognizing pictures (Friedman & Bourne Jr., 1976) and chess positions (Lane & Robertson, 1979). However, there are also many experiments which only partially supported the conclusions of the model. For instance, semantic processing results in poor performance when subjects are tested on a perceptual test (Fisher & Craik, 1977); rhyme acquisition can be superior to semantic acquisition under certain test conditions (Stein, Morris, & Bransford, 1978). It would appear that the levels of processing theory is supported when subjects are tested on semantic questions, not when they are asked to recognize rhymes (Morris, Bransford, & Franks, 1977). Klein (1970) had already suggested that different tasks can force subjects to use different strategies. The relation between the structure of the memory trace and the task executed was also investigated elsewhere (e.g. Arbuckle & Katz, 1976). Subjects' expectation of the test is also believed to be a factor

influencing the results of memory tests (Connor, 1977). Conceptual processing, therefore, is not necessarily superior to perceptual processing (McDaniel, Friedman, & Bourne Jr., 1978). Moreover, Goldstein, Schmitt, & Sheirer (1978) concluded that deep processing instructions led to higher recall than did the shallow processing instructions. However, they found that subjects will not encode semantic information unless specifically forced to do so.

There are other experiments which only supported a very mild version of the levels theory. Nelson and McEvoy (1979) had subjects study a list of single words that were presented either visually or auditorily. They tested recall immediately and after a fifteen-minute delay by using either word endings or categories as extralist retrieval cues. They found that word ending cues were just as effective as category cues on immediate recall, but less effective on delayed recall. They concluded that, contrary to the levels model, sensory analyses do not occur simply to permit deeper analyses to take place. The results of sensory analyses are stored although, as the levels theory stipulates, they are not as persistent as the results of semantic analyses. The fact that the results of sensory analyses are stored was also suggested in another study where superficial as well as semantic information played a role in remembering (Morris, Bransford, & Franks, 1977). Finally, despite the efforts of the proponents of the levels of processing approach to invalidate the previous stage theory of memory, memory can still be understood through a stage theory (e.g. Composite holographic associative recall model, Eich, 1985).

The weaknesses of the model also reside in the fact that there is the problem of finding an independent measure of depth (Baddeley, 1978) and degree of elaboration of the processing; and of defining what depth really is independently of the outcome of memory tests (Nelson, 1977). Finally, even if levels of processing proposes a very interesting framework of memory, and even if it were at the basis of many research proposals, levels of processing, contrary to what a good theory should be, is not easily refutable (Bruce, 1985). Despite its inherent problems, however, the levels of processing theory was successful in demonstrating the relative importance of semantic analysis for semantic-related tasks. It is believed that second language learners are faced with semantic-related tasks in their novel communication experience. They much more often have to retrieve the meaning of words than their physical features to communicate ideas and understand others'. Given what the individual has to do to understand the recently acquired material, and given the results obtained in levels experiments, it seems appropriate to favor semantic analysis to implement new words in the second language learner's memory.

Another view: Number of mental operations

If semantic analysis were the major factor accounting for good memory performance, as proposed by the levels model, what would the consequences of various types of perceptual operations be, then, on memory? Kolers (1973) found that subjects were better at recognizing sentences that had originally been presented in an unfamiliar typography. Another experiment later revealed that subjects were not

merely distinguishing between words that were either easy or difficult to read, eliminating difficulty of reading as a possible explanation (Kolers, 1974). Kolers and Ostry (1974) hypothesized that the analyses taking place at the graphemic level were responsible for the higher recognition rate.

They had subjects read a deck of 60 sentences, 30 in normal (N) orientation, and 30 inverted (I) on the X-axis. Subjects later had to sort all the sentences in a second deck of 120 sentences. Half of these were the 60 original ones, 30 of which appeared in the same orientation (N or I) while the other 30 appeared in the other orientation. The remaining 60 sentences were new. The subjects' task consisted of classifying each of the 120 sentences into one of three different categories: new sentence; old sentence, same orientation; old sentence, different orientation. The interval between finishing the Read deck and starting the Recognize deck ranged from 3 minutes to 32 days. Their results indicated that, overall, sentences whose words appeared in the same orientation in both the Read and Recognize decks were recognized better than sentences which were presented in a different typography the second time around. More importantly, however, sentences that first appeared in the inverted orientation were better recognized than sentences in the normal orientation. Kolers (1975) explained this latter result by arguing that the more numerous processes required to analyze the inverted typography provide more chances for an inverted sentence to be recognized. Kolers further specifies that recognition occurs when the analyses performed during encoding are reactivated later on. This position stands as a

sharp contrast to the previous model which emphasized the crucial role of semantic processing for good memory performance. In fact, Kolers specifies that the ensemble of analyses by itself may explain recognition with no need to refer to the "mental contents" it is believed to produce. In other words, the better performance can be accounted for by what the subjects were doing to the sentences rather than what they were encoding about them (Kolers, 1979). Kolers' proposal raises interesting possibilities in terms of how a person could enhance his/her performance in recognizing new words. For instance, given that the same phonemes will be heard in a variety of ways (different accents) would one's performance be enhanced if he/she were to listen to these phonemes in many different accented ways? Kolers' position, however, does not entirely reject the importance of meaning. In fact, semantic analysis is part of what the reader does to the sentences eventually and, in that respect, the semantic element is contributing to the whole end result. Kolers considers semantic analysis to be just as important, no more no less, as any other analyses. Memory performance can be explained by the extent and complexity of the analytical operations (Kolers, 1979).

Following Kolers' position, memory is not conceptualized as a product of cognitive processes anymore but in terms of skills and processes necessary for encoding. Moreover, these skills and processes can, but need not be related to semantic analysis. We are left, then, with two contrasting formulations of memory and it seems that both could be helpful in explaining the cognitive processes taking place when one is in the process of acquiring a second

language.

Masson and Sala (1978) bridged the gap between the two different views. They conducted a study examining the importance of the semantic and surface information in reading and recognizing sentences. Proposing another explanation for Kolers' results, they suggested that reading is an interactive process involving both data driven and conceptually driven processes. The interaction between the two may be either automatic or controlled. Automatic processing does not require attention whereas controlled processing is attention-demanding (Schneider & Shiffrin, 1977). More specifically, automatic processing is fast, does not require any effort, and is not limited by STM capacity; whereas controlled processing is slow, requires effort and is capacity limited (Fisk & Schneider, 1984). Hasher and Zacks (1979) chose the term "effortful" processes to better represent what controlled processing represents.

Masson and Sala's first hypothesis was aimed at providing information to answer the following question: Does controlled processing of sentences involve the meaning of the sentence as opposed to its graphemes?

They used a paradigm such similar to that which Kolers had used with three new manipulations regarding the task to execute, the wording and the meaning of the sentences. First, Masson and Sala introduced a new task. They had half their subjects read sentences aloud (like Kolers) and the other half had to do a sentence continuation task. They expected the recognition of originally

inverted sentences to be high, irrespective of the task executed on them. They also expected recognition to be high among subjects who executed the sentence continuation task.

The second manipulation consisted of presenting half of the original sentences in a paraphrase form in the Recognize deck. They expected that their subjects would be good at recognizing paraphrases. They also expected reading speed to be facilitated on paraphrases as well as on the verbatim form of the sentences. Thirdly, they expected that memory for typography would be better when a sentence was presented in the same form a second time around.

Finally, Messon and Sala manipulated the meaning of some sentences by replacing at least one word in the sentence by its antonym, changing the meaning of the sentence completely. In this latter case, they hypothesized that if the repetition of the same analyses plays an important role in recognition (as Kolers suggests) then one would expect a high rate of false recognition for these sentences.

They utilized a Read deck of sentences and a Recognize deck of sentences. They had some subjects performing the Read Aloud task, and others performing the Sentence Continuation task. All subjects had to indicate whether a sentence in the Recognize deck meant the same thing as a sentence in the Read deck. If it were recognized to be an old sentence, then subjects had to specify whether it had appeared differently in the Read deck. Moreover, subjects had to give a rating (from 1 to 7) to indicate their confidence in the judgment they were making. Subjects' answers were computed as hits and false alarms,

from which Masson and Sala derived d' values. An analysis of variance was used to analyze the d' values.

They found that recognition of meaning was high for originally inverted sentences, independently of the task executed on the sentences. They concluded that inverted typography induced controlled processing which, in turn, produced an elaborated memory representation. They also found that for originally normal sentences, the read aloud task produced a poor performance whereas the sentence continuation task produced a good recognition performance. This finding revealed the importance of semantic analysis and thus supported the levels of processing model. Thirdly, they found that verbatim sentences were recognized more often than paraphrases but the recognition of paraphrases was good enough to indicate the importance of meaning over surface information. Their results, therefore, generally supported the idea that recognition also depends on some semantic information when target sentences are being "extensively processed at encoding".

A second experiment replicated the findings of the first one and also demonstrated that originally inverted sentences produced faster reading the second time independently of the test form (paraphrase or verbatim). Recognition, therefore, cannot rely on the same pattern-analyzing operations as Kolers had proposed. It is also dependent on memory for meaning. Masson and Sala concluded that reading inverted sentences causes more extensive processing both at the level of the graphemes and at higher levels such as wording, syntax, and meaning.

As opposed to Kolers, Masson and Sala clearly demonstrated the importance of semantic processing for sentence recognition. They further specified that meaning is not processed independently of the surface structure but seems to be more important than the perceptual operations. Sentence comprehension and recognition are mediated by perceptual and semantic analyses which are, therefore, interactive processes and depending on the presentation of the material to be processed, this interaction can require effort or can be done automatically. Graf and Levy (1984) supported the conclusions drawn by Masson and Sala.

The overall performance of beginners in a second language varies according to many factors. At the very basis of their performance is the ability to deal with new sounds, new grammatical structures, and new words. The present study examines subjects' ability to recognize sentences varying in accent and structure. It is assumed that a good recognition performance is an indication that some learning took place. Accordingly, it is believed that Masson and Sala's study provides a very useful framework from which the role of surface (sound) and semantic information can be evaluated in the context of second language performance.

The purpose of the study was twofold. First, the study was designed to verify if it would be possible to replicate Masson and Sala's pattern of results when subjects are asked to listen to sentences instead of reading them. Is the concept of interaction

between surface and semantic information still valid in listening experiments or is it specific to reading experiments? A previous study (Stevenson, 1981) has already confirmed the importance of semantic processing for high retention of aurally presented sentences.

Second, when subjects are not familiar with the material presented to them (second language learners) is surface information helpful or detrimental to higher retention rates?

A group of Francophones and a group of Anglophones were asked first to listen to a set of English sentences (Listen deck) and, later, to do a recognition test. Half of the sentences were spoken with regular English pronunciation, the other half with a German accent. The Francophone group was expected to resort to controlled processing in both the regular and German accent conditions, whereas the Anglophone group was expected to resort to controlled processing in the German accent condition only. According to the theory covered earlier, controlled processing produces better memory performances. It was hypothesized, therefore, that Francophones would perform better in both conditions than Anglophones in the first (regular) condition. Furthermore, Anglophones should perform better in the German accent condition than in the regular condition.

In the same way, the construction of the sentences was manipulated in order to have a simple and complex condition at the level of the syntax as well. Half of the sentences, therefore, had a simple syntax which, it was believed, would permit more automatic processing. The other sentences, however, had a complex, less

familiar structure which would require more controlled processing. Again, it was hypothesized that increased controlled processing would produce better memory performances and this should be true for both groups. More specifically, the complex sentences were expected to produce a higher recognition rate than the simple sentences.

Both groups had to execute one of two tasks for each sentence in the Listen deck: A headline task which consisted of finding a brief title summarizing the main idea in the sentence. This task was believed to induce deep or semantic processing. A rating task was also required and it consisted of evaluating the syntax or construction of the sentence in terms of easy or complex. This second task was introduced to induce shallow processing of the sentences. According to the levels of processing theory, sentences undergoing semantic processing (headline task) should be recognized better later on. It was hypothesized, therefore, that sentences for which a headline was found, would be better recognized than sentences whose structure was evaluated, this should be true for both groups. The insertion of two different tasks was intended to differentiate the effects of controlled processes on one hand, and deep processing on the other.

Following the presentation of the Listen deck, subjects were unexpectedly presented a second set of sentences, the Recognize deck, which contained all the sentences presented in the Listen deck plus an equal number of new ones. For the Recognize deck, half of the original sentences remained syntactically identical (Simple (S) or Complex (C)). The other half was different, that is, S became C, and

C became S. As in Masson and Sala's study, this manipulation was introduced to focus on the importance of meaning in recognizing sentences.

In short, then, this study was aimed at replicating Masson and Sala's findings in the auditory modality. German accented speech was substituted for inverted typography. The shallow task consisted of rating sentences as opposed to their Read Aloud task. The semantic task consisted of a headline task as opposed to their sentence continuation task (since a sentence continuation task was considered to be too difficult for the Francophone subjects).

In addition to native speakers of English, the study included a group of Francophone subjects. This group was expected to provide information about recognition performances when meaning information is less readily available. Two possible outcomes were considered: surface information can be more important for this particular group because of the activation of controlled processing mechanisms; or, surface information can be detrimental because the interaction between meaning and surface information is difficult.

Method

Subjects

Sixteen Francophones and 16 Anglophones were chosen from an available sample of volunteers recruited by advertisement at French and English universities. There were eight males and eight females in

each of the Anglophone and Francophone groups. The mean age for the Francophone group was 24.06 years and 22.56 for the Anglophone group.

Subjects were selected, according to the results obtained on a screening test designed to estimate one's level of competence in his/her mother tongue and second language (L2) (cf. Favreau & Segalowitz, 1982). The criteria used for the Francophone group were a comprehension score ranging between 50% and 80% on a listening task in L2 (Mean = 60.31%, s.d. = 10.96), and a reading speed of 200 words per minute or less in L2 (Mean = 181.62 wpm, s.d. = 2.78). These criteria were selected to ensure that the subjects would be functional but not too highly skilled in their second language. The Francophone subjects were also chosen on the basis that they did not use English in their everyday activities such as attending an English university, working in an English milieu or having English relatives.

The Anglophones were chosen on the basis of their performance on the English listening task which also had to be between 50% and 80% (Mean = 72.19%, s.d. = 6.61). Two Anglophone subjects had to be discarded because they had not followed the instructions during the experiment, and were therefore replaced in the original sample.

