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The comprehension of relative clauses in patients with Alzheimer’s disease

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It is well known that patients affected by Alzheimer’s Disease suffer from cognitive and linguistic deficits. This article briefly reviews the main symptoms of the disease, focusing mainly on language impairment. We also display the results of an experiment on the comprehension of relative clauses. A group of ten Italian speaking patients underwent a sentence-picture matching task, which included four different types of sentence; subject-verb-object simple sentences, subject relative clauses, object relative clauses, and passive object relatives (SVOs, SRs, ORs and PORs). Overall results from the experimental group displayed impairment on the comprehension of all sentence types, with an especially low performance on object relative clauses, probably as a consequence of their complex featural set.

1. Introduction
This article deals with the comprehension of relative clauses in elderly patients affected by Alzheimer’s disease (AD). This study arises and is motivated by an interest in two separate fields of inquiry, namely: (i) the cognitive and linguistic deficits in patients affected by Alzheimer’s disease, and (ii) the processing of relative clauses by different speaker profiles.

Alzheimer’s disease and similar forms of dementia affect around 35.5 million elderly adults in the world, and the number is expected to increase to 115.4 million by the end of 2050, considering the rate at which the population is aging (Rapporto Mondiale Alzheimer 20101). Accordingly, Alzheimer’s disease can be considered a world health emergency. The high incidence of Alzheimer’s disease appears even more dramatic if we consider the lack of effective treatments and reliable diagnostic methods. Neuropsychologists are working on the creation of accurate techniques and tests to screen for Alzheimer’s disease, a diagnosis, that at present, can only be confirmed by a post mortem examination. To achieve this, there is a need for much more detailed descriptions of the symptoms of Alzheimer’s disease, including comprehensive descriptions of the major cognitive deficits exhibited by Alzheimer’s patients. This study can therefore be considered a modest contribution.

1 Rapporto Mondiale Alzheimer 2010 is the Italian version of the original Alzheimer’s Disease International 2010.
to the attempts made to detect the linguistic deficits caused by Alzheimer’s disease, with a specific focus on sentence processing.

This study also provides the possibility of sampling the comprehension of relative clauses in a new segment of the population (AD patients) other than those we can read about in the existing literature. Recently, researchers have been working on the acquisition and processing of relative clauses, and their experimental works lead to interesting and challenging insights regarding the syntactic configurations and movements involved in relative clauses. This study relies on the account, first formulated in Friedmann, Belletti, Rizzi (2009), of the involvement of feature set analysis in relative clause computations.

The first part of this study provides an overview of recent studies on relative clauses. A brief overview of Alzheimer’s disease and its subsequent deficits then follows. In the last section, an experiment on the comprehension of relative clauses in AD patients is presented.

2. Relevant background on relative clauses
Relative clauses are syntactically complex structures which function as modifiers. They are implemented through an operation of abstraction starting from an internal position of the clause, to some element of the main clause to be modified. The modified element is named “head of the relative”; while the “relativization site” is the position from which the element is moved. Depending on the position from which the movement begins, namely the “relativization site”, the clause can either result in a subject relative, or in an object relative.

Previous studies have already confirmed that the two different structures do not display the same degree of difficulty, with ORs being more demanding and expensive than SRs, from the computational point of view. Early data came from cross-linguistic studies on L1 acquisition. Subject relatives are readily comprehended and produced even in pre-school children, while object relatives require a few more years to be mastered.

In Friedmann, Belletti, Rizzi (2009) Hebrew speaking children under the age of five were tested on the comprehension of relative clauses through a picture and scenario-sentence matching task. While SRs were well comprehended (90% accuracy), the performance on ORs did not exceed the chance threshold (55%), a clear sign that children could not understand the latter type of configuration.

Elicitation tasks on Italian speaking children of different ages revealed a similar pattern (Utzeri 2007; Belletti, Contemori 2010). Accuracy rates vary depending on age, but SRs are already being well produced by the age of four, while a clear difficulty with ORs persists. Children tend to avoid the production of ORs by developing a variety of strategies (Belletti, Contemori 2010). They resort to verb changes, invert characters (which actually leads one to think they misunderstand the task), and most of all, they convert ORs into SRs by adopting a passive voice structure. This last strategy is particularly and increasingly adopted after the age of six, which corresponds to the age at which children master the use of passive structures in L1. What is most striking is that the very same strategy was even preferred by a group of adult speakers. Belletti and Contemori (2010) included a control group of twenty-eight adults, aged 20-28, in their study, who displayed a
clear tendency to produce subject relatives with a passive voice in most of the trials (88%) where a target object relative was elicited. The linguistic attitude of adult speakers then allows us to reinterpret children’s performances and their tendency to increasingly use passives in order to avoid ORs. We can then compare both adult and child performances and consider the latter as a progressive approach to the adult system.

Basing the discussion on this data, Belletti (2009) labelled the structure mentioned above as passive object relative. This definition refers to the use of the passive voice in an SR in order to reproduce the semantic equivalent of an OR. If ORs are avoided, preferably through the production of PORs, we are allowed to infer that ORs demand high computational costs, which can be reduced by utilizing PORs.

The reasons for this phenomenon were explained by Belletti and Rizzi (2010), and earlier in Friedmann, Belletti, Rizzi (2009) by adopting a perspective based on the formulation of the Principle of Relativized Minimality elaborated by Rizzi (1990).

Given a configuration such as the following in (1), in which X, Z and Y represent positions characterized by abstract syntactical features, according to the Principle of Relativized Minimality (RM), a local relation between X and Y can hold only if Z does not intervene, that is to say only if Z is not a position of the same kind of X and therefore does not represent a valid candidate for the local relation:

(1) \[ X \ldots Z \ldots Y \]

In other words, we need X and Z to carry slightly different features in order to permit a relation between Y and X, otherwise Z intervenes.

We should now try to reconsider what happens in terms of locality and features in the configuration of subject and object relative clauses. In the examples, [+N] represents the lexical restriction feature, while [+Rel] stands for the scope discourse feature able to attract the relative head.

(2) SR: Show me the dog that <the dog> is biting the cat
\[
\begin{array}{ccc}
X & Z & Y \\
[+N; +Rel] & <[+N; +Rel]> & [+N]
\end{array}
\]

(3) OR: Show me the dog that the cat is biting <the dog>
\[
\begin{array}{ccc}
X & Z & Y \\
[+N; +Rel] & [+N] & <[+N; +Rel]>
\end{array}
\]

basic adult grammar
* child grammar
As can be seen above, in the SR (2) the relation between the relativization site and the relative head holds, as no other element intervenes.

In the OR (3), problems arise as Z (the subject of the relative clause) shares the feature [+N] for a lexical restriction with X. The two positions then result in a relation of inclusion, in which they share a few features, except for the [+Rel] feature. Friedmann, Belletti and Rizzi (2009) claim, at this point in the analysis, that adults would be perfectly able to handle a configuration of inclusion in which two positions share a similar (yet still slightly different) set of features, while children would suffer from problems, as the analysis required to detect the difference in features is too sharp. In other words, children would apply a stricter version of the principle of RM; in their grammar the presence of a lexical restriction both in the attractor position (X) and in the potential intervener position (Z) would be problematic. Therefore children cannot properly parse ORs, as detected by tests on comprehension (Friedmann, Belletti, Rizzi, 2009) and on production (Belletti, Contemori, 2010).

PORs are the preferred option for adults speakers when ORs are elicited, and children seem to develop the same strategy as soon as passive becomes a valid and mastered option in their grammar (Belletti, Contemori, 2010). The reason for this can be explained by utilizing Collins’ analysis (2005) for passive structures. According to Collins, the configuration in passive structure is realized through a smuggling operation, as given in (4):

\[
\begin{array}{c}
\text{TP} \\
\begin{array}{c}
\text{VP} \text{ V NP} \\
\text{by} \\
\text{vP NP} < \text{VP V NP} >
\end{array}
\end{array}
\]

The smuggling operation allows the VP-chunk (V and O-NP) to move as part of the vP, to a position higher than the one occupied by the subject (S-NP) of the matrix clause. By doing this, the original O-NP (and therefore the relativization site of the relative clause) achieves a higher position than the original S-NP, thus neutralizing the potential intervention.

Although apparently very expensive, the smuggling operation is actually an effective strategy as it allows the original object-NP to cross over the position of the subject-NP without triggering any potential intervention effect. When the [+Rel] operator in the main clause functions as an attractor for the adjunction of the relative clause, the O-NP is already in an optimal position, right above any other lexical element threatening intervention.

According to the theoretical and experimental data available on relative clauses, we could now set SRs, ORs and PORs along a scale of difficulty, in which SRs would be at one extreme as the easiest structure, and ORs at the other extreme as a very expensive configuration. PORs would be in between because they are easier than ORs for being a subject relative clause, yet still, to some extent demanding because of the smuggling operation involved.

From this perspective, the Principle of Relativized Minimality and the analysis of passive structures à la Collins provide a strong theoretical background to explain
why ORs are expensive for adults and ungrammatical for children, and why PORs are the preferred alternative output.

3. The linguistic deficit in Alzheimer’s disease patients: An overview

Alzheimer’s disease is a form of senile dementia, determined by a neurodegenerative process. Causes are still unknown, however the disease is associated with the loss of neurons and the subsequent atrophy of parts of the brain. Brain damage begins within the hippocampus and the amygdala in the limbic system and then spreads to the neo-cortex. The loss of long-term memory is perhaps its most well known symptom, however daily living activities and cognitive functions are also progressively affected to the extent that the person becomes dependent.

The faculty of language is also affected by a form of fluent aphasia, with anomia being its first and most evident symptom. AD patients experience problems in comprehension and in production because of a difficulty in retrieving words and understanding their meaning. The first episodes usually occur with low frequency and semantically rich words; later, high frequency words of ordinary use are increasingly involved. The phenomenon has been deeply investigated and seems to be generated by the loss of information stored in the semantic network of our lexicon (Chertkow, Bub, 1990). The semantic knowledge impairment causes the underspecification of the meaning of words, so that once the core semantic information is lost, patients are not able to use the correlated words anymore. This hypothesis is based on the assumption of a strong correlation between Naming and Knowing (Chertkow, Bub, 1990). According to this assumption, the faculty of naming an object is based on the quantity of information the mind holds for the definition of an item. For example, to be able to name a “fork”, the patient must keep in mind the core information related to the object, that is to say its function, shape, material and use. Once this kind of basic information is lost, the person is no longer able to name the item.

Taking into account Pinker’s formulation (1999) of a dual system in which a declarative system and a procedural system can be distinguished as two processing mechanisms, the mental lexicon (declarative system) of AD patients suffers significant damage, unlike mental grammar (procedural system), which suffers less and remains unaffected longer. This framework was confirmed through tests on verbal morphology (Walensky et al. 2009; Colombo et al. 2009). Not surprisingly, AD patients displayed impairment when inflecting irregular verbs, as this ability is based on the mental lexicon, where irregular verbal forms are normally stored. In the same tests, the use of regular verbal morphology not only remains generally intact, however it even appears to be still productive. AD patients manage to inflect novel verbs, provided that the input can suggest that the verb belongs to a regular class verb, like the Italian verb class in –are (Walensky et al. 2009). This last point is particularly surprising, as it can be seen as a strong confirmation of the fact that the disease leaves the procedural aspects of processing intact (at least during the first stages, before dementia becomes severe).

One important aspect of language faculty in AD patients still remains unclear to researchers: sentence processing. As mentioned before, patients mostly display a
form of fluent aphasia in which sentence production apparently seems unimpaired (at least in the first stages of the disease). Nevertheless, there are indications which suggest that this might not be the case. Patients clearly tend to simplify their language by overusing basic sentence structures; moreover, data on comprehension has revealed a slight impairment.

Sentence processing is known to be a very complex mechanism, which includes many components and involves a variety of extra-linguistic cognitive resources; not only are the lexical-semantic network and the syntactic parser activated, but working memory, short-term memory, processing speed, visual perception and mapping to extra-linguistic reality (to give a few examples) are required too. As a consequence, investigations in this field might be very demanding; any time a problem in production or in comprehension is detected, it has to be determined which specific part of the mechanism failed. This makes designing experiments challenging for researchers. Nevertheless, we can certainly claim that AD patients suffer from a general deficit in cognitive resources like working memory, the inhibitions of alternatives and attention span, and this inevitably affects sentence processing; furthermore, patients appear to be sensitive to different levels of grammatical difficulty.

For reasons of space, we cannot provide an extended overview of all syntactic structures and extra-linguistic cognitive resources tested so far; for the sake of illustration, in the next paragraph, we will limit our attention to the data available on the processing of relative clauses, this being our focus of interest.

4. Relative clauses in patients with Alzheimer’s disease

Previous research on the processing of relative clauses by AD patients were mainly developed in the late 1990s. Although relative clauses were not the main focus of research in any of those studies, relatives were still introduced as a factor of grammatical difficulty. Therefore we can gather the data collected and review those aspects concerning relative clauses.

Kempler et al. (1998) test the comprehension of sentences characterized by different levels of grammatical difficulty. Through a sentence-picture matching task, they assess patients’ ability to correctly process four different types of sentences; simple active sentences, simple active plus an adjunction sentences, passive sentences, and active sentences followed by a relative clause. This last condition leads to the highest number of mistakes, with accuracy of 66%, despite the 90% in simple active sentences. Authors therefore claim that patients are sensitive to the index of grammatical complexity, which would mean that their syntactic parser suffers from some kind of impairment. However, their interpretation of data could go no further than citing grammatical complexity as the main factor of comprehension failures, without exactly explaining what these consist of.

The same type of task, a sentence-picture matching task, is also used in Waters, Rochon and Caplan (1998). In this case, the authors combine three factors of grammatical complexity to manipulate sentences; the number of arguments (2 or 3), the canonicity of theta roles, and the number of verbs/propositions given in one sentence. The manipulation results in nine different types of sentences, two of
which include a relative clause; one is of the OS type (subject relative with right-branching) and the other one is of the SO type (embedded object relative, left-branching). Both conditions are among the three which lead to the poorest outcome, as the percentage of accuracy is around 65% for OS and 55% for SO, while all other conditions have percentages of comprehension well above 80%, except for the condition in which two simple active clauses are adjunct in the same sentence. Thus, authors interpret the data by attributing the main factor of difficulty to the number of verbal phrases, in consideration of the fact that the three conditions with the lowest percentage of accuracy (two of the relative type and one with adjunction) all share the same feature: they are composed of two propositions.

Small et al. (2000) tackle the problem from a different perspective and decide to adopt a sentence repetition task. This type of task is supposed to trigger syntactic parsing as a requirement for being able to repeat the sentence; without parsing and understanding the sentence, speakers should fail in correctly repeating the input. The test includes six different types of input created by combining three factors: (i) canonicity of theta role assignment, (ii) number of propositions (sentence with/without a relative clause), and (iii) branching direction (left/right) for relative clauses. Canonicity in theta role assignment and right-branching seem to be the two factors which make sentences easier, while patients experience more difficulty when the input contains a non-canonical assignment of theta roles or a left-branching relative clause. Canonicity and right-branching would then lose their assistive effect whenever respectively combined with left-branching and non-canonical assignment of theta roles (So that SS are more difficult than OS sentences, and OO more than OS). Authors explain the results by adopting the Resource Capacity Theory. According to this theory, speakers have a limited amount of available cognitive resources to parse sentences. In AD patients this quantity would be reduced and therefore not sufficient to fulfil all requirements, so that when more than one factor of difficulty occurs at the same time, there is competition for those computational resources. Whenever the available cognitive resources are not sufficient, speakers fail to properly parse, remember and repeat the input.

Overall, the three studies manage to detect an impairment in the processing of relative clauses, however they all fail to give an exact description of why these types of clauses are so problematic for patients with AD. What is missing is an up to date analysis of the configurations and movements involved in relative clauses. For this reason, we utilize the background literature on relative clauses reviewed in section 2 in order to design a suitable task to test AD patients on the comprehension of relative clauses.

5. The experiment
The experiment samples the comprehension of several types of relative clauses by elderly patients affected by Alzheimer’s disease.

A sentence-picture matching task was chosen for this purpose because of the advantages offered by this technique when used with elderly people. It makes reasonable demands on AD patients’ on-going memory, trials require a short time to
be completed, and deficits of attention and short-term memory are counterbalanced by the images provided\(^2\).

5.1 Participants
The experimental group was composed of ten subjects, all referred to us by a nursing home in Siena, Italy. Patients underwent neurological and neuropsychological assessments and results showed that they met the NINCDS-ADRDA criteria for probable Alzheimer’s disease. The diagnosis was made despite the absence of laboratory assessments. Exclusionary criteria included previous history of psychiatric disorders, strokes or alcoholism, and the presence of other neurodegenerative conditions such as Parkinson’s disease or vascular dementia.

The group included nine women and one man, aged 73.5 - 95.2 (\(M=82.2\)).

To evaluate the severity of their cognitive dementia, patients were tested with the Mini Mental-State Examination\(^3\) (MMSE); therefore only patients who scored above 14/30 were included in the experiment. Overall results showed patients to have a mild to severe impairment, with MMSE scores in a range between 14 and 24 (\(M=17.2\)).

Five subjects in a similar age bracket were then recruited to create a control group (CO). Participants were between 75.5 and 88.1 years old (\(M=81.7\)). Their cognitive abilities were verified with the MMSE where they achieved scores above 27/30.

Both AD and CO subjects had a poor level of education (3-5 years), except for one member in the experimental group, who had completed a higher level of education (approximately 13 years in total).

The data summarized below shows that participants with AD and those of the control group did not display significant differences in age or education. MMSE average scores are provided as well. Detailed data for each participant is reported in Appendix A.

\(^2\) The presence of disorders of visual perception in AD has been suggested by different authors (Hodges et al. 1991; Silveri and Leggio, 1996), however the phenomenon has not been definitively confirmed so far, at least in the first stages of the disease. For this reason, in designing the experiment, we did not take into account the use of images as a relevant bias.

\(^3\) The Mini Mental-State Examination is a test based on thirty items, created to screen for cognitive impairment. It samples functions and abilities including spatial and temporal orientation, language, memory, arithmetic and constructional apraxia. Any scores above 26 correspond to an intact cognitive system. Scores below 26 indicate very severe (<5), severe (6-9), moderate (10-20) and mild (21-25) cognitive impairment conditions.
Table 1: ADs in comparison to COs

<table>
<thead>
<tr>
<th></th>
<th>AD</th>
<th></th>
<th>CO</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Range</td>
<td>Average</td>
<td>Range</td>
</tr>
<tr>
<td>Age</td>
<td>82;2</td>
<td>73;5 - 95;2</td>
<td>81;7</td>
<td>75;7 - 88;1</td>
</tr>
<tr>
<td>Men</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>9</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MMSE</td>
<td>17;2</td>
<td>14 – 24</td>
<td>28,8</td>
<td>27 – 30</td>
</tr>
<tr>
<td>Edu</td>
<td>5</td>
<td>2;5 – 13</td>
<td>4;6</td>
<td>3;1 - 5</td>
</tr>
</tbody>
</table>

5.2 Design and Materials

The material used for the sentence-picture matching task were adapted from BAMBI (Friedmann, Novrogodsky, 2002), an experiment originally designed to test the comprehension of relative clauses in young, Hebrew speaking children.

The material was then tailored in consideration of the specific characteristics of the participants to be tested; characters like a hippopotamus, a penguin and a dwarf were eliminated from the materials as, according to the experimenter and the medical commission from the nursing home, they might have proven unfamiliar to the patients. In that case, a problem of anomia could have interfered with the performance on comprehension. After the selection, fifteen paperboard cards were included in the experiment.

A total of sixty sentences were orally presented to the participants in combination with two images. The images depicted two characters involved in the same action; with the roles reversed in the second image. The participants were then requested to point to the image which corresponded to the scenario described in the sentence. Only one of the two images (the target) could precisely match the oral input, while the other one functioned as a syntactic foil, as it represented an identical action but with reversed thematic roles.

Each pair of images was presented four times in combination with four different sentences, each corresponding to a different grammatical condition. As an example, see Figure 1 below, presented in combination with the sentences in the examples (5)a to (5)d:

---

4 The value refers to the number of years of formal education the participants had.
The sentence in (5)a represents the basic condition with a simple present active tense in subject-verb-object word order, which corresponds to the unmarked sentence structure in Italian. The three following conditions all include a main clause at the imperative mood (“Mostrami”/”Show me”), followed by a relative clause. The three conditions correspond to the three different types of relatives we have considered above. In (5)b there is a subject relative, in (5)c an object relative, and in (5)d, what has been labelled as a passive object relative (Belletti, 2009).

We would also like to underline that the introductory sentence (“Show me…”) had the function of frequently reminding the patients the nature of the task to be fulfilled. Concerning sentences like (5)a, we decided they should be presented without any introductory pattern to sound as natural as possible. Indeed, the use of an explicit request to point to the correct target picture would have considerably

(5)a  Il cane morde il gatto
The dog bites the cat
“The dog is biting the cat”

(5)b Mostrami il cane che morde il gatto
Show-me the dog that bites the cat
“Show me the dog that is biting the cat”

(5)c Mostrami il cane che il gatto morde
Show-me the dog that the cat bites
“Show me the dog that the cat is biting”

(5)d Mostrami il cane che è morso dal gatto
Show-me the dog that is bitten by-the cat
“Show me the dog that is bitten by the cat”
changed the grammatical structure of the condition, or would have made it sound less natural. In this condition, subjects were nevertheless expected to be able to complete the task, thanks to its repetition.

As mentioned before, each pair of images (as the one given in Fig.1) was presented four times during the experimental section, in alternated combinations with one of the four sentence types as in the example (5)a to (5)d. This resulted in a total number of sixty trials, which were randomized and divided into four blocks of fifteen. The random order was then revised so that each couple of pictures was presented only once per block and the sentence types were equally distributed throughout the blocks, which resulted in a variable number of three to four sentences per type in each block (see Appendix B for more examples).

There was no correlation between the target picture and its position on the page, so the target could consecutively appear in the same position on the page more than twice. However, the same sentence type was never presented more than twice in a row.

Each block was preceded by a training trial, which was not included in the analysis of the results.

5.3 Procedure
AD patients were tested at the nursing home where they were living. A few measures were taken to prevent them from feeling under pressure or uncomfortable. A quiet room in a silent area was chosen as the location for the experiment. Experiment sessions usually took place in the morning, based on the recommendations of the medical staff, as this is the time of the day in which patients seem to suffer from behavioural fluctuation less. Tests were usually performed by the experimenter with the presence of a person familiar to the patients (usually a member of the nursing staff), for the same reasons described above.

All patients managed to complete the four blocks in one section, with a single five minute break between the second and the third block. Additional breaks were allowed any time a patient asked for one or showed evident signs of attention deficit.

Subjects from the control group were interviewed at their private home. In this case, the session started with the MMSE test to verify their cognitive abilities were intact, as a binding requirement to enter the control group.

Regarding patients, their MMSE scores were provided by the medical staff at the nursing home, according to the results obtained during the latest neuropsychological assessment. All tests were conducted by the same experimenter, who was responsible for presenting the oral input in combination with the images and for taking note of the patients’ performance. Upon participants’ request, the input sentences could be repeated up to a maximum of two times. After that, further requests for repetition were allowed, however the trial was classified as failed, even in the event of a correct answer. In case of incertitude, the subject was kindly invited to move on to the following trial. No feedback was given about the accuracy of the answers.

5 In case the available data referred back to a period of time two months previous, the assessment was repeated, to obtain an up to date evaluation.
Except for instructions on the task, no information or explanation about the experiment or its goal were provided at the beginning. Any other question was answered at the end of the session.

5.4 Results

All participants managed to comprehend and complete the task.

After the editing process described in 5.2, all the remaining characters depicted in the images were recognizable and familiar to the subjects. Nevertheless, one of the pictures still caused misunderstandings among the participants. This was the image with a young girl and a monkey involved in an embrace. A few subjects needed to carefully analyze the images before being able to answer; others commented that the two images could equally match to the sentence because in both images the girl and the monkey were embracing each other, while others admitted they could not provide an answer in spite of understanding the meaning of the sentence, as they could not distinguish the difference between the two images. Not surprisingly, the comprehension of the matched sentences was very poor, with a high percentage of incorrect answers in all four conditions. Thus, the corresponding trials were omitted from the analysis.

All participants managed to complete the experiment in one single session; only patient G.B. repeated the test twice. During the first appointment G.B. appeared to be in a more severe confused mental state than was expected based on her MMSE score (21.4). Indeed, after completing the task, her glycaemia was checked and abnormal values were detected. The performance could therefore not be considered representative of the patient’s skills and we decided to repeat the test the following week. On that second occasion, the patient appeared calm and lucid and showed no memory of having attempted the same task before, therefore the experiment was repeated. The second performance though, presented other peculiarities; the percentage of correct answers showed considerable differences in comparison with all other participants. ORs were well mastered (correct comprehension of twelve sentences out of fifteen), unlike SVOs (8/15), SRs (9/15) and, with the lowest results, PORs (7/15). As no other participant (neither in the experimental nor in the control group) showed a similar pattern and in consideration of the exceptional situation already associated with the subject, we decided to exclude the data of patient G.B. from our discussion.

The table below summarizes the performances of our patients for each type of clause; the scores correspond to the number of correct answers per type out of fourteen. In the last two columns, the total number of correct answers and their counter value in percentage are given.

---

6 The total number of trials per type of sentence is now fourteen, as we excluded trials corresponding to the image of a girl and a monkey embracing each other for the reasons described above.
Table 2: Results of the experimental group (AD).

