

PROJECT REPORT:

THE PROCESSING OF CLITIC PRONOUNS IN ADULT L2 LEARNERS OF SPANISH:
FROM AGRAMMATIC APHASIA TO ADULT SECOND LANGUAGE ACQUISITION

I wish to start this report by thanking the “Marica De Vincenzi” foundation for supporting my research project linking two contiguous fields of linguistic investigation; neurolinguistics and second language acquisition. Secondly, I would like to thank Dr. Judy Kroll (PSU), Dr. Giuli Dussias (PSU), and Dr. Janet van Hell (Radboud University Nijmegen and PSU) for sharing with me their outstanding knowledge and expertise and for their continuous support during this year.

In this document I will report on the results and scientific activities accomplished during this year of academic activity. In the first, I will describe the main results obtained from the experiments performed up to date and I will describe the ongoing projects that will be concluded in the coming semester. In the second part, I will outline the parallel scientific activities that have been carried out through the year.

EXPERIMENTAL RESULTS

The general goal of the project was to expand the research on clitic pronouns’ processing from the field of aphasiology to the field of second language acquisition in adulthood, specifically in adult English L2 learners of Spanish. One of addressed questions was to which extent can adult English learners of Spanish (being English a clitic-free language) acquire the Spanish clitic system. It is well reported in the literature that adult second language learners have difficulties in acquiring a second language, rarely achieving L1 or child L2’s proficiency. Two main hypotheses have been formulated to answer to this question. Representational theories (e.g., Clahsen & Felser, 2006a; 2006b) argue that L1 and adult L2 syntactic parsing processes differ because L1 speakers rely on a full-range of syntactic representations, while L2 speakers have access only to a “shallow syntactic structure”, i.e., they have only partial access to an L1 type syntactic representations, and the interpretation of complex syntactic sentences relies more on lexical/semantic strategies. This perspective implies as well that L1 speakers should always have all possible syntactic representations (or structures) available for parsing. This view has been challenged by results that show that adult L1 speakers immersed since a long time in an L2 environment change their parsing preferences (showing different parsing preferences than L1 speakers immersed since a shorter time in the same L2 environment), that is they become “L2 parsers” (Dussias & Sagarra, 2007). As an alternative account, L2 performance can be understood in terms of reduced availability of cognitive resources, in that processing in one’s L2 language places increased demands on the neurocognitive resources that are recruited during the processing of complex syntactic structures (e.g., Hasegawa, Carpenter, & Just, 2002). This hypothesis has been supported by data showing that L1 performance resembles L2 performance under conditions of increased noise or memory stress (McDonald, 2006) or when individuals have a low working memory span (Traxler et al. 2005).

The goal of the first study was to investigate on this topic, trying to disentangle which could be the underlying mechanisms responsible for adult L2 performance. For this goal I chose to investigate the processing of Spanish clitic pronouns in adult L2 English learners of Spanish. Clitics are morpho-syntactically complex linguistic particles that agree in gender and number with their antecedent and they vary their sentential position according to the structure of the clause. One of the dimensions along which weak English pronouns and clitic Spanish pronouns differ is the *position* in the clause respect to the verb. In English, weak pronouns always appear after the verb (both in finite and non-finite sentential constructions), while Spanish clitic pronouns have to appear before a finite verb in finite clauses, and after a non-finite verb in non-finite clauses (for a detailed description, refer to the linguistic background session in the original project proposal, page 1).

EXPERIMENT 1:

THE PROCESSING OF CLITIC PRONOUNS POSITION IN L1 SPANISH AND L2 ENGLISH LEARNERS OF SPANISH

Experimental method and design:

A self-paced reading task was used. Participants sat in front of a computer screen, while reading sentences in Spanish. At the beginning of each sentence a series of dashes (representing all the words in the sentence) were presented on the screen. Each time participants pressed the spacebar, words would appear one by one on the screen in a moving window fashion and Reading Times were recorded at each word (i.e. at each time that participants pressed the space bar). This experimental technique was used as a sensible measure for detecting the processing load required to read each word in the sentence. Reading times are indeed a good indication of the on-line processing load that is necessary to process sentences. Moreover, at the end of each sentence, participants made a grammaticality judgment by pressing a "yes" button if the sentence was considered grammatical, or a "no" button if it was considered ungrammatical. Reaction times and accuracy were recorded. Moreover, to keep participants' attention, comprehension questions on some of the sentences were randomly presented during the task.

Each participant read 160 sentences (80 experimental sentences -20 per condition- and 80 fillers), presented in a semi-randomized order. As critical elements, each experimental sentence contained an antecedent (composed by a determiner and a noun) and the relevant clitic pronoun which could appear in a correct position or in an incorrect position. Gender and number were balanced across sentential structure and condition. Antecedents were matched for frequency. There were 4 conditions:

- 1) *Correct* clitic position in *finite sentences* (clitic pronouns precedes the finite verb)
Antes de comer la manzana, María *la* peló con un cuchillo
Before eating the apple, Mary it peeled with a knife
- 2) *Incorrect* clitic position in *finite sentences* (clitic pronouns follows the finite verb)
Antes de comer la manzana, María peló *la* con un cuchillo
Before eating the apple, Mary peeled it with a knife

3) *Correct* clitic position in *non-finite sentences* (clitic pronouns follows the non-finite verb)

Antes de beber el jugo, Carla trató de enfriarlo con cubitos de hielo.