Furthermore, all subjects were required to have higher scores in their mother tongue than in their second language. Finally, all subjects reported normal hearing and no familiarity with the German language. Subjects in both groups were tested individually in an 80-minute session and were paid for their participation in both the screening test and the present experiment.

Screening Procedure The purpose of the screening test was to evaluate the subjects' reading and listening proficiency in both their first and second languages, using standardized texts followed by multiple-choice questions (cf. Favreau & Segalowitz, 1982). The texts and questions were supplied by the Educational Developmental Laboratories Inc., Don Mills, Ontario. The English texts (Series GH10/19 and Series 1J/9/18/20/21) had an average length of 1,408 words whereas the French texts (Series GH9/8 and Series 1J6/9/16/20) had an average length of 1,293 words.

Subjects were instructed to silently read for comprehension as quickly as possible and then answer multiple-choice questions. Subjects were timed by stopwatch while reading two different texts in each language and the reading rate for each language was calculated as the mean number of words per minute across the two texts in a given language. The order of presentation of the texts was counterbalanced across subjects.

Subjects were also asked to listen to two texts in French (Mean = 185.71 wpa) and two texts in English (Mean = 185.61 wpa) played on a taperecorder and then to answer multiple-choice questions. The order of presentation of the two different tasks, that is reading and listening, was also counterbalanced.

Design

The experiment was constructed on the basis of a 2 x 2 x 2 x 2 x 2 mixed design. There was one between-group variable: Group (Anglophones, Francophones); and four within-subject variables: Sentence structure (simple, complex), Phonology (no accent, accent),

Task (rating, headline) and, finally, Test wording (same, different).

Materials

A list of 160 sentences was presented to subjects with a Pioneer taperecorder (Model CT-F850). Subjects listened with Koss headphones (Model K/6A), and their answers were recorded. Half of these 160 original sentences were read with a German accent, and the other half with the standard English pronunciation. For the recognition task which followed the initial presentation of sentences, another set of 160 new sentences was introduced. The second set was also equally divided between German and English accent. All the sentences were spoken in the same voice to avoid confounding variables such as different voices, different tones etc. Recognition of words spoken in the same voice as that of the first presentation is more accurate than recognition of words when voices differ from the first to the second presentation (Madden & Bastian, 1977). Moreover, subjects can recall which one of two different voices initially spoke a word (Crain & Kirsner, 1974). Although these findings were true in other experiments for short intervals, great care was taken here to ensure that only accent would influence recognition performance.

A pool of 320 sentences was originally constructed with half of these sentences containing key words common to a few sentences (e.g. cake, house, tourists, etc.) and the other half with key words chosen at random. Accordingly, half the sentences contained one of the 20 key words that were repeated a number of times and, the other half

contained other key words that were not necessarily repeated a fixed number of times. This step was taken to ensure that subjects would not recognize a sentence on the basis of a single word only, but would be forced to consider the idea contained in each sentence. Therefore, hearing the word "cake" during the recognition task was not sufficient to permit a subject to say that this sentence was contained in the previous presentation of sentences since several sentences contained the word "cake". Furthermore, the words making up the sentences were chosen for their simplicity to ensure that Francophone subjects would be able to understand them. It was assumed, then, that subjects would concentrate on processing the whole sentence rather than focus on the individual words.

Each one of the 320 sentences was translated into a more complex form using either a double negative and passive form or constructions using the expression "the one which...". For example, the sentence "He played the song that brought back a lot of memories" was transformed into the more complex "The one which he played was the song which brought back a lot of memories". In the same way, the sentence "The deputy revealed the promising project to her voters" was changed to "The not unpromising project was revealed by the deputy to her voters". The original pool, therefore, contained 320 simple sentences and 320 matching complex sentences. The 320 complex sentences contained 160 of each of the two complex forms. To verify the complexity or simplicity of each sentence, four raters were asked to read all of the 640 sentences and assign to each a number from 1 to 5, indicating simple (1) or complex (5). The results of this

verification procedure confirmed that, as intended, a complex sentence was indeed complex and vice versa.

The order of presentation of all the sentences was then randomized to avoid meaningful links or associations from one sentence to the next. From this pool of sentences eight new lists of 40 simple sentences each and eight new lists of 40 complex sentences each were then put together. Lists 1-4 were subsequently randomly chosen to supply the stimuli, and Lists 5-8, the distractors.

The list of 160 sentences forming the stimuli (see Appendix A) was constructed as follows: the first 10 sentences of each of the four simple lists made the 40 EE sentences (easy syntax, easy (English) phonology); the next 10 sentences made up the 40 EH sentences (easy syntax, hard (German) phonology); the third set of 10 sentences (from the complex lists) composed the 40 HE sentences (hard syntax, easy accent); finally, the last 10 sentences on each complex list made the 40 HH sentences (hard syntax, hard phonology). The distractors were put together exactly the same way with the remaining eight lists.

The recognition task used 320 sentences, that is, the 160 distractors and the 160 stimuli (see Appendix B). Half of the stimuli, however, were presented in the other syntactic structure than they had originally been. For instance, instead of having the 40 EE as before, 20 of those sentences were changed to HE (hard syntax but keeping the easy phonology). In the same way, 20 of the 40 EH sentences were changed to HH, 20 of the 40 HE sentences were changed to EE, and, finally, 20 of the 40 HH sentences were changed to EH. In

the recognition test, then, subjects listened to four sets of 40 new sentences and four sets of old sentences (stimuli) with half presented exactly as they had been the first time and half in the other syntactic form.

The order of presentation of each sentence in the list of stimuli and in the list containing both the stimuli and the distractors was randomly assigned. Moreover, subjects were tested in four different groups in order to counterbalance the order of presentation of the stimuli. Accordingly, the 40 sentences forming the EE sentences for Group 1, were presented under the form EH to the second group, under HE to the third, and HH to the fourth. In the same way, the 40 EH sentences for Group 2, became HE for Group 3, HH for Group 4, and, EE for Group 1. All the sentences, therefore, were presented in all possible combinations of syntax and accent variations across subjects.

Both lists of sentences were recorded on a Hitachi taperecorder (Model D-85a) in a sound-attenuated booth.

Procedure

Once subjects had agreed to participate in the experiment they were instructed, first of all, to listen to a series of sentences played on a taperecorder while doing one of two tasks for each sentence: a rating task (say whether sentence is easy or complex) or a headline task (find a short title summarizing the main idea contained in the sentence) (see Appendices C and D). Each task had to be executed in a six-second interval. Subjects gave their answers aloud and were recorded. After six seconds, another sentence was

read and the subject had to execute its corresponding task (see Appendix E). The order of presentation of the sentences was randomized before being presented to the subjects, so were their corresponding tasks. Prior to randomization, each sentence had been assigned a task to assure that an equal number of each one of the tasks would be in all categories of sentences.

When this first part of the experiment was completed, subjects were given a second set of instructions (see Appendices F and G). They were told that they would listen to a second set of sentences containing old and new sentences. Their task consisted of recognizing the idea contained in each sentence (and not the structure of the sentence) and say whether or not they had heard this idea in the previous set of sentences. They were told that for a completely new sentence, they would have to answer "no"; for an old sentence, in the original or transformed structure, they would have to answer "yes". Subjects had not been warned beforehand that they would have to do this recognition task after the presentation of stimuli.

Results

Each subject's answers were compiled into hits and false alarms. An answer was considered a hit when a subject recognized an old sentence, independently of the structure of the sentence. Consequently, each subject had 16 different hit scores, one for each condition. An answer was scored as a false alarm when a subject answered "yes" to a new sentence. Given that new sentences were presented in four different ways, each subject had four different

false alarm scores. Unanswered questions by subjects were not included in any analyses.

Hits and false alarms were later transformed into d' values. The advantage of working with d' is that d' is not influenced by the receiver's specific criterion nor is d' influenced by strategy-related instructions given to the subjects (Elliott, 1964). The d' value, therefore, is presumed to give the experimenter a discrimination index independent of response bias factors (Hochhaus, 1972). The higher the d' value, the better the recognition performance by the subject. When $d' = 0$, both the signal and noise curves are confounded and the subject cannot objectively differentiate between the two. In such a situation, therefore, subjects are as likely to score a hit as they are to score a false alarm. Consequently, $d' = 0$ indicates performance at chance level.

Sixteen different d' values, corresponding to the 16 different conditions, were calculated for each of the 32 subjects. Tables 1 and 2 contain all the d' values across Francophone and Anglophone subjects respectively. A hit rate corresponding to a particular presentation in the Listen deck, for example, simple structure and no accent, was evaluated in terms of the false alarm rate for that same type of presentation. Consequently, each of the four false alarm rates was used four times each to produce the 16 d' values. The hits and false alarms were transformed into d' following Hochhaus (1972).

A five-way analysis of variance was performed on the d' values (see Appendix H for source table). The analysis yielded five main effects showing, first of all, that Anglophones obtained a higher

Table 1

Francophone subjects' mean d' values (and standard error of means) for 16 conditions.

Syntax	Test wording	
	Same	Different
Regular accent		
Simple		
Rating task	1.64 (0.20)	1.36 (0.24)
Headline task	2.48 (0.25)	1.84 (0.23)
Complex		
Rating task	1.27 (0.25)	1.16 (0.27)
Headline task	2.02 (0.19)	1.58 (0.24)
German accent		
Simple		
Rating task	0.78 (0.14)	1.10 (0.16)
Headline task	1.41 (0.14)	1.26 (0.16)
Complex		
Rating task	0.81 (0.20)	0.85 (0.13)
Headline task	1.39 (0.21)	1.15 (0.16)

Table 2

Anglophone subjects' mean d' values (and standard error of means) for 16 condition.

Syntax	Test wording	
	Same	Different
Regular accent		
Simple		
Rating task	1.75 (0.20)	1.79 (0.17)
Headline task	2.51 (0.22)	2.53* (0.20)
Complex		
Rating task	1.59 (0.16)	1.25 (0.18)
Headline task	2.39 (0.25)	2.47 (0.20)
German accent		
Simple		
Rating task	1.12 (0.14)	1.64 (0.15)
Headline task	1.96 (0.18)	2.12 (0.20)
Complex		
Rating task	1.01 (0.14)	0.97 (0.20)
Headline task	2.35 (0.26)	1.77 (0.26)

recognition rate than Francophones ($F(1,30) = 5.48, p < .05$); simple sentences were recognized more often than complex sentences ($F(1,30) = 8.23, p < .01$); and non accented sentences were recognized more often than accented sentences ($F(1,30) = 43.20, p < .001$). The headline task produced a higher recognition performance than the rating task ($F(1,30) = 64.01, p < .001$). Finally, sentences which were presented in the same syntax structure in the Recognize deck were recognized more often than sentences whose syntax had been changed ($F(1,30) = 6.37, p < .05$). Table 3 presents the mean d' for each level of the five factors.

A Group by Task interaction was obtained ($F(1,30) = 4.19, p < .05$) and a post-hoc Newman-Keuls analysis revealed that Anglophones were better at recognizing sentences when they had previously performed the headline task (Mean $d' = 2.26$) rather than the rating task (Mean $d' = 1.39$). The difference between the two different tasks did not reach significance for the Francophones (Figure 1).

A Group by Test wording interaction was also obtained ($F(1,30) = 4.22, p < .05$) and post-hoc analysis showed that Anglophones (Mean $d' = 1.82$) were better than Francophones (Mean $d' = 1.29$) at recognizing sentences whose structure was changed in the Recognize deck. There was no difference between "same" and "different" for any of the two groups (Figure 2).

An Accent by Test wording interaction reached significance ($F(1,30) = 6.16, p < .02$). A Newman-Keuls analysis indicated that recognition was higher in the no accent "same" condition (Mean $d' = 1.96$) than in the accent and "same" condition (Mean $d' = 1.35$).

Table 3

Mean d' values for factor levels

<u>Factors</u>	<u>Levels</u>	<u>Means</u>
Group	Anglophones	1.82 *
	Francophones	1.38
Sentence	Simple	1.71 **
	Complex	1.50
Accent	No accent	1.85 ***
	German	1.36
Task	Rating	1.26
	Headline	1.95 ***
Test wording	Same	1.66 *
	Different	1.55

Note: Starred values were significantly different from the value for the other level of a given factor. * $p < .05$, ** $p < .01$, and *** $p < .001$.

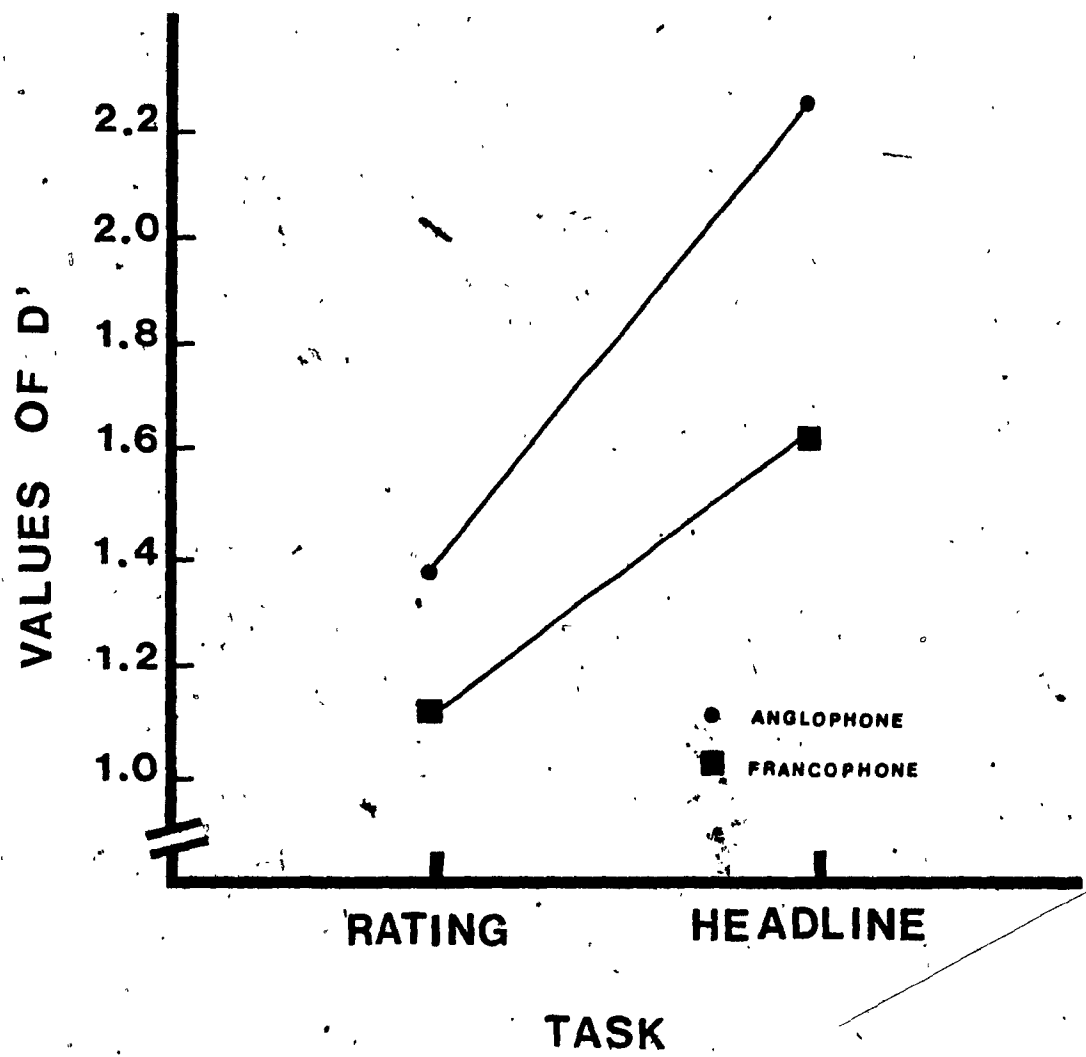


Figure 1. Values of d' for Francophone and Anglophone subjects as a function of the rating and the headline tasks.