<table>
<thead>
<tr>
<th></th>
<th>Correct answers per sentence type (AD)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVO</td>
<td>B. M.</td>
<td>Be. I.</td>
<td>Bi. I.</td>
<td>B. L.</td>
<td>P. M.</td>
<td>S. R.</td>
<td>S. E.</td>
<td>V. C.</td>
<td>Z. A.</td>
<td>109/126</td>
<td>86.50%</td>
</tr>
<tr>
<td>SR</td>
<td>8</td>
<td>11</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>14</td>
<td>12</td>
<td>14</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td>6</td>
<td>12</td>
<td>13</td>
<td>11</td>
<td>9</td>
<td>13</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>103/126</td>
<td>81.70%</td>
</tr>
<tr>
<td>POR</td>
<td>7</td>
<td>9</td>
<td>10</td>
<td>12</td>
<td>9</td>
<td>13</td>
<td>12</td>
<td>13</td>
<td>12</td>
<td>72/126</td>
<td>57.10%</td>
</tr>
</tbody>
</table>

The results gathered from the control group are reported in Table 3. As this group was composed of five members, seventy trials were performed by the group per sentence type in total.

Table 3: Results of the control group (CO).

<table>
<thead>
<tr>
<th></th>
<th>Correct answers per sentence type (CO)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVO</td>
<td>C. L.</td>
<td>F. G.</td>
<td>F. M.</td>
<td>M. C.</td>
<td>Z. S.</td>
<td></td>
<td></td>
<td>70/70</td>
<td>100%</td>
</tr>
<tr>
<td>SR</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>13</td>
<td>14</td>
<td></td>
<td></td>
<td>69/70</td>
<td>98.60%</td>
</tr>
<tr>
<td>OR</td>
<td>14</td>
<td>13</td>
<td>13</td>
<td>12</td>
<td>13</td>
<td></td>
<td></td>
<td>66/70</td>
<td>94.30%</td>
</tr>
<tr>
<td>POR</td>
<td>14</td>
<td>13</td>
<td>13</td>
<td>14</td>
<td>14</td>
<td></td>
<td></td>
<td>68/70</td>
<td>97.10%</td>
</tr>
</tbody>
</table>

We would now like to compare the results from the AD and the CO groups, by considering the percentages of accuracy per sentence type in the two groups (Table 4); the data is also illustrated in a graph (Figure 2).

Table 4: Performance of AD and CO in comparison.

<table>
<thead>
<tr>
<th></th>
<th>AD</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVO</td>
<td>86.50%</td>
<td>100 %</td>
</tr>
<tr>
<td>SR</td>
<td>81.70%</td>
<td>98.60%</td>
</tr>
<tr>
<td>OR</td>
<td>57.10%</td>
<td>94.30%</td>
</tr>
<tr>
<td>POR</td>
<td>77.00%</td>
<td>97.10%</td>
</tr>
</tbody>
</table>
5.6 Discussion

Overall, subjects in the control group displayed a proficient comprehension of all four types of sentences; performances were not above the ceiling, and a low percentage of mistakes were reported, which means the task was not completely undemanding, however, it was still suitable to the cognitive and linguistic skills of elderly adult speakers in the selected age range.

In the results of the control group, the SVO condition displayed the highest percentage of accuracy (100%), which means that all SVO sentences were correctly interpreted and matched to the target image. A few mistakes occurred in the SR and POR conditions, while ORs registered the lowest performance, as comprehension only reached 94.3%. In the control group, OR is the condition with the highest number of inaccuracies, which probably reflects how expensive this kind of clause is in terms of computation, for the reasons described in section 2. Currently, there is no available data on the comprehension of ORs by young adults, however the clear tendency to avoid the production of ORs in elicitation tasks, seems to correlate to data from comprehension in elderly people.

Results from the control group confirm that the task was reasonable and adequate for a population segment of elderly adult people. Therefore, we may suggest that the different and overall lower performance detected in AD patients as a group compared to the control group can be reasonably considered as a product of the neurodegenerative disease and its subsequent cognitive deficit, rather than an effect of normal aging.

All subjects in the experimental group managed to understand and fulfill the task throughout the complete session, however results showed considerable differences among the four sentence types, which means patients were sensitive to the grammatical manipulation we introduced. If we had found similar low levels in all conditions, several hypotheses could have been made (patients did not understand the task, the lexicon was unfamiliar, the pictures lead to misunderstanding); however, this was not the case, because differences in
comprehension of the four sentence types clearly reflects an altered parser, challenged by syntactic complexity.

As expected, the performance of our patients was best on SVO sentences, with 86.5% accuracy; SRs, PORs and ORs follow in this order. SVOs, SRs and PORs are clearly understood above chance level results, with results all higher than 75%, which reveals the comprehension skills of AD patients to be weaker, yet still comparable to those displayed by the control group.

The theoretical and experimental backgrounds we outlined above can now suggest an explanation for the current data from the performance of AD patients. SVO sentences reproduce the unmarked subject-verb-object word order, do not require any specific movement, and can therefore be considered inexpensive configurations. Indeed, SVOs were successfully comprehended. The control group did not have any difficulties with them, and AD patients seemed to be able to cope with them as well, although with a lower degree of accuracy (86.5%).

Subject relatives immediately follow in the rank of comprehension; this is probably due to the A’ movement they require to move the subject of the relative clause to the main clause. This movement does not entail any violation of the Relativized Minimality theory as it does not cross over any other lexical element, however it still displays a more complex structure than the simple SVO sentence.

POR sentences are structurally similar to SRs, as they are based on a subject relative clause, however their computational cost is increased by a smuggling movement, which is required to facilitate a passive voice structure.

The data which stood out the most regards the comprehension of OR clauses. This condition is the most challenging for our patients, who indeed achieved chance level scores. While SVOs, SRs and PORs are all within a 10 point range (86.5% to 77.1%) and are well above chance level, OR results (57.1%) are 20 points lower than POR results.

The considerable gap between PORs and ORs (on average around 20 points), can be explained by considering the data collected from adult speakers reacting to elicitation tasks. According to Belletti and Contemori (2010), most adult speakers tend to avoid the production of OR clauses and prefer to adopt passive object relatives as a semantic equivalent, yet less expensive, alternative. This point was confirmed in the performance of young speakers; children gradually conform to adult behaviour as soon as they master the use of the passive (Belletti 2009). Smuggling clearly appears to be easier and less expensive than the A’ movement required in ORs. For these reasons PORs are preferred whenever available as a valid, semantically equivalent alternative. We suggest that the syntactic parser of patients with AD could be able to bear the cost of smuggling to compute sentences in a passive voice, while this is not the case when it comes to computing ORs. The computation of a configuration which involves a movement across a position similar in features to the target position would generate an effect of locality violation in AD patients, who would then not be able to conduct a detailed analysis of the features involved and their configuration.

The computational system of our patients seems much more similar to the one detected in children during L1 acquisition, rather than to an adult system. In Belletti (2012), children under the age of seven correctly interpreted 64% of OR clauses and
79% of sentences with a POR structure, while our patients scored 57% and 77%, respectively. The percentage of accuracy in comparable materials in the two groups is therefore almost equivalent. We hypothesize that patients affected by Alzheimer’s disease could suffer from a weaker parser, and consequently could be forced to restrict themselves to a simpler system, similar to the one adopted by children.

According to Grillo (2009), aphasic patients also experience feature set misinterpretations, when challenged with configurations that require a detailed feature analysis, like OR clauses, for example. Grillo hypothesizes that aphasic patients suffer from reduced cognitive resources, which would make their syntactic parser weaker and unable to give a proper analysis of the elements. Syntactic information associated with lexical items would activate more slowly and then decay faster than normal, resulting in an impoverished feature make-up. In other words, patients could not activate all features simultaneously and for a period of time long enough to allow for sentence processing. As a consequence, parsing operations would be held on a reduced set of features, as some of those features are omitted. The omission of one feature can convert a grammatical configuration into a violation of locality; if, for example, the simplified feature make-up ignores the [+Rel] feature which characterizes the attractor in relative clauses. Positions like the target and the potential intervener result in having an identical feature set and intervention effects follow.

Setting aside the different causes behind these cognitive deficits, we can now compare AD patients to aphasic patients. We suggest that the poor performances of AD patients on the test (especially regarding the OR condition), could be determined by a simplified computational system, unable to execute proper analyses of all features involved, similar to that which theoretically occurs in aphasics patients. Limited cognitive resources could manage to compute configurations in which there is a clear disjunction in features, while they would experience difficulty in situations of inclusion, which are re-analyzed as identity (and therefore refused as ungrammatical).

In conclusion, we can say that the performance of AD patients can be compared to that of the other two groups: young children and aphasic patients. What is clear is that the three groups display a different syntactic parser with respect to the normal adult one, even though as a consequence of completely different causes. As a result, subjects are unable to analyze subtle featural sets and fall back to a simplified system, in which either a stricter version of the principle of Relativized Minimality is adopted (as in child grammar) or in which some features are omitted (as by aphasics).

6. Conclusion
Basing the discussion on the data displayed above, we suggest that AD patients perform differently than controls when tested on the comprehension of several types of relative clauses. Percentages of accuracy were lower than in the control group, thus revealing a deficit in sentence processing, with selective responses to manipulations on grammar difficulty. By increasing the difficulty of the configurations involved, patients displayed a subsequent decrease in their
comprehension ability. In particular, they could not perform above chance level in the processing of OR sentences. This kind of relative clause could be too expensive to be processed, because of the detailed analysis of the subtle featural set required. Therefore, the performance of AD patients could be compared to that of young children during L1 acquisition (Friedmann, Belletti, Rizzi, 2009; Belletti, Contemori, 2010) and that of aphasics with agrammatism (Grillo, 2009). In both groups, problems with the analysis of subtle sets of features have been detected, although on the bases of different causes and mechanisms. Children may adopt a stricter version of the RM principle and be more sensitive to locality violations, while aphasics may be unable to include the complete set of features in their analysis. At the moment, we cannot say exactly where this explanation for the phenomenon found in AD patients will, or should lead. Nevertheless, we can certainly claim that their incapacity to properly analyze complex featural sets explains their poor performances regarding ORs. Further research should now be designed with the specific goal of detecting how Alzheimer’s patients handle complex feature set analysis.

References


The comprehension of relative clauses in patients with Alzheimer’s disease

Appendix A

<table>
<thead>
<tr>
<th>AD GROUP (1/2)</th>
<th>B. M.</th>
<th>Be. I.</th>
<th>Bi. I.</th>
<th>B. G.</th>
<th>B. L.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>80;2</td>
<td>79;11</td>
<td>73;5</td>
<td>95;2</td>
<td>86;1</td>
</tr>
<tr>
<td>Sex</td>
<td>F</td>
<td>F</td>
<td>M</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>MMSE</td>
<td>14</td>
<td>15</td>
<td>15,3</td>
<td>21,4</td>
<td>16,2</td>
</tr>
<tr>
<td>Years of education</td>
<td>8</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AD GROUP(2/2)</th>
<th>P. M.</th>
<th>S. R.</th>
<th>S. E.</th>
<th>V. C.</th>
<th>Z. A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>82;3</td>
<td>81;6</td>
<td>84;1</td>
<td>85;3</td>
<td>74;9</td>
</tr>
<tr>
<td>Sex</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>M</td>
</tr>
<tr>
<td>MMSE</td>
<td>14,7</td>
<td>14,7</td>
<td>15</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>Years of education</td>
<td>3</td>
<td>13</td>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CO GROUP</th>
<th>C. L.</th>
<th>F. G.</th>
<th>F. M.</th>
<th>M. C.</th>
<th>Z. S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>75;7</td>
<td>82;4</td>
<td>88;1</td>
<td>84;4</td>
<td>78;6</td>
</tr>
<tr>
<td>Sex</td>
<td>M</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>MMSE</td>
<td>30</td>
<td>29</td>
<td>28</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>Years of education</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Appendix B

Example 1

SVO  Il bambino bacia il nonno
     The child is kissing the grandfather

SR   Mostrami il bambino che bacia il nonno
     Show me the child that is kissing the grandfather

OR   Mostrami il bambino che il nonno bacia
     Show me the child that the grandfather is kissing

POR  Mostrami il bambino che è baciato dal nonno
     Show me the child, that is kissed by the grandfather
Example 2

SVO  La bambina dipinge la mamma
     “The child is painting the mother”

SR   Mostrami la bambina che dipinge la mamma
     “Show me the child, that is painting the mother”

OR   Mostrami la bambina che la mamma dipinge
     “Show me the child, that the mother is painting”

POR  Mostrami la bambina che è dipinta dalla mamma
     “Show me the child, that is painted by the mother”
Setting, resetting and general learning mechanisms: On the elements of syntactic variation in L2A*

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Since the Principles & Parameters approach, syntactic variation among languages has been dealt with through the notion of parameters, conceived of as binary options that can be differently set in different languages. In the field of L2A set parameters have been considered by some authors the source of syntactic transfer errors. In this work I argue that if parameters are not specified in principles but in the functional lexicon, and the triggers are vocabulary items, parametric values need not and cannot be transferred, as a by-product of UG availability. If UG is accessible in L2A, parameter values will not be transferred and then reset, but set again. The cause of transfer errors must be found somewhere else. I propose to characterize transfer neither as part of UG nor as a general learning mechanism but rather as a mental ‘escape’ mechanism alternative to acquisition.

0. Introduction
In the field of second language acquisition (henceforth L2A) one of the fundamental questions that researchers try to answer is what makes it different from first language acquisition (L1A), provided that everyone agrees that at least the ultimate attainment of the two processes is different. Various intersecting factors have been considered:
- UG availability
- Age
- Resort to general learning mechanisms
- Initial state

These factors intersect in the sense that UG availability is possibly a function of age (according to Lenneberg’s (1967) Critical Period, and related notions, as the

* Parts of this work have been presented at the XLVI Congress of the Società Italiana di Linguistica. I thank the anonymous reviewers and the audience of the XLVI Congress of the Società Italiana di Linguistica, Glow 36 (Biolinguistics Workshop) and GASLA 12 for their advice and their helpful comments on some of the issues discussed here. I wish to dedicate this work to the CISCL people, for creating and feeding a place where ideas and ways of working can be fruitfully and lively interchanged.
one of sensitive periods differentiated for different language modules), and resort to
general learning mechanisms is possibly a function of UG availability (if UG is not
available, the learner resorts to general learning strategies).
The Initial State factor is related to UG availability in different ways according to
different models, but a common consideration is that in L2A the Initial State is
different from L1A in the obvious sense that the L2 learner has already acquired a
language. This could have a number of consequences. It could make UG as a
whole no more accessible (as maintained by Clahsen, 1988; Clahsen and Muysken,
1989, a.o.) leaving the L2 learner with only general learning mechanisms (or
inductive learning strategies in Clahsen’s (1988) terms) at disposal for L2A, or
could be responsible for some peculiarities found in L2A.
In particular, transfer errors (or cross-linguistic influence) from the L1 have been
observed since long in L2A (Sweet, 1899). In pre-generative frameworks (e.g.
Bloomfield, 1945) they have been interpreted as the output of ‘lifelong habits of
muscular action, of naming, classification and combinatory patterns’ peculiar to the
native language.
Restricting our attention to syntax, for some L2A researchers working in the
Principles and Parameters framework, transfer errors are given a different
interpretation. White (1989) for instance, maintains that UG principles are fully
accessible in L2A, but the values for parameters, already set for the L1, are initially
transferred to the L2 and then possibly reset to the L2 values as long as L2A
proceeds. Then the problem is how is resetting achieved (is it a UG driven
process?) and what evidence is needed in order to trigger it (is negative evidence
needed?).
The idea that parameter values are transferred when the acquisition of an L2 starts,
as a consequence of the availability of UG in this process, strongly relies on a
conception of parameters as options specified in principles. But if parameters are
not expressed in principles, and are rather featural specifications in the functional
lexicon, as recently maintained by Rizzi (2011) following a tradition that goes back
to Borer (1983), there is no principled reason to assume that parametric values are
transferred as a by-product of UG availability. The L2 learner is faced with new
vocabulary items (words, morphemes or their apparent absence) whose
idiosyncratic properties have to be discovered, as the L1 learner is.
In what follows I will briefly review some studies of the late 80s – early 90s that
propose and discuss the idea of parameter transfer and resetting (Section 1) as well
as Rizzi’s (2011) characterization of parameters (Section 2). In Section 3 I’ll
provide some evidence that L2 learners do make UG driven hypotheses concerning
L2 items they are exposed to, while in Section 4 I’ll go back to transfer errors
proposing for them a different explanation.

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1 In this work, as commonly held, we distinguish bilingualism (the simultaneous acquisition of two
languages) from L2A, where a language starts to be acquired when another is already acquired.
1. UG access and the transfer of parameters values

The question of whether UG is accessible in L2A has received different answers in the Principles and Parameters approach. While for some authors (Clahsen 1988; Clahsen and Muysken 1989 among many others) UG is no more accessible, for others it is accessible but not in the same way as in L1A. Crucial in this respect is the discussion on whether L2 grammars are UG compatible or not. Among the proponents of UG accessibility, some authors have argued that UG is not the same in L1A and L2A, since in L2A parameters have already been set. While for Bley – Vroman (1989) L1 settings constitute the L2 learner’s only access to UG, White (1989) assumes that L2 learners use L1 settings of UG parameters as an interim theory about the L2. In some cases L2 learners are able to reset parameters to the L2 values, and sometimes negative evidence may play a role in this resetting. White (1985) found for instance that Spanish speakers learning English incorrectly transfer the null subject property of their L1 to English in roughly the 40% of the cases.

White (1991) studied the L2A of adverb placement in English by native speakers of French aged 11-12. As it is well known, French and English exhibit some similarities as well as some differences in this respect, which White (1991), following Pollock (1989) attributes to the different setting of a parameter, the verb movement parameter. In English, adverbs may not appear between the verb and its direct object, whereas they may in French:

(1) a. Marie regarde souvent la télévision
    b.* Mary watches often television

In English, adverbs may appear between the subject and the verb, whereas they may not in French:

(2) a. *Marie souvent regarde la télévision
    b. Mary often watches television

In French the verb raises past the adverb. In English verb raising is prohibited (for all verbs but have and be).

Two groups participated in White’s study
1) Adverb group: they were taught adverb placement
2) Question group: they were taught question formation

In addition there was a control group (monolingual native speakers of English)

There were three testing sessions in the main study: pre-teaching test, immediate post teaching test, and five weeks later. A follow-up study was conducted one year later.

Three tasks were used: a grammaticality judgment task, a preference task and a manipulation task.

Results showed that there was no significant difference prior to instruction between the Adverb and the Question group, and both differed significantly from the Control
group. The measure used by White (1991) is ‘error score’. Restricting our attention to the grammaticality judgment task for ease of exposition, considering a maximum error score of 16, she found a mean error score of 3.5 for the Adverb group and of 4 for the Question group. She notes however (p.144) that the error scores vary considerably between individuals, from 0 to 10. 

There was no significant difference in the Question group’s scores on the three test occasions, suggesting no improvement over time in the absence of appropriate teaching. For the Adverb group, the pre-teaching test differs significantly from both post teaching tests, and the two do not differ from each other, suggesting that they learned *SVAO in English and did not forget it. 

This makes White (1991) assume that negative evidence (here in the form of explicit rule explanation) plays a crucial role in parameter resetting: the Question group should behave as the Adverb group if the value for the verb movement parameter were reset, but in fact does not. 

White (1991) notes however some peculiarities of the learning process of the Adverb group learners: they learned *SVAO but they did not acquire the difference between VO and VPP structures or between manner and frequency adverbs in the VPP case. The underlying, conscious generalization the learners make seems to be: 

\[(3) \text{ Adverbs may not appear between the verb and other categories [White 1991:152]}\]

On the other hand, many of the subjects did acquire the distinction between SAV as the preferred position for frequency adverbs and SVOA as the preferred position for manner adverbs, without specific instruction on this point, and this is a distinction which cannot simply be attributed to the mother tongue, since SAV is not a possible adverb position in French. 

The one year later follow-up test revealed however that children of the Adverb group had reverted to the state of knowledge that they revealed prior to instruction: the error score was not significantly different from the pre-instruction error score (pre-instruction mean error score for the different tasks was 3.2, in the follow-up 2.9). Nor was this score significantly different from the score of an uninstructed children group that participated in the follow-up study: explicit formal instruction does not give lasting results. 

Schwartz and Gubala-Ryzak (1992) argue that there is no evidence that learners in White (1991) ’s study have re-organized their grammar, i.e. that their rejection of SVAO in English is a consequence of Verb raising having been unlearned, since the result is not lasting and since subjects also reject SVAPP. To exclude SVAPP, they argue, the grammar must have ‘unlearned’ base-generating adverbs to the right of VP, but the fact that SVO/PP is still allowed is an inherent contradiction that a natural grammar cannot contain. They argue that primary linguistic data are the only input that UG can make use of, in L2A as in L1A: the language faculty cannot access the knowledge that gets learned as a result of exposure to negative evidence (information about the impossibility of a form or utterance) and explicit positive data (descriptive information about the language). 

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3 Results in the three tasks reveal parallel trends (White 1991:150).
White (1992) replies that a number of acquisition researchers recognize the possibility that L1 acquisition may involve a period of ‘trying out’ more than one setting at a time, and if L1A and L2A are alike, this possibility cannot be dismissed for L2 acquisition. White (1992) accepts the arguments of the rejection of both SVAO and SVAPP, and the one based on the follow-up study which revealed that after one year subjects had reverted to the state of knowledge they had in the pre-teaching test, and agrees on the fact that negative evidence does not seem to have led to parameter reset in this particular case (but not in principle). She gives then further data, based on Trahey (1992) and Trahey and White (1992) which show that L2 learners might not use primary linguistic data to reset the verb movement parameter. 54 francophone subjects of the same age of the subjects in White (1991) were given an input ‘flood’ of positive evidence inconsistent with finite verb raising, and received no negative evidence or explicit positive evidence on adverb placement. The results show that exposure to the flood of positive input led to a significant increase in subjects’ acceptance and use of adverbs in the SAV position. However, subjects’ SVAO errors did not decrease after the input flood: optional raising seems thus a feature of their grammar too, even though they did not receive explicit positive evidence or negative evidence.

I fundamentally agree with Schwartz and Gubala – Ryzak (1992) on the fact that if negative evidence and explicit positive evidence are used by an L2 acquirer, UG is not engaged, but general learning mechanisms are involved, and I agree (with both Schwartz and Gubala – Rizak 1992 and White 1992) that the results of White’s (1991) study (rejection of both SVAO and SVAPP, but also acceptance of both, loss of *SVAO after one year) strongly indicate that UG was not involved.

I think however that the fact that both SVA and SAV are accepted in the ‘flood’ study (Trahey 1992; Trahey and White 1992), which reveals that even in the absence of negative evidence subjects showed optionality of verb raising, must be interpreted as indicating that UG is not involved in transfer, either.4

One important fact that I would like to stress in this respect is that the amount of syntactic transfer errors found by White is far below the amount one could expect if they were the result of a deterministic, UG driven, process: in White (1985) they were nearly the 40%. White (1991) in the pre-teaching test found not only a mean error score of 3.5-4/16 (which means 25%) but also, as we have seen, that the error scores varied considerably between individuals, from 0 to 10. Both data are inconsistent with a UG driven process: a UG driven process is not supposed to take place in the 25% (or 40%) of the cases and with great variability between individuals.

This does by no means entail, however, that UG is not involved in L2A, but simply that it is not involved in the transfer of parameter values. We will come back to transfer errors in Section 4.

For the moment I would just like to argue that there is a principled reason to justify my claim. The idea that parameter values are transferred in L2A as a

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4 The fact that optionality is also attested, to a certain extent, in L1A, must not be thought of as indicating that the two kinds of optionality are alike. In L1A optionality is a transitory feature, while in L2A it may ‘fossilize’. We do not (and cannot) know whether optionality of verb movement was a transitory feature of the grammar of White’s subjects.
consequence of the availability of UG is based on the idea that parameters are options specified on UG principles or, in Rizzi’s words, on the ‘Parameters expressed in Principles’ view:

(4) Parameters expressed in Principles: each UG principle specifies one (or a small number of) parameter(s), a choice point to be fixed on a certain value for the principle to become operative. [Rizzi, 2011: 146 (6)]

One consequence of this view is that since the L1 is already acquired, parameters values have been fixed, and, in re-accessing UG, the L2 learner can do nothing else but start L2A with those values. But if parameters are specified in the lexicon the availability of UG principles and the values for parameters are two independent objects, and having access to UG principles does not necessarily entail assuming the L1 parameters values. In the next section I will briefly summarize Rizzi (2011)’s characterization of parameters.

2. Parameters and principles as independent entities

Following a tradition that goes back to Borer (1983) and Kayne (2000), Rizzi (2011) assumes that parameters are not options expressed directly in UG principles but rather featural specifications in the (functional) lexicon:

(5) A parameter is an instruction for a certain syntactic action expressed as a feature on an item of the functional lexicon, and made operative when the item enters syntax as a head [Rizzi, 2011:150 (13)]

Or, more precisely,

(6) $H$ has $F \{\text{yes}, \text{no}\}$ [ibidem:150 (14)]

where

(7) $H$ is an item of the functional lexicon entering syntax as a head, and $F$ is a relevant feature [ibidem:150]

In the set of possible linguistic features, parametric features will be restricted to a small and well-defined subset of morpho-syntactic features which have the property of triggering the basic syntactic actions, i.e. merge, move and spell-out. The typology of parameters is thus derived:

(8) A typology of parameters [ibidem: 150 (15)]

1. Merge parameters:
   - $H$ c-selects $XP$ (where $XP$ departs from the canonical structural realisation of the s-selected entity)

2. Move parameters:
   - $H$ attracts $X [+F]$
Setting, resetting and general learning mechanisms

- H attracts XP [+ F]

3. Spell-out parameters
- H is null
- H licenses a null Spec

(9) “each item of the functional lexicon has a small number of switches, corresponding to the typology in (15); acquiring the lexical item amounts to setting its switches on the basis of the linguistic data the learner is confronted with. So a given head may c-select a particular category (departing from the canonical structural realisation of its s-selectional properties), attract another head or a specifier, be spelled-out or not and govern the spell-out properties of its Spec.” 

