
ON THE RELATIONSHIP BETWEEN WORKING MEMORY CAPACITY AND L2
SPEECH DEVELOPMENT

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ABSTRACT

This study investigates whether working memory capacity varies in the course of L2 speech proficiency. Seventy-nine students of the Federal Universities of Bahia and Santa Catarina were assigned into a basic or an intermediate group, according to their scores in the L2 proficiency test. They were also submitted to an L2 adaptation of Daneman's 1991 speaking span test. Positive and statistically significant correlations were found between working memory scores and L2 proficiency measures. Results point to the conclusion that working memory capacity seems to vary as a function of L2 speech proficiency.

KEY WORDS: L2 acquisition, individual differences, working memory capacity, L2 proficiency.

INTRODUCTION

Research to date has acknowledged that limitations in individuals' working memory capacity may be seen as a possible independent constraint on the process involved in using and acquiring both a first and a second language (DANEMAN and GREEN, 1986; DANEMAN, 1991; FORTKAMP, 1999; 2000; FONTANINI et al. 2005; WEISSHEIMER and FORTKAMP, 2004; BERGSLEITHNER, 2005; GUARÁ-TAVARES, 2005; FINARDI and PREBIANCA, 2006; XHAF AJ, 2006; FINARDI, 2008; BERGSLEITHNER and FORTKAMP, in press). These studies have shown that, in general, individuals with a higher

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working memory capacity tend to outperform those with a lower capacity in various aspects of language performance and acquisition. These findings are crucial to our understanding of how people differ when attempting to use their first or second language; a fact that has to be taken into consideration by anyone attempting to delve into the complexities of human cognition.

The view of working memory capacity as a source of individual differences in L1 use and acquisition is already indisputable (JUST and CARPENTER, 1992; DANEMAN and GREEN, 1986; TOMITCH, 2003; TURNER and ENGLE, 1989; CONWAY and ENGLE, 1996; ENGLE et al., 1999; KANE, 2001). A wide range of studies seem to agree that processing and storage capacity differ from individual to individual being one of the crucial aspects in determining their performance on important cognitive tasks, such as reading comprehension, the ability to abstract grammatical regularities, and speech production.

There is now mounting evidence for the role of working memory capacity as a possible independent constraint on the process involved in second language use and acquisition (HARRINGTON, 1992; HARRINGTON and SAWYER, 1992; ELLIS and SINCLAIR, 1996; MIYAKE and FRIEDMAN, 1998; BERQUIST, 1998; FORTKAMP, 1999, 2000; FONTANINI et al., 2005; WEISSHEIMER, 2007; FINARDI, 2008). Overall, these studies suggest that working memory capacity may be even more involved in the processes of using and acquiring an L2 than in those processes involved in L1 production and development.

The reasons why working memory capacity may be more required during L2 acquisition and use are, among others, the possible lack of access to UG and qualitative differences between L1 and L2 development (HARRINGTON, 1992). Miyake and Friedman (1998) suggest that L2 acquisition may have to rely to a greater extent than L1 acquisition on general learning mechanisms and principles, such as, for example, working memory capacity. Because working memory capacity is believed to be more required during L2 use and acquisition, an extra load is imposed on the system, affecting the speed and quality of acquisition.

The role of working memory is also crucial in both L1 and L2 speech production. According to Levelt's model (1989) of L1 speech production, which in turn, inspired models of L2 speech production, the speaker has to go through a number of processes, namely *conceptualization*, *formulation* and *articulation*, until the message can be finally articulated as overt speech. In the first component of his model, the *conceptualizer*, the speaker selects information to convey an intention, bringing this information into perspective. The second component, the *formulator*, translates a conceptual structure, the preverbal message, into a linguistic structure. Finally, the *articulator* proceeds to the execution of the phonetic plan so that overt speech can be generated. Working memory stores intermediate representations of messages (preverbal message, surface structure, and phonetic plan) making them available for further processing. For example, the intermediate products of the conceptualization of a message, that is, the information which is currently being accessed and manipulated by the speaker, are, according to Levelt (1989), deposited in working memory, which, in turn, decides the amount of attention different aspects of the information will receive.