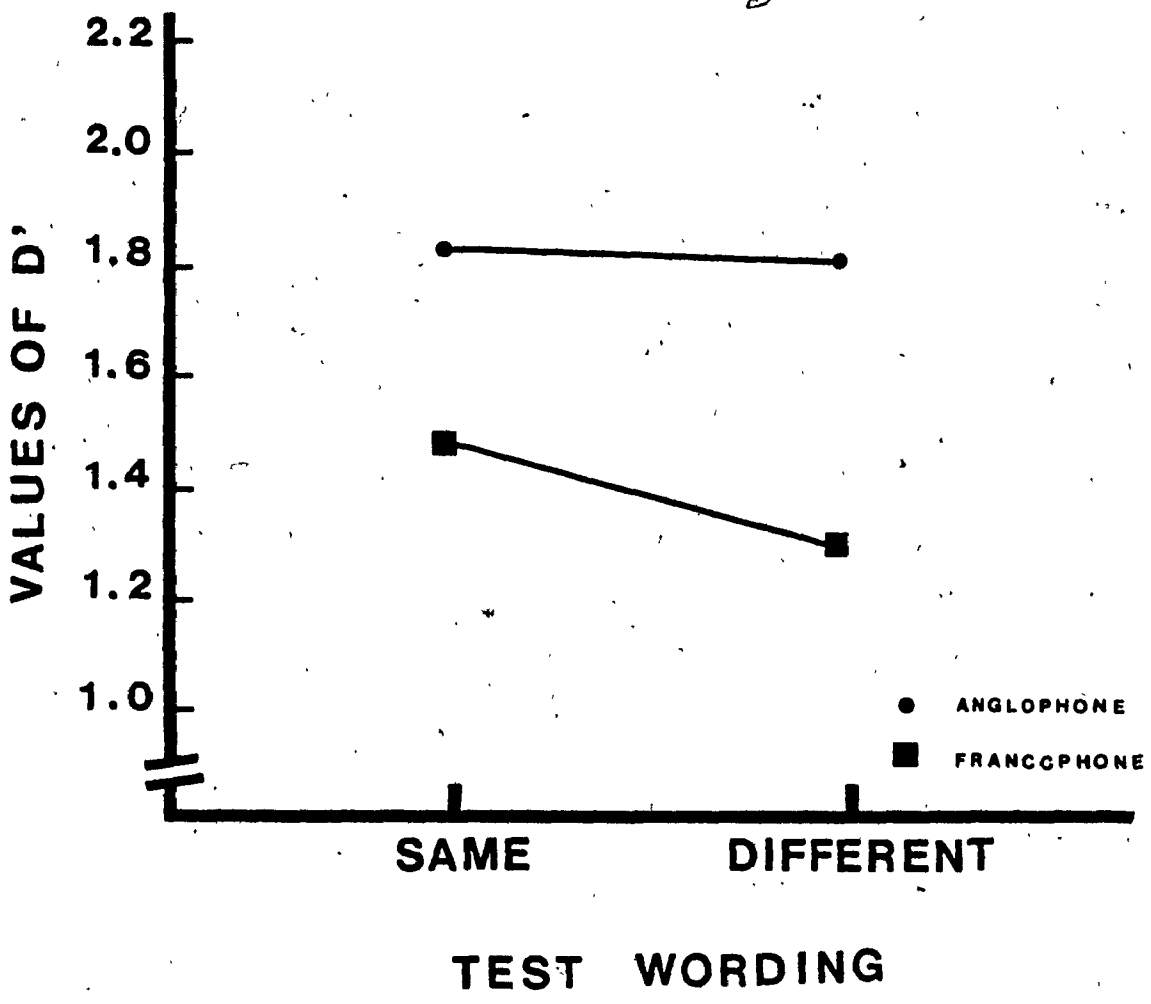


Figure 2. Values of d' for Francophone and Anglophone subjects as a function of same and different test wording.

Figure 3 illustrates the interaction.

A significant Task by Test wording interaction ($F(1,30) = 10.13$, $p < .01$) was found. A Newman-Keuls analysis showed that recognition was higher in the "same" condition following the headline task (Mean $d' = 2.10$) as opposed to the rating task (Mean $d' = 1.25$). The same result occurred in the "different" condition where the headline task yielded a better recognition performance (Mean $d' = 1.84$) than the rating task (Mean $d' = 1.26$). Within the "same" condition, however, the difference between the headline and rating tasks was greater than that in the "different" condition (Figure 4).

An Accent by Task by Test wording ($F(1,30) = 6.06$, $p < .02$) interaction was found. The rating "same" condition resulted in better performance when the speech was not accented (Mean $d' = 1.56$) than when the speech was accented (Mean $d' = 0.93$). From Figure 5, it is possible to observe that the rating accent condition was better when the second presentation was different than when it was the same. The slope of the three remaining curves, however, was negative suggesting that the performance was better in the "same" condition as opposed to the "different" condition.

The interaction between Sentence by Accent by Test wording ($F(1,30) = 4.42$, $p < .05$) was also significant. A Newman-Keuls analysis performed on all the pairings of means revealed that simple non accented sentences presented in the same form (Mean $d' = 2.10$) were better recognized than simple accented sentences in the same form (Mean $d' = 1.32$). There was no significant difference observed between the simple non accented sentences in the "different" condition

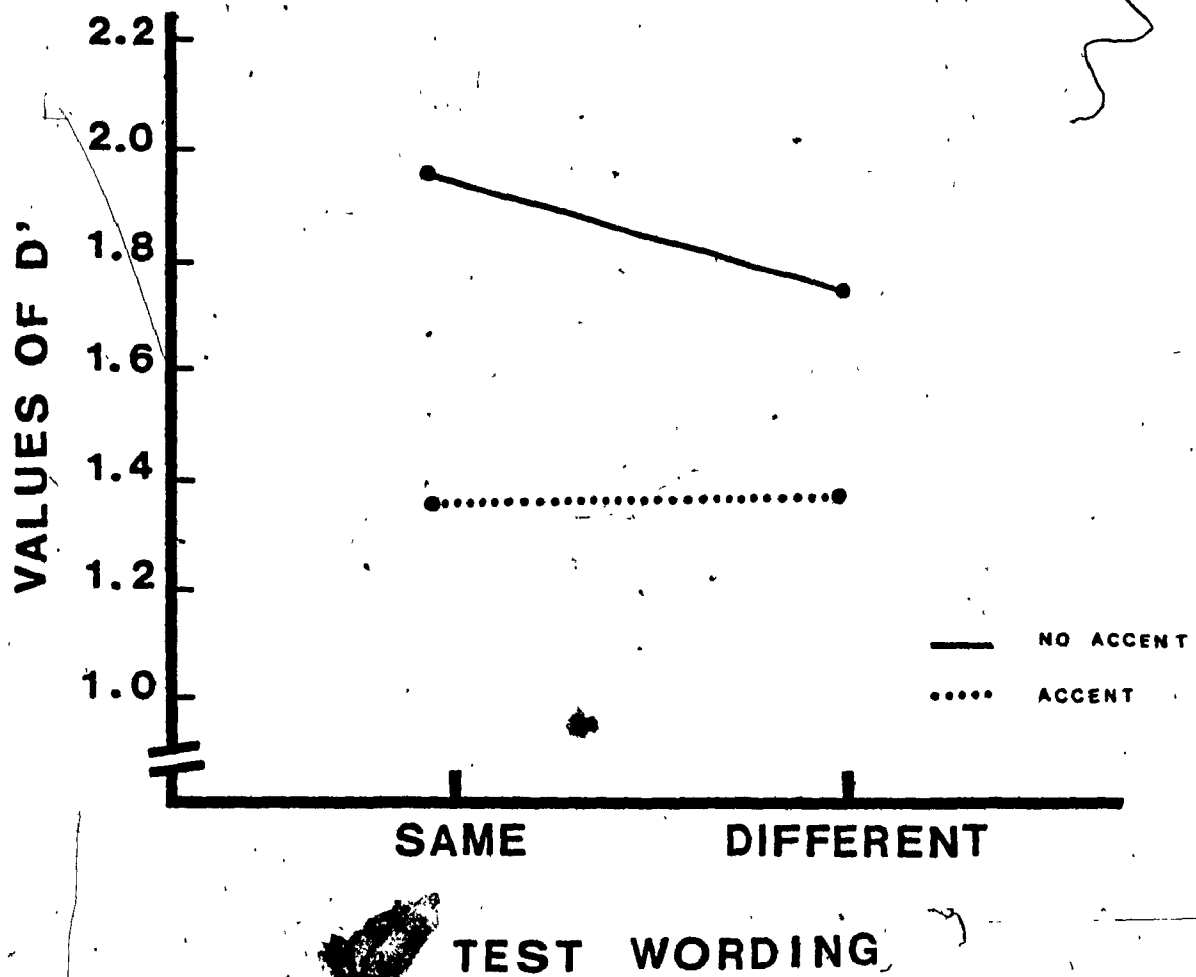


Figure 3. Values of d' for the accent and no accent conditions as a function of same and different test wording.

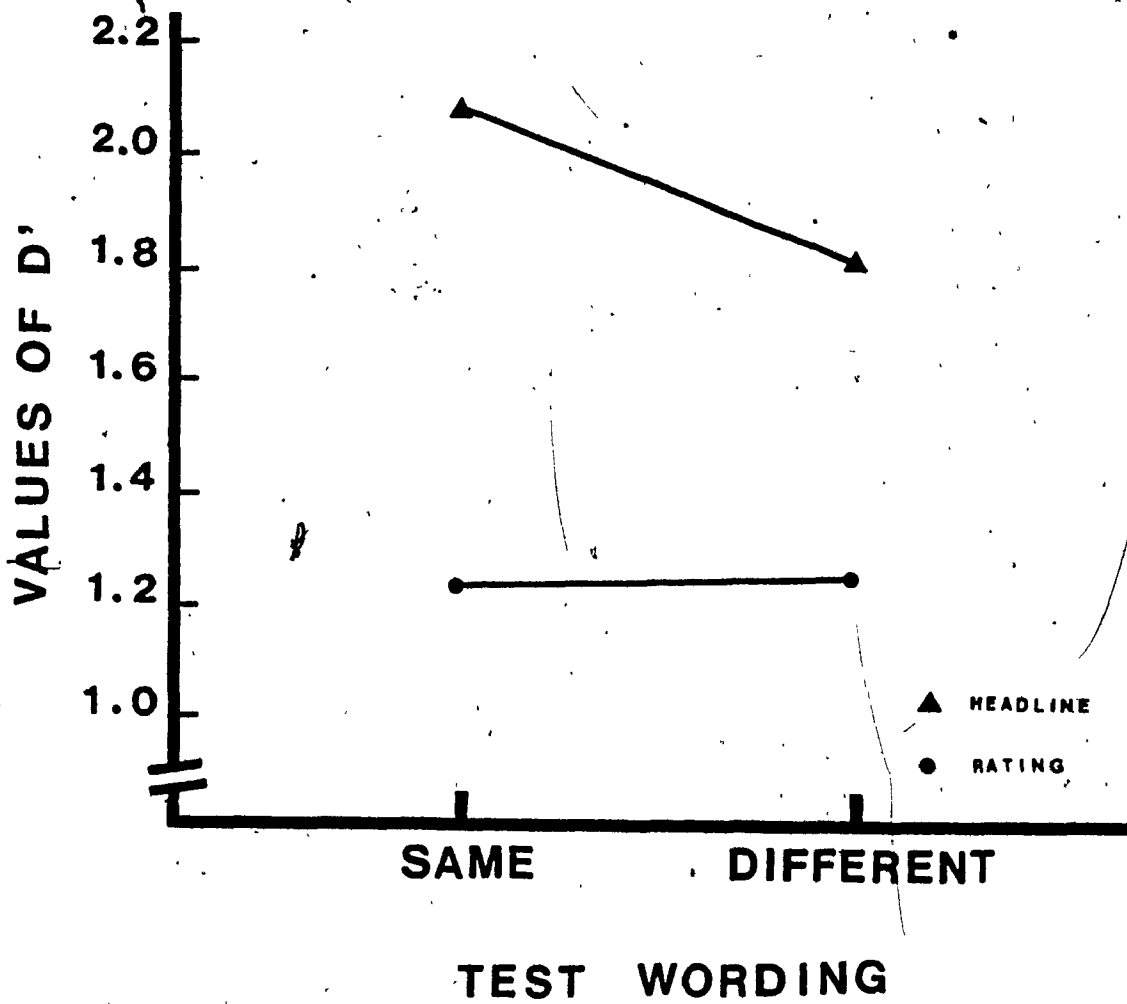


Figure 4. Values of d' for the headline and rating tasks as a function of same and different test wording.