[ibidem:151]5

The lexicon is traditionally considered the component of grammar for which there is strong evidence for learning (Borer 1983), and acquiring a new word is an open possibility throughout life.

And if acquiring a lexical item means setting its switches (i.e. discovering its merge, move and spell-out properties) on the basis of the data a learner is confronted with, we can assume this possibility to be open as long as UG is operative.

There is no principled reason to assume that this possibility is not at disposal when an L2 is acquired, provided that UG is still accessible. But if it is so, principles can be operative independently of the setting of parameters, so the values of parameters need not be transferred in order to access principles. They need not but they also cannot, since they must be established for each new lexical item the learner encounters.

A different view is expressed by Tsimpli and Russou (1991). They also assume (following Borer 1983) that parameters are not associated with UG principles but with lexical items and, in particular, functional categories. They adopt the idea that functional categories form an independent component of UG, the UG lexicon.

With respect to L1A, it is this module of UG that is subject to maturation. With respect to L2 acquisition, on the other hand, the prediction is that this module is inaccessible to the adult L2 learner, on the assumption that language learning at stages other than those included in the Critical Period cannot make use of the same mechanisms. Thus parameter resetting in L2 is excluded. UG principles, however,

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5 According to Cinque and Rizzi (2010), the inventory of functional elements (heads or specifiers of functional projections) is much larger than is generally thought. Besides determiners and complementizers, there are conjunctions, functional and spatial adpositions, mood, modal, tense, aspect, polarity and voice morphemes (whether bound or free), auxiliaries, copulas, and other verbs lacking a clear argument structure, pronouns (strong, weak, clitics), demonstratives, quantifiers, numerals, classifiers, number morphemes, gender or class morphemes, diminutive/augmentative morphemes, degree words, indefinite/wh-words, Case morphemes, focusing adverbs, comparative and superlative morphemes, and many more: at least four hundred or so. According to the authors, it is in fact quicker to consider which elements are lexical, i.e. belong to an open class. Nouns in all languages appear to belong to an open class. It is less clear as far as adjectives, verbs and adverbs are concerned.
are assumed to be operative in any language acquisition process. The availability of UG principles allows the L2 learner to make use of grammatical options which are not the ones adopted by the L1 grammar nor by the L2 target grammar. This theory also predicts that where L2 differs from L1 in terms of parametric values there will be transfer errors at the early stages, given that the functional module is not accessible to the language learner. At the more advanced stages, where the L2 learner seems to adopt the correct parametric choice, the authors assume that this is the result of general learning mechanisms correctly analyzing the input data.

This model thus predicts the availability of UG principles but also transfer errors for parameters values, and no resetting.

More than two decades of studies on the structure of functional projections (see Cinque and Rizzi, 2010 for a review), however, allow us now to clearly distinguish a universal hierarchy of functional projections from language specific functional properties. The latter, under Rizzi’s (2011) proposal, are established by the learner endowed with the discovery procedure outlined above, which is as well a universal endowment. No transfer of language specific functional properties is thus predicted, and I think we should dispense with the notion of a UG lexicon no more accessible to the L2 learner. If UG is accessible to the L2 learner (modulo Critical (or Sensitive) Period/s ) no language specific properties need to transferred.

One final point concerns the maturation of functional categories (now understood as a universal hierarchy). There is ample evidence in the L1A literature that in the early stages of language acquisition the complete functional structure is not available to the child (Wexler 1994, Friedemann and Rizzi 2000, Hyams 2001 a.o.), while it seems that in L2A the functional structure is at disposal since the early stages ( Lardiere 1998; Prévost and White 2000; Schlyter 2003 a.o.). Is the functional structure, fully available once L1 is acquired, part of the Initial State in L2A?

In the next section I’ll provide some evidence consistent with the idea that L2 learners in fact try to establish the syntactic properties of L2 lexical items, and do so with operative UG principles on one hand and a matured functional structure on the other.

3. Discovering the properties of lexical items in L2A

How do L2 learners behave when they are faced with a new lexical item (word or morpheme)? In a pilot study ( Di Domenico 2012) I made inquiries concerning the English –s morpheme proposing a written grammatical decision task to 50 native speakers of Italian aged 10-12, beginners or near-beginners of L2 English. Given the written nature of the test, I chose two uses of the –s morpheme which are homographic and homophonic: the case in which ’s is a (contracted) form of BE and the case in which it is a genitive.

Subjects were presented five sentences, corresponding to different structures: in two of them ‘s is a form of BE, in three of them it is a genitive. The sentences contained no violations and were not ambiguous. Subjects had to decide whether the value of ’s in each sentence was BE or genitive and indicate it to the right of the item.

Two testing sessions were realized: one soon after students were taught BE simple present and ’s genitive and one five months later. The main results reveal that (in
both experimental sessions) there is a statistically significant difference between sentences of the type in (8) (the lowest number of target answers: 28/50 in the first session, 29/50 in the second session) and sentences of the type in (9) (the highest number of target answers: 39/50 in the first session, 42/50 in the second session):

(8) Jake’s at the skatepark.

(9) Is this Jack’s tracksuit?

Why is (8) a significantly more difficult structure than (9) ($\chi^2=5.4726$, $p=.05$, with Yates correction $\chi^2=4.5228$, $p=.05$ in the first session; $\chi^2=8.2079$, $p=.05$, significant also at $p=.01$ and at $p=.001$, with Yates correction $\chi^2=6.9937$, $p=.05$, significant also at $p=.01$ in the second session) to decide what is ‘s’?

And why is it difficult to decide what is ‘s’ even after 5 months of exposure, and despite what the kids have been taught?

We interpreted the results as follows. First of all, subjects really find ‘s’ ambiguous, but this ambiguity is structure dependent. They also make the hypothesis in (10):

(10) *Is* and ‘s’ are allomorphs of a general agreement morpheme

where ‘general’ means that it can be merged both clause internally and DP internally. In (8), the most difficult sentence type, ‘s’ is placed at a ‘choice point’ (Fodor 1998b), i.e. a point at which it can be attached into the currently parsed DP (and in this case it is interpreted as a genitive) or in the clausal structure (and in this case it is interpreted as a form of BE). The two interpretations are coherent with two different parsing principles: Late Closure in the first case and Minimal Attachment in the second case.

In (9), the easiest sentence type, on the contrary, ‘s’ is not ambiguous because the sentence parsing has started with *is* in C, which is coherently interpreted as a verb, and thus the subsequent occurrence of ‘s’ is not ambiguous.

6 (10) is confirmed by some elicited productions collected by Bennati and Di Domenico (unpublished work) such as:

(i) a. What does Jane want?
   b. Bag is Mary

(ii) a. Where are the belts?
   b. The belt is brom is on the table. The belt is Katrina is on the bed.

7 Late Closure (Frazier and Fodor 1978)
   When possible attach incoming material into the constituent currently being parsed
   Minimal Attachment (Frazier and Fodor 1978)
   Attach incoming material into the phrase marker being constructed using the fewest nodes consistent with the well-formedness rules of the language under analysis
   On the universality of these parsing principles see in particular Fodor 1998a.

8 The idea that (8) is difficult because ‘s’ is at a choice point is confirmed by the fact that the second most difficult sentence type is:

(i) Rosie’s dog is very friendly
The results of this study are an instance of how second language learners behave when they are exposed to a new vocabulary item: they make UG driven hypotheses trying to establish its syntactic properties, in this case the merge properties of ‘s, using universal parsing principles grounded on a fully developed clausal architecture, and, despite what they are taught about ‘x, their hypotheses are more in line with proposals made by linguists in this respect.9

4. Back to cross-linguistic influence

It might be argued that the study just reported refers to a domain where no transfer is expected since there is no equivalent of the –s morpheme in the L1 of the subjects.10 This is in fact true, but notice by the way that the notion of ‘equivalence’ is not a linguistic one, but rather a mental one.

If we go back to very early studies of L2A, after the immediate post- Bloomfieldian period in which transfer was emphasized (as in work by Lado 1957, for instance), researchers tried to quantify transfer errors, with respect to other kinds of L2A errors (or ‘goofs’, Dulay and Burt 1974), at the same time individuating other sources for the peculiarities of interlanguage grammars (Selinker 1972). Dulay and Burt (1974) report a series of studies of the late 60s and early 70s concerning both adult and child productions which all found an amount of transfer errors around the 30%. A study of Doca (1979), similarly found that the amount of transfer errors in the spontaneous production of the adult subjects under investigation was 28%.

Interestingly, these percentages are not dissimilar from those found by White (1985; 1991). Note however that the two amounts are not directly comparable, in that White’s data express the amount of transfer errors with respect to target answers, while the studies just reported express the amount of transfer errors with respect to errors of different sources.

Nevertheless, both kinds of data reveal that transfer errors (and hence the process of transfer), can only in part characterize L2A. The study we have reported in Section 3 surely refers to the other part.

A lot of evidence concerning transfer errors has been gathered up to now. More recent research (see White 2009 for a review) has individuated that different sub-modules are differently interested by transfer. In particular, in various domains at the syntax discourse interface, at more advanced levels of L2 proficiency, a disjunction can be observed between the L2ers syntactic knowledge, which is target like in the relevant respects, and knowledge of interface conditions which is subject to protracted L1 effects, and higher percentages of transfer- driven responses (Belletti and Leonini 2004; Sorace and Filiaci 2006 a. o.). An even greater role of transfer seems to influence the PF interface, where the L1 feature inventory, according to Brown (2000) constrains L2 speech perception.11 It seems thus, as

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9 The hypothesis that possessive ‘s is the singular form of the copula has been advanced by den Dikken (1998; 1999) while Bernstein and Tortora (2005) maintain that it is a (singular) number marking akin to that found in the verbal domain. Our data seem to support den Dikken’s analysis.

10 See footnote 11 below on morphological transfer

11 As far as morphology is concerned, transfer can be observed in a more indirect way. Montrul (2000) proposes that morphological items in the L1 which lack equivalents in the L2 have a blocking effect on L2 acquisition of related syntactic structures.
Ionin and Zubizarreta (2010) suggest, that purely syntactic phenomena are less vulnerable to transfer.

It is beyond the scope of the present article to find an explanation for these observed differences which surely deserve further consideration.

What is worth noting with respect to the assumptions made here, is that transfer on one side can only in part explain L2 syntax, and on the other seems to affect other language sub-modules more than syntax.\(^{12}\)

Recent research on transfer, furthermore, seems to attest transfer not only in L2 learners but also in adult heritage speakers and bilingual children (see Ionin and Zubizarreta, 2010 and the references quoted there). In both cases, and differently from L2A, L1 and L2 are acquired simultaneously.

Research on L3 (Ln) acquisition has revealed that at the early stages of Ln acquisition transfer seems to occur more from the learner’s L2 than from her L1 (Falk and Bardel 2010 and the references quoted there).

Finally, transfer errors are more likely to be observed in certain experimental tasks then in other: translation tasks significantly give rise to more transfer errors with respect to productions elicited without L1 material (Bennati and Di Domenico, 2008).

All these facts in my opinion lead to the conclusion that transfer does not have the features of a UG driven process, but is rather to be conceived of as a mental process. I would like to suggest that it has to do with the ‘tricks’ we are able to make with language: solve (or even invent) a cross-word or a rebus, produce rhymes and alliterations, create and understand a pun, translate, transfer, and so on and so forth.

In transfer we first establish an equivalence between an item of our L2 and an item of our L1 (or of our Ln and our L(n-x)), keep the morpho-phonological make-up of the item in the L2 (or Ln) but the feature values (and hence the syntactic actions that they trigger) of the ‘equivalent’ item in the L1 (or L(n-x)).\(^{13}\)

Transferrable features are of many kinds (from discourse-related features to phonological features) and they are transferred at different degrees, possibly in relation to their different sensitive periods of acquisition.

Among the things we can do with language, we can also re-organize a language grammar (or parts of it).\(^{14}\) While re-organizing a language grammar is indeed a general learning mechanism (which may profit of negative evidence and descriptive information about the L2) transfer is not a learning mechanism at all, but rather an anti-acquisition procedure, an escape mechanism the learner may resort to when and if linguistic competence in the target language is lacking or hardly accessible. Perhaps in some cases transfer is an escape mechanism the learner must resort to, if the UG driven procedure of acquisition is not accessible for critical period related reasons: phonological features might be such a case. As far as syntax proper is concerned, it seems that L2ers resort to transfer in less than a half of the cases.

\(^{12}\) But see Belletti and Leonini (2004) a.o. for an interpretation of problems at the C-I interface as syntactic problems.

\(^{13}\) In code-switching we do not keep the morpho-phonological make-up of the item in the L2.

\(^{14}\) Resetting is thus a misleading term for this operation.
5. Conclusions

In this work I have argued that transfer of parameters settings is not a UG driven operation. It needn’t be so under the assumption that parameters and principles are independent entities, as in the approach to parameters proposed by Rizzi (2011) which follows Borer’s (1983) proposal that the locus for parameters is the (functional) lexicon. It cannot be so under the assumption that parametric values are triggered by and established for each new element of the (functional) lexicon the learner is faced with.

Even some external peculiarities of transfer errors lead to the same conclusion: their amount and individual variability, the fact that they can occur at different degrees in different domains, that they preferably (at least in the early stages of an L3 acquisition) occur from the L2 than from the L1, and that they may be favored by certain metalinguistic tasks such as translation.

I have proposed that transfer is to be conceived of not as learning mechanism but as an escape-from-acquisition mental mechanism that L2ers (or Ln-ers) may resort to: in L2A, features can be acquired or transferred.

In Section 3 I have given some evidence of how a UG driven acquisitional procedure can work in L2A.

Assuming a Universal Grammar consisting in principles (possibly reduced to recursive merge and interface conditions), a hierarchy of functional projections (if not determined by interface conditions, see Cinque and Rizzi (2010) for a brief discussion), a functional lexicon containing the list of possible functors (Cinque and Rizzi 2010) and a procedure/instruction to set language specific properties of lexical items, as the one proposed by Rizzi (2011), nothing differentiates the L1 and the L2 learner’s endowment in this respect, modulo Critical Period.

References


Sweet, H. (1899) *The practical study of languages* (New edition OUP 1964)


This article discusses the results of an experiment in which the theory of verb movement (Pollock, 1989) was used in second language teaching. The hypothesis underlying the experiment is that an explicit explanation of the deep computational mechanisms of a language should be more effective in resetting a parameter than a traditional descriptive explanation. The subjects were 67 Italian learners of English as a second language from four different classes: 2^D and 2^F (Junior High School), 3^A and 3^F (High School). They were first tested to record their knowledge of the position of English adverbs and then they were divided into two groups selected on the basis of their Pretest. One which was given a *descriptive* account of adverbs placement and the other which was given a *linguistic* account of the reason why the two languages differ on adverbs position, namely the verb movement theory. They were tested immediately after the explanation and again after 10 weeks. Results show a greater and longer lasting improvement in the ability to place adverbs correctly in subjects who were exposed to the linguistic account of the differences between the two languages compared with subjects who were given the descriptive explanation. These results support the hypothesis that an explicit explanation of the deep computational mechanisms underlying a language is more effective in teaching the correct placement of adverbs than the descriptive explanations traditionally used in second language teaching.

**Introduction**

The role of Universal Grammar (UG) differs in first and second language acquisition. While there is a widespread agreement about the role UG has in L1 acquisition, there are several different hypothesis that seek to explain the role of UG in L2. Among these are the Minimal Trees Hypothesis (Vainikka and Young-Scholten 1994), the Weak Transfer Hypothesis (Eubank 1993) and the Full Transfer/ Full Access Hypothesis (Schwartz and Sprouse 1994). According to Vainikka and Young-Scholten, the initial state of L2 acquisition is constituted by
the transfer of the lexical category solely from the L1 onto the L2 following the linear order and then, going on with the interlanguage stages, there would be the progressive transfer of the functional categories as well, bottom to top. According to Eubank instead, both functional and lexical categories are transferred onto the L2 though in their weak form, that is the value of the features is not transferred in the initial stage, but only at more advanced stage of the interlanguage. However, the theory most widely accepted and corroborated by experimental data is the Full Transfer/Full Access (FT/FA) Hypothesis. According to Schwartz and Sprouse, second language acquisition involves an initial full transfer of the L1 parametric values onto the L2, followed by a failure-driven readjustment process that is guided and constrained by UG, hence the term full access. According to the FT/FA hypothesis one should expect Italian learners of English to move the verb in English as well, resulting in agrammatical linear orders in adverb placement. This is in fact what one finds in Italian learners of English L2 even at high levels of proficiency. As well as the difficulty of learning a parametric difference for a second language, learners also have to cope with accounts given from traditional descriptive grammars that generally confine themselves to describing how an adverb is placed using a series of rules that describe location not even trying to explain the reason behind the differences between two languages. The following explanations of adverb placement given in some English grammar books illustrate the descriptive approach to teaching the subject of adverbs of frequency to learners of English as L2:

1. Gli avverbi di frequenza esprimono con quale frequenza compiamo determinate azioni oppure si verifica qualcosa. In inglese essi sono always (sempre), usually (di solito) often (spesso) sometimes (a volte) seldom/rarely (raramente), never (mai). Gli avverbi di frequenza precedono sempre il verbo principale nelle frasi affermative, negative ad interrogative. Con il verbo to be essi vengono posti dopo il verbo, mentre con il verbo to have got vanno posti tra have e got.

Es.
Do you often play with your computer?
I usually have lunch at one o’clock.
Kate is often late for school.
I haven’t always got my dictionary in my school bag.

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Italics emphasise that the key point of the account is the location of the adverb rather than focusing on the verb. This type of approach fails to consider that learners do not need to put adverbs anywhere, because they are already part of the functional structure of the sentence.

2 Adverbs of frequency express the frequency with which actions take place or are performed. In English these words are: always, usually, often, sometimes, seldom, rarely, never. Adverbs of frequency always precede the main verb in affirmative, negative and interrogative sentences. With the verb to be they are placed after the verb, while with the verb to have got they are placed between have and got.
We often use the present simple with adverbs of frequency (always, often, sometimes, usually, hardly ever and never). Adverbs of frequency go before the main verb, but after be.

Es.
He often goes out. NOT He goes often out
She is always late. NOT She is late always

Some adverbs (for example, always, also, probably) go with the verb in the middle of a sentence:

Es.
Tom always goes to work by car.
We were feeling very tired and we were also hungry.
Your car has probably been stolen.

Study these rules for the position of adverbs in the middle of a sentence. (They are only general rules, so there are exceptions.):

i) If the verb is one word (goes/fell/cooked etc.), the adverb goes before the verb
   Note that these adverbs go before have to.
ii) But adverbs go after am/is/are/was/were
iii) If the verb is two or more words (can remember/doesn’t smoke/has been stolen etc.) the adverb goes after the first verb

The rules given are purely descriptive of location. In the first two examples the rules are relatively simple, relying on the student to remember when to put the adverb before and when to put it after the verb. The third example uses a more difficult approach requiring learners to count the words that make up a verb. None of these approaches mentions the existence of different kinds of verbs (modal, auxiliary and lexical). It could be argued that this alone might be a more reasonable and less complicated explanation of differences in verb behaviour. Although attempting to make the subject ‘adverbs of frequency’ easy to learn, these explanations actually make it unnatural to learn.
Hence the hypothesis underlying this research project is that:

3 C. Oxenden, C. Latham-Koenigh, P. Seligson. New English File. Pre-intermediate student’s book. Oxford University Press. This text book is used in the third year of High School and is the text book used by the older subjects (groups 3^A and 3^B) of the experiment.
A linguistic explanation of the linear differences between English and Italian, which takes into account and renders explicit the deep functioning of languages, is expected to be more effective than a traditional descriptive explanation.

1. The experiment

1.1 Subjects

A total of 67 subjects took part in the experiment; 38 of them were in their second year of Junior High School (2^D and 2^F; mean age 12 years) and 29 were in their third year of High School (3^A and 3^B; mean age 17 years).

The original experiment design intended to use first year Junior High school students who had never been exposed to any kind of explanation of adverb placement in English as the younger group of subjects. However, pupils in their first year of Junior High lack grammar awareness and metalinguistic knowledge with their instruction focusing mostly on lexical items and very basic English grammar. The subject of adverbs of frequency is introduced at the end of the first year, a period in which the experiment could not have taken place within the framework of the school year. The experiment used students at the beginning of their second year who had not revised the topic of adverbs of frequency. These subjects all started learning English as L2 in their first year of elementary school, around 6 years of age and they were not taught any English outside school.

2^D comprised 21 subjects, 18 of whom were native speakers of Italian and 3 of whom were bilingual (Italian-Byelorussian, Italian-Spanish and Italian-Albanian) The Pretest results for this subgroup of 3 did not differ from those of their native Italian-speaking peers, (probably because Italian is their primary language of communication) and hence they could reliably be included in the subject group.

2^F comprised 17 subjects, 14 of whom were native speakers of Italian and 3 of whom were bilingual (two Italian-Albanian and one Italian-English) This subgroup delivered similar results in the Pretest to the bilingual sub group within 2^D.

The students in the third year of High School were chosen as the second group because the experiment required older subjects to be more advanced than the younger group but not so proficient in English L2 that they would make very few mistakes in adverb placement. Subjects from the High School group started learning English as L2 between second and third year of elementary school (7-8 years of age) and were not taught English outside school.

3^A comprised 17 subjects, 16 Italian native speakers and 1 bilingual Italian-German whose results did not differ from those of her peers.

3^B comprised 12 subjects all native speakers of Italian.

A control group of ten native English speakers between the ages of 20 and 40 completed all tests.
1.2 Experiment phases
The experiment was structured in four phases:

- Pretest
- Explanations
- First Post-test
- Second Post-test

1.2.1 Pretest
In the Pretest phase, subjects were given a test that implicitly tested their knowledge of adverb placement in English. The test comprised six different exercises administered separately to avoid cross referencing. At the beginning of the test there were written questions concerning the linguistic history of each subject in order to gather information about the kind and the amount of their exposure to English as L2. The tests included small word reference lists to allow students greater independence in accomplishing the tasks and the tests were completed anonymously.\(^5\)

The test required subjects to use a total of 17 adverbs in 37 different sentences:

- 8 adverbs of frequency: always, usually, often, rarely, never, frequently, occasionally, seldom
- 3 adverbs of manner: slowly, easily, carefully
- 3 'focusing'\(^6\) adverbs: only, even, also
- 1 adverb of quantity: very much
- 1 epistemic adverb: probably
- 1 pronoun that behaves the same as an adverb: both

The six exercises tested subjects’ knowledge of adverb placement with different tasks: translation, word ordering, error correction, single word placement in a sentence, answering questions with provided information and creating sentences out of a chart.

Correct (‘target’) answers were those that identified basic word order (Adv-lexical verb and Aux-Adv); other word orders where prosody or context were involved were not considered correct (‘not target’). The responses from the control group of 10 English native speakers provided a default position for ‘correctness’.

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\(^5\) See appendix 1.
\(^6\) Belletti (1990).
Results of the Pretest

Table 1

<table>
<thead>
<tr>
<th></th>
<th>TARGET</th>
<th>NON TARGET</th>
<th>OMISSIONS</th>
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<tbody>
<tr>
<td>2^D</td>
<td>34%</td>
<td>57%</td>
<td>9%</td>
</tr>
<tr>
<td>2^F</td>
<td>28%</td>
<td>46%</td>
<td>26%</td>
</tr>
<tr>
<td>3^A</td>
<td>54%</td>
<td>39%</td>
<td>7%</td>
</tr>
<tr>
<td>3^B</td>
<td>55%</td>
<td>51%</td>
<td>4%</td>
</tr>
</tbody>
</table>

1.2.2 Explanations

In the Explanations phase subjects were divided into two groups. One (2^D and 3^A) was given the traditional account of the rules of adverb placement and the other (2^F and 3^B) was given the linguistic explanation of the difference between the two languages. For both the younger and older groups, the classes with the higher percentages of non target answers in the Pretest were chosen for the linguistic group.

Both the descriptive and the linguistic explanation, were presented using a power point presentation to ensure that both groups were exposed to the same experimental conditions.

The descriptive explanation was called ‘The difference in adverb placement between Italian and English’. The first slide illustrated that in the same sentence (Gianni legge spesso il giornale / John often reads the newspaper) the adverb position differs in English and Italian. The researcher emphasised that in Italian the word order is Subject Verb Adverb (SVA) while in English it is Subject Adverb Verb (SAV). The second slide showed that in Italian with either a lexical or an auxiliary verb the adverb always follows the verb, while in English, as the third slide showed, the order is not the same given that adverbs follow auxiliary verbs and precede lexical verbs:

Gianni legge spesso il giornale
Gianni è sempre contento
John often reads the newspaper
John is always happy

The linguistic explanation was called ‘The reason behind the difference in adverb placement between Italian and English’. The first slides were the same as for the non-linguistic account, illustrating the difference between the two languages for the same sentence, and then subjects were introduced to the theory of verb movement. The subjects were told that linguistic research shows that our brain doesn’t process and produce sentences word by word or develops sentences in linear order but it is as if it follows an outline, a hierarchical structure where every element of a sentence, such as the subject or the verb, has its place. Elements such as the subject are high in the hierarchy and thus we hear them at the beginning of the sentence; elements such as verbs are lower and so we hear them later in the sentence.

---

7 The theory was simplified and neither the split inflection nor the inversion of TP and AgrP was explained, as they were not relevant to the discussion.
They were then shown a slide with two structures, an Italian one (with the order SVA) and an English one (with the order SAV). It was pointed out that it is unlikely that an Italian and an English brain are structured in different ways, so the structures have to be the same, and in fact they are, but then something has to happen for the linear orders to be different. They were then shown another difference between the two languages: verb inflection, rich in Italian where for the present tense there are six different forms agreeing with the person (leggo, leggi, legge, leggiamo, leggete, leggono) and poor in English where there are only two (read, reads). At this point subjects were again shown the two structures, both with the order SAV; a second slide overlaid inflection after the subject. They were told that being rich Italian inflection is like a big magnet, able to attract the verb, while English poor inflection is a small magnet that does not have enough strength to attract the verb and that is the reason why the two languages differ in the linear order of adverb and verb.