The distinction between controlled and automatic processing (SHIFFRIN and SCHNEIDER, 1977) is key in Levelt's speech production model, once these two processes, despite dichotomous, coexist within the act of speaking. According to Shiffrin and Schneider (1977), automatic processes are executed without intention or conscious awareness, are usually quick, and operate on their own resources. Controlled processes, on the other hand, demand attentional resources, which are limited in working memory. Controlled processes are usually serial and, therefore, take time. Looking back at the components of Levelt's model, message generation (in the conceptualizer) and monitoring involve highly controlled processing. The other components of Levelt's model are claimed to be largely automatic.

Thus, according to Levelt's model of L1 speech production, working memory capacity is largely required in the process of message generation,

executed with controlled processes in the Conceptualizer. Nevertheless, when it comes to L2 speech production, it can be argued that working memory capacity may be even more important as it would play a role not only in conceptualization but also in message formulation, since grammatical encoding processes are not completely automatized in L2 (FORTKAMP, 2000). Moreover, when it comes to L2 speech production, according to Poullisse (1997), three major characteristics of L2 speech have to be taken into consideration: 1) the L2 knowledge base (both lexical and grammatical) is incomplete; 2) L2 procedures lack automaticity; and 3) the two languages may be mixed, either intentionally or accidentally.

Following the rationale above, researchers have been attempting to compile evidence on the extent to which working memory capacity is related to learners' performance on specific L2 skills, such as reading comprehension (HARRINGTON, 1992; BERQUIST, 1998; HARRINGTON and SAWYER, 1992; TORRES, 1998, 2003), the acquisition of grammatical structures (MIYAKE and FRIEDMAN, 1998), the acquisition of vocabulary (MENDONÇA, 2003), speech production (FORTKAMP, 1999, 2000; FORTKAMP and ZIMMER, 2005; FONTANINI et al., 2005; WEISSHEIMER and FORTKAMP, 2004; FORTKAMP and BERGSLEITHNER, in press; BERGSLEITHNER, forthcoming; GUARÁ-TAVARES, 2005; FINARDI and PREBIANCA, 2006; XHAFAJ, 2006) and speech development and acquisition (WEISSHEIMER, 2007; FINARDI, 2008).

The relationship between working memory and skill acquisition is a straightforward one and has been developed within the realms of cognitive psychology, more specifically, the information processing approach (McLAUGHLIN et al. 1983; McLAUGHLIN and HEREDIA, 1996). Decades of research on performance in laboratory tasks have revealed general information-processing constraints on the acquisition of skilled performance. The most important constraint concerns the capacity of working memory – the amount of information about the task and generated results that subjects can keep continuously accessible during task performance (ERICSSON and DELANEY, 1998).

In this paradigm, learning takes place along a developmental continuum in which attention and control are necessary processes, at least in the early stages of skill development. Learning occurs with the mediation of controlled and automatic processes (SHIFFRIN and SCHNEIDER, 1977) and practice plays a key role for it is through practice that procedures are automatized, thus freeing controlled processes to be allocated to other higher levels of processing (MCLAUGHLIN and HEREDIA, 1996).

In order to understand how people learn and perform complex skills, one must understand why people differ in the way they acquire and perform complex skills, such as producing and acquiring an L2. Various models in the cognitive psychology literature address how people acquire skills and most of them specify that people go through stages leading towards automaticity and claim that skill acquisition, as well as the level of expertise attained in a certain skill is partly a function of the amount of cognitive resources that individuals possess (PERLOW et al., 1997; MIYAKE and FRIEDMAN, 1998).

According to a number of researchers (HARRINGTON, 1992; BERQUIST, 1998; HARRINGTON and SAWYER, 1992, FORTKAMP, 1995; MIYAKE and FRIEDMAN, 1998, among others), an interesting question to be pursued is whether working memory capacity may vary in the course of L2 acquisition as a function of increased command of language and, consequently, more automatization of the linguistic system. This belief is mainly based on the low correlations researchers have found between measures of working memory capacity in L1 and L2, which have led them to suggest, as already mentioned, that working memory scores in L1 and L2 may be independently motivated to some extent. While, in L1, working memory is believed to be more closely linked to a biological trait, in L2 it seems to be associated to the degree of proficiency one has in that specific language (HARRINGTON, 1992; BERQUIST, 1998; HARRINGTON and SAWYER, 1992; MIYAKE and FRIEDMAN, 1998).