Before drinking the juice, Carla tried to cool it with some ice cubes.

4) *Incorrect* clitic position in *non-finite sentences* (clitic pronouns precedes the finite verb)

Antes de beber el jugo, Carla trató de lo enfriar con cubitos de hielo.

Before drinking the juice, Carla tried to it cool with some ice cubes.

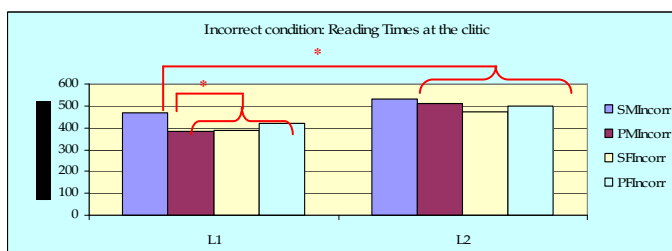
Participants:

12 L1 Spanish speakers (7 females and 6 males; all right handed; age: 19-35) and 11 L2 English learners of Spanish (8 females and 3 males; all right handed; age: 19-32) with an intermediate-high knowledge of Spanish participated to the experiment. In order to determine their proficiency level, participants filled in a Language History Questionnaire, were tested with a picture production task, and completed one section of a Spanish grammar test (Diploma de Español Como Lengua Extranjera). Moreover, participants were tested for measures of working memory (using O-span) and measures of cognitive control (using the Simon task).

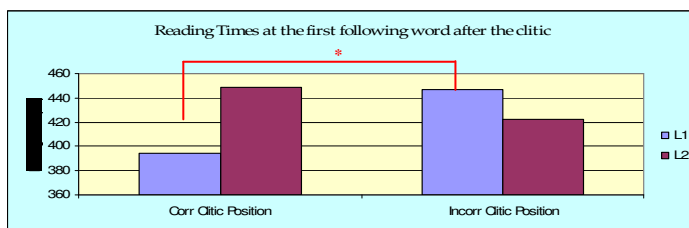
Results:

For finite sentences (the performance in non-finite sentences is under current analysis)

- Accuracy in the grammaticality judgment task: Native speakers: 99.2% L2 learners: 93.3%
- As expected, L1 native speakers showed significantly faster reading times than L2 learners. L1 speakers read clitics faster than L2 speakers in both the correct and incorrect conditions (both p values < 0.01).
- For incorrect sentences, Masculine Singular clitics showed the slowest reading times (L1 native speakers: p < 0.01; L2 learners: p = 0.06).
- As expected L2 learners were slower than native speakers in all conditions (all p < 0.05)



For all other clitic types in the incorrect condition, L1 native speakers showed an effect at the word following the misplaced clitic (p < 0.05), while L2 learners did not show such effect (they actually show the opposite tendency).



For clitics that are identical to determiners, L1 native speakers show an effect at the word which follows the misplaced clitic. This suggests that L1 speakers activate an alternative interpretation as possible determiners of a new noun. Upon realizing that the next coming word is not a noun, they show then a disambiguation effect. L2 learners do not appear to activate parallel syntactic interpretations, but they only show an effect at the clitic position. In the absence of other manipulations, these data do not allow us to determine whether the observed difference between L1 and L2 processing is the result of a shallow syntax or diminished cognitive resources for L2. However, they do suggest that the processing of clitics provides a sensitive context in which to test these alternative claims. In ongoing research we are investigating the basis of the observed differences between L1 and L2 by using ERPs to more sensitively examine the time course of this effect and by examining the consequence of memory span differences within native language speakers.

EXPERIMENT 2:

THE TIME COURSE OF CLITIC PRONOUNS PROCESSING IN L1 SPANISH AND L2 ENGLISH LEARNERS OF SPANISH

As introduced in the project proposal, behavioral measures, such as accuracy and reaction times give fundamental information about how different linguistic parameters are processed, and they importantly highlight differences between experimental groups (i.e. between L1 and L2 speakers). However, neurophysiological measures (like ERPs) provide physiological correlates of behavioral differences. With the second experiment I addressed the question of whether time course of clitic pronouns processing will be different between L1 and adult L2 learners of Spanish. The major goal of the second (ongoing) experiment was to assess whether clitic pronouns are processed differently among the experimental groups (mainly between L1 speakers and L2 learners of Spanish), and whether different levels of proficiency play a role in characterising the various dimensions of the ERP components (presence of specific ERPs, amplitude, latency and topography).