For the younger group there were two additional slides, that repeated the same concept using a metaphor. Using a cartoon of a bee, they were told that the bee (the verb) collects pollen from the flowers (inflection) and then takes it to its hive. In Italian, there are six flowers and so the bee has enough pollen to take back to hive and thus moves itself to a higher position (being the hive on a tree and the flowers on the ground), while in English there are only two flowers, the pollen is not enough and thus the bee doesn’t take it to the hive and stays at ground level.

At this point they were shown two sentences, one with a lexical verb and the other with an auxiliary verb, which seemed to contradict what had been said so far. It was pointed out though that the verbs in question were not the same kind of verbs one being auxiliary and the other not. They were shown the structures again and told that in the structure auxiliary verbs have their own position which is higher than the one of non auxiliary verbs. Thus in Italian the verb always precedes the adverb, either because it is already high (auxiliary) or because it moves (lexical), while in English the verb only precedes the adverb when it has a high position, that is when it is an auxiliary verb, given that verbs with a low position (lexical verbs) don’t move.

1.2.3 Post-tests
Subjects of both groups were tested immediately after the explanations (First Post-test) and after approximately ten weeks (Second Post-test) during which the subjects were not exposed to any kind of explanation on adverb placement, nor were they given any explicit exercise on the subject. Both for reasons of time and the subjects’ willingness, in the first Post-test each subject was randomly given only one exercise out of the six that made up the test, while in the Second Post-test phase each of them was given the entire test, as in the Pretest phase.

2. Results
2.1 Results of the First Post-test
The descriptive explanation seemed to have had no effect at all in the younger group, where non target answers decreased but were replaced by omissions as the chart shows
Table 2

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Non Target</th>
<th>Omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>28</td>
<td>41</td>
<td>5</td>
</tr>
<tr>
<td>1° Post-test</td>
<td>28</td>
<td>34</td>
<td>12</td>
</tr>
</tbody>
</table>

Subjects of the younger group that were exposed to the ‘linguistic’ explanation showed a great improvement, doubling target answers and decreasing omissions and non target answers.

Table 3

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Non Target</th>
<th>Omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>21</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>1° Post-test</td>
<td>40</td>
<td>24</td>
<td>23</td>
</tr>
</tbody>
</table>

Among the older group, both sets of subjects improved, however the subjects who received the linguistic explanations improved more. Subjects exposed to the descriptive explanation achieved a slightly higher rate of target answers compared to the Pretest results, but still produced a quite high number of non target answers (32%).

Table 4

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Non Target</th>
<th>Omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>50</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td>1° Post-test</td>
<td>59</td>
<td>29</td>
<td>2</td>
</tr>
</tbody>
</table>

On the contrary, subjects who received the linguistic explanation achieved double the number of target answers and produced a much lower percentage of non target answers (13%).

Table 5

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Non Target</th>
<th>Omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>35</td>
<td>34</td>
<td>2</td>
</tr>
<tr>
<td>1° Post-test</td>
<td>61</td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>

Results of the first Post-test support the hypothesis of the experiment, showing that the linguistic explanation, which involves the deep computational mechanisms of language, is more effective that the descriptive one, at an immediate level.
2.2 Results of the Second Post-test

Results of the second Post-test also support the experiment hypothesis. After ten weeks, the younger group of subjects who had received the descriptive explanation had reverted to the level at which they had begun and in some cases to an even poorer level.

Fig. 1

Table 6

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Non Target</th>
<th>Omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>28</td>
<td>41</td>
<td>5</td>
</tr>
<tr>
<td>1st Post-test</td>
<td>28</td>
<td>34</td>
<td>12</td>
</tr>
<tr>
<td>2nd Post-test</td>
<td>25</td>
<td>40</td>
<td>9</td>
</tr>
</tbody>
</table>

By contrast, the younger group of subjects who were exposed to the linguistic explanation, not only improved immediately after it but, more importantly, retained that improvement over time.
Formisano

Fig. 2

![Graph showing Pretest, 1° Post-test, 2° Post-test for Target, Non Target, and Omissions]

Table 7

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Non Target</th>
<th>Omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>21</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>1° Post-test</td>
<td>40</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>2° Post-test</td>
<td>36</td>
<td>27</td>
<td>24</td>
</tr>
</tbody>
</table>

Comparison between the younger groups

Table 8

<table>
<thead>
<tr>
<th></th>
<th>TARGET</th>
<th>NON TARGET</th>
<th>OMISSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>2°Post-Test</td>
<td>Pretest</td>
<td>2°Post-Test</td>
</tr>
<tr>
<td>2°D</td>
<td>34%</td>
<td>33%</td>
<td>57%</td>
</tr>
<tr>
<td>2°F</td>
<td>28%</td>
<td>39%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Results from the older groups showed even more clearly the greater efficiency of the linguistic explanation.

Subjects who received the descriptive explanation showed a slight improvement right after the explanation (First Post-test) but, after ten weeks (Second Post-test) their target answers dropped and non target answers increased. Their general performance though, was still better than their starting point.

This improvement might be due to the fact that the researcher used a different technique from the one found in text books with the descriptive group, explaining that adverb placement varied according to whether they were dealing with lexical verbs or with auxiliary verbs. The older group may have found this insight into the generalisation of adverb behaviours more valuable, hence their improvement.
The most outstanding results are those obtained by the older group that received the linguistic explanation. While they had already improved in the First Post-test, more importantly, they retained their improvement over time, as the graph and the charts show.

### Table 9

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Non Target</th>
<th>Omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>50</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td>1° Post-test</td>
<td>59</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>2° Post-test</td>
<td>51</td>
<td>37</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 10

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Non Target</th>
<th>Omissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>35</td>
<td>34</td>
<td>2</td>
</tr>
<tr>
<td>1° Post-test</td>
<td>61</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>2° Post-test</td>
<td>60</td>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>

Comparison between the older groups

Table 11

<table>
<thead>
<tr>
<th>TARGET</th>
<th>NON TARGET</th>
<th>OMISSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest 2°Post-Test</td>
<td>Pretest 2°Post-Test</td>
<td>Pretest 2°Post-Test</td>
</tr>
<tr>
<td>3°A 54%</td>
<td>60%</td>
<td>39%</td>
</tr>
<tr>
<td>3°B 55%</td>
<td>79%</td>
<td>51%</td>
</tr>
</tbody>
</table>

3. Discussion

Results from both the younger and the older groups support the hypothesis of the experiment.

Within the younger group, the traditional explanation seemed to be effective neither immediately nor in the longer term. The group scored 34% of target answers in the Pretest and after ten weeks the percentage was almost the same at 33%.

The linguistic explanation offered to 2°F had a remarkable effect immediately (subjects doubled their target answers, 21 vs. 40). Although this learning was not completely retained after ten weeks, they performed better than 2°F in the longer term. From an initial 28% of target answers of the Pretest the group achieved 39% in the Second Post-test.

For the older group, subjects who were given the traditional explanation showed a slight improvement both at the immediate level and in the longer term, increasing from 54% of target answers in the Pretest to 60% in the Second Post-test. The most outstanding results were those of the older subjects who were given the linguistic explanation, who not only improved at the immediate level but, more importantly, retained the improvement; from an initial 55% of target answers in the Pretest, the percentage increased after ten weeks to 79% of the Second Post-test.

Despite the fact that both groups who were given the linguistic explanation improved, they still produced some non target answers (44% for the younger group and 19% for the older group).

It is noteworthy though, to discuss the kind of non target answers produced by these subjects given that they seem to suggest that where there is a choice regarding adverb placement in English, native Italian speakers will choose an Italian pattern.

In the younger group, the most common non target sentence produced was Usually she has a big breakfast in the translation task (target sentence: She usually has a big breakfast). This sentence is not strictly wrong but it was considered non target both because it relies on prosody to be correct and also because none of the controls translated the sentence Di solito fa una grande colazione as Usually she has a big
breakfast. This non target sentence was produced by 14 out of 17 subjects, which increased the percentage of non target answers for this group. Furthermore, usually is the highest adverb in the hierarchy proposed by Cinque (1999)\(^8\), something that renders the respective placement of verb and adverb more difficult.

Another non target sentence commonly produced by these subjects (11 out of 17) was *I eat only fresh fruit* in the single word placement in sentences task (target sentence: *I only eat fresh fruit*). This response was considered non target even if not wrong because none of the controls produced it.

Both these non target sentences greatly increased the percentage of non target answers for this group. In both cases, although they were considered non target, sentences produced were not agrammatical. Possibly subjects preferred these structures because of their correspondence to their L1.

Another sentence that elicited a high percentage of non target responses (15 out of 17) was: *Maths tests aren’t always difficult*. However, given the variety of non target word orders produced (*Maths tests always aren’t difficult, Maths always tests aren’t difficult, Always Maths tests aren’t difficult, Maths tests aren’t difficult always*) and the low percentage of non target responses to other sentences with auxiliaries, it is likely that the problem lies with the complexity of the sentence itself rather than the task of placing the adverb into the sentence.

Among the older group, the total of non target responses produced is much lower (19%) than that of the younger group. The highest percentage of non target answers was produced in response to usually (5 out of 12) and only (6 out of 12) just as for the younger group, for which what afore stated holds as well. In the correction task the most commonly (10 out of 12) missed correction was in the sentence *I enjoyed very much the party* which was considered correct (target sentence *I enjoyed the party very much*). The fact that subjects failed to correlate the absence of verb movement with the fact that no linguistic element can go between the verb and its direct object, and so consider correct the aforementioned sentence, supports the hypothesis put forward by White (1990) that in second language acquisition, instruction on a parameter is not enough to generalize the properties correlated with it.

A noteworthy aspect of the results was that neither group overgeneralized the rules they had been given. Even though they had been instructed on the fact that lexical verbs do not move and thus follow the adverb, none of the subjects produced the non target word order *She slowly walks to school* in the translation task, not even in the Pretest. The reason for this probably lies in that *slowly* is a ‘low’ adverb, so no

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\(^8\) In this work Cinque puts forward the idea of a universal hierarchy of adverbs which is part of the functional structure of every language. Adverbs are in the specifier of functional heads and so have a fixed position in the sentence, contrary to what was thought before Cinque when they were considered adjuncts. The hierarchy is as follows:

- Mood\(_{\text{speech act}}\) > Mood\(_{\text{evaluative}}\) > Mood\(_{\text{evidential}}\) > Mod\(_{\text{epistemic}}\) > T(Past) > T(future) >
- Mood\(_{\text{irrealis}}\) > Asp\(_{\text{habitual}}\) > T(Anterior) > Asp\(_{\text{perfect}}\) > Asp\(_{\text{retrospective}}\) > Asp\(_{\text{durative}}\) >
- Asp\(_{\text{progressive}}\) > Asp\(_{\text{progressive}}\) / Mod\(_{\text{root}}\) > Voice > Asp\(_{\text{cereative}}\) > Asp\(_{\text{completive}}\) > Asp\(_{\text{repetitive}}\) >
- Asp\(_{\text{iterative}}\)

matter what kind of explanation subjects were given (linguistic or traditional), it was not able to deactivate the hierarchy in their UG. In addition, during the explanation phase only one adverb (often) was used as an example and subjects were then expected to rely on their UG for all the other adverbs.

4. Conclusion
Although further research is needed, results of this experiment seem to constitute evidence in support of the FT/FA theory. In the Pretest phase all of the subjects (with different percentages) extended verb movement to English, yet their adverbial hierarchy (Cinque, 1999) was perfectly accessible resulting in the absence of non target word orders with the low adverb slowly. Furthermore, the findings also support the hypothesis that a linguistic explanation of the linear differences between English and Italian, which takes into account and renders explicit the deep functioning of languages, is more effective than a traditional descriptive one, demonstrating the crucial role of linguistics in the field of language teaching.

References
Appendix 1

La tua lingua materna:

Se la tua lingua materna non è l’italiano:
- da quanti anni sei in Italia:
- che lingua parli a casa:

La tua età:

Da quanti anni studi inglese?

TEST 1

Dizionarietto:
- raramente: rarely
- si sveglia: wakes up
- fa una grande colazione: has a big breakfast
- passeggia: walks
- incontra: meets
- inizia: starts
- cena: has dinner

TRADUCI

La giornata di Jane
Jane si sveglia sempre alle 6.00 perché le piace l’aria fresca del mattino. Di solito fa una grande colazione. Passeggia lentamente nel parco pubblico di fronte casa sua per mezz’ora e lì incontra spesso il suo amico Henry. Inizia a lavorare alle 9.00 e pranza raramente. Non è mai a casa prima delle 7.00. Cena intorno alle 8.00 e non va mai a letto dopo le 10.00.
Frequently: frequentemente
alone: solo

ORDINA LE PAROLE PER FORMARE DELLE FRASI. RISCRIVI LE FRASI

1. car/ frequently/ travel/ we/ by
2. my/ cooked/ yesterday/ for/ I/ friends
3. play/ I/ and/ tennis/ also/ football/ play/ I
4. fruit/ eat/ only/ fresh/ I
5. never/ shopping/ go/ Saturdays/ I/ on
6. at/ alone/ rarely/ am/ house/ my/ I
7. like/cinema/ going/ I/ the/ to
TEST 3

Cod.

Dizionarietto:
told: ha detto
you claim: sostieni
rarely: raramente
found: abbiamo trovato
carefully: attentamente

CORREGGI GLI ERRORI, SE CE NE SONO

1. Your mother told me that you go often at the seaside.
2. I cleaned the house and cooked also the dinner.
3. You claim to go often to the pool, but I’ve seen you rarely there.
4. I have usually a shower when I get up.
5. We found easily the solution to that problem.
6. Steve get frequently angry with her girlfriend.
7. I do some shopping and I went also at the bank yesterday.
8. She always says she will phone me, but she never does.
9. I enjoyed very much the party yesterday.
10. Robert prepared carefully a nice, big picnic for his friends.
RISCRIVI LE FRASI UTILIZZANDO LE PAROLE TRA PARENTESI

1. I go to bed after midnight. (rarely)
2. Susan does her homework before dinner. (frequently)
3. I have got two brothers. (younger)
4. Maths tests aren’t difficult. (always)
5. I visit my grandparents every month. (French)
6. John is late for school. (never)
7. Yesterday my mother bought a table. (round)
8. Jenny has been abroad. (often)
Teaching adverbs position to Italian students of English as L2

TEST 5

Dizionarietto:

even: nemmeno
bored: annoiato
both: entrambi
hate each other: si odiano

RISPONDI ALLE DOMANDE USANDO LE PAROLE DATE

1. What does Timothy have for breakfast? (an egg + usually)
2. Does Margaret watch a lot of television? (doesn’t have a TV + even)
3. Why did James leave the party? (was bored + probably)
4. Does Sally like your new house? (has been there + never)
5. Why do Robert and George hate each other? (want to marry Alice + both)
**Cod.**

Dizionarietto:
- **occasionally:** raramente
- **seldom:** quasi mai
- **early:** presto
- **late:** ritardo
- **ill:** malato
- **a day off:** un giorno libero

**CREA DELLE FRASI RIGUARDO ANGELA E JOHN USANDO LE PAROLE NELLE RIGHE E GLI AVVERBI IN CIMA**

<table>
<thead>
<tr>
<th></th>
<th>occasionally</th>
<th>often</th>
<th>seldom</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Angela</strong></td>
<td>arrives at work early</td>
<td>isn’t in the office in the afternoon</td>
<td>has taken a day off</td>
</tr>
<tr>
<td><strong>John</strong></td>
<td>is late for work</td>
<td>is ill</td>
<td>eats sandwiches for lunch</td>
</tr>
</tbody>
</table>
WH-movement in the history of Brazilian Portuguese*

MARY A. KATO
University of Campinas /CNPq
mary.kato@gmail.com

1. Introduction
Like Old English (cf. Lightfoot, 1991) and Old French (Adams, 1987, Roberts 1993), Old Portuguese (OP) has been claimed to have been a V2 language (Ribeiro, 1995) and Modern European Portuguese (EP) and Brazilian Portuguese (BP) have been proposed to have residual V-to-Comp in Wh-questions (Lobato, 1988, Ambar, 1992). Example (1a) is the typical residual V2 type. However, Brazilian Portuguese has lost even the residual V2 type\(^1\) but has acquired two other orders, the WhSV order (1b) and the wh-in-situ pattern (1c) (Duarte 1992, Lopes-Rossi 1996).

In the 17\(^{th}\) century there appeared, in EP, the first signs of the reverse cleft question (2a), with \(é que\)\(^2\), with the other types in (2) appearing only in the 20\(^{th}\) century spoken language, and only in BP.

(1) a. O que viu a Ana? What saw the Ana
   b. O que a Ana viu? What the Ana saw
   c. A Ana viu o que? the Ana saw what
      ‘What did Ana see?’

(2) a. O que é que a Ana viu? Reverse cleft
   b. O que que a Ana viu? Reduced cleft
   c. É o que que a Ana viu? Canonic cleft
      is what that the Ana saw
      ‘What is it that Ana saw?’

---

* This work had the support of grant CNPq 301219/2008-7. I thank Marcello Marcelino for his usual help in revising the text.

\(^1\) BP can have WHVS with unaccusatives and with other types of verbs when the subject is in right dislocation.

(i) Onde pro está o menino?
   where pro is the boy

2. The aims, and hypotheses of the paper

2.1. The aims of the paper
The aims of the paper are
a) to provide a brief history of wh-questions from Old and Middle Portuguese 3 to 19th and 20th century EP4 and BP5 6.
b) to provide a comprehensive analysis of the patterns found;
c) to provide a different view on the wh-in-situ pattern in natural languages, with the claim that there is no covert, or (LF) wh-movement in BP wh-in-situ;
d) to interpret the difference between the grammar of BP and the grammars of OP and EP.

2.2. The assumptions and hypotheses of the paper
My analyses will be based on the following assumptions and hypotheses:
a) I assume that every interrogative sentence has a clause-typing Q, which corresponds to the –ka/no in Japanese (cf. Miyagawa 2001), be it a yes/no question or a wh-question.7 I assume that Q is in the head of ForceP (cf. Rizzi’s 1997 cartographic approach);
b) within the cartographic approach I assume both a FocP in the sentential periphery (cf. Rizzi 1997), and a FocP left-adjacent to vP (cf. Belletti 2004, 2005)8, with additional TopP when needed;

\[
\text{a+b: } [\text{Force P } Q ... \text{ FocP}... \text{TP} \ldots \text{FocP}... \text{vP} \text{ [VP ]}]
\]
c) the Focus head is assumed to be syncretic for the purposes of Focus and wh-checking;
d) grammaticalization can involve erasure processes at PF;

3. The evolution of Focus structures and wh-questions in Portuguese

3.1. The oldest forms: the V2 and the reverse pseudo-cleft
Confirming previous studies (Torres Morais 1995: Ribeiro 1995a, 1995b, Kato & Raposo 2009), Old and Classic Portuguese are found to exhibit verb second patterns in both declaratives and wh-questions:

---

3 I will be using Kato and Ribeiro (2009) for V2 constructions in both declarative and wh-questions, covering the periods between the 14th and the 18th century. The examples of Old and Middle Portuguese are marked according to the source: 
4 I will be using Lopes-Rossi (1996) for this period.
5 I will be using Duarte (1992), Lopes-Rossi (1996), and Kato and Duarte (2002) for this period.
6 Other examples have been taken from my own work.
7 I do not assume, like in Cheng and Rooryck (2000), that Q is present only in yes/no questions in the specific cases of French wh-in-situ questions.
8 I also assume the other projections: two TopP and a FiniteP, though I will not be representing these in this paper.
Reverse *pseudo*-clefts were the only constructions found in the oldest period as alternatives for the V2 patterns. The cleft *wh*-questions in this period are of the inverse *pseudo*-cleft type, but the only *wh*-pronoun that appears in this type of question is *o que*. This pseudo-cleft pattern is the first to disappear, not going beyond the 18th century.

3.2. *The first innovation: the reverse that-clefts*

Declarative reverse that-clefts (8) are the next type to appear in the seventeenth century. The interrogative that-clefts start to appear also in the same period.

3.3. *A new innovation: the canonic clefts*

In the eighteenth century EP and 19th century BP we have another innovation: the appearance of canonic *pseudo-clefts* (10) and also canonic *that*-clefts (11):
(10) **Foi VOSSA EMINÊNCIA quem julgou que eu era digna de expor.**
(Alorna, 18th c.)
was Your Eminence who considered that I was worth of expose
‘It was Your eminence who considered that I was worth exposing

(11) **É O REI LEGÍTIMO que devemos opor ao usurpador.**
(Alorna, 18th c.)
is the king legitimate that (we) should oppose to the usurper
‘It is the legitimate king that we have to oppose to the usurper.’

No corresponding wh-questions have been found in the written corpora. We assume, however, that the canonic clefts also existed in the form of wh-questions, as it can be observed today in recordings of children’s production and of their mothers’ (see Lessa de Oliveira (2003), though very little is found in adults’ corpora. It is also relevant to compare what happens in Québec French with structures similar to those in (12), but in adult language (13).

(12) a. **É O QUE que cê quer, filha?** (mother’s input)
is what that you want baby
‘What is it that you want, baby?’
b. **É QUEM que tá tomano banho?** (mother’s input)
is who that is having bath
‘Who is it that is having bath?’
c. **É QUEM que tá tocando o violão?** (Luana, child: 02; 03. 22)
is who that is playing the guitar
‘Who is playing guitar?’
d. **É QUE que tá gravando?** (Luana, child: 02; 03. 22)
is what that is recording
‘What is being recorded?’

(13) **C’est OÙ que t’ás mis les oranges?** (apud Noonan 1989)
it is where that you have put the oranges
‘Where did you put the oranges?’

3.4. The reduced that-cleft
In the 20th century, there appears the pattern that Kato & Ribeiro (2009) call the reduced cleft question, the most vernacular of the BP wh-questions. It appears only in the spoken corpus of NURC (Educated Brazilians), and in TV dialogues. What is interesting is that Québec French can also have this sort of wh-question.

(14) a. **O QUE que você faz?**’ (NURC Spoken corpus)
what that you do
‘What is it that you do?’
b. **DE QUEM que é esse peixe?’** (TV)
of whom that is this fish
‘Whose is this fish?’

(15) Où que t’á mis les oranges?’ (apud Noonan 1989)
where that you have put the oranges
‘Where have you put the oranges?’

Fronted focalized examples can also be heard in colloquial BP in the same pattern.

(16) a. ESSA MENTIRA que ela me contou.
this lie that she me told
‘THIS LIE she told me.
b. O PAI DELE que está na cadeia.
the father of-his that is in-the jail
‘HIS FATHER is in jail.

Wh-questions of this kind are still strongly stigmatized in written language, according to Kato and Mioto (2005).

3.5. The non-V2 Wh SV type
In the second half of the 19th century there appears the non-V2 type of wh-questions, the WhSV pattern. This type appears also in spoken 20th century corpus.

(17) a. ONDE ele foi? (Dias Gomes, 2nd half of the 19th c.)
where he went
‘Where did he go?’
b. QUANTO você ganha? (TV)
how much you earn
‘How much do you earn?’

Declarative SV sentences with the Focus in initial position are also possible today:

(18) a. PRO AEROPORTO ele foi, não pro escritório.
to-the airport he went not to-the office
‘TO THE AIRPORT he went, not to the office’.
b. UMA FORTUNA eu paguei meu carro.
a fortune I paid my car
‘A FORTUNE I paid my car.

3.6 The wh-in-situ
According to Lopes-Rossi (1996), the so called wh-in-situ questions start to appear in the second half of the 20th century, but is barely noticeable in EP written documents (2.9%), against a more expressive presence in BP (8.1).
In spoken language EP exhibits only 8.1%, while BP shows 28.1%.
Lessa (2003) discusses differences in the production of mothers’ *wh*-in-*situ*, depending on whether the family is from São Paulo or from the northeast. In the northeast of Brazil the child starts producing *wh*-in-*situ* earlier than the other patterns, which she believes to be a function of the frequency on *wh*-in-*situ* in the input.

In this study, I will only include considerations about the *wh*-in-*situ* in Brazil and will leave what happens in EP for future work.

3.7. Summary
The following figure summarizes the findings in previous works.

![Fig 1](adapted from Lopes-Rossi 1996)

4. Reviewing some analyses
4.1. Reviewing the V2 analysis
The previous studies (Ribeiro 1995, Torres-Morais 1995 a.o.) have been assuming that the oldest pattern is technically a V2 structure, with the V+I moving to Focus, or to C in the non-cartographic frame.

The fact that OP was also a Null Subject (NS) language makes us rethink this analysis. It contains many V1 structures with either a NS or a postposed subject, and in embedded contexts it has an ordinary non-V2 syntax. We will propose, after Kato (1993) and Kato and Raposo (1996) that OP was like EP, where a null head F had strong *wh* and focus features, but had weak Tense features. The V+I stays in T and the subject stays in the postposed subject position, where it gets nominative by AGREE. An adverb or adjunct can, moreover, occupy the second position, instead of the verb, such that the order can be Wh X VS, as in (20):

(19) \[FocP  Wh/Focus [Ø [TP  (X) V+T [\_p  Subject ……]]]]

(20) – Como *em tanto tempo* fezesti tu tã pouco como esto? [Flos 14th]
how in such long time did you so little like this
‘How come you did so little in such a long time, like this?