Following these assumptions, Berquist (1998) suggests that since working memory is assumed to be complete in adult L2 acquisition, the

variation in working memory capacity scores might not be completely linked to a fixed biological capacity, but rather to processing efficiency.

Finally, Miyake and Friedman (1998) also signal the importance of investigating how working memory influences the speed and quality of L2 learning, focusing on the process of L2 learning rather than on its product. By doing so, according to these two researchers, one may not only contribute to the discussion on how learners differ from each other, but may, concomitantly, throw some new light on how to maximize the outcome of L2 learning by unveiling the particularities of the process.

In conclusion, it remains unclear whether working memory capacity is independently motivated or not. The predictive ability of the speaking span test for L1 and L2 has received some support, but the evidence to date precludes any claims as to the causal role such capacity might have in the development of language skill – L1 or L2. According to Fortkamp (1995), the degree of proficiency learners have in the cognitive task being performed is a problem that researchers dealing with the psychometric correlational approach seem to be avoiding. The researcher suggests that further investigations can verify this aspect more carefully by assessing individuals' working memory capacity during various moments of their L2 acquisitional process and then observing whether this capacity is held constant. This is one of the aims of this paper.

Based on evidence that working memory capacity is related to L2 speech performance and development, the focus of the present investigation is to verify whether working memory capacity scores experience any sort of change in two distinct stages of L2 acquisition, bearing in mind that L2 processing gets more automatic as a result of increased knowledge on the language.

METHOD

The method used in this study is quasi-experimental and quantitative (BACHMAN, 2005; BROWN, 1988; DANCEY, 2004; HATCH and LAZARATON,

1991). The aim of the present study is to investigate the extent to which working memory capacity assessed in terms of an L2 speaking span test (SST) varies as a function of language development and automatization. That general research question generated the hypothesis that there will be a difference in the mean scores of the L2 speaking span test of basic and intermediate L2 learners and that the means for the intermediate group will be higher than the means for the basic group.

In what follows the participants used in this study, as well as the instruments and procedures of data collection will be described, along with the statistical procedures used to analyze the data.

PARTICIPANTS

Seventy-nine students of different courses at the Federal Universities of Bahia (UFBA) and Santa Catarina (UFSC) integrated the original sample of this experiment. The participants were divided into two groups according to their proficiency level. Forty-seven participants were in the basic group and studied in the following courses and programs of the Federal University of Santa Catarina: 26 from the Letters and Executive Secretarial Programs and 21 from the English 2 of the Extracurricular Course. The cohort consisted of 18 male and 29 female participants, ages ranging between 18 and 55 with a mean of 25,5.

The participants in the intermediate group were thirty-two students of the Letras Course of the Federal University of Bahia and the cohort consisted of 11 male and 21 female participants, ages ranging between 18 and 35. Twelve participants were enrolled in the fifth semester of the Letras course, fourteen were in the second semester, and the six remaining participants were taking a tenth semester subject – Syntax and Semantics. The Letras course at UFBA comprises twelve semesters. All participants who were pre-tested and agreed to be volunteers in this study have signed a consent form.

INSTRUMENTS

Participants in the basic group studied in the same L2 level classes and had done an in-house placement test so as to be categorized as basic students. A written placement test was administered. So as to guarantee that all participants had the same L2 oral level, they were pre-tested with an oral interview.

Participants in the intermediate group were submitted to a proficiency trial – the speaking test. In this speaking test participants were asked to describe a picture-cued narrative. Three experienced raters judged the speech samples against a speaking proficiency scale (D'ELY and WEISSHEIMER, 2004) (see Appendix A) and Pearson's Correlations were run for each of the three ratings in the proficiency trial. Correlations were significant [$r(32)=.90$; $.83$; and $.76$, $p < .01$], showing consistency among results provided by the three different raters. Cronbach's coefficient alpha for the proficiency test was $.93$, attesting internal consistency and reliability to the test. In an attempt to guarantee sample homogeneity, in terms of oral proficiency, participants whose scores were at least 1,5 points above or below the mean ($M=2,86$) were excluded from the sample.