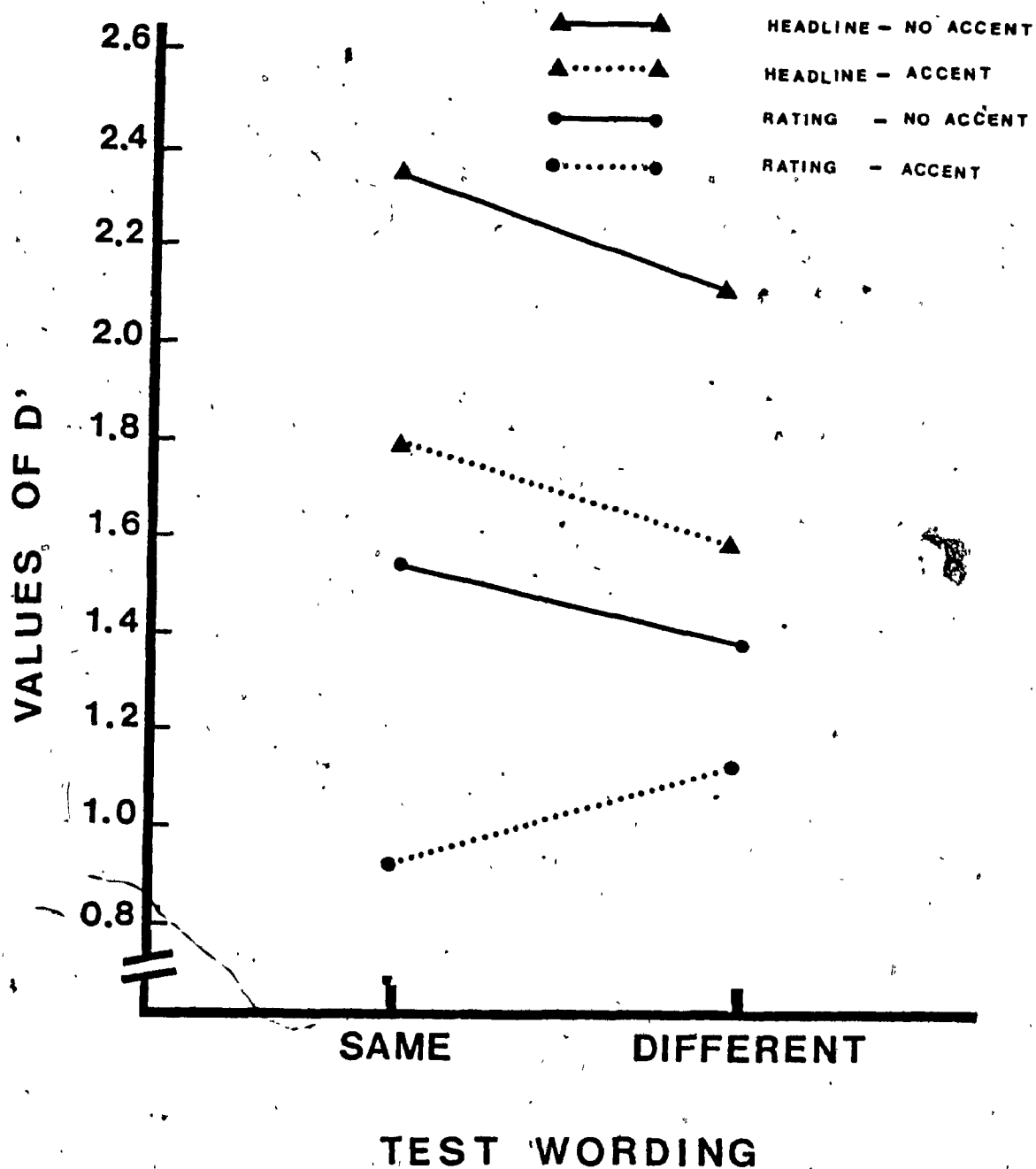


Figure 5. Values of d' for the headline and rating tasks and the accent and no accent conditions as a function of same and different test wording.

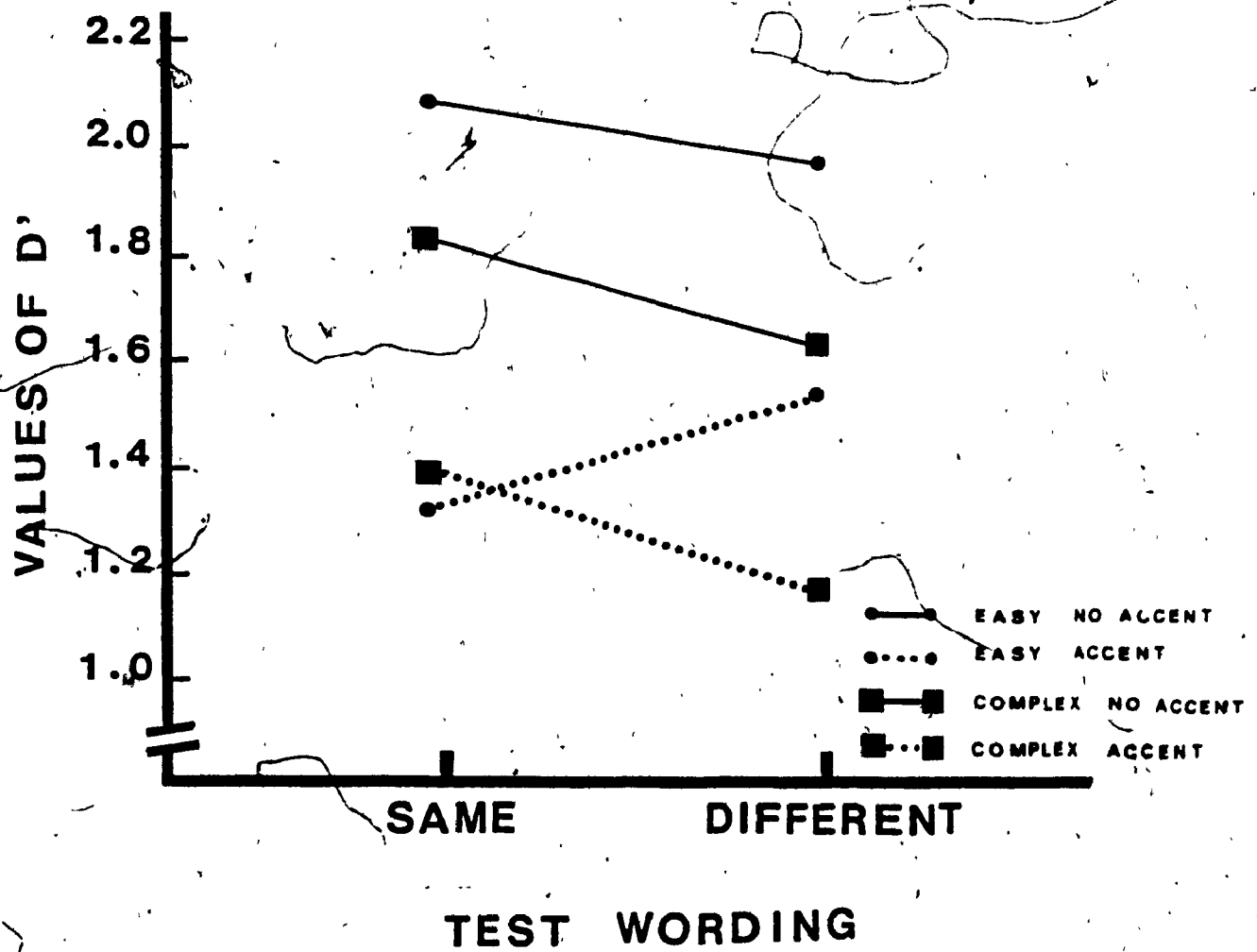


Figure 6. Values of d' for the simple and complex conditions and the accent and no. accent conditions as a function of same and different test wording.

and the simple accented "different" sentences (Figure 6).

Finally, a four-way interaction, Group by Accent by Task by Test wording ($F(1,30) = 5.01, p < .05$) reached significance. Further analysis revealed that for Anglophones, when they have performed the headline task, the manipulation of Accent produced different changes in performance between the "same" and "different" conditions. More specifically, performance in the "different" condition was superior to that of the "same" condition for non accented sentences but the opposite results were found with accented sentences. Francophone subjects, on the other hand, showed a performance declining from "same" to "different" with nonaccented sentences showing a much greater decline. With the rating task, however, both Anglophone and Francophone subjects showed similar changes in performance with changes in Accent and Test wording. Accordingly, for both groups of subjects, performance in the "same" condition was superior to that to performance in the "different" condition for non accented sentences, with Anglophones showing superior performance. Correspondingly, both groups revealed superior performance in the "different" condition, as opposed to the "same" condition for accented sentences. Figures 7 and 8 illustrate the four-way interaction for Anglophone and Francophone subjects respectively.

Both hit rates and false alarm rates are influenced by the subject's response criterion, or the Beta value. In order to obtain more information about the subjects' performance, an analysis of variance was also computed on Beta values. A lack of significance

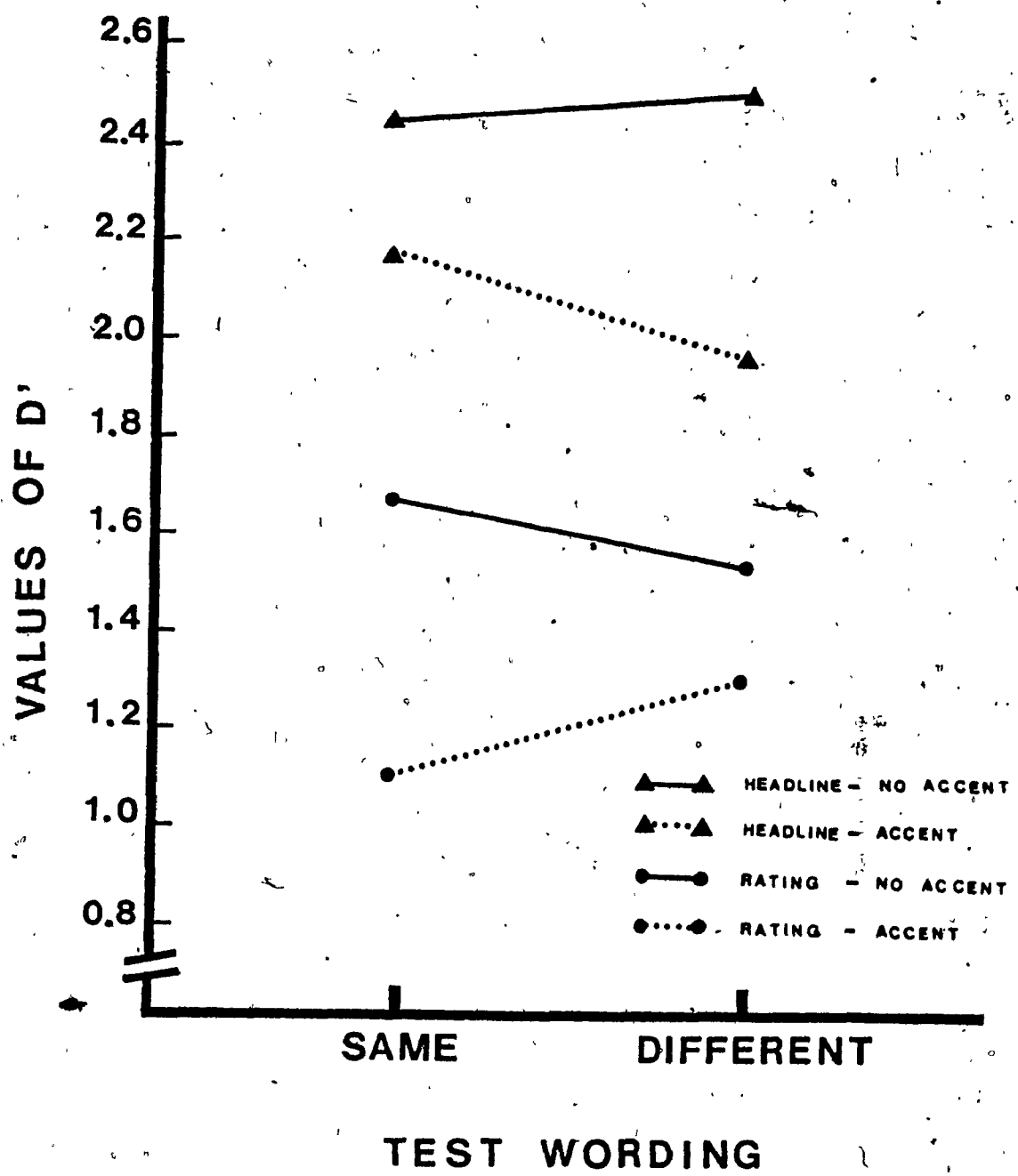


Figure 7. Values of d' for the Anglophone subjects for the headline and rating tasks and the accent and no accent conditions as a function of same and different test wording.