---

9 In Kato (1993) I used the notion of Nominative by government in Koopman and Sportiche (1990), before the introduction of the notion AGREE in (Chomsky 2001). Recent studies with apparent V2 structures have been analyzed in Romance along similar lines (see a.o. Ordoñez for Spanish, and Barbosa (2001) for EP.)
4.2. Maintaining the analysis of the reverse cleft and the canonic cleft

The analysis of reverse clefts is maintained from Kato and Ribeiro’s (2009):

(i) its input sentence is similar to the *presentative* sentence (21a), with some constituent marked +wh;
(ii) the result merges with a complementizer,
(iii) subsequently the copula merges;
(iv) the copula makes the derivation project the matrix sentence and its periphery with a null Focus head;
(v) the *wh*-element is then moved to check the Focus features in the matrix Focus.

(21) a. É que [o Pedro ama a Maria] Presentative cleft
     is that the Peter loves the Maria’
     ‘It happens that Peter loves Mary.
   b. Quem é que o Pedro ama? Reverse cleft
      who is that the Peter loves
      ‘Who is it that Peter loves?’

(22) a. [TP O Pedro ama quem +F ]
    b. [CP que [TP O Pedro ama quem +F ]]
    c. é [CP que [TP O Pedro ama quem +F ]]
    d. [FocPØ [TP é [CP que [TP O Pedro ama quem +F ]]]]
    e. [FocP quem Ø [TP é [CP que [TP O Pedro ama quem +F ]]]]

The derivation of canonic *that*-cleft is also maintained from Kato and Ribeiro (2009), and goes as follows:

(i) it is derived from the same input, to which a complementizer is merged;
(ii) a copula merges subsequently;
(iii) a FocP merges to the vP periphery of the copula;
(iv) the element with *wh*-features moves to this low FocP,
(v) the copula moves over it to T.

(23) a. É quem que o Pedro ama.
     is who that the Peter loves
     ‘Who is it that Peter loves?’

(24) a. [TP O Pedro ama quem +wh ]
    b. [CP que [o Pedro ama quem+wh ]]
    c. [vp é [CP que [o Pedro ama quem+wh ]]]
    d. [FpcP quem Ø [vp é [CP que [o Pedro ama quem+wh ]]]]
    e. [TP é [FpcP quem Ø [vp é [CP que [o Pedro ama quem+wh ]]]]]

4.3. The spoken variant *Wh que* in BP

The analysis of the pattern in (25) is maintained from Lopes-Rossi (1996), who follows suggestion by Noonan (1989) for Québec French. The source of this

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10 First used in Casteleiros (1979).
pattern is, thus, assumed to be the canonic cleft (25a), which undergoes copula erasure at PF just as it is suggested for Québec French:

(25)  
\[\text{a. } \text{É quem que tá tocando violao?} \]
\[\text{b. PF: } \text{É quem que tá tocando violao?}\]

(26)  
\[\text{a. (C’ést) ou que t’ás mis les oranges?} \]
\[\text{b. OU que t’ás mis les oranges?}\]

(apud Noonan 1987)

Kato and Ribeiro (2009), who adopts the phonological solution, explains, however, that this phonological erasure is triggered by a grammaticalization process in the copula. The copula becomes invariable in BP, losing the *consecutio temporum* with the embedded verb, a phenomenon that did not happen with EP.

(27)  
\[\text{a. É quem que chegou?} \quad \text{BP *EP} \]
\[\text{is who that arrived} \]
\[\text{b. Foi quem que chegou?} \quad \text{EP} \]
\[\text{was who that arrived} \]
\[\text{‘Who arrived?’} \]

4.4. The late variant WHSV in BP

With the disappearance of the WhVS structure, what takes over are the cleft constructions, with the apparent counterpart WHSV appearing only at the end of the 19th century.

(28)  
\[\text{Onde ela pôs o violão?} \quad \text{‘Where did she put the guitar?’} \]

However, the first analysis for this structure was proposed in Kato and Duarte (2002), who attributed it to the loss of referential NSs and the loss of free inversion in BP\(^{11}\). The delay of such structure from appearing would be explained, as the loss of the referential NS started only in the 19th century. With the loss of pronominal agreement, BP acquired weak pronouns which would have to be moved to Spec of T to obey the EPP (cf. Kato 1999), launching also the loss of free inversion.

(29)  
\[\text{[FocP Wh/Focus [Ø [TP Subject V+T [vP Subject [ V O .]]]]]} \]

But, the analysis which we are endorsing, would have the reduced cleft as its source, through the stylistic *erasure of the complementizer*, a solution also suggested by Noonan (1989) for Québec French. The delay of its appearance is also

\(^{11}\) This thesis is reinforced by Ordoñez and Olarrea’s (2006) study of Cariban Spanish, which underwent a similar change.
understandable as the reduced cleft appeared only in spoken language, and the WHSV would be a stylistic variant more acceptable in written form.

(30) a. **OÙ** (que) t’ás mis les oranges?
where that you have put the oranges
b. **OÙ** t’ás mis les oranges?’
‘Where have you put the oranges?’

(apud Noonan 1989)

(31) a. **(É)** *que* tá tocando violao?
Is who that is playing guitar
b. **Quem que** tá tocando violão?

What is revealing in the empirical work with data is not so much the presence of something in the corpora, but its absence, or small frequency. When the reduced clefts start to appear, the WhSV pattern also starts to appear, but while in spoken language the reduced type have around 20% of the wh-questions, and the WHSV cases have around 15.0 %, in the written corpora the reduced type barely appears (7.9%) contrary to the WHSV, which has around 12.3 % in one corpus (cf. Lopes-Rossi 1996) and 45% in newspaper corpus (cf. Kato & Mioto 2005). The canonic type, on the other hand, seems to be the most stigmatized, appearing only in “motherese” and in child language. Adults tend to erase the copula. Our assumption is, therefore, that the three types are structurally the same, and variation depends on stylistic factors.

### 4.5. Summary of section 4.

Ignoring the second column, with the pseudo-cleft12, and adding the canonic cleft in the fourth column, with the copula and the complementizer erasure at PF, we have:

Fig 2

<table>
<thead>
<tr>
<th>WhVS</th>
<th>Wh é que VS/SV</th>
<th>wh-in-situ</th>
</tr>
</thead>
<tbody>
<tr>
<td>-----</td>
<td>Wh é que SV</td>
<td>wh-in-situ</td>
</tr>
</tbody>
</table>

### 5. The so-called wh-in-situ in Brazilian Portuguese13

#### 5.1. Two types of wh-in-situ in BP

Besides the types of wh-questions studied in the previous sections, BP has a

---

12 Recall that in Fig. 1, this pattern did not last until Modern EP and BP.
13 This section is based on Kato (2004, 2011).
The *wh-in-situ* pattern, but with two different intonations: a) a falling intonation (↓), interpreted as an ordinary question, and b) a rising intonation (↑), which is interpreted as an echo-question.

(32) a. Ele foi onde? ↓ (falling intonation) (ordinary question)  
    he went where  
    ‘Where did he go?’

b. Ele foi onde? ↑ (rising intonation) (echo-question)  
    ‘He went where?’

French has a similar phenomenon of “optional” wh-movement, and two recent solutions have been provided.

According to Cheng, L.L.S. & J.Roorick (2000), *yes/no* questions and *wh*-in-*situ* questions share the same rising intonation in French due to the same Q-morpheme. The presence of this Q morpheme bans the movement of the *wh*-word. Q can appear optionally in the numeration. If it is not in the numeration, wh-movement occurs.

The same analysis cannot be applied in BP as the rising intonation that we have in *yes/no* questions does not occur in ordinary *wh*-in-*situ* questions, where we have the falling type. Moreover, the intonation in (32a) is that of a declarative clause, and the one in (32b) is that of a *yes/no* question.  

In Bošković’s (1998) analysis, French allows LF insertion of C₀ with a strong [wh-feature]. The consequences are that: a) in overt syntax of the in-situ construction, the *wh*-word does not move because there is no feature to attract the *wh*-word; b) no *wh*-in-*situ* is allowed in embedded sentences because LF insertion of *wh*-feature can only occur at the root level; and c) at LF, after the insertion of the *wh*-feature, the *wh*-feature of the *wh*-word moves to check the C₀, the reason why *wh*-in-*situ* is not allowed in islands.

(33) a. *Marie pense que Jean a acheté quoi? ↑  
    Mary thinks that John has bought what

b. *Je me demande si Jean a acheté quoi? ↑  
    I myself ask if John has bought what

c. *Marie aime le livre que qui a écrit? ↑

14 French does not seem to make any difference between echo questions and ordinary *in-situ* questions, as according to Cheng and Rooryck (2000) ordinary *in-situ* questions have the same intonation as yes/no questions.

15 Further differences between French and BP are certain intervention effects, which do not affect BP:

(i) a. *Jean ne mange pas quoi?  
    *John doesn’t eat what?

b. O João não come o que?  
    ‘Nothing.’

(ii) a. A: Marie a acheté quoi?  
    B: # Rien.  
    ‘Mary has bought what?’

b. A: A Maria comprou o que?  
    B: Nada.  
    ‘Nothing.’
Mary loves the book that who has written

However, Bošković’s analysis does not account for the facts of BP, as all such structures are possible with its *wh-in-situ* ordinary questions, though (34b and c) are impossible with echo-questions\(^{16}\).

(34) a. Maria pensa que o João comprou o quê?
   Mary thinks that the John bought what
b. Eu me perguntei se o João comprou o que?
   I myself asked whether the John bought what
c. Maria ama o livro que quem escreveu?
   Mary loves the book that who wrote

5.2. BP echo questions
A solution for BP echo questions comes from what happens in Japanese.

In Japanese the echo-question has always an overt complementizer -tte, as in (35a), which also occurs with complements that are indirect declarative sentences as in (35b):

(35) a. John- wa dare-o mitta-tte?
   J-topic wh-acc saw tte
   ‘John saw who?’
b. [(Kimi- wa) [ John-ga dare-o mitta tte ] itta ka/no]?
   you-topic John-nom who-acc saw tte said ka/no
   ‘You said that John saw who?’

In BP, there is no specific complementizer for either the echo-question or the indirect speech complement, but the intonation is the same:

(36) a. O João viu quem?
   the John saw who
b. [Você disse [ que João viu quem] ?
   You said that João saw who?

I analyze the form in (36a) as an elliptical form of (36b), where we have an explicit indirect speech form. Japanese has the complementizer explicit in the echo-question, while BP and English retain only the prosody assigned by the *Q* complementizer of the performative main clause.

Moreover, I also support Kayne’s view that in both yes/no questions and echo-questions, the IP with the in-situ *wh*- moves to spec of *Q* to produce the rising intonation.

\(^{16}\) Moreover, in most dialects, *wh*-in-situ in BP does not necessarily require a “common ground”, as described in Pires and Taylor (2007).
Possibly, the movement of the remnant IP in (37b) is restricted by weight, which explains why echo-questions are, in general, short.

5.3 BP ordinary “wh-in-situ” questions

5.3.1. Short movement and not LF movement

Natural languages can exhibit the wh question word in two positions for ordinary questions: dislocated to the front of the sentence, as in English, or in-situ, as in Japanese, the well-known wh-parameter (Huang 1982). In Huang’s terms English undergoes movement overtly, while in Chinese and Japanese the movement is covert.18

A completely different view is explored in Miyagawa’s (2001), who claims that, in English the wh-phrase is associated with both \(Q\)-features and \(wh\)-features. As a consequence the wh-phrase has to move to Spec of CP to satisfy the EPP feature on C. In Japanese the two features are distributed between two morphologically independent items: -\(ka\) in C and the \(wh\)-word in T.

The difference in the \(wh\)-parameter between Huang and Miyagawa would be movement in LF for the former and short overt movement for the latter.

I will assume Miyagawa’s proposal of a short movement in “wh-in-situ” constructions, but instead of movement to T, I will propose that the \(wh\)-element will move to a designated FocP position, in Belletti’s (1998) model, at the edge of vP, where other discursive projections, like TopP, can appear.

\[
(38) \text{[ForceP } Q .. \text{[TP……[TopP …[FocP …[TopP …[vP …[VP ]]]]]]} \tag{apud Belletti 1998}
\]

\[
(39) \text{a. Você viu quem? ↓}
\]

\[
\quad \text{you saw who}
\]

\[
\text{b. }[Q \text{[TP você viu } [FP quem[vp tvocê tviu tvp tviu t quem ]]]]
\]

17 Two previous alternative analyses for wh-in-situ in Portuguese are worthy of mention. One is proposed by Lopes Rossi (1996) for BP, who follows Kim’s (1991) analysis for Korean /Japanese that the \(wh\) has the nature of a quantifier. The other is Ambar’s (2003), for whom in-situ questions are actually derived from the dislocated one by remnant movement of the IP to AssertiveP (AssP), after the \(wh\) has moved to Spec of WhP. Despite their interest, neither analysis distinguishes two types of “wh-in-situ” constructions as in my study.

18 But see problems regarding covert operations since Chomsky (2000).
The motivation of this lower Focus position is in the Italian postposed subjects, which are focalized.

(40) a. Ha parlato Gianni.
   has spoken John
   ‘JOHN has spoken.’
   b. [CP .... [ TP pro ha parlato [FocP Gianni [vP tGianni [VP ]]]]]

Indirect objects can also be focalized, and moved to this position, with the direct object moved to TopP, the place of the presupposition.

(41) a. Você deu pra quem esse CD?
   You gave to whom this CD
   ‘To whom did you give this CD?’
   b. [CP Q[TP Você deu [FP PRA QUEM [TopP este CD [vP você deu [vP este CD [pra quem ]]]]]]

The element in FocP requires nuclear stress (cf. Zubizarreta 1997), and a falling prosody, eliminating the effect of the Q-morpheme in the sentence intonation.

5.3.2. Arguments for the mid-sentence FocP for the landing site of wh-phrases
I. There are no problems in BP wh-in-situ ordinary questions, regarding the occurrence of the wh-element in embedded or in island contexts as shown in section 5.1. The short nature of the movement explains the lack of such restrictions.

II. The intonation of wh-in-situ ordinary questions is similar to the falling intonation of a simple declarative sentences with postposed focalized subjects 19:

(42) a. Você viu quem?
   you saw who
   ↓
   Chegou a Maria.
   arrived the Maria

III. In European Portuguese, the possibility of wh-in-situ is subject to Focus-sets according to word order (cf. Cheng and Rooryck 2002, apud Costa 1997).

<table>
<thead>
<tr>
<th>Word order</th>
<th>Focus set</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVO</td>
<td>O, VO, or SVO</td>
</tr>
<tr>
<td>VSO</td>
<td>S, or O</td>
</tr>
<tr>
<td>VOS</td>
<td>S</td>
</tr>
</tbody>
</table>

(43) a.*O João pensa que [ quem viu a Maria?]
   the John thinks that who saw the Maria
   (SVO)
   b. O João pensa que [viu a Maria quem?]
   the John thinks that saw the Maria who
   (VOS)

19 I thank Raquel Santos who drew the intonation contour of these sentences.
c. João pensa que viu quem a Maria? (VSO)

IV. BP, contrary to EP, does not license postverbal subjects with transitive verbs. It also cannot have a *wh-in-situ* question with a postposed wh-subject with such verbs.

(44) a. Telefonou [a Maria].
   EP  BP
   telephoned the M.
   ‘MARY called.’

   b. Telefonou quem?
   EP  BP
   telephoned who
   ‘Who called?’

(45) a. Compraram os CDS [os meninos].
   EP  *BP.
   bought the CDs the boys
   ‘The boys bought the CDs.’

   b. Comprou os CDS quem?
   EP  *BP
   bought the CDs who
   ‘Who bought the CDs?’

Following this reasoning, we can say that *wh-in-situ* questions in French cannot derive from the landing of the *wh*-element on the low FP position, since it has no inverted subjects and neither a falling intonation in *wh*-questions. As it has the same intonation as echo questions, we can support Kayne’s (1994) idea that *in-situ* questions in French are like *Yes/no* questions, with movement of the whole sentence to Spec of C.

V. *Wh*-elements do not have to appear in sentence-final position, because, in Belletti’s system, the clause internal A’-area has, like in Rizzi’s (1997) periphery, TopP projections below and above FP.

(46) a. João tinha restituído que livro para a Maria?
   John had returned which book to Mary
   ‘Which book had John returned to Mary?’

   b. João tinha restituído para a Maria que livro?
   John had returned to Mary which book
   ‘Which book had John returned to Mary?’

(47) a. João tinha restituído [FP que livro TopP para a Maria] [VP que livro para a Maria]

   b. João tinha restituído [TopP para a Maria [FP que livro [VP que livro para a Maria]]]
Conclusions
We started our study assuming that not only OP and EP had wh-movement, but that Modern BP had a sort of optional wh-movement. But no explanation was provided for the increase of the so-called wh-in-situ questions.

Our analysis changed our assumptions in radical ways.

First, the so-called fronted wh-questions were considered syntactically canonic cleft questions, with the copula in V1. The wh-element had structurally moved to the low FocusP position, and was sitting to the right of the copula before its erasure.

Second, the so-called wh-in-situ questions were proposed to have the wh-element undergoing a short movement to the same FocP position, at the edge of vP.

This means that, after the 19th century, short wh-movement marks the typical BP wh-questions, with a conservative long one still shared with EP. Though licensed in EP, wh-in-situ is still stigmatized in EP, especially in written language, while the only cleft that is possible is the type without PF erasure.

Fig 3

<table>
<thead>
<tr>
<th>WhVS</th>
<th>Wh é que VS/SV</th>
<th>wh-in-situ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long</td>
<td>Long wh-movement</td>
<td>Short Wh-movement</td>
</tr>
<tr>
<td>wh-movement</td>
<td>(É) Wh (que) SV</td>
<td></td>
</tr>
</tbody>
</table>

References
Casteleiros, J.M. (1979) Sintaxe e semântica das construções enfáticas com È QUE. Boletim de
Kato


On Intervention effects in weak islands.  
A self-paced reading experiment

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Filler-gap dependencies are created when a constituent is dislocated from its base position. A prototypical example is given by A’-movement in wh- questions. In this case, a clause-initial wh- element has to be linked to its corresponding gap in a lower, c-commanded position. Different factors might influence the human parser in resolving filler-gap dependencies, as i. the properties of the filler and ii. the presence of an interivener. In this paper, I present the result of a new self-paced reading experiment in which a particular kind of intervention effect, i.e. the one created by the sentential negative maker, will be observed in relation to different types of wh-constituents, distinguished in accordance to the oppositions +/- argument and +/- referential.

1. Introduction
A’-movement typically creates a filler-gap dependency, in which the filler is the dislocated constituent and the corresponding gap is the position where the same constituent would appear in absence of movement. Echo questions can be used to help us to detect the position of the gap (1), whereas a constituent has been dislocated (2):

(1) What did you say <t> to John ?
(2) You said what to John ?

For what concerns the possible span of a filler-gap relation, A’-movement is potentially unbounded in length and it may extends over several clause boundaries, as (3) below shows:

(3) What did Harry say that Tom thought that Mary was hiding <t> ?

However, this movement is not unconstrained and long distance dependencies become impossible across a range of interveners. One example is given by adjunct clauses:

(4) a. You skip the class because you needed to do what?
b. *What did you skip the class because you needed to do <t> ?
While (4)a is grammatical when the interrogative pronoun is left in its base position, the attempt to move it outside the adjunct clause (4)b generates ungrammaticality. Violations as the one in (4) are usually labeled as strong islands, for the reason that they are insensitive to the properties of the filler, i.e. the kind of extracted wh-element:

(5)  
\[
\begin{align*}
\text{a. }^*\text{Where} & \text{ did you skip the class because you needed to go }<t>\text{?} \\
\text{b. }^*\text{How much} & \text{ did you skip the class because you needed to earn }<t>\text{?}
\end{align*}
\]

Strong islands constraints have been extensively studied both from the theoretical and the psycholinguistic point of view, for the reason that they could provide important information about the functioning of the human parser. In the last twenty-five years, various real-time measures as self-pace reading (Stowe 1986, Pickering et al. 1994, Phillips 2006) and event-related potentials (Kluender & Kutas 1993, McKinnon & Osterhout 1996, Neville et al. 1991) have been employed, all of them focusing on filler-gap effects in strong islands.

There are, however, other kinds of island-effects that have been kept distinct from the previous ones since they are modulated in accordance to the referential properties of the filler. For this reason, they are usually referred to as weak islands. I illustrate this point by considering a particular type of weak islands, the ones in which the presence of a negative operator generates an effect of ungrammaticality (Ross 1967/83; Obenauer 1984). On a par with strong islands, the extraction of a wh-constituents from (6) and (7) is grammatically marked:

(6) *How did you not behave?
(7) *How much beer did you not drink <t>?
(8) Which beer did you not drink <t>?

What is interesting about weak islands is the fact that this kind of violation is not rigid but it varies as a function of the extracted wh-constituent. Speakers usually find (8) more acceptable than (7). This asymmetry has been accounted for either in syntactic (Rizzi 1990) or semantic terms (Szabolczi & Zwarts 1993, Fox and Hackl 2007, Abrusan & Spector 2011) capitalizing on the interaction between the negative operator and the reference of the extracted constituent.

However, in spite of the great attention that weak islands received in the theoretical literature and the existence of many psycholinguistic studies on strong islands, weak islands still relatively unexplored from a psycholinguistic point of view. In particular, the effects of the intervener on parsing have not been substantiated by real time studies. In this paper, I’ll present the results of a new self-pace reading experiment. My goal, here, is to establish when (and if) intervention effects are detectable during the processing of filler-gap dependencies.

2. A syntactic account of negative islands
As I already pointed out, the core facts related to the difference in acceptability between (7) and (8) have been captured in various ways, invoking either a syntactic or a semantic-based explanation. Disentangling and testing the predictions of the
two families of accounts is beyond the purposes of this work and I’ll frame negative islands phenomena in their early syntactic formulation (Rizzi 1990). Consider again (6), (7) and (8) repeated below:

(9)  *Which beer did you not drink <t>?
(10) *How did you not behave <t>?
(11) *How much beer did you not drink <t>?

According to Rizzi’s analysis, the crucial difference between (9) on one side and (10)-(11) on the other, relies on the availability of binding: while in (9) the wh-element and its trace can be co-indexed, the same mechanism is excluded in (10) and (11). This follows by assuming the existence of two conditions active on indexing:

(12)  **Condition 1 on indexing**: a referential index must be licensed by a referential theta role.

(13)  **Condition 2 on indexing**: the assignment of referential indices is limited to (wh-) phrases which “refer to specific members of a pre-established set”

Sentence (9) satisfies condition 1, given that the trace might have an index since it is the internal argument of the verb. Moreover, it is quite easy to imagine (and accommodate) a situation in which a certain set of beer brands is given (condition 2). Sentence (10), instead, violates condition 1, given that the trace is not theta-governed. This condition is instead satisfied in (11). However, in (11), the wh-can hardly\(^1\) pass the requirement imposed by condition 2, for the reason that a pre-established set is not easily available for interrogative pronouns denoting quantities. The only other available mechanism able to license the traces in (10) and (11) is antecedent-government, where the restriction in X α-governs Y only if there is no Z such that: applies:

(14)  X α-governs Y only if there is no Z such that:
(i) Z is a typical potential antecedent governor for Y
(ii) Z c-commands Y but does not c-command X

However, negation (Z) constitutes a potential antecedent, blocking the link between the wh-elements and their traces. For this reason, antecedent government is also excluded and sentence (11) is ungrammatical.

A question which we may want to ask, at this point, is whether this mechanism of intervention has any psychological reality. In particular, an effect should be visible on the position where the filler-gap link is hindered. In our terms, on the position of the intervener Z - the negative operator. In addition, an effect could be also visible at the gap site, where the filler stored in memory has to be integrated in the structure. These issues will be addressed in a new experiment

\(^1\) Accordingly, the sentence is acceptable if discrete quantities are salient in the discourse.
based on reading times, which will be presented in section 4. In the next section, I’ll review some of the relevant data on island effects, as reported in previous studies based on the self-paced reading paradigm.

3. Reading times: trace integration and island effects

Before turning to islands, a preliminary question concerns the functioning of the parser when a filler is encountered. Broadly speaking, a *filler-gap* dependency is created every time a dislocated *wh*-element has to be integrated in the syntagmatic structure. This means that the *wh*-element needs to be stored in memory, at least until the corresponding gap position is met. Thus, the parsing algorithm should first, keep track of the *wh*-element and second, be able to generate gaps in the appropriate structural positions.

This relation can be thought as imposing processing costs on the computation, since the filler has to remain active until a suitable gap is generated. However, different strategies could be employed in order to minimize these costs. One of them is the early integration of the filler. According to this idea, the parser will try to integrate the filler as soon as possible. Evidence in support of a parsing strategy of this sort comes from several reading times studies (Crain & Fodor 1985, Stowe 1986). In particular, reaction times seem to increase whenever an overt constituent is encountered in a position where a trace could instead be generated. This phenomenon has been interpreted by assuming that the parser always tries to generate traces, in order to minimize the processing costs. However, if an overt constituent is encountered, instead of a trace, the parser has to revise its strategy and reanalyze the structure. This would result in an increase in reaction times.

Now let’s move one step further and consider the syntactic factors that influence the parser’s decisions. More specifically, we want to know whether the syntactic (or semantic) constraints which generate islandhood could affect the parsing strategy. If the parser is sensitive to island constraints, it should not hypothesize traces within islands and, by reflex, no increase in reading times should be observed. This seems to be the case, as documented in Stowe (1986), Pickering et al. (1994) and in Phillips (2007). To illustrate, consider the two sentences (15) and (16), both presenting a subject island:

(15) The teacher asked what \text{SUBJ}[\text{the silly story about (*<t>) Greg’s older brother}] was supposed to mean <t> \[\text{Stowe 1986}\]

(16) The school superintendent learned which schools \text{SUBJ}[\text{the proposal that expanded (*<t>) drastically and innovatively upon the current curriculum}] would overburden <t> during the following semester \[\text{Phillips 2006}\]

In both sentences, the first potentially available gap site is within an island. If the parser initially is insensitive to this kind of grammatical constraints, it is expected to generate traces within the subject island. As a result, a slow-down in reaction times should be observable. However, the aforementioned studies showed that there is no
evidence of a slow down, suggesting that the parser does not hypothesize gap positions within islands. This supports the idea that the islands constraints are directly encoded within the parser’s syntagmatic rules.