The reason why the two speaking tests were different is that in the case of the basic group, the participants formed a homogeneous group, all having been categorized as basic learners by in-house exams. Because these students had a limited L2 knowledge, a picture-cued narrative would be too demanding for them, thus, it was decided that a simple interview should suffice to guarantee that all had the same L2 speaking level. In the case of the intermediate group there was more variation, both in terms of previous L2 knowledge and in terms of the groups the participants belonged to. Thus, it was decided that in the case of the intermediate group it was important to test a larger sample and ask different raters to judge their performances so as to select a homogeneous group in terms of intermediate L2 speaking proficiency level.

THE L2 SPEAKING TESTS

In the case of the basic group the researcher asked the participants the following questions during the interview: What's your full name? How old are you? Where do you live? What do you do? Where do you work? Can you speak any other language apart from English? Do you study English outside of class? Why are you studying English?

Regarding the intermediate group, the participants were taken to the lab and given a cartoon strip containing pictures of a story (Appendix B). They were instructed to look at the pictures and tell the story in the pictures speaking English into the microphone. Both the interviews and the narratives were recorded and analyzed by different raters.

THE L2 SPEAKING SPAN TEST (L2 SST)

Weissheimer's (2005) version of the L2 speaking span test (L2 SST), which, in turn, was based on Daneman's (1991) speaking span test was used in this study. The L2 SST used in this study consisted of 120 words. The criteria for the selection of words were: (1) words should be known by all participants (2) only monosyllabic and dissyllabic words were included; (3) words semantically and phonetically related were avoided within each sequence in order to prevent participants from establishing associations between words, which would, in turn, aid memorization. Because this test was designed for intermediate level groups the words used in the L2 SST were piloted with the basic group so as to guarantee that all participants knew the words included in the test.

The total number of words (120) was organized in six sets, each of 2, 3, 4, 5 and 6 words. Each word was presented individually, in the middle of a computer screen for one second. Participants were instructed to read the words silently. After ten milliseconds, the next word in the set appeared in the same position on the screen as the previous word was presented. This procedure was followed until the set ended and a black screen

appeared with interrogation marks on it. These marks signaled the number of words that had to be recalled and the number of sentences to be produced. Participants were instructed to use the words in the correct form and order they appeared to generate syntactically and semantically acceptable sentences, aloud, in English. There were no restrictions concerning the length or complexity of the sentences produced. The words of the L2 speaking span test can be seen in Appendix C.

Participants' speaking span was defined as the maximum number of words (out of 60) for which they could generate grammatically and semantically acceptable sentences in English. Following Daneman (1991) and Daneman and Green (1986), in this study, participants' responses, which were recorded, transcribed and analyzed, generated two different speaking span scores: a speaking span strict, when all the sentences the subject produced contained the target word in the exact form and order of presentation, and a speaking span lenient, when credit was given for sentences that contained the target word in a form other than that of presentation (e.g., target word being 'drug' and the word in the sentence produced being 'drugs'). No credit was given to ungrammatical sentences in terms of syntax and semantics.

PROCEDURES

Two researchers were in charge of data collection, one in Santa Catarina and the other one in Bahia. Regarding the procedures for the basic group, the researcher administered the L2 speaking span test two weeks after the pre-test in the first semester of 2007 in the Federal University of Santa Catarina, in individual meetings with the participants.

The data for the intermediate group was collected at the Federal University of Bahia in the second semester of 2005. The speaking span test was administered eight weeks after the pre-test. The data belonging to the two proficiency groups was recorded and transcribed. Regarding the procedures for the L2 speaking span test, which was exactly the

same for the two proficiency groups, a training phase (60 words) preceded the testing phase (60 words) and the actual test did not start until the participants reported feeling comfortable to perform the test. All participants underwent the practice session.

DATA ANALYSIS

The data in this study were submitted to different statistical procedures using the statistical program SPSS 10.0. The statistical techniques used in this study will be described in what follows.

DESCRIPTIVE STATISTICS

So as to address the hypothesis raised in this study, descriptive analyses of the data were conducted so as to have a general picture of the participants' performance in the tests used in this study. Moreover, the data were checked for normal distribution.

