Processing form and meaning in L2: evidence from the production of a syntactic construction in L2 speech

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Título: O processamento da forma e do sentido em L2: dados da produção de uma construção sintática da fala em L2

Resumo: O processamento da forma e do significado é analisado durante a produção da fórmula (So+aux+I e Neither+aux+I) em respostas curtas na fala em L2 durante a retenção e a aquisição da fórmula em L2. Os resultados são discutidos em termos da complexidade linguística da estrutura da língua de destino com base em variações linguísticas na L1 e L2 e na relação psicolinguística entre a produção da estrutura sintáctica em relação à capacidade da memória de trabalho, o processamento da forma verso o processamento do significado, e a aquisição da fórmula em L2 pelo sistema baseado em regras. O estudo apresenta dados quantitativos e qualitativos para o primeiro plano da discussão, bem como algumas implicações pedagógicas para o ensino-aprendizagem de inglês como língua estrangeira.

Palavras-chave: processamento da forma e do significado em L2; retenção e aquisição de estrutura sintática na fala em L2; aprendizagem-ensino de inglês.

Abstract: The processing of form and meaning is analyzed during the production of the formula (So + Aux + I and Neither + Aux + I) in short L2 speech answers during the retention and acquisition of the formula in L2. The results are discussed in terms of linguistic complexity of the target language structure based on linguistic variations in L1 and L2 and in relation to the psycholinguistic relationship between the production of the syntactic structure in relation to the capacity of working memory, the processing of form and meaning and the acquisition of L2 formula by the rule-based system. The study discusses quantitative and qualitative data in the forefront and offers some pedagogical implications for the teaching and learning of English as a foreign language.

Keywords: processing of form and meaning in L2; retention and acquisition of a syntactic structure in L2 speech; english teaching/learning.

Introduction

Among the many abilities that learners must develop to master an additional language (L2), speaking is usually listed as a top priority for L2 students. Due to the difficulty associated with learning to speak an L2 fluently on the one hand, and its importance on the other, this research endeavor represents an attempt to better understand L2 speech production and acquisition from a linguistic, psycholinguistic and pedagogical perspective.

A linguistic account of L2 processing

The study discusses the processing of form and meaning in the retention and acquisition of the target language structure tests used in Finardi and Mota (2012). The target language structure (So+aux+I and Neither+aux+I) investigated was the English (L2) formula used to agree in short responses in L2 speech. This structure is assumed to be a complex linguistic structure because it requires verb movement (WHITE, 1992) and parameter resetting (i.e., changing the parameter used in L1) in L2

processing (WHITE, 1991). More precisely, it requires auxiliary movement to the left of the subject, an operation traditionally referred to as Subject-Auxiliary-Inversion (SAI), and involved for instance in yes/no-questions as in Can I borrow your book? or Should I study Unit 2? formed from the affirmative sentences I can borrow your book and I should study Unit 2.

In addition, in the English agreeing formula, the particles so and neither are placed at the front of the phrase. So and neither can be treated as polarity items, which move to the left of the auxiliary to agree with an affirmative sentence (so) or with a negative sentence (neither) (WOOD, 2008), thus increasing the linguistic complexity of this construction. Finally, to obtain the English target language formula So/neither-Aux-I, the verbal constituent, i.e. the main verb, its complement(s) and modifier(s), if any, is generally elided (omitted or deleted).

On the basis of cross linguistic analyses (for example, GASS; SCHACHTER, 1989; WHITE, 1992), it is also possible to suggest that the target language structure may be even more complex for L2 speakers whose L1 does not involve auxiliary movement in the corresponding construction expressing agreement, as is the case of the participants in this study who speak Brazilian Portuguese (BrP). In BrP (L1), the sentence used to agree involves main verb repetition and does not require auxiliary movement, so/neither-movement, or ellipsis of the complete verbal constituent (the main verb is not omitted).