Let us now look at negative islands. Is this kind of violation also encoded in the parsing algorithm? Following the previous logic, if the syntactic constraints underlying negative islands are built-in, we expect that the parser will not hypothesize traces within islands of this sort. However, it is also possible that negative islands are quite different from strong islands and that the structure is filtered out at later stages of processing. In the experiment presented in the next section, we address this issue by timing the subjects’ reactions at possible gap sites within negative islands.

One last point worth to be mentioned is the fact that, for what concerns the intermediate positions between the filler and the gap, namely potential sites for intervention, an increase in reading times has never been attested, neither in strong islands nor in weak islands. For this reason, it is worthwhile to look also at intermediate positions: if an account along the lines sketched in the previous section (RM, Rizzi 1990) is on the right track, the interaction between a non-indexed \textit{wh}-element and sentential negation should result in a measurable increase in reaction times.

4. \textit{Wh-} types and intervention: a self pace reading experiment

On-line experimental procedures, as reading times, can be employed in the study of the intervention effects previously discussed. In particular, we are interested in measuring these effects in relation to at least three different types of \textit{wh}- elements:

\begin{enumerate}
\item a. \textit{why} [- argument, - index]
\item b. \textit{how much} N [+ argument, - index]
\item c. \textit{which} N [+ argument, + index]
\end{enumerate}

On the basis of the discussion in section 2, the three interrogative pronouns in (17) are expected to show a different behavior in positive and negative sentences. Let us consider first \textit{why} in (17)a. This element is plausibly base-generated in the left-periphery of the clause (Rizzi 2001) and, for this reason, the filler-gap dependency is at best very short-lived. This means that no gap is expected after the lexical verb:

(18) \textit{why} <t> John is(n’t) drinking at the party?

In (19), instead, \textit{how much} and \textit{which} serve as the direct objects of the verb. This means that they can create a proper filler-gap dependency between the clause initial position and the internal argument position:

(19) \textit{how much}/\textit{which} juice John is(n’t) drinking <t> at the party?

\footnote{I’ll refer to these elements as non-indexed. This label is purely descriptive and it only expresses the fact that, in absence of a discursive context, it is more demanding for the reader to accommodate a plausible referent-set.}
In positive sentence, no difference is expected between *how much* and *which*, since no intervener is present. However, in negative sentences, a weak island is created by negation. In this case, the different referential properties of the two *wh-* elements in (17)a-b might play a role and a grater slow down at the intervener site is expected in the case of *how much*. Moreover, if the intervener blocks the filler-gap chain, traces should not be generated in the direct object position. The prediction, in this case, is that no difference in reaction times should be observed between *how much* and *why* on the lexical verb.

In order to verify these predictions, the interaction between the sentence polarity (positive, negative) and the different kinds of *wh-* elements in (17) will be investigated with a self paced reading procedure based on the *stationary-window* paradigm (Just et. al 1982).

*Materials and procedure.*

Participants sat in front of a computer screen and were asked to read a series of sentences. Words unfolded stepwise at the center of the monitor and, at the end of each sentence, participants were asked to rate it on a scale from 1 to 7, according to the perceived naturalness of the sentence.

Since we were interested in observing the effect of negation in relation to the extracted *wh-* element, the stimuli were grouped into six conditions, in a 2 (Polarity) X 3 (Wh_Type) factorial design (table 1). Subjects heard 20 sentences per condition, for a total of 120 sentences.

The *wh-* elements appeared at the beginning of an embedded clause, in order to avoid the sentence-initial position. Embedded clauses were half of the times positive and half of the times negative. Four different verbs were chosen (*wonder, find out, want to know* and *discovered*) for the matrix clause and 20 different lexical verbs appeared in the embedded. All of them were optional transitive verbs. This made both *wh-* adjuncts (*why*) and arguments (*which/how much*) natural in the context.

Sixty fillers (tab 2) were interspersed within the test sentences and, in total, subject read and rated 180 sentences (120 test + 60 fillers), divided in three blocks of 60 sentences each. Within each block, the presentation was randomized.

**Table 1. Conditions used in the self-paced reading experiment.**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Wh-Type</th>
<th>Polarity</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>why</td>
<td>pos.</td>
<td>… why John is drinking at the party</td>
</tr>
<tr>
<td>(2)</td>
<td>which</td>
<td>pos.</td>
<td>… which beer John is drinking &lt;t&gt; at the party</td>
</tr>
<tr>
<td>(3)</td>
<td>how much</td>
<td>pos.</td>
<td>… how much beer John is drinking &lt;t&gt; at the party</td>
</tr>
<tr>
<td>(4)</td>
<td>why</td>
<td>neg.</td>
<td>… why John isn’t drinking at the party</td>
</tr>
<tr>
<td>(5)</td>
<td>which</td>
<td>neg.</td>
<td>… which beer John isn’t drinking &lt;t&gt; at the party</td>
</tr>
<tr>
<td>(6)</td>
<td>how much</td>
<td>neg.</td>
<td>… how much beer John isn’t drinking &lt;t&gt; at the party</td>
</tr>
</tbody>
</table>

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Table 2. Fillers.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Adams knows that the lawyer is helping the defendant</td>
</tr>
<tr>
<td>(b)</td>
<td>Frank thinks that the politician isn’t keeping the promise</td>
</tr>
<tr>
<td>(c)</td>
<td>Ted is away while the manager is firing the employee</td>
</tr>
</tbody>
</table>

Figure 1 represents the timeline of the stimuli. Three different constituents could appear in the *wh*-position (*why, which N, how much N*) and two different auxiliary forms alternate in the aux position (*is, isn’t*).

**Fig. 1. Self paced reading: sequence of presentation.**

*Subjects.*
21 adult subjects, native Australian English speakers, took part to the experiment. They were all undergraduate students at Macquarie University.
Results.
Let us consider first the off-line judgments given at the end of each sentence. Results are visually reported in figure 2, where ratings are averaged across all the subjects. As expected, the lowest ratings are obtained with non-indexed wh-elements (*how much*) in negative sentences. Also in the negative *which* condition, subjects found the sentences marginally acceptable. In all the other conditions, acceptability judgments raised at almost the same level, including *why* in negative sentences.

![Fig. 2. Average ratings in the six experimental conditions.](image)

Data were analyzed with a 2(polarity) x 3(wh_type) repeated measure ANOVA. The analysis revealed a significant main effect of Polarity (F(20)=66.158, p<.001) and Wh_Type (F(40)=27.050, p<.001). The interaction between Polarity and Wh_Type was also significant (F(40)=44.614, p<.001). Post-hoc (Bonferroni) comparisons revealed that the difference between *which* and *how*, in negative sentences, was also significant (p<.01). These results are consistent with the judgments predicted by the analysis presented in section 2.

We turn now to the on-line data. Reading times were normalized by filtering out the outliers. Individual value greater than the mean + 2 standard deviations were substituted by the value mean + 2sd. The average reading times, for each segment in each condition, are reported in Table 3.
Tab. 3. Reaction times per conditions

<table>
<thead>
<tr>
<th>Position</th>
<th>N-how Mean</th>
<th>S.E.</th>
<th>N-which Mean</th>
<th>S.E.</th>
<th>N-why Mean</th>
<th>S.E.</th>
<th>P-how Mean</th>
<th>S.E.</th>
<th>P-which Mean</th>
<th>S.E.</th>
<th>P-why Mean</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT1</td>
<td>.5181</td>
<td>.0164</td>
<td>.5423</td>
<td>.0191</td>
<td>.5214</td>
<td>.0184</td>
<td>.5341</td>
<td>.0182</td>
<td>.5225</td>
<td>.0175</td>
<td>.5574</td>
<td>.0195</td>
</tr>
<tr>
<td>RT2</td>
<td>.5409</td>
<td>.0116</td>
<td>.5383</td>
<td>.0110</td>
<td>.5374</td>
<td>.0116</td>
<td>.5559</td>
<td>.0132</td>
<td>.5194</td>
<td>.0117</td>
<td>.5327</td>
<td>.0127</td>
</tr>
<tr>
<td>RT3</td>
<td>.6586</td>
<td>.0172</td>
<td>.5652</td>
<td>.0138</td>
<td>.4847</td>
<td>.0091</td>
<td>.6320</td>
<td>.0146</td>
<td>.5634</td>
<td>.0121</td>
<td>.4947</td>
<td>.0119</td>
</tr>
<tr>
<td>RT4</td>
<td>.5845</td>
<td>.0143</td>
<td>.5616</td>
<td>.0117</td>
<td>.5078</td>
<td>.0108</td>
<td>.5612</td>
<td>.0116</td>
<td>.5521</td>
<td>.0108</td>
<td>.5058</td>
<td>.0120</td>
</tr>
<tr>
<td>RT5</td>
<td>.5869</td>
<td>.0155</td>
<td>.5476</td>
<td>.0120</td>
<td>.5234</td>
<td>.0130</td>
<td>.5078</td>
<td>.0101</td>
<td>.5066</td>
<td>.0101</td>
<td>.4889</td>
<td>.0088</td>
</tr>
<tr>
<td>RT6</td>
<td>.7107</td>
<td>.0216</td>
<td>.6792</td>
<td>.0212</td>
<td>.5697</td>
<td>.0148</td>
<td>.5904</td>
<td>.0172</td>
<td>.6199</td>
<td>.0194</td>
<td>.5502</td>
<td>.0131</td>
</tr>
<tr>
<td>RT7</td>
<td>.8362</td>
<td>.0255</td>
<td>.8007</td>
<td>.0233</td>
<td>.8036</td>
<td>.0243</td>
<td>.7342</td>
<td>.0213</td>
<td>.7405</td>
<td>.0227</td>
<td>.7818</td>
<td>.0233</td>
</tr>
</tbody>
</table>

Let us consider separately the reading times for positive (figure 3) and negative (figure 4) sentences, looking at each distinct position of the embedded clause.
Fig. 4. Reading time in the negative conditions

In the first two positions (POSITION 1 and 2), reading times are relative to the subject and to the matrix verb. There is no visible difference between the various conditions and they are of little interest here. For this reason, we move directly to POSITION 3: where the different wh-elements appear and the embedded clause begins. For each constituent of the embedded clause, data were submitted to a 2(Polarity: positive, negative) x 3(Wh_type: how-much, which, why) repeated Measure ANOVA. Results are reported separately below:

The analysis revealed here only a main effect of Wh-type (F1(2, 40)=57.552, p<.0001). Post-hoc comparisons between each level of the Wh-type factor show significant differences between all the level of the variable Wh-type (p<.05).

This result could be readily explained by the variation in the number of characters between the various wh-elements (how much X > which X > why X).

A main effect of Wh-type (F1(2, 40)=19.766, p<.0001) reached statistical significance. Planned comparisons between each level of the Wh-type factor show significant difference between why and how much N (p<.001) and why and which N (P<.001).

This result is consistent with the assumption that filler-gap dependencies impose a memory cost on sentence processing. In fact, why has a much faster
reading time, when compared with *how much* and *which*. This difference is unlikely to be related to the length-effect found in position 3. In fact, now there is no difference left between *how much* and *which* and subjects process the two at the same speed. No other length effect would affect the reaction times, here, since the word length of the sentential subjects was counterbalanced across all the conditions.

At the position where the distinction between positive and negative sentences is introduced, the ANOVA revealed a main effect of Polarity (F1(1,20)=26.001, p<.0001) and Wh-type (F1(2, 40)=7.019, p<.005. The interaction between Polarity x Wh-type (F1(2,40)=4.047, p<.05) was also significant. Post-hoc comparison between each level of the Wh-type factor showed only a significant increase in reaction times with *how much*, when compared to *which* (p<.05) and *why* (p<.005).

In positive sentences, no difference is observable between the three different kinds of *wh*- elements (figure 3), while the introduction of negation has two interesting effects. The first is a general increase in reaction times for each kind of *wh*-element. The second, is the significant interaction between polarity and wh-type. As the post-hoc comparison shows, this effect is due to an increase in reading time in the case of *how much*, the non-indexed *wh*- element.

Main effects of Polarity (F1(1,20)=15.374, p<.001) and Wh-type (F1(2, 40)=12.332, p<.0001) were found also in this position, as well a significant interaction between Polarity and Wh-type (F1(2,40)=6.860, p<.005). Interestingly, post hoc analysis revealed no significant difference between *which* and *how much* (p>0.5), while they both differ from *why* (p<0.05).

This result could be interpreted if we assume that a slow-down is associated with the filler integration. In this case, higher reaction times are expected for both *which* and *how much*, but not for *why*. Interestingly, an increase in reaction times for the two argument *wh*- is found in the positive and in the negative conditions. This suggests that the presence of an intervener won’t prevent the parser from placing a gap site after the lexical verb.

e. Position 7. Prepositional phrase
After the verb, differences associated with the Wh-type disappear and only a main effect of Polarity reaches significance (F1(1,20)=6.962, p<.05).

This result shows that, at this point, the trace has been integrated in the constituent structure and the filler-gap dependency has been solved. Only the generic cost associated with negation is still having an effect in sentence final position.

5. General Discussion
The experimental results confirm that reaction times in sentence processing are influenced by both the referential and the argumental properties of the filler. For what concerns the argument/adjunct distinction, we compared the reaction times after the lexical verb between adjunct and argument *wh*- , finding a significant slow-
down at the gap site for argument *wh-* elements. This effect has been found in both positive and negative sentences and it is consistent with previous findings on filler-gap dependencies (Crain & Fodor 1985, Stowe 1986, Phillips 2006).

The referential properties of the *wh-* element also seem to play a role in resolving filler-gap dependencies. In particular, in negative sentences, reaction times increase as soon as the sentential negative marker is encountered. Interestingly, this effect is higher for *wh-* elements denoting quantities i.e. *how much.* This effect is predicted by both semantic theories, as the one in Szabolcsi & Zwart (1993) or syntactic theories (Rizzi 1990). Therefore, reaction times do not permit us to discriminate between these two families of accounts. However, other real time measures, sensitive to syntactic or semantic violations (ERP, MEG) could be helpful and this could be a viable direction for future research.

One last remark concerns the increase of reaction times after the verb, found in the negative condition for *wh-* arguments. This result could be interpreted by saying that *which* and *how much* are integrated in the syntagmatic structure after the verb and that negation doesn’t block the generation of gap positions after the verb. This is consistent with the fact that negative island structures could be saved when the appropriate semantic or discursive conditions are met (Fox and Hackl 2006, Abrusan & Spector 2011).

References.


On intervention effects in weak islands

Four different agreement configurations in Italian (Determiner – Noun, Subject – Verb, Subject – Predicative Adjective, Clitic – Past Participle) can be naturally ranked from a minimum to a maximum of complexity in terms of the movement operations they necessarily involve, and of the derived representations at the interfaces. We put forth the hypothesis that this complexity ranking has predictive capacities with respect to the timing of full mastery of the different configurations in acquisition: a more complex configuration is expected to be fully mastered later than a less complex configuration. We check the consistency of the predicted sequence with the available data from corpus studies. Then, we test the prediction experimentally through the Forced Choice of Grammatical Form paradigm with children of age three, four and five acquiring Italian.

0. Introduction.
Agreement processes generally obey fundamental locality conditions. Nevertheless, different kinds of agreement involve somewhat different computational ingredients: some are necessarily satisfied in configurations derived via movement in multiple steps (e.g., past participle agreement with clitics in gender and number in many Romance languages), while others never involve movement (e.g., the agreement between a determiner and a head noun again in gender and number), and there are intermediate cases, involving less complex movement chains than clitic constructions. As a consequence of such computational differences, the surface configurations in which the agreeing elements appear can be quite diverse: maximally local in some cases, less local in others.

In the first part of this paper, we look at four different kinds of agreement configurations in Italian (Determiner - Noun, Subject – Verb, Subject – predicative Adjective, clitic – past participle) which can be naturally ranked from a minimum to a maximum of complexity in terms of the derivational operations which they require and of the derived representations at the interfaces. We then turn to language acquisition, and put forth the hypothesis that the ranking in terms of
complexity has predictive capacities with respect to the timing at which the different agreement configurations are fully mastered in development. After verifying the consistency of such predictions with the data available from corpus studies, we turn to the experimental part of the paper, and we test the predictions of the hypothesis through the Forced Choice of Grammatical Form (FCGF) paradigm. The complexity ranking is shown to predict the order of full mastery of the four different agreement configurations in development.

1. Background: agreement configurations and locality.
Agreement is a morphosyntactic process by which two elements are (externally or internally) merged in a local configuration and share certain morphosyntactic features. A prototypical case is subject-verb agreement in person and number (in most Indo-European languages; other languages may involve other kinds of features). The process is governed by strict locality constraints: for instance, a verb typically agrees with its local subject, not with the subject (or other nominal elements) of an embedded clause. Moreover, locality is established in hierarchical terms, not linearly. So, in a sentence like

(1) The picture of the girls is on the table

The verb be does not agree with the linearly adjacent adnominal complement girls, but with the head of the subject noun phrase picture, more distant in linear terms, but closer in the hierarchical tree structure.

All agreement processes are submitted to general locality constraints. Nevertheless, the surface configurations holding between the agreeing elements can vary, within a narrow range. This gives us the possibility of drawing a typology of agreement configurations, based on the more or less strictly local nature of the relation holding at the interface. In this paper we’ll look at the following four agreement configurations (all illustrated by Italian examples, as the experimental data will concern Italian):

(2) a. D-N agreement:
Le case
Thef,plur housesf,plur

b. Subj - V agreement:
Gianni  parte
Gianni3P,sing  leaves3P,sing’

c. Subj - Adj agreement:
Maria  è  stanca
Mariaf,sing  is tiredf,sing

d. Clitic – Past-Part agreement:
Gianni  le  ha  viste
Gianni themf,plur  ha  vistef,plur
(2)a is a case of agreement in gender and number between the determiner and the noun in a nominal expression, an agreement that in fact spreads, in Romance, to adjectives and other nominal modifiers. (2)b illustrates agreement in person and number between the subject and the inflected verb; (2)c exemplifies agreement in gender and number between a subject and a predicative adjective, normally across a copular verb; (2)d is a case of agreement in gender and number between the clitic, attached to an auxiliary verb, and the past participle.

Arguably, in all these cases agreement is checked under strict locality conditions, essential conditions defined by (external and internal) merge and a local search (or “Agree”) operation; nevertheless, the configurations holding at the interface between the agreeing elements differ significantly, due to independent properties of the constructions in (2). From now on, we will call the the “source” of agreement the nominal element whose features are copied and the “target” of agreement the head in the functional structure of the DP or of the clause which receives the featural specification of the source: in the system of Chomsky (1995), the distinction coincides with the one between the element bearing interpretable (and valued) features and the one bearing uninterpretable (and unvalued) features.

Agreement and movement are closely connected computational operations. For instance, in Kayne’s (1989) classical analysis, core agreement configurations typically involve movement of the source to a local configuration with the target; and further applications of movement may subsequently separate the two elements, giving rise to non-local interface configurations. We would like to capitalize on this connection between agreement and movement to differentiate the agreement configurations given in 0(2): the number and properties of movement operations involved in the different configurations will determine a natural gradation of the complexity of the configuration, which we will use as a generator of predictions on the developmental course.

In presenting this idea, let us consider the four agreement configurations reported in (2), ranking them in terms of the movements operations necessarily involved. The simplest case is (2a), D – N agreement, which does not involve movement at all: we may think of this kind of agreement as a morphological reflex of external merge putting these two elements together. Nothing moves here, in the normal case.

(3) D [NP … N … ]

Absence of movement thus singles out (2a) from all the other cases, all requiring a movement operation.

Subj – V agreement (2b) involves, under current assumptions, movement of the subject from its thematic position in the vP to the Spec position of a functional head

1 It is not entirely obvious, in this case, which element is the source and which is the target; nevertheless, this is not crucial for our typology, as nothing moves in any case and the two elements remain strictly local at the interfaces. On number and gender agreement within DP’s see Cardinaletti & Giusti (2011).
in the clausal structure bearing unvalued Phi features \(^2\) (the position AgrS of pre-
minimalist analyses; following Rizzi 2006b, Rizzi & Shlonsky 2007 we use the
label Subj to designate the head licensing the subject position in the high part of the
functional structure of the sentence). The local Spec-head configuration between the
source and the target of agreement is necessarily created by movement, and
movement typically stops there: other principles conspire to preserve the local
configuration at the interfaces. For instance, Criterial Freezing (Rizzi 2006b, Rizzi
& Shlonsky 2007) has the effect of freezing the configuration and blocking further
movement of the subject (see the references quoted on the strategy that languages
may use to circumvent this ban).

\[(4) \quad \text{___ Subj ___ [vP DP ___]}\]

A partially similar case is given by Subj – Adj agreement, illustrated in (2c). This
configuration also involves movement of the nominal expression from its thematic
position in the AP (under Stowell’s 1983 Subjects across Categories hypothesis) to
the Spec of a functional head bearing Phi features (perhaps a Pred(ication) head à la
Bowers 2010); however, an important difference exists between the two cases.
While for Subj-V agreement the local Spec-head configuration is a criterial one and
no further movement is allowed, in the case of Subj-Adj agreement the Spec-head
configuration holds in a non-criterial position. Hence the nominal expression does
not (and in fact cannot) stop there: it further moves to the subject position of the
copular verb, the normal subject position of clauses with criterial properties. The
relevant point for our typology is that agreement of the predicative AP is typically
checked “in passing” here: the subject moves from its thematic position to the
adjectival agreement position, and then it moves further

\[(5) \quad \text{___ Subj ___ [ ___ Phi [AP DP ___]}\]

Our fourth case Clitic – Past Participle Agreement (2d) also involves agreement “in
passing”. According to Kayne’s (1989) seminal analysis (see also Belletti 2006), the
clitic moves from object position, triggers agreement on the past participle endowed
with number and gender features, and then proceeds to its final destination, the
clitic position in the functional structure of the clause. Again, the position in which
agreement is checked, the Spec-head configuration created with the participial head

\(^2\) In the system of Chomsky (2000) Subj – V agreement involves two steps: first, the establishment
of an Agree relation between the functional head endowed with Phi features in the inflectional space
and the subject DP in its thematic position vP internally and, second, the successive movement of the
DP to the Spec of the inflectional head. See Franck, Frauenfelder, Lassi & Rizzi (2006) for evidence
supporting the view that agreement is checked twice, in the Agree configuration and then in the
Spec-head configuration derived via movement of the subject. In this paper we will not address the
status of agreement in configurations in which the subject remains in a lower position (such as so-
called “free inversion” in Romance), hence in which the checking under Spec-head does not take
place. See Guasti & Rizzi (2002) for discussion of this case.
The selective development of Agreement in Early Italian

(an aspectual head in the system of Cinque 1999) is not a criterial configuration, hence the clitic proceeds to a higher position after checking agreement features:

\[
(6) \quad \ldots \quad \text{Cl} \quad \ldots \quad [\ldots \text{Asp} \quad \ldots \quad \text{vP} \quad \text{V} \quad \text{DP} \quad \ldots \quad ]
\]

Clearly, the configuration bears some similarity with the case of adjectival agreement in that checking “in passing” is involved; but plausibly, the surface configuration between the trigger and the target is even less local in the case of cliticization. As the clitic chain always crosses a phase edge (the edge of the vP node in (6) in the system of Chomsky 2001), while the moved DP does not cross any such edge (if we assume, with Chomsky op. cit., that unaccusative and copular verbs define defective, not full vP phases).

In conclusion, the notion of movement provides us with three factors which could define a gradient of complexity between different agreement configurations. The first is the general cost associated with a movement operation. Under this assumption, configurations involving no movement at all (D - N agreement) are more local and less complex than configurations derived by movement. However, once movement takes place, not all the configurations must be treated alike. This leads us to the second factor, related to the landing site of the moved constituent. The local spec-head configuration triggering agreement could be the final landfall of movement or not. In the first case, agreement will be obtained in a locally stable configuration at the interface (Subj - V agreement) while in the latter case, agreement will be achieved “in passing” (Cl – Past Participle agreement, Subj - A agreement).

The last factor concerns instead the “syntactic distance” between the position where agreement is checked and the final landing site of movement. We might assume that the intervention of a phase edge could add additional complexity, distinguishing Cl – Past Participle agreement from other configurations, as Subj - Adj agreement, which arguably do not cross a phase edge.

As we are interested in the global configurations holding at the interfaces, perhaps an even more perspicuous way of characterizing the gradient is through the representational notion of chain: we have a representation involving no non-trivial chains (D - N), a representation involving a non-trivial chain which ends at the agreeing head (Subj - V), a non-trivial chain which continues after reaching the agreeing head (Subj - A), and a non trivial chain which continues after reaching the agreeing head and crosses a phase edge (Cl – Past Participle). 3

Each factor can be naturally thought of as increasing the complexity of the configuration: movement, as opposed to the absence of movement clearly does, as it represents an extra operation. Satisfaction in passing is more complex than satisfaction at the head of the chain, as it requires some form of reconstruction.

---

3 Another possible factor singling out the clitic configuration is that it involves movement across an intervener: the clitic must move across the thematic position of the subject, while no other case considered in table (6) involves movement across an intervening nominal element. We will not try to tease apart here the two ways of singling out the fourth case.
Moscati and Rizzi

Crossing a phase edge involves keeping an element active in operative memory across phases.