INTER-RATER RELIABILITY

Two independent raters (apart from the researchers) analyzed all the transcriptions of the working memory tests. The three raters had extensive knowledge of the L2 SST, having used this test in different studies. Correlations were run among the three scores accepting only strong correlations. In case the correlations were weak it was decided that the data would have to be reanalyzed and the raters would have to discuss individual cases to reach agreement. All the correlations were high and so the data was analyzed only once. Only the researcher in charge of data collection had access to the qualitative data of the memory tests and because there was good inter-rater reliability a methodological decision was made to use the scores yielded by the rater who was in charge of data collection to answer the research question raised in this study.

PAIRED SAMPLES T-TESTS

Paired Samples t-tests were run between the scores yielded by the two proficiency groups in the working memory tests to check whether the difference in their performance was statistically significant.

RESULTS

This section will present the statistical analysis conducted so as to answer the main research question of whether working memory capacity assessed in terms of an L2 speaking span test varies as a function of L2 speaking proficiency level. To reiterate, the hypothesis raised in this study predicted that there would be a difference in the means of the two proficiency levels groups in the L2 SST scores and that the means for the intermediate group would be higher than the means for the basic level group. Moreover, it predicted that the difference in means would be statistically significant.

This section is divided in two parts. The first part will present the descriptive statistics for the two proficiency level groups, so as to enable a general view of their overall performance on the tests. The second part will present the t-tests run so as to check whether the difference in performance across proficiency levels was statistically significant.

As can be seen in Table 1, the means for the intermediate group, as expected, were higher than those for the basic group. While the mean for the basic strict group was of 16.979, the mean for the intermediate strict group was of 26.125. In the case of the lenient score, the mean for the basic group was of 20.457 while for the intermediate group it was of 27.062. The data is normally distributed. The raw scores of the L2 SST can be seen in Appendix 4.

TABLE 1
DESCRIPTIVE STATISTICS

	N	MIN	MAX	MEAN	STD. DEV	SKEW	KURTOSIS
	STAT	STAT	STAT	STAT	STAT	STAT	STAT
	STAT	STAT	STAT	STAT	STAT	STAT	STAT
basic strict	47	5.0	30.0	16.979	6.641	.069	-.838
basic lenient	47	10.0	33.5	20.457	5.932	-.131	-.656
interm strict	32	14.0	45.0	26.125	7.691	.673	-.088
inter lenient	32	14.0	46.0	27.062	7.641	.583	-.062
Valid N (list	32						

So as to check whether the difference in performance of the two groups was statistically significant, a series of paired samples t-tests were run. Results of these tests are in Table 2.

TABLE 2
PAIRED SAMPLES TEST

		MEAN	STD. DEV	STD. ER MEAN	T	DF	SIG. (2-TAILED)
Pair 1	basic strict - intermediate strict	-5.938	11.308	1.999	-2.970	31	.006
Pair 2	basic lenient - intermediate lenient	-3.844	10.682	1.888	-2.036	31	.050

The comparison of means in Table 2 indicates that the difference in performance in the L2 speaking span test for the basic and intermediate groups was statistically significant for the strict score ($p < .05$) but not for the lenient score, though it almost reached significance ($p = .05$). Thus, the hypothesis raised in this study can only be partially confirmed, that is, there is a difference in means for the performance of the basic and intermediate groups in the L2 speaking span test; the means for the intermediate group are higher than the means for the basic group but this difference is statistically significant only for the strict scores. In order to explain what these results mean, we now turn to the discussion of the data.

DISCUSSION

The first issue that must be addressed in this discussion is the difference in L2 working memory capacity means (assessed in terms of an L2 speaking span test) across two L2 speaking proficiency levels. To reiterate, this study departed from the assumption that working memory capacity was related to the processes involved in L2 use and acquisition, perhaps even more so than in L1, because of the less automatized nature

of L2 procedures. Moreover, it assumed that this relationship would be stronger in basic proficiency levels in which the controlled processes involved in L2 speaking predominated. It was also assumed that as learners advanced in the L2 development continuum, controlled processes would be gradually automatized and less control (from working memory) would be required during L2 speaking in more advanced proficiency levels. Based on these assumptions, it was hypothesized that the means for the intermediate group would be higher than those for the basic group and this hypothesis was borne out in this study.