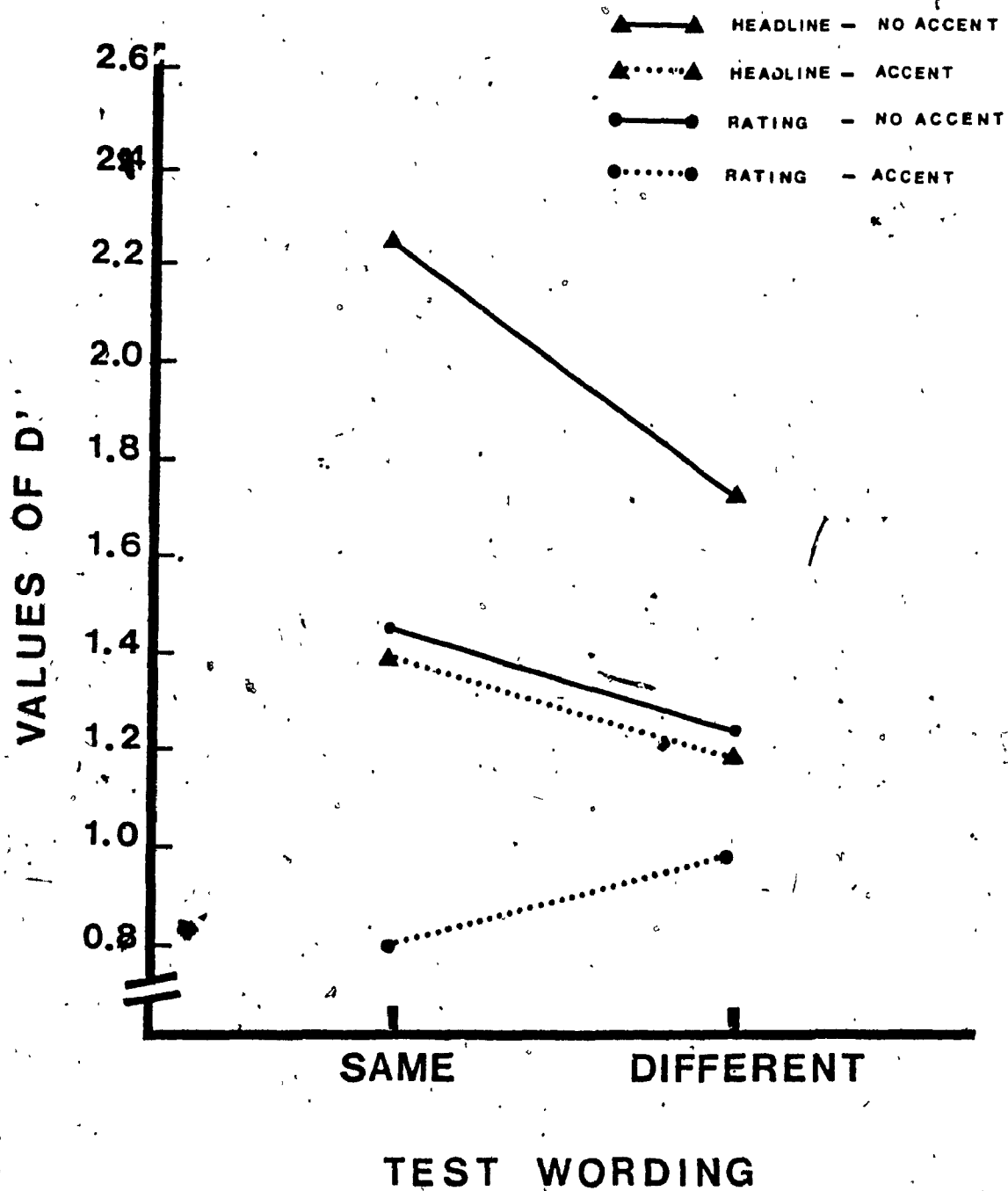


Figure 8. Values of d' for the Francophone subjects for the headline and rating tasks and the accent and no accent conditions as a function of same and different test wording.

between the means of Beta suggests that the subjects used a criterion which did not significantly vary during the test. The analysis yielded two main effects showing that, first of all, subjects had a higher Beta value when they had to recognize accented sentences compared to nonaccented sentences ($F(1,30) = 4.13, p < .05$). Secondly, sentences on which a rating task had been performed, were recognized using a higher Beta value than sentences for which a headline was found ($F(1,30) = 9.15, p < .01$). Table 4 presents the mean Beta values for each level of the two previously mentioned factors.

A Group by Sentence by Accent by Task ($F(1,30) = 4.62, p < .05$) interaction and a Group by Accent by Task by Test wording ($F(1,30) = 4.86, p < .05$) interaction reached significance. Subjects used a higher Beta value with the rating task than with the headline task. However, there are two exceptions to this tendency. Francophone subjects had a higher Beta value on accented simple and complex sentences when they had previously performed the headline task as opposed to the rating task. Subjects had a higher Beta value in the "different" condition than in the "same" with the exception of Francophones in the no accent rating condition. They had a higher Beta value in the "same" condition.

The analyses performed on the Beta values suggested that, in general, when subjects had difficulty with the rated sentences or the "different" condition, they had a higher Beta value (more conservative strategy).

Table 4

Mean Beta values for levels of accent and task factors

Factors	Levels	Means
Accent	No accent	1.90
	German	2.35 *
Task	Rating	2.36 **
	Headline	1.89

Note: Starred values were significantly different from the value for the other level of a given factor. * $p < .05$ and ** $p < .01$.

Discussion

The purpose of the present study was to investigate the role of surface and meaning information in the processes underlying second language performance. It was hypothesized that all the manipulations inducing semantic analysis or controlled processing would yield a better recognition performance. It was expected, therefore, that Francophones would do better than Anglophones because they were expected to resort to controlled processes; that complex and accented sentences would be recognized more often than simple and non-accented sentences because of the activation of controlled processes; and that the headline task would produce a better performance than the rating task because of the deeper analysis it produces.

The results indicated, first of all, that Anglophones performed better than Francophones. The counter-intuitive hypothesis favoring Francophones was based on Masson and Sala's conclusion taken to its extreme form, in that, controlled processing produces a more elaborate memory representation. Their conclusion, however, was based on the fact that their subjects had the meaning of the sentences readily available to them. That is, subjects resorted to controlled processes to look up the words in the lexicon and meaning was there "awaiting". In the present situation, although great care was taken in choosing easy words to make up the sentences, it is possible that Francophones had difficulty with words or the sentence as a whole. If understanding was not present in the first place, then effortful processes could not possibly be applied to meaning. Controlled

processes were either not activated at all because there was nothing at the source of this activation to be worked on, or they were activated but worked in a loop searching for meaning. It would appear, therefore, that, in order to be effective, controlled processes have to be applied to familiar items or at least to items clearly understood. This interpretation is in accordance with the results of previous studies which had shown that cognitive effort by itself was not sufficient to account for good memory performance (e.g. Craik, 1981; Kellogg, 1984).

Favreau and Segalowitz (1983) and Vasos (1983, reported in Segalowitz, in press) compiled results which suggested that there are deficiencies in the way some words can activate meaning representations. More specifically, words in L2 can sometimes trigger weaker meaning representations than words in L1. This is generally the case when bilinguals have a slower reading rate in L2 as opposed to equal-reading-rate bilinguals. Their conclusion, drawn from a reading study, appears to be appropriate to the bilinguals of the present study as well. Their conclusion concerns fluent bilinguals who do not read as fast in their second language. They were not as skilled as their equal-reading-rate peers. The subjects tested in the present study were not fluent. It is therefore possible that their activation of meaning representations was even weaker than that of Favreau and Segalowitz' subjects. Furthermore, Segalowitz (in press) points to the evidence that moderately skilled bilinguals present semantic representations in L2 that are not as strong and of shorter duration than the equivalent in L1. It appears very likely then that

the Francophones in this study experienced difficulty activating the semantic representation of what they were listening to. Consequently, it appears that controlled processes could not be applied effectively and thus produce the expected higher retention rate.

This latter possibility can also be looked at in Alba and Hasher's (1983) terms. They maintained that if the structure of incoming information does not match one's knowledge, then the memory of that information is reduced. Furthermore, discrepancies between incoming information and existing structures can result from one of two possible factors. First, it is possible that the structure of the incoming information is unfamiliar or unusual. Secondly, it is possible that a person does not have sufficient knowledge of the structure. When comparing the performance of Francophones with that of Anglophones on English stimuli, one might be comparing the performance of individuals who don't have a sufficient knowledge of the required structure with that of individuals who know the structure. That state of affairs, of course, would leave the initial hypothesis undressed.

Another explanation can be found in Hasher and Zacks's (1979) presentation of controlled processes. They maintained that the central processor has certain limitations. Accordingly, an individual only has at his/her disposition a certain amount of controlled processes. This position would be consistent with Dornic (1980) who suggested that many bilinguals have less spare processing capacity at their disposition when they are working in their second language. As a general rule, when more controlled processes are required than are

available, the individual is at an impasse and cannot perform the task. In the present experiment, if Francophones were already using controlled processes in trying to get at the meaning of the English words (or executing a controlled lexical search), processing the whole sentence was too difficult and they found themselves overwhelmed by the task. This first result might suggest that, in the early stages of acquisition (subjects were not too highly skilled in L2), processing sentences as opposed to single words might be too difficult.

The results also indicated that simple sentences were better recognized than complex sentences. This finding is the opposite of what was expected, and is also contrary to what Craik and Tulving (1975) had found. It is in accordance with Levy (1981) and Graf and Levy (1984, Experiment 1), however, who showed that comprehension difficulty leads to poorer performance on later retention tests. Moreover, Graf and Levy found that subjects read difficult passages more slowly. The subjects in the present experiment had to listen to complex sentences. If their comprehension was slowed down, as suggested by a slower reading rate in Graf and Levy's study, a slower pace of presentation could have helped subjects comprehend the complex sentences. As opposed to a reading study, subjects in the present experiment could not adjust the input of information to the speed at which they could process that information.

The complex sentences, as presented here, were either too unfamiliar and puzzled subjects to the point where they could not understand them; or, too easy whereby subjects habituated to the

unfamiliar syntax rapidly and processed both simple and complex sentences in the same way. The latter possibility, however, seems very unlikely since there is a main effect of sentence structure.

A clarification of the effects of complex sentences is provided by Stein, Morris, and Bransford (1978). They specified that complex sentences require greater amounts of elaboration (as proposed by Craik and Tulving (1975)) but that this elaboration is not necessarily effective for retention. Elaboration contributing to retention depends on the quality rather than the quantity of the information expressed. Hashtroudi (1983) supported this statement in showing that words modified by necessary adjectives are recalled better. Stein et al. further specified that relationships among the context of elaboration, the information to be remembered, and the subject's knowledge are all factors to be considered before concluding that elaboration contributes to retention. This specification complements Alba and Hasher's (1983) position, reported earlier, that the unfamiliar nature of incoming information might, in itself, be detrimental as opposed to beneficial to the individual's retention. This statement, along with the present results, seems to suggest that controlled processes are effective in increasing memory as long as they are applied to familiar items. A second language learner, therefore, would only benefit from controlled processes if they are applied to information already part of the learner's repertoire. Controlled processes do not seem to be appropriate in the acquisition of new information.

Also, contrary to the expectations of this study, results showed

that nonaccented sentences were better recognized than accented sentences. The most parsimonious explanation appears to be appropriate here. It seems that subjects could simply not understand what the speaker was saying when he used the German accent. The more conservative criterion (Beta) used by subjects when listening to accented sentences adds credibility to this explanation. It can suggest that subjects hesitated to answer "yes" because they never knew when they had heard a sentence or not.

Stein, Morris, and Bransford (1978) conducted a study examining the constraints on effective elaboration. They specified that a viable theory of retention must consider the learner's potential skills for encoding a specific type of information and the constraints which govern the effective utilization of the information. It was assumed that the subjects had the necessary skills to understand accented English sentences. However, it seems that they did not at least in the sense that the German accent apparently acted as a burden preventing subjects from comprehending the sentences. After the experiment, many subjects manifested their frustration because they had not understood the accented sentences. This negative result will unfortunately prevent comparisons of memory performances when controlled processes are used at the phonetic level with performances obtained from semantic analysis. Therefore, it will be impossible to point to the one which could contribute the most to enhance one's performance in an incidental learning situation.

As expected, the semantic headline task produced a better recognition performance than the shallow rating task. This result is

in accordance with the early versions of levels of processing theory (Craik and Lockhart, 1972; Craik and Tulving, 1975) as well as with the more recent versions which specify that semantic analysis will produce a better performance when a semantic test is administered (e.g. Morris, Bransford, & Franks, 1977). The more conservative criterion used by subjects on rated sentences possibly indicates their hesitation because they did not remember them. As reported earlier, subjects also used a more conservative criterion when the sentences were accented. In that situation, it was relatively easy for all the subjects to perceive the difference between accented and non accented sentences. It was thus relatively easy as well to adopt a different strategy, consciously or not, when the sentences were alternatively spoken with and without an accent. In the present situation, however, the subjects could not tell the difference between a "rating" sentence and a "headline" sentence just by listening to it a second time and yet, they adopted a different strategy. An explanation seems unlikely at the perceptual level. A more cognitive explanation however might possibly help understand the subjects' differential strategic attitude.

The levels theory stipulates that a deeper analysis yields a more discriminable memory trace. The subjects' more conservative attitude to answer "yes" for rated sentences may be an indication of the difficulty associated with recognizing a trace similar to many others. If the memory traces of the rated sentences were all very similar, that is without any specific information to distinguish them from one another, then the subjects were probably often uncertain

about their decision, and adopted a different strategy. A rating of subjects' certainty about their decision could have helped to support or reject this hypothesis.

The results of the present experiment also revealed that sentences presented in the same structure were better recognized than sentences whose structure had been changed in the Recognize deck. The difference between the two means, however, is not very impressive (0.11). The fact that recognition was as good as it was for the "different" sentences suggests that what was encoded in memory was not limited to surface information. This finding is similar to what Masson and Sala (1978) had observed in their verbatim versus paraphrase condition. This finding, along with that of Masson and Sala's, are not supportive of Kolers' proposal that recognition occurs only with the activation of the same pattern-analyzing operations. Clearly, in order for paraphrases as well as for differently-structured sentences to be recognized, meaning has to be involved in the recognition process. The results are not necessarily fatal to Kolers, however, in that if meaning had been processed in the first place then it is part of the same pattern-analyzing operations.

Some interesting interactions also reached significance. It was found, first of all, that the Anglophones recognized more sentences when they executed the headline task. Once again, this shows that the deeper the analyses performed on sentences, the better the recognition performance later on. There was no significant difference, however, between headline and rating for Francophones (although there is when

accent and no accent, and "same" and "different" are taken into consideration). Assuming that Francophones performed the headline task correctly this result, then, could point to a difference between semantic analysis when the meaning of words is more readily available, versus semantic analysis following an unsuccessful controlled lexical lookup. (There was no measure regarding the appropriateness of the titles found. However, the experimenter who heard the responses, without knowing the stimuli, was able to ascertain that, in general, subjects were generating titles appropriate for the pool of sentences.) This conclusion emphasizes, first, the importance of meaning and, secondly, raises the possibility that semantic analysis can only be beneficial following a successful lexical search.

This latter possibility is in accordance with the conclusion reached by Bransford et al. (1982) stressing the importance of previously acquired knowledge for understanding relatively new facts and events. In terms of levels of processing, they maintain that emphasizing semantic processing is not sufficient for a novice to reach a level of expertise in a new domain. They conclude that levels of processing is more appropriate for individuals who already have a certain expertise in a given area than it is to beginners. Just like controlled processes, therefore, it would appear that resorting to semantic analysis is beneficial only to those who already have a certain degree of knowledge. Learners of a second language, it seems, may not significantly profit from controlled processes nor semantic analysis to learn and retrieve entirely new material.