By putting these observations in the form of a table, we obtain the following:

(7) Agreement configurations in relation to Movement

<table>
<thead>
<tr>
<th>The computation of Agreement configurations:</th>
<th>Involves movement to the Spec of the target of agreement</th>
<th>Involves further movement from the agreement position</th>
<th>Involves further movement crossing a phase edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>D N Agr</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subj V Agr</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subj...A Agr</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Cl ... Past Part Agr</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

In this paper we are interested in the consequences of this gradation of complexity for language development and a natural hypothesis is the following:

(8) A more local agreement configuration is fully mastered earlier than a less local agreement configuration.

This hypothesis, in conjunction with the gradient of locality in (7), generates a clear prediction on development: the four agreement configurations in (2) are fully mastered with the following temporal order in language development:

(9) I. D - N Agreement
    II. Subj - V Agreement
    III. Subj - Adj Agreement
    IV. Cl - PastPart Agreement.

In order to test (9), we decided to adopt an experimental paradigm based on forced choices, close to explicit grammaticality judgment but able to avoid the limitations on tasks based on metalinguistic reasoning with young children (McDaniel et al. 1988).

In the next sections, we look at existing data on the development of agreement, which seems to be consistent with our hypothesis in (9). In section 4 we will present a new experimental study based on the Forced Choice of Grammatical Form.

2. Previous studies on morphological agreement in Italian

Early morphosyntactic development is a prominent topic in language acquisition and most of the agreement configurations previously mentioned have been analyzed in corpus-based and elicited production studies. On the basis of our hypothesis on a selective development of agreement, we will briefly review here the results of previous research on Early Italian.
Let us start from subject-verb agreement. In considering this relation, we are interested in sentences with all the relevant functional projections in place: the prerequisite for triggering agreement. Therefore, the first preliminary question amounts to asking when Italian children start producing inflected forms and what their proportion is on total. An answer to this question can be found in the results coming from corpora studies on Italian, as the ones reported in Pizzuto & Caselli (1992), Guasti (1993/1994) and more recently Caprin & Guasti (2009).

In a cross-sectional study based on the transcriptions of the spontaneous speech of 59 children, Caprin & Guasti (2009) found that children in the youngest age group (mean = 2;3 years) already produced 57% of inflected structures, mainly with present indicative and past tense. If imperatives are also included, the total of the inflected verbs reaches 90%.

These results are in line with previous ones coming from longitudinal studies (Guasti 1993/1994, Pizzuto & Caselli 1992), confirming that Subj-Verb agreement can be observed since the very first spontaneous productions. In general, the overall performance of Italian children with verbal inflection is remarkably good from early on, at least if compared to other populations of children, where non-finite forms are more frequent (Rasetti 2000; Poeppel & Wexler 1993; Phillips 1995) in early transcriptions.

Given that verbal forms are inflected since the earliest verbal productions, a second question, directly relevant to our discussion, is to determine to what extend children correctly process Subj-Verb agreement.

In their study, Caprin & Guasti (2009) reported (table 1) that at the present indicative children in the youngest age group already produce the correct Subj-Verb agreement morphemes in 94% of the cases (64/68). Longitudinal data from Guasti (1993/1994) also confirm that errors with verbal agreement morphology are extremely rare. Non-target verbal forms were produced only in a few cases and the highest error rate is the one of Martina, which didn’t exceed the 6.2% in the period between 2;2 and 2;7. These results are analogous to the ones reported in Pizzuto & Caselli (1992), who analyzed the longitudinal transcriptions of three different children. Again, the highest error rate (Marco, 1;5 – 3;0) was only at 4.3%. The results are summarized in Table 2. The conclusion is that Italian children do not only use finite morphology from very early on, but also that they make relatively few mistakes.


<table>
<thead>
<tr>
<th>Study</th>
<th>Group</th>
<th>MLUW and age</th>
<th>substitution on total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caprin &amp; Guasti</td>
<td>G1</td>
<td>MLUW = 1 – 1.5 mean 2;3</td>
<td>4/68 (5.9%)</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>MLUW = 1.5 – 2 mean 2.36</td>
<td>12/242 (5%)</td>
</tr>
<tr>
<td></td>
<td>G3</td>
<td>MLUW = 2 – 3.1 mean 2.51</td>
<td>13/838 (1.5%)</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Study</th>
<th>Children</th>
<th>Age</th>
<th>Correct finite forms</th>
<th>Total errors</th>
<th>Substitutions excluding infinitives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guasti 1993/1994</td>
<td>Martina</td>
<td>1;8 – 2;6</td>
<td>486</td>
<td>32/518 (6.2%)</td>
<td>8 (1.4%)</td>
</tr>
<tr>
<td></td>
<td>Diana</td>
<td>1;10 – 2;6</td>
<td>619</td>
<td>10/629 (1.5%)</td>
<td>8 (1.2%)</td>
</tr>
<tr>
<td></td>
<td>Guglielmo</td>
<td>2;2 – 2;7</td>
<td>208</td>
<td>10/218 (4.5%)</td>
<td>6 (2.7%)</td>
</tr>
<tr>
<td>Pizzuto &amp; Caselli</td>
<td>Claudia</td>
<td>1;3 – 2;9</td>
<td>935</td>
<td>23/958 (2.4%)</td>
<td>n.c.</td>
</tr>
<tr>
<td>1992</td>
<td>Francesco</td>
<td>1;4 – 3;9</td>
<td>827</td>
<td>17/844 (2.0%)</td>
<td>n.c.</td>
</tr>
<tr>
<td></td>
<td>Marco</td>
<td>1;5 – 3;0</td>
<td>311</td>
<td>14/325 (4.3%)</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

With this overall picture on Subj-Verb agreement in mind, the next step is to compare it to the other agreement configurations in 0. Given that Subj-Verb agreement is in an intermediate position, we expect to find, at the same developmental stage, a higher accuracy with D-N agreement. On the contrary, Clitic-PastPart agreement should be still problematic. Let us consider now these two structures in turn, disregarding for the moment Subj-Adj agreement in predicative constructions as we are not aware of any existing study directly addressing this issue.

For what concerns D-N agreement, a preliminary observation is that a more permissive distribution of null determiners is found in child than in adult grammar and that, at early stages, full-fledged determiners coexist with phonologically reduced forms (protosyntactic devices in Bottari, Cipriani & Chilosi 1994). Given that omissions and reduced forms are not informative on the development of D-N agreement, we need first to isolate full Ds. Their proportion on total has been investigated in several corpora studies (Ferrari & Matteini 2009, Caselli, Leonard, Volterra and Campagnoli 1993), with the most prudent estimation reported in Caprin & Guasti (2009) where the production of full determiner between the second and the third year is attested at 58.5% on total. Among these full unreduced forms, according to our hypothesis, we expect fewer agreement errors if compared with Subj-Verb agreement.

Caprin & Guasti (2009) report errors at about 3%, which is very much the same rate as the one given in Pizzuto & Caselli (1992) for Claudia, Francesco and Marco: their error rate being respectively of 4%, 3% and 3%. Notice that, in their count, Pizzuto & Caselli also included cases which could be classified as phonological and not as morphological errors. In fact, in Italian, the features +masculine +plural are...
associated with the two allomorphs “gli” and “i” and that their distribution is constrained by the properties of the following phonological segment. For this reason, the error rate in Pizzuto & Caselli (1992) may have been slightly pumped up by the fact that substitutions of “i” instead of “gli” (i occhiali, Claudio 1;9) have also been counted as mistakes.

On the basis of these studies, we can estimate that the proportion of D-N agreement mistakes, around the second year, is at most at 4%. This allows us to draw only one safe conclusion, namely that D-N agreement is not more difficult than Subj-V agreement. However this is a rather weak result, and although being compatible with our hypothesis, it doesn’t directly support it.

A first crucial problem should be evident at this point: in employing corpora analysis, many critical assumptions affect the count. This seriously weakens the possibility of obtaining a direct and accurate comparison between different structures. A second problem is that, in a normally developing population of children, the error rate is extremely sensitive to the selected time window. As an example, consider again Table 2 and the error rate relative to the transcriptions coming from the production of Francesco. Here we found the lowest proportion of errors, if compared with Claudia and Marco. In this case, it is likely that the error’s proportion has been underestimated as a direct consequence of an overextension of the selected time-window: Francesco is the only child being recorded until 3;9 years, much later than any other child. This problem could be only partially alleviated by employing additional controls based on developmental metrics, as dictionary size or MLU.

Elicited production can overcome some (but not all) of the drawbacks associated with the analysis of spontaneous production. This methodology has been repeatedly employed to study Clitic-PastPart agreement and the reason is that clitic constructions in the past tense are extremely infrequent in early transcriptions. As a consequence, the paucity of data makes any quantitative analysis unreliable. The rarity of this kind of sentences depends essentially on two factors. The first is that most structures involving participial forms (passives, for instance) are largely avoided in the first spontaneous productions. The second is that object omission is another distinguishing feature of early grammar. Consider the following three sentences, produced by one of the children taking part to an elicited production experiment reported in Moscati & Tedeschi (2009).

(10) a. (la mucca) l’ ha lavata
    the cow,f,sing cl has washed f,sing

    b. ha lavato la mucca
    has washedm,sing the cow,f,sing

    c. ha lavato
    has washedm,sing
Sentences (10)a and (10)b are two possible adult sentences, with obligatory past participle agreement in (10)a and the default –o [+masculine, +singular] form in (10)b. The third sentence (10)c is instead a typical sentence in Early Italian (see also Jakubowicz et al. 1996, Pérez-Leroux et al. 2008 for French, Wexler et.al. 2004 for Catalan and Spanish) and it is ungrammatical in the elicited context. Will this sentence be a reduced form of (10)a or (10)b? If we consider the null object in (10)c as a full DP, no agreement is required and the past participle is correctly inflected. On the contrary, if we instead consider (10)c as having a null clitic pronoun (McKee & Emiliani 1992, Tedeschi 2009), the silent counterpart of l’ in (10)a, the study of the past participle morphology could be potentially relevant.

Given the debated status of sentences in (10)c, different studies keep the cases from (10)a to (10)c distinct. For this reason, the past participial agreement rate has been separately reported in relation to clitics, full DPs and null objects. This distinction is maintained in Table 3, where the results of the different studies are summarized.

### Table 3. Past participle agreement in relation to direct objects.

<table>
<thead>
<tr>
<th>Study</th>
<th>N.of subjects, Age</th>
<th>Agreement with direct object</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Clitic</td>
</tr>
<tr>
<td>McKee &amp; Emiliani (1992)</td>
<td>(N = 9, mean 2;4)</td>
<td>14/14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(100%)</td>
</tr>
<tr>
<td>Schaeffer (2000)</td>
<td>(N=5, mean 2;5)</td>
<td>8/8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(100%)</td>
</tr>
<tr>
<td>Moscati &amp; Tedeschi (2009)</td>
<td>(N=10, mean 2;8)</td>
<td>1/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(25%)</td>
</tr>
<tr>
<td></td>
<td>(N=25, mean 3;6)</td>
<td>33/41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(80.5 %)</td>
</tr>
<tr>
<td></td>
<td>(N=21, mean 4;4)</td>
<td>60/79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(75.9%)</td>
</tr>
</tbody>
</table>

Let us discuss first the case of post-verbal full DPs. In adult Italian, past participle agreement is excluded in sentences like (10)b. In this kind of sentences, children must know that the agreement rule is extremely selective and that it only applies to dislocated internal arguments. Empirical evidence from McKee and Emiliani (1992), Schaeffer (2000) and Moscati & Tedeschi (2009) show that Italian children are sensitive to the relevant distinctions and that they only marginally overgeneralize agreement to postverbal DP (see Antinucci & Miller 1976).

For null-objects, McKee and Emiliani (1992) report that past participle agreement is always realized. However neither Schaeffer (2000) nor Moscati & Tedeschi (2009) confirmed this conclusion, finding all together only 4 cases on 28 observations.

With pronominal clitics (10)a, the most interesting case for our purposes, Schaeffer and McKee & Emiliani found that whenever a clitic was produced, the correct agreement morphology was also selected by children as young as 2 y.o. However,
results discord here and Moscati & Tedeschi reported a much lower agreement rate. A possible explanation for this inconsistency could be based on the relatively low number of total observations. Therefore, results become more reliable and stable when numbers grow with age. Null objects slowly disappear from child grammar and sentences with overt clitic pronouns become more productive. Whatever constraint blocks the overt realization of clitics in the early period, such limitation starts to disappear after the third year and, past this age, children tend not to omit objects anymore. Nevertheless, even at this later stage, Clitic-PastPart agreement is far from stable, as shown by the results from Moscati & Tedeschi (2009): Clitic-PastPart agreement is attested only at the 75.9% in the 4 y.o. group, when the number of relevant observations is of greater significance. This result suggests that Clitic-PastPart agreement is more problematic than D-N and Subj-V agreement: while by the third year subject-verb and determiner-noun agreement errors have largely disappeared, PastParticipial agreeing forms are still far from being completely mastered.

This is in line with the predictions of the hierarchy in (9), even if the presence of null-pronouns in child speech shows another of the limits of production. In general, the possibility to omit sentential arguments is a serious problem for the study of both subject- and object-verb agreement. For example, the data on subject-verb agreement reported in Table 1 and 2 also include sentences with a null subject. Although the subject referent can be often inferred from the context, it is still impossible to establish with certainty whether the verb was incorrectly inflected or if a different referent was selected and then left unpronounced by the children. In this latter case, we would have a discourse-pragmatic violation, but not a morphosyntactic one.

In conclusion, although the results reported in this section are consistent with the idea that different kinds of agreement are fully mastered at different stages, different problems hamper a fully reliable verification of the hypothesis through corpus and elicited production studies. In order to check the prediction of the ranking given in (9) a more controlled task is needed. In the next section, we will then present an experiment based on a forced choice paradigm involving a direct comparison of the relevant grammatical and ungrammatical agreement forms.

4. Forced Choice of Grammatical Form
To investigate adult grammatical competence, the procedure traditionally employed is to resort to explicit grammaticality judgments. With adults, we could simply ask them to judge sentences (13) and (14) in turn, in order to reconstruct adult grammatical properties of agreement:

(13) (le ragazze) Gianni le ha viste
    (the girls) John clf,plur has seenf,plur

4 In the case of Subj-Verb agreement, a second problem is that unintelligible forms were also excluded. Now, these forms could likely be deviant forms indicating morphological mistakes and their proportion is not negligible. In the case of Francesco 142 out of 1406 verbs were excluded, around the 10% on total. In a picture where differences are made on a small scale, this amount of unanalyzed data may be potentially relevant.
“(the girls) John has seen them”

(14) *(le ragazze) Gianni le ha visto
(the girls) John clf,plur has seenm,sing

However, grammaticality judgments require a grammatical/metalinguistic reasoning over utterances, a factor which might pose certain difficulties with young children (see McDaniel, McKee & Cairns 1998). A way to circumvent this problem is to exploit children’s ability in discrimination tasks and to combine grammaticality judgments with a forced choice paradigm. Pirvulescu & Belzil (2008) showed that children react consistently when asked to choose the right sentence between a syntactic minimal pair. Thus, instead of asking children to judge (13) and (14), we could ask them to choose between (13) and (14). If children choose (13) to the same extend as adults, we could assume that children master past participle agreement.

The Forced Choice of Grammatical Form Task (FCGFT) is then useful to overcome many of the problems connected with sentence production. In particular, we can balance the linguistic structures in order to collect enough data points to compare less frequent sentences with the more frequent ones. Moreover, by testing the same group of children, we will have a punctual temporal point of observation, unbiased by heterogeneous counting procedures and time windows. For this reason, we adopt it to investigate the four different agreement configurations, ranked in accordance to the hypothesis in (9). In what follows, we will briefly illustrate the contrasts which have been presented to children.

The first kind of violation concerns D-N agreement, the most local one. Remember that whenever a determiner is required, D-N agreement in gender and number is obligatory. Thus in the pair in (15), only (15)a is grammatical and it minimally differs from the ungrammatical (15)b for a number mismatch on the determiner le

(15) a. (la candela) la nonna la ha spenta
(the candle) thef,sing grandmotherf,sing clf,sing aux3p, sing put outf,sing
b. *(la candela) le nonna la ha spenta
(the candle) thef,plur grandmotherf,sing clf,sing aux3p,sing put outf,sing

The second structure is Subj-Verb agreement. We asked children to choose between (16)a and (16)b, with the latter presenting a number mismatch on the auxiliary:

(16) a. (la candela) la nonna la ha spenta
(the candle) thef,sing grandmotherf,sing clf,sing aux3p,sing put outf,sing
b. *(la candela) la nonna la hanno spenta
(the candle) thef,sing grandmotherf,sing clf,sing aux3p,sing put outf,plur

The third kind of violation concerns past participle agreement. For a detailed description of the agreement pattern, we refer to Belletti (2006). For our purposes, it will suffice to say that past participle agreement is triggered when the direct
The selective development of Agreement in Early Italian

object is moved from its base position, and it is obligatory with 3rd person direct object clitics as in (17)a. The alternative in (17)b shows again a number mismatch on the past participle.

(17)  a. (la candela) la nonna la ha spenta
     (the candle) thef,sing grandmotherf,sing clf,sing aux3p,sing put outf,sing
     b. *(la candela) la nonna la ha spente
        (the candle) thef,sing grandmotherf,sing clf,sing aux3p, sing put outf,plur

The last kind of agreement structure is Subj-Adj in predicative constructions as in (18):

(18)  a. La fragola è rossa
      the f,sing strawberryf,sing is red f,sing
      “the strawberry is red”
     b. *La fragola è rosse
        the f,sing strawberryf,sing is red f,plur

This last contrast is especially interesting since, although some attention has been devoted to copular constructions (Franchi 2004, 2006), to the best of our knowledge no study has focused on the acquisition of adjectival agreement. Notice that the agreement paradigm of adjectives and participles is exactly the same: four morphemes used to express all the possible combination of gender and number:

### Tab. 4. Adjectival and participial inflectional morphology in Italian.

<table>
<thead>
<tr>
<th>features</th>
<th>inflection on adjectives</th>
<th>inflection on participles</th>
</tr>
</thead>
<tbody>
<tr>
<td>m, sing</td>
<td>ross-o (red)</td>
<td>spent-o (put off)</td>
</tr>
<tr>
<td>m, plur</td>
<td>ross-i</td>
<td>spent-i</td>
</tr>
<tr>
<td>f, sing</td>
<td>ross-a</td>
<td>spent-a</td>
</tr>
<tr>
<td>f, plur</td>
<td>ross-e</td>
<td>spent-e</td>
</tr>
</tbody>
</table>

A developmental hypothesis based only on the size of the agreement paradigm (the larger the paradigm from which the correct form must be chosen, the harder the choice is for the child) would not distinguish between Subj-Adj agreement and Cl - PastPart agreement. Nor would linear order: in both constructions an extra element (an auxiliary) intervenes between the two terms of the relation. According to the ranking in (9), instead, our hypothesis makes the prediction that the discrimination task should be harder with the pair in (17) than with the one in (18).

The minimal pairs in (15) – (18) will be tested in three different populations of Italian children at different ages. In addition to the four agreement conditions, we also included a non-agreement condition, where the internal object is left in his base position and no past-participle agreement is allowed:

(19)  a. la nonna ha spento la candela
      thef,sing grandmotherf,sing aux3p,sing put outm,sing the candle f,sing
b. *la nonna ha spenta la candela
thef,sing grandmotherf,sing aux3p,sing put outf,sing the candle f,sing

this last kind of sentences, lacking agreement, has been inserted in the test batteries to verify whether children unselectively extend the agreement rule also to post-verbal DPs (19)b as claimed in Antinucci & Miller (1976).

**Method & Materials**

Children were first presented with a warm-up session consisting in a simple naming task. A sequence of objects was presented on a computer screen and children had to name each of them in turn. This preliminary warm-up task was adopted to familiarize children with the computer presentation and also to ascertain if they knew the names of the objects presented later in the test session.

At the end of the warm up, the test sentences were presented with the help of a sequence of two pictures. For example, in the first picture it was depicted an old lady approaching a burning candle and in the following one it was portrayed the same scene but with the candle put out. At the end of the second picture, children heard two sentences and they had to choose the ‘right’ sentence in each pair. There where 5 different conditions, one for each different agreement configuration plus the non-agreeing condition in SVO past tense sentences. Children heard six sentence pairs for Cl-PastPart agreement and four pairs for each of the other agreement conditions. Other six sentences for the non-agreeing condition were also added, for a total of twenty-four minimal pairs.

**Table 5. Materials**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Grammatical</th>
<th>Ungrammatical</th>
</tr>
</thead>
<tbody>
<tr>
<td>D – N</td>
<td>(la candela) la nonna la ha spenta</td>
<td>(la candela) le nonna la ha spenta</td>
</tr>
<tr>
<td>Subj-V</td>
<td>(la candela) la nonna la ha spenta</td>
<td>(la candela) la nonna la hanno spenta</td>
</tr>
<tr>
<td>Clitic - PastPart</td>
<td>(la candela) la nonna la ha spenta</td>
<td>(la candela) la nonna la ha spentata</td>
</tr>
<tr>
<td>Subj – Adj</td>
<td>La candela è rossa</td>
<td>La candela è rosse</td>
</tr>
<tr>
<td>PastPart-DP</td>
<td>la nonna ha spento la candela</td>
<td>la nonna ha spenta la candela</td>
</tr>
</tbody>
</table>

All the target sentences were presented in minimal pairs, differing only in a single morpheme and the stimuli were counterbalanced with respect to the presentation order of the correct sentence. In order to make the task enjoyable by children, we carried out the sessions as games in which the child had to help a puppet to learn Italian.

**Subjects**

55 monolingual Italian-speaking children between 2;11 to 5;10 took part in the experiment. All the children were recruited from 3 kindergartens in the Siena area.
and they were assigned to three groups, in accordance with age. An additional group of 15 adults served as a control. Data about participants are given in table 6.

**Tab.6. Participants**

<table>
<thead>
<tr>
<th>Age group</th>
<th>age</th>
<th>mean age</th>
<th>Tot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>2;11 – 3;9</td>
<td>3;4</td>
<td>30</td>
</tr>
<tr>
<td>Group 2</td>
<td>4;3 – 4;9</td>
<td>4;6</td>
<td>13</td>
</tr>
<tr>
<td>Group 3</td>
<td>5;2 – 5;10</td>
<td>5;4</td>
<td>12</td>
</tr>
<tr>
<td>Adults</td>
<td>&gt;20</td>
<td>-</td>
<td>15</td>
</tr>
</tbody>
</table>

**Results**

Some children in the youngest age groups failed the preliminary naming task showing a poor lexicon or paying little attention to the images on the screen. For this reason, 7 children from Group 1, 3 children from Group 2 and 1 child from Group 3 were excluded. We report here the data of children that completed the task (i.e. looking at the screen until the end of the experimental session) and gave the correct answers to the initial naming task (Group1, N=23; Group2, N=10; Group3, N=11). Unintelligible responses were also excluded from the count.

In Table 7 we report the number and the proportion of correct choices on total for each experimental conditions in the four groups. The overall rate of correct answers (figure 1) shows that children were able to detect the minimal difference between a pair of sentences already in Group 1. They chose the right alternative in 73.8% of the cases and the proportion of correct answers raised to 87% in Group 2 and to 94.3% in Group 3. No ungrammatical choice was instead made by the adults in the control group.

**Table 7. Overall results of the FCGFT**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Conditions</th>
<th>D-N</th>
<th>S-V</th>
<th>S-A</th>
<th>Cl-PastPart</th>
<th>PastPart – DP</th>
<th>Tot</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td></td>
<td>96,5%</td>
<td>79,8%</td>
<td>69,6%</td>
<td>56,9%</td>
<td>76,3%</td>
<td>73,8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>72/85</td>
<td>71/89</td>
<td>64/92</td>
<td>78/137</td>
<td>74/97</td>
<td>369/500</td>
</tr>
<tr>
<td>G2</td>
<td></td>
<td>100%</td>
<td>89,7%</td>
<td>87,2%</td>
<td>78,3%</td>
<td>85,2%</td>
<td>87%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>38/38</td>
<td>35/39</td>
<td>34/39</td>
<td>47/60</td>
<td>46/54</td>
<td>200/230</td>
</tr>
<tr>
<td>G3</td>
<td></td>
<td>100%</td>
<td>93,2%</td>
<td>95,4%</td>
<td>89,4%</td>
<td>95,4%</td>
<td>94,3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44/44</td>
<td>41/44</td>
<td>42/44</td>
<td>59/66</td>
<td>53/66</td>
<td>249/264</td>
</tr>
<tr>
<td>Adults</td>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60/60</td>
<td>60/60</td>
<td>60/60</td>
<td>90/90</td>
<td>90/90</td>
<td>360/360</td>
</tr>
</tbody>
</table>
Let us now examine the proportion of correct answers in the different experimental conditions, leaving for the moment aside PastPart-DP. Remember that agreement is obligatory for D-N, Subj-V, Subj-A and Cl-PastPart, while for the PastPart-DP condition past participle agreement is excluded and the default +singular, +masculine form has to be chosen. This is the only non-agreement condition and it will be considered separately later, when compared with Cl-PastPart agreement.
Figure 2 shows that the proportion of correct answers grows in relation to age, with the exception of D-N agreement, where an adult-like performance is found already in the youngest age group. This result is in line with the production studies from Guasti (1993/1994) and Pizzuto & Caselli (1992) and it confirms that, by the end of the second year, children master determiner-noun agreement without any difficulty. A clear developmental trend is instead observable in the other conditions, more pronounced for Cl-PastPart agreement. In this condition, children in Group 1 choose the right alternative only in the 56.9% of the cases. Notice that, even if children’s performance rapidly increases with age, correct choices in the Cl-PastPart agreement conditions are still below 80% at four years. For what concerns instead Subject-V and Subj-Adj agreement, they also present a developmental curve, but less pronounced than in the case of Cl-PastPart agreement. If compared with the D-N and Cl-PastPart condition, these two kinds of agreement appear to be an intermediate case.