According to linguistic accounts of syntactic processing (for example FLYNN, 1987, 1989; GASS; SCHACHTER, 1989, WHITE, 1991a; 1992), this means that the target language structure form investigated in this study may also be considered linguistically complex because it involves parameter resetting from BrP (L1) to English (L2), from absence of verb movement to verb movement.

That the target language structure is linguistically complex because it involves linguistic computation with verb movement is supported by Weckerly, Wulfeck and Reilly's work (2004) on the acquisition of tag questions, a syntactic structure whose processing can be said to be similar to that of the English agreeing formula investigated in this study. The

authors claimed that though tag questions are linguistic devices frequently used by children who are familiar with their pragmatic function, they are complex. One reason for them to claim that tag questions are complex is that, although their production places relatively few demands on the speaker in terms of motor output (only two words), they involve the analysis of a number of components of the stimulus clause, perhaps holding some of this information in working memory, and then synthesizing and transforming these features into tag questions. Like the target structure discussed here, tag questions require the use of an auxiliary verb (in this and in Weckerly, Wulfeck and Reilly's study: do, be, or can) which moves to the left of the subject (SAI). As in our work, half of the main clause sentences used in this study were in the affirmative, and half were in the negative form.

According to Weckerly, Wulfeck and Reilly (2004), the analysis of tag question production offers a number of measures of some of the fundamental elements of English morphology, such as agreement marking and auxiliary selection, along with measures of subject selection and polarity, as well as the simultaneous processing and coordination of these components. The overall number of correctly produced tag questions can be considered a measure of how well the various tag features were synthesized and coordinated in the response. In this sense, the production of tag questions offers "tests" of both linguistic knowledge and language processing. Finardi (2010) and Finardi and Mota (2012) went a step further and suggested that the acquisition of a syntactic structure, measured in the production of the formula required to agree in English, namely (So+aux+I and Neither+aux+I), is a good test of both language processing in L2 and working memory capacity.

Thus, linguistic and cross linguistic analyses of the target language structure investigated in this study predict that the processing of this structure is linguistically complex because it involves movements, in particular auxiliary movement, ellipsis, and, perhaps, more importantly, because the acquisition of this structure by BrP speakers learning English involves parameter resetting since this structure is processed with different

parameters in L1 and L2. In what follows we present the processing of the target language structure from a psycholinguist perspective.

A psycholinguistic account of L2 processing

Information processing theory has been used as a framework to study both L2 learning and speaking in a systematic way for over a decade now (FORTKAMP, 2008). A basic tenet of this approach is that human beings process information under the constraints of a limited capacity cognitive system – working memory – which functions as a computational arena, fueled by limited cognitive resources (attention) that support both the execution of various symbolic computations and the maintenance of intermediate products generated by these computations (JUST; CARPENTER, 1992; MIYAKE; FRIEDMAN, 1998). In this framework, working memory is treated as the theoretical construct that refers to the system or mechanism underlying the maintenance of task-relevant information during the performance of a cognitive task (SHAH; MIYAKE, 1999, p. 1).

Working memory capacity is assumed to constrain a number of cognitive processes, among which are L1 and L2 speaking (BERGSLEITHNER, 2007; DANEMAN; GREEN, 1986; DANEMAN, 1991; FINARDI; PREBIANCA, 2006; FORTKAMP, 1998; 2000; GUARA-TAVARES, 2008; MIZERA, 2006; WEISSHEIMER, 2011; XHAFAJ, 2006) and L2 speech development (FINARDI; WEISSHEIMER, 2009; FINARDI; MOTA, 2012; PREBIANCA; FINARDI; WEISSHEIMER, 2014; WEISSHEIMER, 2011; WEISSHEIMER; MOTA, 2009). Overall these studies show that individuals with larger working memory capacity tend to outperform those with smaller working memory capacity in different aspects of speech production and development.

Most accounts of L2 learning do not emphasize the role of production as a potential variable to trigger acquisition. Among the rare accounts of L2 learning that include production (for example, BIALYSTOK, 1982; 1991), Skehan's (1998) account of L2 learning was selected to explain L2 speech production and acquisition in this study because of the importance of production in his model. Drawing on Swain (1985), Skehan claims that

production (for him, through tasks) is necessary to force L2 learners who are driven by a focus on meaning, to focus on form to syntacticalize language.