The importance of meaning also emerges when Anglophones

recognize more "different" sentences than Francophones. Performance is optimized for the group which could process meaning more efficiently. Furthermore, the headline task produced a higher recognition rate than the rating task independently of the type of presentation in the Recognize deck. Similarly, if we retain the hypothesis that the addition of accent prevented subjects from understanding what was being said, then the importance of meaning can account for the fact that non accented "same" sentences were better recognized than accented "same".

Throughout the results, in fact, a general pattern emerges. Whenever a variable did not favor access to meaning, the performance of subjects decreased. Globally, the results indicate changes that vary with the task, the accent, the presentation in the Recognize deck, and from one group to the other. The manipulation of accent produced different changes from "same" to "different" for Anglophones. The nonaccented sentences were better recognized in the different presentation than the accented sentences. Presumably, the nonaccented sentences were better understood and thus processed more efficiently.

(The most puzzling result, however, concerns the accented sentences that underwent the rating task. For both Anglophone and Francophone subjects the recognition performance was higher in the "different" presentation than in the "same". The theory does not seem to provide a logical explanation for that kind of result. The performance improves from "same" to "different" also in the headline no accent condition for Anglophones. The theory does not explain what took place in the interaction).

Throughout this study, it was assumed that the recognition performance was an indication that learning took place. The role of surface and meaning information were investigated in order to assess the contribution of each in the performance of second language users with relatively new material. The present study, however, does not permit a conclusive comment on the role of surface information in the learning process. The results point to a detrimental effect brought by the addition of accented speech. It is believed, however, that this result is specific to the manipulations used in this study, in that the accent was too strong to permit the subjects to comprehend what was said. In order to reach a conclusion regarding the role of surface information, other manipulations than accent should be used. The addition of white noise could probably produce the desired effect. In order to keep the study as naturalistic as possible, however, and to keep the conditions as close as to what second language learners experience, manipulations directly affecting the way sentences are spoken would be desirable. The use of accented, distorted speech and prevented subjects from understanding what was being said. Accordingly, a manipulation that would not distort speech but change the amplitude or intonation could perhaps produce the desired effect. Nevertheless, the assumption that the rules applying to reading can also be applied to auditory material is, at this point, questioned.

The role of semantic information, as investigated in this study, seems to be the most important factor accounting for a good

recognition performance, thus suggesting that more learning took place. Overall, performance was optimal when meaning could easily be processed. The role of semantic information in second language acquisition, for example, would seem to depend on the degree of skill and knowledge that a particular individual has (e.g. Bransford et al., 1982). It appears to be the case, therefore, that semantic processing is appropriate to further implement or broaden one's knowledge in a particular area. The absence of minimal success of semantic processing, however, can overshadow advantages that might be expected from other levels or other types of processing, like controlled processes.

Given the results obtained in this experiment, Masson and Sala's (1978) findings did not generalize. The present study illustrates well the importance of meaning for recognition but fails to show the role of surface information. The tasks used in the present study differ from that used in Masson and Sala's. The rating task possibly required more processing than simply reading a sentence aloud. The headline task, however, probably also required more processing than a sentence continuation task. It is believed, therefore, that a parallel can still be drawn between this present experiment and Masson and Sala's. The present results point to the importance of considering additional factors when Read and Listen studies are compared. In a reading experiment, subjects always have the possibility of going back to the information they did not understand right away. In a study where the stimuli are aurally presented, subjects have one presentation of the stimuli only. Moreover, whereas

subjects can often read at their own speed in a reading study, they have no control over the rate of aurally-presented items.

Finally, in studies investigating the various cognitive factors playing a role in learning, subjects should also be screened on their status as good or poor learners. Bransford et al. (1982) indicated marked differences on the attitude of both groups when the subjects were facing new material. This variable was only controlled for in the present study by random assignment of subjects to conditions.

The possible applications of this study may be of some interest to the teacher of a second language functioning in the classroom environment. Practical implications may point to more effective ways of working on new material. First of all, it appears to be beneficial in terms of a better retention performance, to ask the student to actively do something with the material presented to him/her. Accordingly, a task requiring the student to summarize a sentence as opposed to reading it over many times should produce better retention rates. The success of the task, however, appears to depend on the learner's level of expertise at the time. If the student has a basic knowledge of the language then the task is likely to succeed in enhancing one's performance. On the other hand, if the student does not know the meaning of the sentence, then the task is not likely to produce the desired results. The results of the study do not permit recommendations regarding the presentation of the material. Strictly according to the theory, a presentation favoring the activation of controlled processes should produce a better retention. As indicated in this study, however, attempts to elicit the use of controlled

processes may hinder a successful lexical search and thus completely eliminate any chance of a good performance from occurring.

To conclude, then, it appears that second language performance could be enhanced by the use of semantic analysis. Processing meaning is important for obvious reasons in a learning situation, but also because of its interactions with other levels. Moreover, the failure of minimal semantic processing in a lexical search can interfere with the advantages associated with controlled processing.

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Appendix A

Sentences for training task

The ones which I liked were the flowers which had been planted in the garden last spring. (a)

The strongly committed demonstrators rejected the new proposition.

The not untypical problem of funds was raised by the movie producer several times.

Not undeserved by the children were the principal's sanctions after recess. (a)

The car was put up for sale by the owner at a not unreasonable price.

She went to the restaurant he had recommended to her a while ago. (a)

The only one which he could recall was the proverb which dealt with another topic. (a)

Record box office sales were predicted by the critics for the not old play. (a)

She deplored the angry reproach. (a)

The one which he remembered better was the song which she had played for him.

The protective father gave his children warnings about the danger of the adventure.

She doubtfully accepted his advice. (a)

The clerk delivered the important notice in a dramatic way. (a)

The one which she reconsidered was the decision which concerned the future of the group.

The one whom I saw yesterday was the girl to whom I waved.

The attractive woman modelled the original fashions for the fall. (a)

The not unusual course of action was advocated by the lawyer to her client.

She rented a brand new car and they picked it up in the afternoon. (a)

They spread around nasty rumors to destroy the doctor's reputation.

The young campers were frightened by the not unclouded sky. (a)

The ones which flew the fastest were the planes which made the most noise. (a)

The one which he feared was the exam which was unexpectedly postponed.

(a)

She liked the boy her sister was going out with.

The ambitious manager reached his goal of doubling production. (a)

She did not like the sad movie he took her out to.

The one which I chose was the white curtain which was suitable for our kitchen. (a)

He laughed at the play featuring the oldest actor. (a)

The ones which they bought were the unusual drawings which had been put on sale.

The one which the young girl went to was her class which started last month. (a)

The zealous policeman arrested the driver of the licensed car.

The one which they called off was the trip in the Laurentians which they had planned for two weeks this summer.

The visitors really appreciated the renovated cottage last week. (a)
Not unsatisfactory results were obtained by her given the difficult conditions she was working in.

The one whom we thought started the argument was the man who paid for the taxi.

The successful couple hired a maid for their immense house. (a)
Not unspecific instructions were given by the not unconventional leader to the followers. (a)

The customer refused the sweetened black coffee.

The one which she threw out was her sister's cake which was horrible.
The presentation of the dancer's show was not uninterrupted by the blackout.

He wrote her a letter last week and she answered it right away. (a)

The not unpredictable outcome was guessed by the spectator. (a)

The one which he got rid of was the tie which he received as a gift.
(a)

The not unacceptable contract was signed by him after days of negotiation. (a)

She preferred the article published in the new magazine.

The not unbiased report presented against her proposition was denounced by her. (a)

The experienced therapist handled the difficult session very well.

The not unpremeditated crime was committed by the burglar when nobody was home. (a)

The sailing host invited the group on a tour.

She won a prize the other day and he delivered it to her. (a)

The father was welcomed with a big hug by his not undemonstrative child.

The child ate the delicious cake his mother had bought at the store.

(a)

A not unattainable goal was set by her for her weakest group. (a)

The one which disrupted her concentration was the incident which involved four people.

Advice from the experienced pediatrician was asked for by the not unconcerned mother. (a)

The one which she lost was the ring which he had given her last year.

He spent the afternoon piling up boxes but children later knocked them down.

This popular restaurant created a good impression on the tourists.

The executives submitted an accountable summary of all the transactions made last month. (a)

The one which he visited was the group of friends whom she invited.

(a)

The problem was detected right away by the not inexperienced doctor.

The one which we saw was the big plane which was going to land at the airport. (a)

The ones whom she trusted were her older boys who had been referred to her a couple of years ago.

They redecorated the accommodating room with great taste. (a)

She stripped the old table her grandfather gave her.

The one whom he released was the player whom they had laid off.

A not unexceptional request was made by the client at the last minute.

The one which was most expensive was the toothpaste which was the least effective. (a)

The one which the artisans transformed into colorful pots was the old heap of clay which was considered to be useless.

The one whom she congratulated was the winner of the contest which was organized by the authorities.

The one whom she did not like was the friend whom she hardly knew anything about. (a)

The not undefined rules concerning drinking in public places were severely applied by the officers.

I knew the individual smoking many cigarettes a day who died of cancer. (a)

The polluted lake still attracted many people in the hot summer days.

He refused to sign the petition he did not approve of. (a)

She wrote an interesting story with a happy ending.

She finally looked at the one which was the house which he had described earlier.

The most advanced literature students wrote the lyrics.

He thought of a solution to solve his friend's problem. (a)

She misplaced the photograph of the crime needed as evidence in court.

The candidate offered the most likely answer at that particular moment. (a)

The assimilated minority lost all power over its rights.

The obese patient was helped by the not unassisted nurse to get out of his bed. (a)

The drinks we had ordered after dinner were forgotten by the not

unhurried waiter. (a)

He supported the local team in a fanatical way.

The one which he gave her was the phone call which she took days to return. (a)

The not unwell trained battalion was ordered to attack the enemy by the general.

She accepted the challenging task of convincing the committee.

A long and tedious report was typed by the not inexperienced secretary. (a)

I met a client previously and she owed me money.

The deputy revealed the promising project to her voters.

Marriage was classified by her as a not unquestionable institution.

(a)

The least unproductive team was supervised by a dynamic group of students. (a)

The construction work obstructed the road to my grandparents' house.

He was the one who met me at the corner of the street where I took a walk last night. (a)

He did not buy the otherwise satisfactory merchandise.

She decorated the cake ordered by her friend's sister.

Before trying out her program the technician changed the complicated operations. (a)

The journalists kept the public informed of all the important stories.

(a)

The not unadvised procedure to follow in that particular case was fully rejected by him. (a)

The one which travelled the farthest was the car which had recently been inspected. (a)

A lot of turmoil among the staff members was caused by the not unofficial memo.

The one which she held on to was the new umbrella which her mother had recently bought. (a)

The one whom I chatted with was the manager of the restaurant which recently opened.

The one which he cancelled was the appointment which she made for him. (a)

I really enjoyed watching the dancer wearing the white velvet suit. (a)

The not uncalculated risk of increasing the wages was not unaccepted by the director. (a)

She saw the man crying as he came out of the church.

The captain watched the excited tourists and addressed a few words to them. (a)

He prepared the recipe she had highly recommended to him.

A clearer explanation was needed by the apprentice to carry out the not unexpectedly difficult job.

The dog running away with the bone bit the cat.

The clerks made relevant complaints to their employer.

He was disappointed about the student he had given extra credits to. (a)

Not unfortunately nobody was hurt by the eruption of the volcano.

Passengers required a lot of attention from the air hostesses during

the perturbed flight.

He refused the invoice they had mistakenly sent him.

He corrected an assignment last time and she revised part of it. (a)

She always resented his friendly attitude. (a)

Loving grandparents offer presents that are usually appreciated. (a)

The children were scared by the not unkind merchant disguised as a witch. (a)

The one which she preferred was the vase which had been transferred from the other gallery.

The owner of the French bistrot repaired the brick wall condemned by the inspector. (a)

The one whom I saw leaving was the guy whom she had met the day before. (a)

The one which the train engineer had was the old engine which had been put aside some time ago. (a)

He proudly confirmed his announced candidacy to the position available.

She really appreciated the music written for the experienced dancer.

The not unanswerable questionnaire was distributed by him in a few days only. (a)

The newly arrived tourists were impressed by our not undemocratic tradition.

His speech was delivered in a not unaffected way following the presentation of the sad story.

The not unflexible plan she proposed was approved by the monitor. (a)

The not unlively little cat was chosen as a gift by him.

This not unscientific theory was claimed to be the best of all by him.
The most excellent competitors were judged on the quality of their performance.

The exceptionally big parade attracted a large group of children. (a)
John lost a pencil this morning and she found it under the table. (a)
I listened to the boy complaining about school several times. (a)

The sympathetic neighbor offered some milk to the lost cat. (a)
The little girl had a bad dream last night caused by the scary movie.
(a)

He played the song that brought back a lot of memories.

During an election campaign politicians often make promises that are forgotten. (a)

The mindful teacher expressed regrets at one of his pupil's failure.
(a)

The aged lady was busily knitting the angora pullover her daughter asked for her birthday.

The one whom I just saw is the guy who had been recognized at our competitor's office.

She considered the meeting she attended to be a waste of time. (a)

The inspired poet composed a love song in memory of her friend.

The cat chased the woollen ball under the old man's rocking chair.

Children should always be treated by grandparents on a not unequal basis.

The ones which the young porter carried were their travelling cases which were filled with souvenirs. (a)

The doctor did not make any money with healthy clients. (a)

The guide aware of the danger gave specific instructions to avoid this path. (a)

I ignored the girl you saw cheating the other day.

The ones which he had were the tickets which his friend bought last month.

The one which the clerk filed away was the report which had caused some problems.

The apple thieves hiding in the woods were found by the not unsuspecting lady.

She met the recently retired old milkman. (a)

Assignments written in a hurry by restless students are not unlikely to contain many typing errors.

The one who read the fastest was the person who was wearing glasses.

(a)

The foreman prepared a workable schedule with great difficulty.

Yesterday I did the difficult assignment that was due last week.

The one which he prepared two days ago was the large meal for which everyone showed up on time.

Appendix B

Sentences for recognition task

They bought the unusual drawings put on sale.