Experimental method, design and procedure:

The design consisted in word by word sentence reading task. Words were presented one by one on a screen for 300 ms, with an ISI (Inter Stimulus Interval) of 350 ms. There were 4 conditions in which the critical element (the clitic pronoun) was morphologically manipulated. For this experiment only finite sentences were used, because we needed to keep clitic position constant. There were 48 sentences per condition, plus the same number of filler sentences.

Condition 1: Correct gender & number:

“Antes de comer la manzana, Julio *la* peló con un cuchillo”

Condition 2: Incorrect gender & correct number:

“Antes de comer la manzana, Julio *lo* peló con un cuchillo”

Condition 3: Correct gender & incorrect number:

“Antes de comer la manzana, Julio *las* peló con un cuchillo”

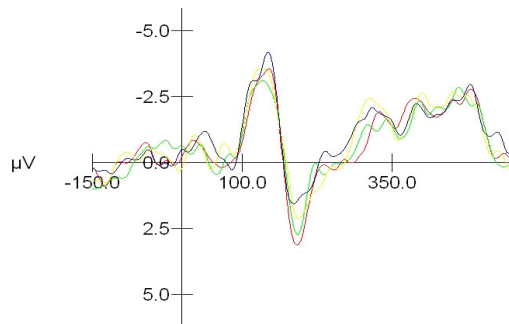
Condition 4: Incorrect gender & incorrect number:

“Antes de comer la manzana, Julio *los* peló con un cuchillo”

In all experimental sentences, the ERPs measurements were always locked to the critical word, i.e. the clitic. Participants read the sentences and at the end of them they needed to perform an acceptability judgment, by pressing yes or no buttons.

Participants and results:

Up to now, 15 L1 speakers participants have been tested. Two had to be thrown out because their accuracy was below 75%. The preliminary visual inspection of the average data highlighted a differentiation in the amplitude of a positive component across conditions, peaking at around 250 ms. From the plot of the central electrode below (Cz) it is possible to see that condition 1 (blue line) presents the smallest amplitude, while condition 2 (the gender mismatch condition) reveals the largest amplitude. This first visual inspection on 13 L1 Spanish speakers participants suggests that gender and number mismatch in clitics are differently processed.



These preliminary data are currently being elaborated. More participants (both for the L1 Spanish group, as well as for the L2 English learners of Spanish) will be tested, and the results from the two groups will be compared.

PARALLEL RESEARCH ACTIVITIES

CENTRE FOR LANGUAGE SCIENCE

In the course of the past year, I actively participated to all academic activities at the CLS (Centre for Language Science). The CLS offers an outstanding research environment which enables all members (and even non-members) to be in contact with language research. Among the many activities proposed, the weekly CLS meetings represent the locus in which all graduate students, researchers, and visiting scholars can share their work with each other. At CLS, I had the chance to present both my past PhD research and my new experimental data. The feedback provided during those meetings was important to evaluate and further develop my research.

Moreover, I had the chance to be invited to give a guest lecture during the “Experimental and Research Methods” course taught by Dr. Janet Van Hell, in which I gave a lecture on: “Testing special populations: psycholinguistic research with aphasic speakers”.

CONFERENCE ATTENDANCE AND PRESENTATIONS

During this academic year I participated at ISB7 (International Symposium on Bilingualism) in Utrecht, The Netherlands. In that occasion I did not present any data, give that the deadline for application was past already even before I began collecting data. However, data from the first experiment were presented at Escop conference (Krakow, 2-5 September 2009).

SPECIAL COURSES

During this year I got accepted to participate to the "Bootcamp for ERP research" organized by Steve Luck at U.C. Davis (20/07/09-29/07/09). The target participants for this group were researchers who already had at least six months of ERP research experience and who were willing to specialize in the technique. The goal of the course was to teach the advanced theoretical basis of ERP research. During the course, theoretical lectures, practical simulations, and invited lectures from prominent ERP researchers (for example Tamara Swaab or Hellen Neville) were offered. The participation to this course deepened and fortified my knowledge of the ERP technique. A practical application of the acquired knowledge will be the organization of three ERP lecture sessions for undergraduate students who will work in our laboratory for the fall semester.

NEW COLLABORATIONS

In the course of the past year I got the chance to meet, Dr. Swhati Kyran (Boston University) who came as a guest speaker within the CLS meetings. Dr. Kyran is an expert in bilingual aphasia, which is one of my previous research fields. As a result of her visit, a new collaboration was put in place. The rationale behind the project is to apply the design to the first experiment to Spanish-English bilingual patients. Comparisons between bilingual aphasics and non-brain damaged L1 Spanish and L2 English-Spanish speakers will further inform on the language mechanisms that control bilingual language processing. I already had the chance to go to University of Boston to test one first Spanish-English bilingual patient. More data collection is needed for preliminary results.

FUTURE RESEARCH

In the next year my research will continue at the Center for Language Science, in collaboration with Dr. Kroll, Dr Dussias and Dr. Van Hell.

In the coming semester I will continue testing more participants for the ERP experiment, with the goal to test at least 15 English L2 learners of Spanish. Moreover, as described in the original project, an eye-tracking experiment will be designed.

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