Skehan's view of L2 learning is rooted in dual-process theories which conceptualize our cognitive system as being subdivided into two systems: a memory-based system responsible for synthesis and a rule-based system responsible for analysis (SKEHAN, 1998). In the case of language use and acquisition and according to Skehan, the memory-based system is responsible for synthesizing language, producing, for example, formulaic language, and the rule-based system is responsible for syntacticalizing language, computing, for instance, grammar rules. For Skehan, production is the means through which learners engage in cycles of analysis and synthesis of language, thus adding items to and transferring from the memory-based and the rule-based system, depending on processing conditions and aims. The rule-based system – which is assumed to be at least partially responsible for the acquisition of a syntactic rule in L2 speech (FINARDI, 2010; FINARDI; MOTA, 2012) – requires attention, which is assumed to be limited in working memory.

The present study is part of a larger study (FINARDI, 2010) and shares with it the assumption that at least some aspects of an L2 can be learned by adults like other skills (MCLAUGHLIN, 1987) though it acknowledges the fact that cognitive theories are but one way to explain L2 processing. Thus, the psycholinguistic account of L2 learning presented here is complemented by the linguistic account of L2 processing which sees linguistic knowledge as being separate from other knowledge systems and L2 acquisition as being different from other kinds of learning and guided by mechanisms that are specifically linguistic in nature (ELLIS, 1994).

Finardi (2010) investigated the role of working memory capacity in the retention and acquisition of a syntactic construction (So+aux+I and Neither+aux+I) in L2 speech and motivated the present study which is more concerned with the processing of form and meaning during the production of the target language structure investigated in Finardi (2010) and the pedagogical implications for L2 speech acquisition.

In order to test working memory capacity, Finardi (2010) used a speaking span test (SST) in L1 and another one in L2 and correlated the results of these tests with scores of the target language structure (So+aux+I and Neither+aux+I) tests administered in two speaking tests, one immediate focused test, and another delayed and unfocused (ELLIS, 2003) test, to measure the retention and acquisition of the target language structure, respectively. Data from these tests were correlated and triangulated with qualitative data from oral interviews carried out with participants after all the tests. Part of the data gathered in the oral interviews with participants was used to build the acquisition test. The retention test required participants to process only the form of the target language structure to agree with the input sentence using the formula (So+aux+I or Neither+aux+I) where as the acquisition test required participants to process both form and meaning to agree or disagree with the input sentence. For instance, if the researcher said I am Brazilian and the participant answered I am not, this question would be assigned only half a point because, although the answer was grammatically correct, the participant should have agreed with the researcher saying So am I since all participants were Brazilian (and the researchers knew this information in advance since this data had been collected during the oral interviews carried out with participants). The retention test had ten sentences with which participants had to agree whereas the acquisition test was tailored in such a way that participants would have to agree with five sentences and disagree with five sentences.

Finardi (2010) found that working memory capacity, assessed in terms of a speaking span test (SST) in L2, was related to the acquisition of the target language structure (.688*) as it emerged in L2 speech. Given the lack of significant correlations between working memory capacity measures in L1 and scores in the retention test, Finardi (2010) suggested that these two tests were tapping different processes. Moreover, based on the interviews conducted with participants after the tests, Finardi (2010) suggested that during the retention test participants were processing only the form of the target language structure whereas during the acquisition

tests they were processing both form and meaning, thus, taxing working memory capacity more than in the retention test.

Finardi (2010) explained her results suggesting that working memory capacity constrained the attention used by controlled processes operating in the rule-based system which in turn were related to the acquisition, but not to the retention of the syntactic structure in L2 speech and also acknowledged the possibility that the linguistic complexity of the target language structure investigated and parameter resetting in the L2 (WHITE, 1983) may also have affected the processing of the target structure in L2 speech.