She went to the restaurant he had recommended to her a while ago. (a)

The young dancer bought the unusual red dress. (a)

The one whom she met was the milkman who was old and who recently retired. (a)

The one whom I knew who died of cancer was an individual who smoked many cigarettes a day. (a)

He considered his luxurious life style to be his most important priority. (a)

Not unfortunately nobody was hurt by the eruption of the volcano.

The constant pressure motivated him to finish his assignment on time.

They picked up the strawberries bought at a cheaper price.

The fit athlete demonstrated the power of exercise. (a)

He sang the song he had learned when he was a boy. (a)

The problem was detected right away by the not inexperienced doctor.

She observed the boy exhibiting behavior problems.

Promises made by politicians during an election campaign are not rarely forgotten. (a)

The lucky gambler won the jackpot. (a)

The fruitful search produced lots of interesting findings. (a)

She won a prize the other day and he delivered it to her. (a)

He prepared the recipe she had highly recommended to him.

They witnessed the accident involving two insured cars. (a)

The citizens invaded the fruit market on the eventful opening day.

Many people were still attracted by the not unpolluted lake in the hot summer days.

The one which she used to feed was the little cat which usually came on her balcony,

She had to take the elevator that was out of order that day.

The not undisguised movie star was recognized by the young reporter.

She classified marriage as a questionable social institution. (a)

The one which she read was a fascinating one which was a novel which was about an adventurous group of women.

She installed the pipe permitting the sink to drain.

The one which the student filled in was the form which was for application which the director had sent him.

The not inexpensive porcelain figurine was ordered by the countess.

(a)

Their not unvoiced dissatisfaction was discussed by both of them.

They climbed the mountain that is always recommended to beginners. (a)

Only the least inessential points of their argument were remembered by her. (a)

The diluted oil affected the ecology of the region. (a)

I chatted with the manager of the restaurant that recently opened.

The most expensive toothpaste was the least effective one. (a)

She stripped the old table her grandfather gave her.

She really appreciated the music written for the experienced dancer.

We brought John's radio that is in better condition than mine. (a)

The cashier did not like the customer she had an argument with.

He kindly helped the old man needing a cane.

The ones which were emptied by her were the mugs which were the ones used for beer which were left on the tables.

The parents put their young baby in a safe crib.

The roof was fixed by the not unskilled men.

She rented a brand new car and they picked it up in the afternoon. (a)

The deputy revealed the promising project to her voters.

The talented Spanish dancer was acclaimed by the not unadvised audience.

The one which they stayed in was the hotel which was little which was hospitable. (a)

The ones whom she invited over were the friends who were the ones who played tennis whom during her holidays she had met.

The investigators found the disputable cause of the tragedy.

The not unused dictionary was constantly consulted by her for her assignment.

They reprinted the text a graduate student had edited.

A lot of care was taken by the movers to slide the not unbreakable window. (a)

A lot of confusion was created by the not unconfirmed arrival of the police. (a)

His not unfriendly attitude was always resented by her. (a)

The not unattended meeting was considered by her to be a waste of time. (a)

The not unheroic actions of the revolutionary were condemned by the Reverend. (a)

He cancelled the appointment she had made for him. (a)

Regrets were expressed by the not unkind teacher at one of his pupil's failures. (a)

The one which the train engineer had was the old engine which had been put aside some time ago. (a)

She was tremendously relaxed by the peace and quiet of the not unfamiliar countryside. (a)

Record box office sales were predicted by the critics for the not old play. (a)

She intentionally provoked the incident at the movie. (a)

The one whom he met was a friend whom he had not seen for a long time. (a)

All the not unchecked invoices were verified a second time by them. (a)

The one which she sewed was the blouse which made her look thinner. (a)

They both liked the rocking chair made of oak. (a)

The one which they all went to was the huge picnic which was held in the park. (a)

The ones which she gave were the indications which he needed. (a)

The one which he feared was the exam which was unexpectedly postponed. (a)

She misplaced the photograph of the crime needed as evidence in court.

The blackout interrupted the presentation of the dancer's show.

The popular museum exhibited the oldest mummy ever found in Egypt. (a)
Warnings about the danger of the adventure were given to his children
by the not unprotective father.

The ones which he collected were the stamps which were old which
illustrated the history of his country. (a)

They refused the bill recommending the expropriation of all these
lands. (a)

The one which they watched was the show which was the late night one
which presented good music.

The ambitious manager reached his goal of doubling production. (a)

The ones which I liked were the flowers which had been planted in the
garden last spring. (a)

This popular restaurant created a good impression on the tourists.

The heavy session was handled very well by the not inexperienced
therapist.

He laughed at the play featuring the oldest actor. (a)

Not unsatisfactory results were obtained by her given the difficult
conditions she was working in.

Loneliness was identified by not unhealthy old people as their biggest
problem. (a)

She gave her reliable friend complete freedom of choice.

He broke the ashtray bought at the antique shop. (a)

All the group went to the new pub that opened recently. (a)

He released the player they had laid off.

Jealousy was not expressed by the not unhurt spouse.

Yesterday I did the difficult assignment that was due last week.

The one which we saw was the big plane which was going to land at the airport. (a)

The wide-eyed girl watched the fireworks sponsored by a local firm.

The one whom I met previously was the client who owed me money.

Restrictions on people were imposed by the not unimpaired situation of the economy. (a)

She lost the little box containing nice jewellery. (a)

The recently inspected car travelled the farthest. (a)

The not uncommon meaning of sharing was not fully understood by her.

Not undeserved by the children were the principal's sanctions after recess. (a)

The agents estimated the burned collection to be worth over half a million dollars.

Some milk was offered by the not unsympathetic neighbor to the lost cat. (a)

The apprentice needed a clearer explanation to carry out the expectedly difficult job.

He surprisingly decided to go to the movie.

He was the one who met me at the corner of the street where I took a walk last night. (a)

The sailing host invited the group on a tour.

The one which she was hanging was the calendar which was the new one which showed beautiful scenery.

Loving grandparents offer presents that are usually appreciated. (a)

The one which he refused was the invoice which they had mistakenly sent him.

The one who read the fastest was the person who was wearing glasses.

(a)

The one which he visited was the group of friends whom she invited.

(a)

She would be likely to spend almost half of her weekly earnings on groceries.

The one which she deplored was the reproach which expressed a lot of anger. (a)

The not unanswerable questionnaire was distributed by him in a few days only. (a)

The corrupted man falsified his story. (a)

The ones which the young porter carried were their travelling cases which were filled with souvenirs. (a)

Restless students in a hurry write assignments that are likely to contain many typing errors.

The one which she put on today was the coat which was made for winter which she had borrowed from her friend. (a)

The not unlively little cat was chosen as a gift by him.

A lot of attention from the air hostesses was not unrequired by the passengers during the not unperturbed flight.

He seriously considered the possibility offered by his best client.

The one which they returned was the parcel which contained articles which were useless.

The one whom he was disappointed about was the student to whom he had given extra credits. (a)

We went to the coffee shop serving incredible cakes.

The one whom I saw yesterday was the girl to whom I waved.

The Russian Revolution was lectured on with a great enthusiasm by the not uncommitted professor.

The owner put his car up for sale at a reasonable price.

The one which she put away was the letter which was short which announced his arrival. (a)

The one which they bought was the house which was made of stone which had a tall chimney. (a)

They called off the trip they had planned in the Laurentians for two weeks this summer.

They stole her insured camera during her stay with us.

The one which the tourists called up which was a popular one was the agency which advertised better services.

A not unsuitable decoration for the old couple's house was proposed by him.

The lawyer advocated the usual course of action to her client.

The experienced therapist handled the difficult session very well.

The one which he corrected last time was the assignment which she partly revised. (a)

They played with the white and blue kite that someone lent them. (a)

The planes making the most noise flew the fastest. (a)

The one which rolled under the rocking chair which was the old man's was the woollen ball which was the one which the cat was chasing.

The not uncrowded terrace was occupied by them all night. (a)

The one which she managed to avoid was the heavy traffic which always takes place at night. (a)

The not untypical problem of funds was raised by the movie producer several times.

The power over its rights was lost by the not unassimilated minority.

She liked the boy her sister was going out with.

He suggested the proposal that required many new investments.

They redecorated the accommodating room with great taste. (a)

The one whom she got angry at was her friend who was selfish who caused her problems. (a)

The fight was not unobtrusively started in the tavern by the bus.

(a)

The nuns of the orphanage accepted a generous gift.

The not unadvised procedure to follow in that particular case was fully rejected by him. (a)

We undertook the task demanding a lot of time. (a)

The sociable old lady guaranteed that she would be present.

The one which he remembered better was the song which she had played for him.

The concerned mother asked advice from the experienced pediatrician.

(a)

Not unambiguous instructions were given by the not unconventional leader to the followers. (a)

The one which his grandparents drank was the tea which was hot which was flavoured with jasmine petals.

The clerk delivered the important notice in a dramatic way. (a)

A not unaccountable summary of all the transactions made last month was submitted by the executives. (a)

She considered hunting to be a questionable sport. (a)

The father was welcomed with a big hug by his not undemonstrative child.

A lot of time was spent by the guys preparing their not unpleasant fishing trip.

The one which she drove was the sports car which he had won the race with.

The black not unsweetened coffee was refused by the customer.

The one which the little girl had last night was the bad dream which was caused by the scary movie. (a)

The one which he ordered was the pamphlet which gave information which was more precise to the tourists. (a)

This not unscientific theory was claimed to be the best of all by him.

An ice cream cone was not undeserved by the tutored child for all her efforts. (a)

The one which he got rid of was the tie which he received as a gift.


(a)

The burglar committed his premeditated crime when nobody was home. (a)

The one which they supported was the group which was a radical one which protested against the status quo. (a)

The not unannounced candidacy to the position available was proudly confirmed by him.

Passengers required a lot of attention from the air hostesses during the perturbed flight.

The ones whom she trusted were her older boys who had been referred to her a couple of years ago.

The one whom we thought started the argument was the man who paid for the taxi.

The ones whom the captain watched were the tourists who were excited to whom he addressed a few words. (a)

She consulted the hit chart rating the most popular songs.

The happy crew provided great entertainment to the tourists. (a)

The spectator guessed the predictable outcome. (a)

My grandparents replaced the old piano standing against the wall for many years. (a)

The increase in sales was contributed to by the not unstable financial situation of the company.

The candidate offered the most likely answer at that particular moment. (a)

As a hiding place the cat chose the box so close at hand. (a)

They all anticipated the foreseeable move of the opposite club. (a)

The construction work obstructed the road to my grandparents' house.

She was eating the cake she was supposed to take to school. (a)

He did not buy the otherwise satisfactory merchandise.

Not unmixd feelings about his ideas were expressed by her.

Everyone was taken by surprise by the not unfair assignment. (a)

They spread around nasty rumors to destroy the doctor's reputation.

The usually cooperative patient refused the series of new tests prescribed by his doctor. (a)

The kind merchant disguised as a witch scared the children. (a)



The successful couple hired a maid for their immense house. (a)

He drew the rare kind of flowers that grows in the region.

The not unacceptable contract was signed by him after days of negotiation. (a)

The customer refused the sweetened black coffee.

The clouded sky frightened the young campers. (a)

The doctors were limited in their work by the not unrestricted possibilities of intervention.

The dancer finally accepted the offer from the best troupe.

The doctor did not make any money with healthy clients. (a)

The tourists bought the suntan lotion offering the greatest protection.

The one which she covered with cloth was the old chair which was used in the living room. (a)

The not uncalculated risk of increasing the wages was not unaccepted by the director. (a)

Children should always be treated by grandparents on a not unequal basis.

He manifested a desirable attitude in this embarrassing situation.

The written complaint stopped the contractor from demolishing the old house. (a)

A new way to market his product was not left undiscovered by the not unintelligent salesman.

The not unchallenging task of convincing the committee was accepted by her.

The guide aware of the danger gave specific instructions to avoid this

path. (a)

The one which bit the cat was the dog which was running away with the bone.

John lost a pencil this morning and she found it under the table. (a)

The one which he found which was at the gas station was a job which was for the summer which required many hours of work a day. (a)

The not uncomplicated operations were not left unchanged by the technician before trying out her program. (a)

The one whom she saw crying was the man who was coming out of the church.

Following the presentation of the sad story he delivered his speech in an affected way.

The one which she pulled was the muscle which was in her lower leg which used to hurt when she exercised.

They had used the fixture that was in the kitchen before. (a)

The one which she wanted to visit was a town which was a little one which was in the mountains. (a)

He gladly attended his grandparents' fiftieth anniversary.

The children wanted the cat they saw at the store.

He was convinced that the newly hired clerk gave him the wrong document. (a)

The official memo caused a lot of turmoil among the staff members.

The selfish truck driver gave no chance to the driver of the little car.

How the sleepy girl felt was not unclearly indicated by her blinking eyes.

I saw leaving the guy she met the day before. (a)

I ignored the girl you saw cheating the other day.

The one which she preferred was the vase which had been transferred from the other gallery.

His advice was not undoubtedly accepted by her. (a)

The advantages of a not uncaredful exposure in the sun were praised by her. (a)

He prepared a large meal two days ago and everyone showed up on time.

The student could not finish on time the assignment requiring a lot of research at the library. (a)

She finally looked at the house he had described earlier.

She wrote an interesting story with a happy ending.

The assisted nurse helped the obese patient to get out of his bed. (a)

The not unflexible plan she proposed was approved by the monitor. (a)

On the quality of their performance were judged the ones who were the competitors who were the most excellent.

Twice a week she meets the friend she goes jogging with. (a)

The drinks we had ordered after dinner were forgotten by the not unhurried waiter. (a)

I chose the white curtain suitable for our kitchen. (a)

She spent the whole afternoon picking up shells on the shaded beach.

The scrupulous businessman refused the deal with the other firm.

He tried to impress his older clients he values. (a)

The one which he liked to ride was the bicycle which was perfect for his height.

The one which she really appreciated was the comment which came from

the director whom she had previously feared.

She held on to her new umbrella that her mother had recently bought.

(a)

The not unoriginal fashions for the fall were modelled by the not unattractive women: (a)

The one whom we saw at the restaurant was the couple we had met previously.

The one which she reconsidered was the decision which concerned the future of the group.

The one which she lost was the ring which he had given her last year.

She refused the invitation that did not appeal to her. (a)

Their not unexpired pass to the swimming pool was replaced by them.

The one whom I really enjoyed watching was the dancer who was wearing the velvet suit which was white. (a)

She acknowledged that she could duly accomplish this chore. (a)

The one which she decorated was the cake which was ordered by her friend's sister.