The explanation offered for this difference in means is aligned with cognitive psychology models of skill development which see the performance of a skill as moving from a more controlled to a more automatized nature, that is to say, in the beginning, learners require more working memory capacity to execute controlled processes which become automatized with practice, thus, freeing up working memory resources to be allocated in the execution of other cognitive processes.

This explanation is also in tandem with studies of L2 speech production and development (for example FORTKAMP, 2000; WEISSHEIMER, 2007; FINARDI, 2008) which see L2 speech production and development as a complex skill which can be approached within the realms of cognitive psychology, more specifically, within information processing theory (LEVEL, 1977, as cited in McLAUGHLIN et al., 1983). Not only is L2 speaking a complex skill but maybe one which is even more related to working memory capacity because of its more controlled nature (FORTKAMP, 2000).

Thus, the difference in means found in this study is understood to reflect different levels of automatization of L2 speech production, in the case of the intermediate group reflecting more automatized processes whereas the performance in the basic group would reflect more controlled processes. Though there was a difference in means between the two groups, confirming the hypothesis raised in this study, this difference was statistically significant only for the strict scores of the L2 SST. The explanation offered here for the lack of statistical significance between

the lenient scores of the L2 SST is also related to the rationale brought to bear in the study, that is, it is related to the interplay of controlled and automatic processes. The lenient score, for its nature, is less related to control than the strict score which reflects controlled processes. Limitations in working memory capacity are also assumed to be more related to control than to automatic processes, thus the statistical significance reached for the strict scores and not for the lenient scores of the L2 SST.

This study departed from models of skill building and information processing theory suggesting that working memory capacity plays a crucial role in the performance and acquisition of complex skills (such as L2 speaking) to suggest that this role was maybe more important in L2 than in L1 (FORTKAMP, 2000), because of the less automatized nature of L2 speech production, especially in basic proficiency levels where the more controlled nature of processes predominated. Based on these assumptions, a hypothesis was raised that there would be a difference in means across proficiency levels when performing the L2 SST and this hypothesis was confirmed though the difference in means was not statistically significant for the lenient scores. Results were explained in terms of the interplay between automatic and controlled processes, the lack of statistical significance related to the less controlled nature of the lenient score when compared against the strict score of the L2 SST.

However enlightening the results of this study might seem, they should be taken as suggestive rather than conclusive, and some limitations have to be acknowledged. Firstly, the cross-sectional nature of this experiment represents a caveat that can be easily overcome by further studies. More reliable results in terms of the relationship between working memory and L2 proficiency may be obtained if, in future endeavors, the *same* learners are tested, in a longitudinal manner, in different stages of their L2 development. Secondly, the limited number of participants may have prevented larger statistical differences to emerge. Ideally, larger samples should be used so as to enable firmer statistical conclusions.

Thirdly, in future research endeavors, two measures of working memory capacity should be used, one in L1 and another in L2 since the L2 SST, as a complex span test, may conflate working memory capacity with L2 proficiency level. One way to safe guard against this possibility would be to use advanced statistical procedures such as factorial analysis to partial out the effects of proficiency on the L2 SST. Unfortunately, these procedures were beyond the scope of this paper. Notwithstanding these shortcomings, this study may be taken as a first step into the exploration of how working memory capacity is related to the L2 speech proficiency level attained.

SOBRE A RELAÇÃO ENTRE A CAPACIDADE DE MEMÓRIA DE TRABALHO E O DESENVOLVIMENTO DE FALA EM L2

RESUMO

Este estudo investiga se a capacidade de memória operacional de um indivíduo varia de acordo com sua proficiência oral na língua estrangeira (L2). Setenta e nove alunos das universidades federais da Bahia e de Santa Catarina foram distribuídos em dois grupos de proficiência (básico e intermediário) e submetidos a uma adaptação em L2 do Teste de Amplitude de Memória Oral de Daneman (1991). Correlações positivas e estatisticamente significativas parecem indicar que a capacidade de memória operacional do indivíduo varia em função do seu nível de proficiência oral em L2.