The present study is based on Finardi (2010) and adds to this discussion by re-analyzing the data from the retention and acquisition tests with a linguistic and a psycholinguistic perspective suggesting that the performance in the retention test required the processing of form only and as such was not affected by working memory capacity, whereas the performance in the acquisition test required the processing of both form and meaning taxing working memory capacity. The psycholinguistic account presented in Finardi (2010) is expanded here with a linguistic account of the processing of the target language structure in L2 and some pedagogical implications.

Methods

The study discusses the processing of form and meaning in the retention and acquisition of the target language structure tests used in Finardi (2010). The target language structure (So+aux+I and Neither+aux+I) investigated was the English (L2) formula used to agree in short responses in L2 speech. The target language structure is assumed to be a complex linguistic structure because it requires auxiliary movement and parameter resetting (i.e., changing the parameter used in L1) in L2 processing (WHITE, 1991), to which movement of so/neither and elision of the verbal constituent should be added.

The syntactic structure investigated is different in the participants' first language (L1), Brazilian Portuguese, and in English (L2). Whereas in BrP agreement is usually achieved by repeating the main verb in a sentence as in

A – Eu falo espanhol (I speak Spanish). B – Eu também falo (I too speak).

In English, the speaker has to undergo a different syntactic computation to produce the target language structure so as to agree with a sentence: (s)he has to introduce an auxiliary verb, not an easy task as it implies using the right tense (the same tense as in the prompt sentence), and the correct form as the auxiliary in the first person (with the subject I/we) does not necessarily have the same form as the bare auxiliary (e.g. am vs. be) as in:

A – I speak Spanish. B – So do I.

In BrP, the canonical order, where the subject precedes the main verb, is used in the agreeing formula Eu tambem falo, whereas in English this ordering can only be used in the prompt sentence (I speak…). In the English agreeing phrase, not only is an auxiliary required, but it has to move to a position preceding the subject, just like so and neither which mark the polarity of the phrase, that is, whether the formula positively or negatively agrees with the prompt sentence, respectively. Tambem 'too' in BrP contrasts with so/neither in that it is not a polarity item, and therefore does not move to the front of the phrase. Rather, it is a focus particle like too in English and expresses emphasis (WOOD, 2008). Finally, BrP and English differ with regard to ellipsis: in the former, the main verb is repeated in the agreeing formula, but its complement (espanhol 'Spanish') is elided; in the latter, the complete verbal unit, i.e. the main verb and its complement (speak Spanish) is omitted in the agreeing phrase.

Context and Participants

Ninety-six adult learners of English as a foreign language (EFL) enrolled in an extracurricular language course at a Federal University in Brazil took part in the study and were pre-tested for proficiency level in English and knowledge of the target language structure. After the pre-test, forty-six participants who belonged to the same proficiency level (beginners) and did not know the target language structure were selected and comprised the pool of participants with 27 female and 19 male ages ranging between 18 and 55 with a mean of 25,5. Participants had studied English for an average of one semester, most of them did not speak another foreign language apart from English (seven reported speaking or understanding a little Spanish) and reported that their main goal for studying English was to develop oral fluency. Participants followed the same schedule, coursebook and program in the classes and took three tests in individual meetings with the researcher – one to test working memory capacity and two to test the retention and acquisition of the target language structure in L2. All tests were followed by an interview in which the researcher asked participants their impressions on the tests and also collected biographical data to tailor the acquisition test. All tests were recorded and transcribed for analysis and will be described in what follows.

Working memory test

The working memory test used in Finardi (2010) was the speaking span test and consisted of 60 unrelated L2 words organized in five sets of 2, 3, 4, 5 and 6 words. The words of the test are presented individually, in the middle of a computer screen, for one second. The test requires participants to read the words that appear on the computer screen silently, trying to memorize them first. Question marks (in the same number as the words presented in the set) appear in the middle of the computer screen in the end of each set, signaling the number of sentences that participants are required to make. When all the words in the set have been presented, participants see question marks and are required to make sentences orally with the words read, in the order in which they appeared.