The one which she threw out was her sister's cake which was horrible.

The visitors really appreciated the renovated cottage last week. (a)

She congratulated the winner of the contest organized by the authorities.

The child ate the delicious cake his mother had bought at the store.

(a)

The one which she used was her loud voice which he was scared of. (a)

The newly arrived tourists were impressed by our not undemocratic tradition.

The one which the aged lady was busily knitting was the angora pullover which was asked for by her daughter for her birthday.

The publisher graded the story as readable but of very poor quality.

The officers severely applied the defined rules concerning drinking in public places.

She did not like the sad movie he took her out to.

The experienced secretary typed a long and tedious report. (a)

The one which was the building which they demolished was the one which was old which burned down last month.

She did not like the crowded restaurant specializing in greasy food.

(a)

The one which they used was the one made of straw which was the basket which they brought back from the country.

She trimmed the bushes growing around the house.

He had the tickets his friend bought last month.

The ones which he spent the afternoon piling up were the boxes which children knocked down later.

The one which she ate was the chocolate cake which was for her birthday which he had baked himself.

I just saw the guy recognized at our competitor's office.

I listened to the boy complaining about school several times. (a)

The clerk filed away the report that caused some problems.

The cleaner sent the bleached linen to the hospital.

The owner of the French bistro repaired the brick wall condemned by the inspector. (a)

The expensively furnished living room impressed her. (a)

She denounced the biased report presented against her proposition. (a)

The exceptionally big parade attracted a large group of children. (a)

The restaurant chef prepared the dish that won first prize in the contest.

The ones whom he taught how to play darts were the young boys whom he liked.

The one which she composed was the one which was humorous which was the song which expressed a lot of sarcasm.

He played the song that brought back a lot of memories. (a)

The one which disrupted her concentration was the incident which involved four people.

The doctor prescribed cooked and raw vegetables to help recovery.

The baseball tournament was not uneasily won by them. (a)

The one which she sent back which was delivered at her door was the dress which she had not ordered. (a)

The mother trained her twins to keep their room tidy.

A not unexceptional request was made by the client at the last minute.

She set an attainable goal for her weakest group. (a)

A new video game was asked for by the not unspoiled child. (a)

He refused to sign the petition he did not approve of. (a)

The angry farmers formed the official Prairie League. (a)

The lyrics were written by the ones who were the least unadvanced students who were studying literature.

She consciously imposed her views on the group.

The first skydiving exercise of the season was permitted by the not unfavorable winds yesterday.

The least unproductive team was supervised by a dynamic group of students. (a)

The not unproising project was revealed by the deputy to her voters.

He gave her a phone call and it took days before she returned it. (a)

This special presentation on TV was found not sufficiently uncommercial by her. (a)

The office clerks made a thorough compilation of the salesman's paid bills.

The one which he thought of was the solution which solved his friend's problem. (a)

The foreman prepared a workable schedule with great difficulty.

Priority was given to the not unofficial mail by the postal clerks.

The one which the young girl went to was her class which started last month. (a)

A not unworkable schedule was prepared by the foreman with great difficulty.

Her life was saved by the not unfastened seatbelt. (a)

The young girl preferred the marionette with long hair. (a)

She preferred the article published in the new magazine.

The one which the artiaans transformed into colorful pots was the old heap of clay which was considered to be useless.

The public was not kept uninformed of all the important stories by the journalists. (a)

He could only recall the proverb dealing with another topic. (a)

The ones which they renewed were the contracts which resulted in bigger profits. (a)

The sorrowful story was precipitated by his not unregrettable forgetfulness.

The ones which she was selling were the chocolate bars which procure money for the school. (a)

She was helped in these difficult times by her not unfaithful friend. (a)

A visit to the dentist's is even feared by not uneducated clients.

She did not like the friend she hardly knew anything about. (a)

The one which he wrote last week was the letter which she answered right away. (a)

The tiring but enduring treatment produced a miraculous cure. (a)

The general ordered his well trained battalion to attack the enemy.

The not ungraceful performance of the figure skaters was interrupted by the cold weather. (a)

The suspicious lady found the apple thieves hiding in the woods.

Appendix C

Instructions for rating task

You will be presented a series of sentences played on a tape. We will ask you to perform two different tasks in relation to them. For one of the tasks, we will ask you to give an expression or a short sentence summarizing as precisely as possible, that is without changing the emphasis, the idea expressed in each sentence.

For example, for the sentence "She was eating the apple she was supposed to take to school", you might want to answer "Eating An Apple" or "Apple Eaten Too Early"; for the sentence "A maid was hired by the not unsuccessful couple for their immense house", here you might want to answer something like "Successful Couple Hired A Maid", or "Maid Hired By Rich Couple". The idea, basically, is to find a headline, or a title, for the sentence. Be careful not to simply repeat aloud the sentence you have just heard.

The second task consists of evaluating the sentence in terms of its complexity. You can judge a sentence as being easy, complex, or if you can't make up your mind on a particular one, you can say "don't

know". As much as possible, try to decide between easy and complex.

You only have to do one task per sentence. The list provided to you will indicate which task goes with each sentence.

You will hear each sentence once only. Please listen carefully and say loud into the microphone in front of you the headline or the rating you decide upon for that particular sentence. Please answer quickly, as the next sentence will be read a few seconds later. Some sentences will be read with a foreign accent. Your task remains the same independently of the type of sentence you hear.

There are no right or wrong answers; we are interested in how people respond to the sentences we present.

If you have any questions, please feel free to ask them before we start.

Appendix D

Instructions for rating task (French version)

Nous allons vous présenter une série de phrases en anglais que vous entendrez à partir d'une enregistreuse. Nous vous demandons d'effectuer deux tâches différentes par rapport à ces mêmes phrases. L'une des tâches consiste à résumer la phrase en donnant une brève expression ou un titre résumant l'idée principale contenue dans chacune des phrases.

A titre d'exemple, pour une phrase comme "She was eating the apple she was supposed to take to school", vous pourriez répondre "Eating An Apple" ou "Apple Eaten Too Early"; pour "A maid was hired by the not unsuccessful couple for their immense house", vous pourriez répondre "Successful Couple Hired A Maid", ou "Maid Hired By Rich Couple". En fait, la tâche se résume à trouver un titre ou une manchette qui convienne pour chaque phrase. Faites attention de ne pas simplement répéter la phrase que vous entendrez.

La deuxième tâche consiste à évaluer la complexité de la structure de la phrase. Une phrase peut être "easy" ou "complex". Si vous ne pouvez absolument pas vous décider entre "easy" et "complex", vous pouvez répondre "don't know". Autant que possible, vous devez décider entre "easy" et "complex".

Vous n'avez qu'une tâche à exécuter par phrase. La liste devant vous indiquera quelle tâche effectuer pour chaque phrase que vous entendrez. A chaque fois que vous lirez "Headline" vous devez trouver un titre, à chaque fois que vous lirez "Rating", vous devez évaluer la complexité de la phrase.

Vous entendrez chacune des phrases une fois seulement. Ecoutez attentivement puis dites votre réponse (le titre ou l'évaluation que vous avez en tête pour cette phrase) dans le microphone devant vous. Répondez aussi rapidement que possible car les phrases sont lues à quelques secondes d'intervalle seulement.

Parmi les phrases que vous entendrez, quelques-unes seront lues avec un accent étranger. Vous devez exécuter la tâche demandée, indépendamment du genre de phrases que vous entendrez.

Dans cet exercice, il n'y a pas de bonnes ou de mauvaises réponses; nous nous intéressons seulement aux différentes réponses que les gens peuvent donner aux phrases que nous leur présentons.

Si vous avez des questions, S.V.P. n'hésitez pas à les poser avant que nous commençons.

Appendix E

List of tasks

1. rating	31. rating	61. rating
2. headline	32. headline	62. headline
3. headline	33. rating	63. rating
4. rating	34. rating	64. rating
5. rating	35. rating	65. headline
6. headline	36. rating	66. headline
7. rating	37. headline	67. headline
8. headline	38. headline	68. rating
9. rating	39. headline	69. rating
10. rating	40. rating	70. headline
11. rating	41. rating	71. headline
12. rating	42. headline	72. headline
13. rating	43. headline	73. rating
14. rating	44. headline	74. headline
15. headline	45. headline	75. rating
16. headline	46. headline	76. headline
17. headline	47. rating	77. rating
18. rating	48. rating	78. rating
19. rating	49. rating	79. rating
20. rating	50. headline	80. headline
21. headline	51. rating	81. rating
22. headline	52. headline	82. headline
23. headline	53. rating	83. headline
24. headline	54. rating	84. headline
25. headline	55. headline	85. headline
26. rating	56. headline	86. rating
27. headline	57. rating	87. rating
28. headline	58. headline	88. headline
29. rating	59. headline	89. headline
30. headline	60. headline	90. headline

91. headline
 92. headline
 93. rating
 94. headline
 95. rating
 96. headline
 97. headline
 98. rating
 99. rating
 100. headline

121. headline
 122. rating
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151. rating
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101. rating
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 117. headline
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 119. headline
 120. rating

141. rating
 142. rating
 143. headline
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 145. headline
 146. rating
 147. headline
 148. rating
 149. headline
 150. rating

Appendix F

Instructions for recognition task

You will now be presented some more sentences played on a tape. This time, however, your task will always be the same for all the sentences you hear.

We would like you to answer the following question for each sentence: Does it express an idea that was expressed in the listening session just completed? In other words, does this sentence mean the same thing as any of the sentences you previously heard?

There are three possibilities:

1. You will hear sentences which are identical to the ones you heard previously;
2. You will hear sentences which have the same meaning as the ones you heard previously but these sentences will have a different syntactic structure;
3. You will hear sentences which are totally new in terms of content.

Your task consists of recognizing IDEAS presented to you earlier. Therefore, you should answer "yes" for the first two possibilities and "no" for the last one.

These sentences will be presented to you in blocks of ten. Everytime you hear a sentence, you should cross out the number corresponding to it and make your decision between "yes" and "no". Everytime you hear a beep sound, you should be at the end of a block and ready to start another one. Please make sure that you are always starting a new block after each beep.

Please make a decision for every example.

If you have any questions, please feel free to ask them before we start.

Appendix G.

Instructions for recognition task (French version)

Nous allons maintenant vous présenter d'autres phrases. Vous n'aurez, cette fois-ci, qu'une seule tâche à effectuer pour toutes les phrases.

Pour chacune des phrases que vous entendrez, nous vous demandons de répondre à la question suivante: Est-ce que cette phrase exprime une idée qui vous a déjà été présentée dans la session précédente? En d'autres termes, est-ce que cette phrase veut dire la même chose qu'une phrase déjà entendue dans la session précédente?

Trois possibilités différentes se présenteront à vous:

1. Vous entendrez des phrases qui seront identiques à celles que vous avez déjà entendues;
2. Vous entendrez des phrases qui auront la même signification mais qui auront une structure syntactique différente, qui seront construites différemment;
3. Vous entendrez des phrases que vous n'aurez jamais entendues auparavant.

Votre tâche est de reconnaître les IDEES qui vous auront été présentées dans la session précédente. Vous devez, alors, répondre "yes" aux deux premières possibilités et "no" à la dernière.

Ces phrases vous seront présentées par groupe de dix à la fois. Sur votre feuille réponse, chaque fois que vous entendrez une phrase, vous devez rayer le numéro correspondant à cette même phrase, puis, choisir entre "yes" et "no". Après dix phrases, vous entendrez un son particulier, à ce moment-là, vous devez être à la fin de groupe et prêt(e) à en commencer un autre.

S.V.P. assurez-vous de toujours être au tout début d'un groupe après le son particulier. Assurez-vous, également, de faire un choix entre "yes" et "no" pour chaque exemple.

Si vous avez des questions, S.V.P. n'hésitez pas à les poser avant que nous commençons.

Appendix H

Source table for ANOVA

<u>Source</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Group	25.25	1	25.25	5.48	.05
Error	138.24	30	4.61		
Sentence	5.28	1	5.28	8.23	.01
Group x Sent.	0.00	1	0.00	0.00	
Error	19.24	30	0.64		
Accent	31.43	1	31.43	43.20	<.001
Group x Accent	.80	1	.80	1.10	
Error	21.83	30	.73		
Sent. x Accent	.60	1	.60	.99	
Group x Sent. x Accent	.30	1	.30	.50	
Error	18.14	30	.60		
Task	61.96	1	61.96	64.01	<.001
Group x Task	4.06	1	4.06	4.19	.05
Error	29.04	30	.97		
Sent. x Task	.81	1	.81	2.26	
Group x Sent. x Task	.98	1	.98	2.75	
Error	10.70	30	3.56		
Accent x Task	.40	1	.40	1.52	

Source table for ANOVA (cont'd)

<u>Source</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Group x Accent x Task	.28	1	.28	1.04	
Error	8.00	30	.27		
Sent. x Accent x Task	.16	1	.16	.61	
Group x Sent. x Accent x Task	.00	1	.00	.00	
Error	8.15	30	.27		
Test wording	1.35	1	1.35	6.24	.02
Group x Test	.91	1	.91	4.22	.05
Error	6.24	30	.22		
Sent. x Test	1.33	1	1.33	3.99	
Group x Sent. x Test	1.32	1	1.32	3.96	
Error	10.00	30	.33		
Accent x Test	1.51	1	1.51	6.16	.02
Group x Accent x Test	.68	1	.68	2.77	
Error	7.34	30	.24		
Sent. x Accent x Test	1.48	1	1.48	4.42	.05
Group x Sent. x Accent x Test	.03	1	.03	.09	
Error	10.03	30	.33		
Task x Test	1.90	1	1.90	10.13	.01
Group x Task x Test	.45	1	.45	2.40	
Error	5.63	30	.19		

Source table for ANOVA (cont'd)

<u>Source</u>	<u>SS</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Sent. x task x Test	.12	1	.12	.42	
Group x Sent. x Task x Test	.00	1	.00	.00	
Error	8.36	30	.28		
Accent x Task x Test	.93	1	.93	6.06	.02
Group x Accent x Task x Test	.77	1	.77	5.01	.05
Error	4.62	30	.15		
Sent. x Accent x Task x Test	.10	1	.10	.49	
Group x Sent. x Accent x Task x Test	.30	1	.30	1.41	
Error	6.33	30	.21		