PALAVRAS-CHAVE: Aquisição de L2, memória operacional, proficiência em L2.

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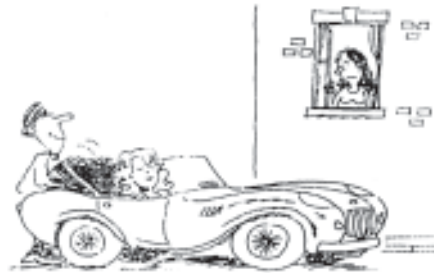
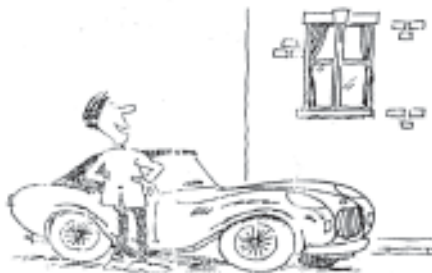
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APPENDIX A - PROFICIENCY SCALE

	5.0	4.5	4.0	3.5	3.0	2.0	1.5	1.0	0	
Grammar and Vocabulary	<ul style="list-style-type: none"> A wide range of grammatical forms and vocabulary is attempted. Grammar is mainly accurate, although minor errors may occur Vocabulary is sufficiently appropriate to deal with the tasks effectively. Errors are barely noticed. 	More features of 5.0 than of 3.0			<ul style="list-style-type: none"> An adequate range of grammatical forms and vocabulary is used. Grammar is sufficiently accurate to convey intended meanings. Vocabulary is sufficiently appropriate to deal with the tasks. Manages most common forms, with occasional errors; major errors present. 	Some features of 3.0 and some features of 1.0 in approximately equal measure			<ul style="list-style-type: none"> The range of grammatical forms and vocabulary is not adequate. Grammar is insufficiently accurate to deal with the tasks, and errors obscure intended meanings. Vocabulary is used inappropriately, or may be too limited to deal with the tasks. Clear lack of linguistic control even of basic forms. 	Insufficient sample of spoken language
	<ul style="list-style-type: none"> Confidently attempts a variety of verb forms (eg. Passives, modals, tense, and aspect), even if the use is not always correct. Regularly takes risks grammatically in the service of expressing complex meaning. Routinely attempts the use of coordination and subordination to convey ideas that cannot be expressed in a single clause, even if the result is occasionally awkward or incorrect. Contributions are relevant and coherent, and are effective in developing the discourse. Contributions are consistently of an appropriate length. 				<ul style="list-style-type: none"> Mostly relies on simple verb forms, with some attempts to use a greater variety of forms (eg., passives, modals, more varied tense and aspect). Some attempt to use coordination and subordination to convey ideas that cannot be expressed in a single clause. Contributions are mostly relevant and coherent, and are adequate in developing the discourse. Contributions are usually of an appropriate length. 				<ul style="list-style-type: none"> Produces mostly sentences fragments and simple phrases. Little attempt to use any grammatical means to connect ideas across clauses. Contributions lack relevance and/or coherence, and are inadequate in developing the discourse. Contributions are of an inappropriate length. 	
Complexity and discourse management	<ul style="list-style-type: none"> The use of stress, rhythm and intonations is sufficiently appropriate for meanings to be conveyed effectively. Individual sounds are articulated sufficiently clearly for utterances to be understood easily. Speaks fluently, without any hesitation, false starts and modification of attempted utterances. Barely makes use of unfilled and filled pauses within clauses – filled and unfilled pauses occurring at the end of clause boundaries. 				<ul style="list-style-type: none"> The use of stress, rhythm and intonations is sufficiently appropriate for most meanings to be conveyed effectively. Individual sounds are articulated sufficiently clearly for utterances to be understood, although there may be occasional difficulty for the listener. A reasonable degree of hesitation due to word-finding delays, relative ability to phrase utterances easily. Reasonable use of filled and unfilled pauses within clauses. Speaks fairly fluently with only occasional hesitation, false starts and modification of attempted utterance. 				<ul style="list-style-type: none"> The use of stress, rhythm and intonations is inappropriate and puts a strain on the listener. Poor articulation of individual sounds makes utterances difficult to understand. Speech is quite disfluent due to frequent and lengthy hesitations or false starts. Too much use of filled and unfilled pauses within clauses. 	
	<ul style="list-style-type: none"> Stress and rhythm Intonation Individual sounds Presence of hesitation and false starts Pausing patterns 									