Participants are instructed to make one sentence per word read, in a grammatically correct form.

Retention test

The retention test used in Finardi (2010) consisted of a focused (ELLIS, 2003) speaking test and was administered immediately after instruction (focused on form: the grammar rule and ten examples) in individual sessions with the researcher. Participants were instructed to agree with the sentences heard using the target language structure (So+aux+I or Neither+aux+I) they had just been taught. Two scores were calculated for the retention test, one strict and one lenient. The criterion to calculate the strict score was to give one point only for answers completely correct. In the lenient score, one point was given for answers completely correct and half a point was given for answers which had either the auxiliary verb or the target term (So/Neither) correct.

Acquisition test

The acquisition test used in Finardi (2010) was similar to the retention test in the sense that it also consisted of 10 sentences (which were similar but not the same as the retention test) but it differed from the retention test in that now participants were required to agree or disagree with the statements presented according to their real situations. The reason why the researcher wanted participants to agree or disagree with the sentences heard was to make sure that participants were processing both form and meaning to answer the questions correctly. In the retention test, participants were not required to respond with the truth, instead they were required to agree with the sentences heard (even if in real life they did not) using the target language structure to do so. Nevertheless the researchers were interested in checking whether participants had acquired the form of the target language structure and could use it in communicative tasks in which they would have to process the meaning as well, thus, demonstrating

acquisition of that particular target language structure. The acquisition test was designed after the researchers had collected biographical data in the interviews so as to elaborate sentences in which participants had to necessarily agree or disagree, depending on their personal circumstances. After assembling the biographical data from the interviews, it was possible to know where the participants lived, where they worked, how many languages they spoke and what nationality they were. Once this information was coded, it was possible to design sentences with which participants had to necessarily agree or disagree, depending on their real life situations. The sentences in the acquisition test were designed in such a way that participants would have to agree with 5 sentences and disagree with the other 5. Two scores (one strict and one lenient) were calculated for the acquisition test but the criterion was slightly different from that used in the retention test. In the strict score, similarly to the retention test, only sentences completely correct were given one point. In the lenient score, half a point was given to sentences partially correct but now the criterion to receive this half point was whether the sentence agreed or disagreed when it had to, and whether either the auxiliary verb or the so/neither item was correct.

The present study discusses only the retention and acquisition tests used in Finardi (2010) although a reference to the working memory test will be made. The study used a mixed methods design (DORNYEI, 2007) with a series of Paired-Samples t-tests to analyze the performance between the retention and acquisition tests and Pearson correlations to analyze the relationship between working memory capacity and the retention and acquisition tests. The alpha was set at .05 for the quantitative analysis. The qualitative analysis used the transcriptions of the interviews carried out with the participants after the tests.

Results

Finardi (2010) predicted that the performance in the retention test would be more accurate than the performance in the acquisition test since it was assumed that in the retention test participants could answer the

prompts by processing only the form of the target language structure whereas they would have to process both form and meaning to answer the prompts in the acquisition test. The results of the qualitative analysis of the interviews carried out with the participants after the tests corroborate this assumption. Immediately after the Retention Test participants were asked the following questions:

Did you think this test was hard? Why?

Over 90% of participants said that the test was hard because they had to pay attention to the Auxiliary and whether the sentences were affirmative or negative so as to use the formula correctly.

Did you use or try to use any strategies to do the test? Which one(s)?

Over 90% of them said they tried to check if the sentence was affirmative or negative first and then tried to figure out what the auxiliary verb to be inserted in the formula was. They also said they did not pay attention to the meaning of the sentence, only the form, so as to answer correctly.

As can be seen from the summary of answers provided by participants during the interview after the Retention Test, the Retention Test was perceived as being difficult because of the computation required to produce the correct grammatical structure and most participants tried to pay attention to the form of the sentence only to answer the test.

The answers to the questions made in the interview after the acquisition test will be summarized in what follows. All participants said they thought the acquisition test was difficult, even more so than the retention test, because they had to pay attention to the verb and also to the meaning

so as to agree or disagree correctly. Most of them said they tried to pay attention to whether the sentence was affirmative or negative first but could not because they had to focus on the correct verb to use, which again was difficult because they also had to pay attention to the meaning. In short, all of them said that the acquisition test was more difficult than the retention test because they had to think about too many things at the same time (affirmative or negative, verb tense, meaning). Most of them also said that the acquisition test was more difficult than the retention test because in the former they had to think about the meaning, sometimes translating the sentence first (so as to determine whether they agreed or not) before processing the response form correctly.

The means of these tests (retention strict 6.10 and retention lenient 7.76; acquisition strict 5.02 acquisition lenient 6.25) indicate that the performance in the retention test (both strict and lenient) was in fact more accurate than in the acquisition test.

So as to verify whether the difference in performance between the retention and acquisition tests was statistically significant, a series of parametric (because the data were normally distributed as verified by analyzing the kurtosis and skewdeness) paired samples t-tests were run. Results of the t-tests show that in fact the difference in performance between the retention and acquisition tests was statistically significant t (45) = 3.69, $p < .001$ and t (45) = 5.46, $p < .001$, respectively, that is, the acquisition test was more demanding than the retention test, as shown by the analysis of means in these two tests.

Regarding the relationship between working memory capacity and the retention test verified in Finardi (2010) and reported here, there were positive and statistically significant correlations (.275*) between the working memory test – the L2 SST – and the retention test. Regarding the relationship between working memory capacity and the acquisition of a syntactic structure in L2 speech, Finardi (2010) found positive (and practically strong) statistically significant correlations between scores on the L2 SST and the acquisition test (.688*).

Discussion

Based on psycholinguistic accounts of L2 processing, the study predicted that the participants' performance in the retention test (focused) would be more accurate than in the acquisition test (unfocused and communicative). This hypothesis was raised based on the assumption that participants would have to process mainly the form of the sentence so as to answer the retention test correctly whereas in the acquisition test they would have to process both form and meaning after deciding whether they agreed or disagreed with the sentences heard to respond to the test adequately. It was also assumed that this double processing (form and meaning plus agree or disagree) imposed by the acquisition test would be likely to tax working memory capacity more than the single processing (form to agree) assumed to take place during the retention test.

The results of the statistical analysis conducted to verify this general hypothesis show that the acquisition test was more cognitively demanding, as shown by its lower means, than the retention test and this difference in means was statistically significant. These results were expected in face of the cognitive and linguistic processing assumed to take place during each of these tests.

Again, it is important to highlight that the linguistic account of L2 processing brought to bear in this study can only be used as a hypothesis to help explain the data. The only way to test whether a certain parameter in L1 affects processing in L2 is to use at least two different L1s, one resembling and another one differing from the parameter being investigated in L1. That type of rationale and methodology was not used in this study and so the linguistic account used here, though interesting and possibly correct, can only be taken as speculative in nature and suggestive for further research.

Nevertheless, if the psycholinguistic and linguistic accounts used here are correct, then there should be statistically significant correlations between measures of working memory capacity and the acquisition of this syntactic structure in short responses in L2 speech since these constructs (working memory capacity and the acquisition of this syntactic form) are believed to operate with controlled processes that require attention for

their execution. Assuming that the form of the target language structure investigated is linguistically complex, it would not be too far fetched to assume that when forced to process syntactically complex structures in sentences for both meaning and form, learners would be under an even greater processing load. Again, if this account is correct, it would be logical to expect stronger correlations between working memory capacity and the acquisition of this syntactic structure, as compared to the correlations found between working memory capacity and the retention of this structure, since working memory capacity would be more required when learners have to process both meaning and form. That is exactly the pattern of results found in Finardi (2010) and reported here.