APPENDIX B - PICTURE FOR NARRATIVE



APPENDIX C - WORDS L2 SST

HOUSE	PEOPLE	BOSS	ARM	SPOON	BALL
BEACH	EARTH	ISLAND	COURSE	BANK	TOOL
SCHOOL	WIFE	TEA	GUY	DATE	ICE
HOBBY	SOCCER	MOUTH	POINT	GAS	BREAD
FAMILY	POWER	SPORT	TRAIN	SKY	SEA
TEAM	WORLD	BABY	COW	CAR	BAG
MUSIC	SUMMER	IDEA	FIRE	DOOR	YEAR
NIGHT	OCEAN	MOVIE	SHOE	PEN	KING
FRIEND	APPLE	SPACE	KEY	DISK	BAND
SNACK	ROOM	TAXI	SNOW	BIRD	FLAG
DRUG	BALL	GIFT	OIL	SEAT	JOB
HONEY	NURSE	CLOCK	DOOR	BATH	AIR
LIGHT	TRUCK	WOMAN	BOAT	GIRL	BRAIN
FACE	ACTRESS	FISH	TOY	CLUB	BOY
MOTHER	MOON	MILK	ART	STREET	CLASS
COFFEE	WORKER	LUNCH	BOX	BED	FARM
PRISON	HEAD	WINDOW	FLOOR	MIND	BUS
NUMBER	CITY	MONEY	ROCK	MAIL	TV
POEM	DRESS	PROBLEM	COAT	BEER	FILE
	PLANT	PARTY	BOOK	PAIR	CROWD

APPENDIX D - RAW SCORES L2 SST
 THE VALUE 99,0 REFERS TO MISSING VALUES

Participant	Basic strict	Basic lenient	Interm strict	Interm lenient
1	26,0	27,0	20,0	20,0
2	30,0	33,5	20,0	21,0
3	25,0	26,0	22,0	23,0
4	23,0	25,0	23,0	23,0
5	27,0	28,0	20,0	20,0
6	24,0	25,0	21,0	21,0
7	27,0	29,0	16,0	17,0
8	24,0	25,0	19,0	21,0
9	30,0	31,0	22,0	22,0
10	23,0	26,5	16,0	17,0
11	24,0	26,0	14,0	14,0
12	19,0	23,5	20,0	23,0
13	20,0	24,5	20,0	20,0
14	21,0	25,0	33,0	33,0
15	20,0	25,5	39,0	40,0
16	22,0	26,5	30,0	30,0
17	22,0	24,0	32,0	32,0
18	15,0	21,5	35,0	36,0
19	15,0	20,5	42,0	42,0
20	20,0	21,5	33,0	33,0
21	18,0	22,0	32,0	33,0
22	11,0	15,5	45,0	46,0
23	13,0	18,0	28,0	29,0
24	16,0	18,5	31,0	31,0
25	21,0	23,0	29,0	30,0
26	16,0	18,5	29,0	29,0
27	18,0	19,5	25,0	26,0
28	21,0	22,0	24,0	25,0
29	14,0	16,5	24,0	24,0
30	13,0	18,0	20,0	33,0
31	15,0	15,5	31,0	31,0
32	13,0	21,5	21,0	21,0
33	16,0	20,5	99,0	99,0
34	16,0	23,5	99,0	99,0
35	15,0	18,5	99,0	99,0
36	13,0	15,0	99,0	99,0
37	11,0	15,0	99,0	99,0
38	11,0	13,0	99,0	99,0
39	7,0	19,5	99,0	99,0
40	10,0	17,0	99,0	99,0
41	10,0	10,0	99,0	99,0
42	7,0	10,5	99,0	99,0
43	5,0	11,5	99,0	99,0
44	9,0	11,5	99,0	99,0
45	8,0	10,0	99,0	99,0
46	9,0	10,0	99,0	99,0
47	5,0	13,0	99,0	99,0