Data triangulation and results of the qualitative analysis confirm that participants thought the acquisition test was more difficult than the retention test because in the former they had to think about the meaning of the sentence while manipulating the form of the response, whereas in the retention test participants only had to focus on the form of the sentence so as to respond correctly. The results of the correlational analysis also show that working memory capacity is more related to the performance in the acquisition test than to the retention test. These results can be taken as evidence that during the acquisition test participants were using more attention and cognitive control (as shown by the strong correlations) from working memory capacity than in the retention test in which their working memory capacity was only weakly required (as shown by the weak correlations).

According to the account of second language acquisition reviewed in this study, language acquisition involves the transfer of items from the rule-based to the memory-based system, and vice-versa (SKEHAN, 1998). The rule-based system is believed to operate with controlled processes, which, in turn, use up attention from working memory capacity. The syntactic structure investigated in this study is considered a rule and so its acquisition should tax working memory capacity since both operate with controlled processes.

It is possible to suggest, based on the dual-code account of language acquisition presented here, that with more practice and use, there would be enough memory instances of this target language structure stored in memory to win the race against the algorithm. That way, when sufficient memory instances for this syntactic structure were stored in memory, perhaps learners would be using the memory-based system to produce it, instead of using the rule-based system. It is also possible to infer, based on the account of L2 acquisition brought to bear in this study (SKEHAN, 1998), that only when items are transferred from one system to the other can we consider this the ultimate stage of acquisition of that particular structure. This study discusses the acquisition of a syntactic structure by the rule-based system, rather than its ultimate acquisition which would entail its transfer to the memory-based system. Thus, the results of this study can be regarded as evidence for the first step in the acquisition process, which involves the acquisition of an item by a specific memory system, before that item can be transferred (if it is) from one system to the other. Though methodologically challenging, it would be interesting to investigate, in future studies, how the transfer of items from one system to the other is done.

Conclusion

The main aim of this study was to discuss the processing of form and meaning during the retention and acquisition tests used in Finardi (2010) from a linguistic and a psycholinguistic perspective of L2 processing. The quantitative analysis of comparison of means showed that the acquisition test was more demanding than the retention test and it was suggested, based on the qualitative analysis of interviews made with participants after the tests, that it was because during the retention test participants were processing mainly the form of the sentences whereas in the acquisition test they were processing both form and meaning. It was further suggested and confirmed by quantitative analysis of test scores that the acquisition test was more demanding than the retention test because the acquisition test taxed participants' cognitive system (as shown by the stronger correlations

with working memory capacity test scores) more than the retention test by forcing participants to process both meaning and form so as to answer the questions.

The study suffered some limitations. Universal Grammar methodology regarding parameter resetting in L2 acquisition requires at least two different L1s and one L2. The two L1s have to be different, one resembling and another one not resembling the parameter being investigated in L2 so as to make claims for L2 processing or acquisition. The results of this study were discussed as being affected by the complexity of the target language structure investigated and its difficulty in acquisition for Brazilian Portuguese speakers whose parameters differed from the L2 (English parameters involved in agreeing formula). Nevertheless, a control L1 with parameters resembling those in L2 was not used and so this suggestion has to be taken as speculative in nature.

Another limitation that must be addressed is the fact that though the model of L2 acquisition adopted was Skehan's (1998) dual-code account of language learning, acquisition was operationalized in much narrower terms in this study. Skehan claims that acquisition is enabled through practice and happens with the transfer of items from the rule-based system to the memory-based system. Acquisition in this study was understood to comprise only the first stage of this process, that is, the acquisition of a particular L2 formula by the rule-based system before this item is lexicalized or, to use Skehan's terminology, "transferred" to the memory-based system. That having been said, it is important to bear in mind that the question of how items are transferred from one system to another is theoretically interesting though methodologically difficult to falsify.

Finally, a last word on possible pedagogical implications of the study is due. The information contained in this study may become relevant knowledge for teachers and researchers interested in how people learn (or not) a foreign language, more specifically, how people may come to speak a foreign language fluently. It is to those that this last section is dedicated.

The first pedagogical implication of the study is that production should be part of L2 classes since it forces learners to process language at a

syntactic level which is ultimately required to reach a certain level of proficiency. Regarding the processing of form and meaning, tasks seem to offer the ideal scenario to acquire language since learners submitted to what Skehan (1998) calls a "healthy diet of tasks" should have the chance to focus on different forms while focusing on the meaning during task performance. The processing of both meaning and form is important to L2 learning but if we accept that L2 learners are driven by a focus on meaning, perhaps teachers can design tasks that channel the learners' attention to the form (focused tasks as in ELLIS, 2003) without penalizing their cognitive system.

Translated into classroom practice, we suggest that when the aim is to teach a complex syntactic structure that requires parameter resetting as the one investigated here, the teacher should, in a first phase, focus on form, calling the learners' attention to the difference of the grammatical structure in L2 explicitly. White, Spada, Lightbown and Ranta (1991), for example, studied how input enhancement or a focus on form affected the acquisition of question formation in English of French 10-12 year-old speakers in intensive programs in Canada. According to the aforementioned authors, a focus on form yielded immediate and positive results on syntactic accuracy and what is more important, learning was not lost over the 5-week period before follow-up testing. French and English differ in their parameters to question formation and White et al. concluded that input enhancement and focus on form is both beneficial and necessary to drive language development beyond a certain level (SWAIN, 1985). White et al. (1991) suggest that a focus on form may benefit L2 learners in two ways: by helping learners to perceive structures that they would otherwise miss in naturalistic input by making the structure more salient thus sensitizing learners to aspects of L2 that are different to those in the L1 and by helping learners "unlearn" incorrect analysis of L2 by supplying negative evidence about forms which are not possible in the target language.

Another pedagogic suggestion to teach complex syntactic structures involves teachers reducing the processing burden by not requiring, at least in a first phase of focus on form, meaning processing from students. Once the form of the target structure is acquired (that is, not requiring controlled

processes and attention for its execution), teachers can use focused tasks (ELLIS, 2003) in which meaning is processed but with a focus on certain grammatical structures. Finally, in a third and last phase of acquisition, teachers should implement tasks (SKEHAN, 1996; 1998) that require learners to process meaning; thus moving, from a focus on form to a focus on meaning in the course of language acquisition. Skehan (1998) suggests the use of tasks for L2 learning, the difference in what we are proposing is that perhaps the task should be the last moment of learning, at least in the case of syntactic structures that require parameter resetting in L2.

In regards to processing conditions, Bygate (2001) and Finardi (2008) suggest that repeating a task may enable learners to focus on different aspects of L2 performance. In terms of L2 speaking, learners may focus on one or more aspects of L2 speech performance, namely: complexity, fluency, accuracy or lexical density. Guara-Tavares (2008) suggests the use of planning as a performance condition to foster L2 speech development. Skehan (1996; 1998) recommends not only a healthy diet of tasks but also different task conditions to allow learners to focus on different aspects of language learning.

Regarding the question of how teachers can help students with small working memory capacities to overcome their limitations, Weissheimer (2011) suggests, and we agree, that two actions are beneficial in that respect: teaching strategies to lexicalize language and teaching metacognitive strategies. If learners lexicalize certain aspects of language, they can devote their attentional capacity to process other aspects of language (syntax being one) that may not be lexicalized. The latter suggestion put forward by Weissheimer is also related to the amount of attention learners have to devote to language processing; if they learn to be strategic, they may have more resources to allocate to different aspects of language processing.

This study attempts to understand L2 learning assuming that some parts of language acquisition could be understood in terms of general learning models. Recognizing its limitations, dual-process theories were brought to bear in this study to explain the specific acquisition of a syntactic

structure by the rule-based system. Moreover, acknowledging that the linguistic complexity of syntactic structures may affect their acquisition, linguistic accounts of language processing were also reviewed and used as a suggestive parameter for comparison. The pedagogical implications mentioned in this section reflect this multifaceted view of language learning.

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