We turn now to the last experimental condition, namely past participle agreement with a post-verbal full DP. Remember, once more, that this configuration requires lack of agreement. Here mistakes are reversed and a non-adult response is the one in which the agreement rule is overgeneralized. By looking at Figure 3, the results indicate that children in Group 1 are already aware of the existence of a difference related to the type of the direct object. Young children choose past participle
agreement with a full DP only in the 23.7% of the cases, a remarkably low rate, when compared with clitic pronouns, where agreement reaches 56.9%.

**Fig.3. Past-Participle agreement in relation to the direct object**

To analyse the results, we adopt a mixed effects logistic regression models (lmer package for R, Bates 2007) in order to account for by-subject and by-item variation in the response probability (Baayen 2008, Jaeger 2008). As fixed predictors we use Group (3,4,5) and Condition (D-N, Subj-V, Subj-Adj, Cl-PastPart, PartP-DP) and the model was fitted by setting the 3-year olds as the reference group for Age, and Cl-PastPart as the reference for Condition. In Table 8 the main effects of Age and Condition are reported.

---

5 That children at 3 are fully aware of the distinction between clitic and non-clitic objects is not surprising: corpus studies show that already several months earlier children never place object clitics in non-clitic positions (Hamann, Rizzi and Frauenfelder, 1996).

6 The by-subject random slopes contribute to the model significantly, compared to an alternative model without them, as indicated by a log likelihood test of model comparison ($\chi^2=53.987$, p<0.001)
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Table 8. Summary of the fixed effects.

| (Intercept) | Estimate | Std. Error | z value | Pr(>|z|) | Sig. |
|-------------|----------|------------|---------|---------|------|
| G1/Cl-PastP vs | 1.12121 | 0.54034 | 2.075 | 0.037988 * |
| G1/Cl-PastP vs G2/Cl-PastP | 2.30792 | 0.62621 | 3.686 | 0.000228 *** |
| G1/Cl-PastP vs G3/Cl-PastP | 1.01169 | 0.32271 | 3.135 | 0.001719 ** |
| G1/Part-DP | 0.67575 | 0.30999 | 2.180 | 0.029266 * |
| G1/Cl-PastP vs G1/Subj-Adj | 3.38886 | 0.75030 | 5.211 | 1.88e-07 *** |

Mod1=lmer(accordo_corretto~gruppo*condizione+(1|soggetto)+(1|item), family=binomial)
Log-likelihood= -396.6; N=994. Intercept terms (reference levels): group=3, condition=cl-pastPart. Signif. codes: ‘***’ p<0.001; ‘**’ p<0.01; ‘*’ p< 0.05

In the Clitic-PastPart condition, children in Group 1 had a probability of selecting the right answer not different from chance, behaving significantly worse than children in Group 2 (p<.05) and Group 3 (p<.001), showing a main effect of Age. A Condition effect also reaches significance and the probability of giving the right answer in G1 for the PastPart condition is lower than in the other 4 conditions (Part-DP, p<.01; Subj-Adj, p<.05; Subj-V, p<.001; D-N, p<.001).

Given that we are also interested in comparing children’s behaviour for each agreement condition in the various age groups, we repeatedly fit the model 7, varying the reference levels for Condition.

---

7 We compare a simplified model without interaction (mod2) with the full model given in table 10 (Mod1) by using a likelihood ratio test. Given that the fit of the two models was not significantly different ($\chi^2 = 3.2652; p>0.9$) we adopt the simplified model in the rest of the paper.

Mod2=lmer(accordo_corretto~gruppo+condizione+(1|soggetto)+(1|item), family=binomial)
Tab.9. Summary of fixed effects as function of the reference level for Condition.

| Reference = G1/D-N         | Estimate | Std. Error | z value | Pr(>|z|)    | Sig. |
|-----------------------------|----------|------------|---------|-------------|------|
| (Intercept)                 | 3.7254   | 0.6583     | 5.659   | 1.52e-08*** | ***  |
| G1/D-N vs G2/D-N           | 14.2888  | 1207.0136  | 0.012   | 0.990555    |      |
| G1/D-N vs G3/D-N           | 14.5972  | 1046.4617  | 0.014   | 0.988871    |      |
| G1/D-N vs G1/Cl-PastP      | -3.3888  | 0.6503     | -5.211  | 1.88e-07*** | ***  |
| G1/D-N vs G1/Subj-V        | -2.1005  | 0.6808     | -3.085  | 0.002033**  | **   |
| G1/D-N vs G1/Part-DP       | -2.3771  | 0.6731     | -3.531  | 0.000413*** | ***  |
| G1/D-N vs G1/Subj-Adj      | -2.7130  | 0.6670     | -4.068  | 4.75e-05*** | ***  |

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<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
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<tr>
<td>(Intercept)</td>
<td>1.6249</td>
<td>0.3576</td>
<td>4.544</td>
<td>5.51e-06***</td>
<td>***</td>
</tr>
<tr>
<td>G1/Subj-V vs G2/Subj-V</td>
<td>0.7690</td>
<td>0.7308</td>
<td>1.052</td>
<td>0.292626</td>
<td></td>
</tr>
<tr>
<td>G1/Subj-V vs G3/Subj-V</td>
<td>1.5772</td>
<td>0.8253</td>
<td>1.911</td>
<td>0.056002</td>
<td></td>
</tr>
<tr>
<td>G1/Subj-V vs G1/D-N</td>
<td>2.1005</td>
<td>0.6808</td>
<td>3.085</td>
<td>0.002033**</td>
<td>**</td>
</tr>
<tr>
<td>G1/Subj-V vs G1/Cl-PastP</td>
<td>-1.2883</td>
<td>0.3423</td>
<td>-3.763</td>
<td>0.000168***</td>
<td>***</td>
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<tr>
<td>G1/Subj-V vs G1/Part-DP</td>
<td>-0.2766</td>
<td>0.3851</td>
<td>-0.718</td>
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<tr>
<td>G1/Subj-V vs G1/Subj-Adj</td>
<td>-0.6125</td>
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<td>0.102600</td>
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</table>

<table>
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<td>0.32664</td>
<td>3.099</td>
<td>0.00194**</td>
<td>**</td>
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<td>G1/Subj-Adj vs G2/Subj-Adj</td>
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<td>0.67822</td>
<td>1.683</td>
<td>0.09232</td>
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<tr>
<td>G1/Subj-Adj vs G3/Subj-Adj</td>
<td>2.66791</td>
<td>0.92430</td>
<td>2.886</td>
<td>0.00390**</td>
<td>**</td>
</tr>
<tr>
<td>G1/Subj-Adj vs G1/Subj-V</td>
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<td>0.37525</td>
<td>1.632</td>
<td>0.10259</td>
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</tr>
<tr>
<td>G1/Subj-Adj vs G1/D-N</td>
<td>2.71306</td>
<td>0.66701</td>
<td>4.068</td>
<td>4.75e-05***</td>
<td>***</td>
</tr>
<tr>
<td>G1/Subj-Adj vs G1/Cl-PastP</td>
<td>-0.67576</td>
<td>0.30999</td>
<td>-2.180</td>
<td>0.02926*</td>
<td></td>
</tr>
<tr>
<td>G1/Subj-Adj vs G1/Part-DP</td>
<td>0.33593</td>
<td>0.35826</td>
<td>0.938</td>
<td>0.34841</td>
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<table>
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<th>Reference = G1/Part-DP</th>
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<tbody>
<tr>
<td>(Intercept)</td>
<td>1.34826</td>
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<td>3.980</td>
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<td>***</td>
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<tr>
<td>G1/Part-DP vs G2/Part-DP</td>
<td>0.59584</td>
<td>0.61612</td>
<td>0.967</td>
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<td>2.33195</td>
<td>0.81122</td>
<td>2.875</td>
<td>0.000405**</td>
<td>**</td>
</tr>
<tr>
<td>G1/Part-DP vs G1/Subj-Adj</td>
<td>-0.33591</td>
<td>0.35826</td>
<td>-0.938</td>
<td>0.348448</td>
<td></td>
</tr>
<tr>
<td>G1/Part-DP vs G1/Subj-V</td>
<td>0.27664</td>
<td>0.38514</td>
<td>0.718</td>
<td>0.472577</td>
<td></td>
</tr>
<tr>
<td>G1/Part-DP vs G1/D-N</td>
<td>2.37716</td>
<td>0.67316</td>
<td>3.531</td>
<td>0.000413***</td>
<td>***</td>
</tr>
<tr>
<td>G1/Part-DP vs G1/Cl-PastP</td>
<td>-1.01166</td>
<td>0.32271</td>
<td>-3.135</td>
<td>0.001719**</td>
<td>**</td>
</tr>
</tbody>
</table>

Signif. codes:  ‘***’ p<0.001; ‘**’ p<0.01; ‘*’ p< 0.05

The intercept values show that in Group 1, the probability of giving the correct answer was higher than chance for all the D-N, Subj-V and Subj-Adj conditions (p<.01).
With the exception of the D-N condition, we found a significant differences between Group 1 and Group 3 (.004 < p <.06) for all the other experimental conditions, a finding which confirms the developmental trend shown in figure 2.
Moreover, the probability of giving the correct responses in the D-N condition is significantly higher than in the other Subj-Adj (p<.001), Subj-V (p<.01), PastPart-Cl and DP-PastPart (p<.01) conditions in every age group. This supports the view that the D-N and the PastPart-Cl conditions are differentiated from the two intermediate Subj-V and Subj-Adj conditions, being the two extremes of the scale. One last observation concerns the non-agreement condition, where children performance increases with age and the trend reaches significance when G1 is compared with G3. This gradual improvement seems to suggest that, initially, children occasionally overextend the agreement rule to non-moved DP, selecting the sentence with Past-Participle agreement more often than their older peers at age five.

Discussion of the results
The data reported in Table 7 show that morphological agreement develops with age, with a different speed in relation to different configurations. The only agreement configuration that presents no increase in relation to age is the D-N condition: three years old children already have a virtually perfect knowledge of determiner agreement. This result also shows that young children do not have problems with the experimental task per se. On the other extreme, we found that Cl-PastPart agreement is still problematic at age 4. It is only one year later that the children’s performance gets closer to the adult one. Subj-A and Subj-V show a level of complexity that it is somewhere in the middle between D-N agreement and Cl-PastParticiple. In these two conditions, children’ performance in Group 1 it is still inaccurate (with a higher level of accuracy for Subj-V agreement), but it rapidly increases over time (see fig. 2). This shows that while the difficulty associated with Subj-Adj and Subj-V agreement disappears between age 3 and age 4, a residual problem persist with Cl-Past Part Agreement. These results are consistent with our hypothesis, which predicts a gradual improvement in the different structures in accordance with the order in (13). It should be noticed though that tendency to a higher accuracy with Subj – V than with Subj – A emerging from table 7 fails to reach statistical significance. We thus leave open for further work the question of whether the two cases should be separated or collapsed in the complexity metric. The point firmly established here is that they are clearly distinct from both D –N and Cl- Past Part agreement, the two extreme points in the ranking8.

A residual question regard the errors made by 3 years old children in the non-agreeing condition. Antinucci & Miller (1976) claimed that there is a stage in early Italian in which children overgeneralize agreement to post-verbal DPs. It is well-known that such an agreement option is attested in certain southern Italian dialects.

---

8 Should further work establish that the tendency to a greater difficulty with Subj – A than with Subj – V agreement is not substantiated, our movement-based metric of complexity should be simplified to generate a tripartite distinction involving three steps:

1. No movement (D-N agreement);
2. Phase-internal movement (Subj – V and Subj – A agreement);
3. Movement crossing a phase edge (Cl- Past Participle agreement).

We leave the issue open here.
(Loporcaro 1998), and may hold in certain varieties of French (Pirvulescu & Belzil 2008). Such an agreement pattern clearly is a UG option; we may then be observing here a case of “parametric discontinuity” (Rizzi 2006), the persistent exploration by the child of a UG option that is not target-consistent.

Conclusions
Agreement phenomena respect fundamental locality principles. Kayne (1989) introduced the important idea that the local Spec-Head configuration between the trigger and the target of agreement is essential for proper checking, an assumption adopted by early minimalist analyses (Chomsky 1993, 1995). Chomsky (2000) shifted much of the burden for agreement checking to the Agree operation, establishing a probe-goal relation between a functional head and a nominal expression, followed by movement of the nominal expression to the Spec of the functional head; subsequently, evidence was provided that the Spec-head configuration is not just a by-product of movement post-Agree, but actively participates in the checking of agreement features (Guasti & Rizzi 2002, Franck et al. 2006). Within this tradition, we continue to assume that the Spec-head configuration is a critical component of agreement checking. Three of the four agreement processes that we have considered in this study -- Subj – V, Subj – A, Cl – Past Part -- share a checking component in a Spec-head configuration. If this component is common, other properties of the three agreement configurations differentiate them in a way that is amenable to a natural complexity scale based on the required applications of movement, or internal merge.

In Subj – V agreement, the nominal expression moves to the Spec of the functional head in the functional structure of the clause endowed with Phi features and stops there, due to the criterial properties of the position, in the sense of Rizzi (2006), Rizzi & Shlonsky (2007).

In Subj – A agreement, the nominal expression moves to the Spec of the functional head expressing adjectival agreement, and then continues to move to its final destination, the subject position of the clause, due to different factors (the necessity of satisfying the criterial properties of the latter position, Case Theory, etc.). Agreement is thus checked “in passing” in the Spec-head configuration. The derivation of the global structure of A agreement is thus more complex than the previous one in that it involves a movement step both before and after checking; in representational terms, it is more complex because the trigger and target of agreement always end up in a less local (not structurally adjacent) configuration in the surface representation, which plausibly involves added costs in the processing of the structure.

Finally, clitic – past participle agreement involves an even more complex derivation and representation: again, agreement is checked “in passing”, as the clitic moves from the thematic position to the Spec of the relevant agreement head, from which it proceeds to the clitic position (Kayne 1989, Belletti 2006). Moreover, the movement chain always spans over two distinct phases, in the sense of Chomsky 2001, as it comes from within the VP and moves through the phase edge to a landing site in the next higher phase, thus plausibly engaging extra computational resources.
in terms of operative memory requirements (the extra complexity of this case can also be seen in terms of intervention, as suggested in FN 3).

As for the first agreement process considered here, D – N agreement, it clearly does not involve a Spec-Head configuration, but rather a head-head configuration; moreover, it appears to be highly local, as it involves all the heads occurring in the stretch between D and N, e.g., Q and A in examples like Lef, plur molte f, plur belle f, plur idee f, plur “the many beautiful ideas”. The strong locality of the phenomenon is highlighted by an effect observed in Zamparelli (2000): an adjective which is invariable for number and gender, such as blu (blue) cannot appear prenominally, thus interrupting the continuous stretch of agreeing heads: lef, plur rosse, plur bandierese, plur della libertà (“the red flags of liberty”) vs * lef, plur blu-bandeirese, plur della libertà (“the blue flags of liberty”). It thus appears that the agreement in question is a direct reflex of external merge: as a new element is externally merged to N (or to a higher projection of the nominal system), it agrees in number and gender with it. We will not work out the details of the analysis of this DP-internal agreement (see Cardinaletti & Giusti 2011 for relevant discussion); anyway, what is clear is that this kind of agreement is not dependent on movement: thus, in our hierarchy of complexity based on movement, it represents the lower end, the case not involving movement at all. On this basis we arrived at the hierarchy expressed in (9) and repeated here:

(20)  
I. D - N Agreement  
II. Subj - V Agreement  
III. Subj - A Agreement
IV. Cl - Past Part Agreement.

In this paper we have put forth the hypothesis that this complexity hierarchy has a predictive capacity on the temporal order of full mastery in language development, under the natural assumption that, all other things being equal, more complex configurations are fully mastered later than simpler ones. We have systematically tested this prediction through a task of forced choice of grammatical form, and shown it to be correct in language learners acquiring Italian.

References

9 But see fn.8.


Jaeger, T. F., 2008. Categorical data analysis: Away from ANOVAs (transformation or not) and towards logit mixed models. *Journal of Memory and Language*, 59(4), 434-446.


The selective development of Agreement in Early Italian

Verb movement: The contrast between English and Italian

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This paper discusses V features, nominative case checking and V movement in Chomsky’s (1995, 2001) minimalist program, explains certain facets of the English subjunctive and imperative, and contrasts the difference of V movement between English and Italian. I propose the V feature specifications [‒Tense, +Agr] and [+Tense, ‒Agr] for the English subjunctive and imperative respectively. Under this analysis, the auxiliary do can be inserted solely into [+Tense], which is an independent case checker, while [+Agr] is a dependent case checker which must be activated by another head under adjacent head-to-head relation (Raposo 1987).

It is further illustrated that the finite V carries [+Tense, +Agr] in present-day English, but [+Tense, +Agr, +Mood] for earlier English and other European languages such as Italian. The claim is that the diachronic change of V movement should not be attributed to any impoverishment of agreement morphology but to the demise of mood morphology, and that V raising can be accounted for in terms of the strength of I by counting the number of positive features: the more, the stronger. The peculiar behavior of inflected verbs in Italian negative imperatives can be explained by setting up NegP which blocks imperative V raising from I to C.

1. Introduction
This paper offers a solution of V (Verb) movement for English and Italian, on the basis of syntactic features deriving from morphological verbal inflections in the sense that such syntactic features (or categories) as Tense and Agreement originally stem from verbal morphology. In Chomsky’s (1995, 2001) minimalist program, I will discuss the peculiarity of English verbal behavior, including two ‘idiosyncratic’ constructions: the subjunctive and the imperative.

The claim is that, contrary to widely held belief (e.g. Vikner 1997; Rohrbacher 1999 among many others), the diachronic change of V movement should not be attributed to any version of the impoverishment of agreement morphology, but to the loss of mood morphology which started in the period of Middle English as

*This paper is based on part of the research I undertook during my stay in Siena, Italy in academic year 2010-2011. I am grateful to my advisors Luigi Rizzi and Adriana Belletti, and to my colleagues Cristiano Chesi and Emilio Servidio, to name only two, and to Guglielmo Cinque and Anna Cardinaletti who arranged and attended my presentation in Venice. Thanks are also due to Joseph Macadam for reading earlier versions of this paper as an English native speaker with a working knowledge of Italian. Needless to say, any remaining errors are my own responsibility.
contended by Murakami (1992). I will pursue this argument by referring to some historical evidence in English and comparing English with Italian, the most direct descendent from Latin of all Romance languages in the Indo-European family.

2. V movement in English

2.1. V features

V features are essentially based on verbal morphology. Table 1 illustrates a verb paradigm of regular inflection in Old English (OE, c.700-1100), adapted from Mitchell and Robinson (2007: 46):

<table>
<thead>
<tr>
<th>Present</th>
<th>Indicative</th>
<th>Subjunctive</th>
<th>Imperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sg ic</td>
<td>ic fremme</td>
<td>fremme</td>
<td>ic fremme</td>
</tr>
<tr>
<td>2nd Sg þu</td>
<td>þu fremest</td>
<td>fremme</td>
<td>þu fremme</td>
</tr>
<tr>
<td>3rd Sg he</td>
<td>he fremeþ</td>
<td>fremme</td>
<td>he fremme</td>
</tr>
<tr>
<td>1st Pl we</td>
<td>we fremmaþ</td>
<td>fremmen</td>
<td>we fremmaþ</td>
</tr>
<tr>
<td>2nd Pl ge</td>
<td>ge fremmaþ</td>
<td>fremmen</td>
<td>ge fremmaþ</td>
</tr>
<tr>
<td>3rd Pl hi(e)</td>
<td>hi(e) fremmaþ</td>
<td>fremmen</td>
<td>hi(e) fremmaþ</td>
</tr>
</tbody>
</table>

This paradigm demonstrates that the past morpheme is *ed*, that the subjunctive morpheme is *e*, and that the second singular forms for indicative, subjunctive, and imperative are distinct from each other (*fremest, fremme, and freme* respectively). There was thus a positive V feature ‘Mood’ (M) in OE. In addition to T (Tense) and Agr (Agreement), OE finite verbs carried [+M], the value of which can be either indicative, subjunctive, or imperative. The V feature matrices for OE must therefore be as follows:

<table>
<thead>
<tr>
<th>T</th>
<th>Agr</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicative</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Subjunctive</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Imperative</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

In the period of Middle English (ME, c.1100-1500), however, subjunctive morphology ceased to constitute part of verbal inflection. The verbal inflections which encoded the subjunctive or indicative distinction had ceased to exist in later ME (Traugott 1972: 148-149). As a matter of course, what followed the loss of
mood morphology was the loss of Mood as a positive V feature, yielding the hypothetical system represented in Table 3:

<table>
<thead>
<tr>
<th>Table 3: Hypothetical stage in the history of English V features</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Indicative</td>
</tr>
<tr>
<td>Subjunctive</td>
</tr>
<tr>
<td>Imperative</td>
</tr>
</tbody>
</table>

*I do not assume that this stage actually existed, but I rather suppose that the features in Table 2 and those in Table 4 overlapped for a considerable time, covering the period of Early Modern English (EModE, c. 1500-1700). We will see some historical evidence for this in §2.2.*

English could never have maintained three different moods at this stage of identical feature matrices. With the demise of Mood, the inevitable consequence was a reaction to conserve the mood distinction – namely, the change of feature matrices for the subjunctive and imperative, as depicted in Table 4:

<table>
<thead>
<tr>
<th>Table 4: V features for present-day English</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Indicative</td>
</tr>
<tr>
<td>Subjunctive</td>
</tr>
<tr>
<td>Imperative</td>
</tr>
</tbody>
</table>

Put differently, the V feature specifications underwent this change for the three moods respectively, as shown in Table 5:

<table>
<thead>
<tr>
<th>Table 5: V feature reinterpretation in English history</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicative:</td>
</tr>
<tr>
<td>Subjunctive:</td>
</tr>
<tr>
<td>Imperative:</td>
</tr>
</tbody>
</table>

The motivation for this feature reduction is that syntax compensated for the disappearance of mood morphology at the expense of finiteness in the subjunctive and imperative. That is to say, as long as the English verb was positively specified for Mood, it could be recognized as either indicative, subjunctive, or imperative by that positive feature. After this feature was lost, however, by making the subjunctive [−T] and the imperative [−Agr], it became possible to distinguish these from each other and from the indicative, but only at the cost of their finiteness in terms of the number of positive V features. I will argue for the specifications of their respective V features for the following four reasons:

Firstly, there is no tense concord in subjunctives; a subjunctive that-clause never undergoes the sequence of tenses when embedded in its preceding main clause in the past tense:
(1) I demanded that he leave/*left.

Even the past subjunctive were cannot be employed in this context:

(2) The chairperson decreed that the meeting be/*were adjourned.

This is because of the absence of Tense in English subjunctives.

Secondly, the crucial criterion for either positive or negative Tense is do-support: by definition, [+T] allows do to be inserted, while [−T] prohibits it because the auxiliary do is a dummy tense carrier. In other words, it is Tense and nothing else that the auxiliary do actually has to support. Thus, indicatives and imperatives can accommodate do, while subjunctives and infinitives cannot.1

(3)a. Indicative: I did pass the exam.
   b. Subjunctive: I demand that he (*do) leave.
   c. Imperative: Do come to our new house.
   d. Infinitive: You make me (*do) feel happy.

Thirdly, the claim that imperatives are tensed with no Agr can be supported by somewhat peculiar constructions, in which the imperative do never inflects for agreement even in the presence of an overt subject like a third person singular one or archaic thou (Shakespearean examples are borrowed from Ukaji 1978: 79, 89):

(4)a. Everybody do/*does sit down.
   b. Don’t/*Doesn’t anybody touch this wet paint.
   c. Now do/*dost thou watch, for I can stay no longer.
      − Shakespeare (1591: I.iv.18) *King Henry VI*
   d. Do/*Dost not thou, when thou art king, hang a thief.
      − Shakespeare (1597: I.ii.69) *King Henry IV*

Due to syncretism, nominative you is identical in form to accusative you, but (4c) and (4d) illustrate that in EModE, nominative thou, instead of accusative thee, was employed as an imperative subject, sometimes with the auxiliary do carrying no agreement morpheme. Contrary to the commonly held view (e.g. Potsdam 1998), imperatives are not tenseless but tensed for present, and this Tense – sometimes embodied as do – may check off the nominative case of its subject. In Chomsky’s (2001: 3-6) discussion, case checking is also a process of feature checking where a category with uninterpretable features called a Probe checks them against the same interpretable features of another category called a Goal during the operation Agree. A Probe with uninterpretable features looks down in the c-command domain for a Goal with interpretable features, and gets the uninterpretable features checked, valued and deleted.

1 If the auxiliary do is inserted in that-clauses at all, this means that they are not subjunctive but indicative. So the following example is an indicative clause, even if it seems subjunctive in the context:

(i) We recommend that you do not go there alone.
Fourthly, given that (not Agr but) Tense is an independent case checker as shown in (4), the subjunctive Agr must be responsible for its nominative subject in the absence of Tense. Following Raposo (1987), who discussed nominative Case assignment in European Portuguese (EP) inflected infinitives, Agr is arguably a dependent case checker which has to be activated by another head under head-to-head adjacency. I maintain here that nominative case in the English subjunctive is analogous to that in the EP inflected infinitive, the I of which visibly consists of \([-T, +Agr]\) with agreement morphology but no tense. In both the constructions, the C position that introduces an English subjunctive or an EP agreeing infinitive must be filled with something overt – *that* in English or raised V in EP – in order to activate Agr:

(5) I asked \([C \text{that}/*\phi]\) he take the medicine.
(6a) *O Manel pensa \([C \phi]\) os amigos \([i \text{ter-em}]\) levado o livro.

b. O Manel pensa \([C \text{ter-em}]\) os amigos \([i t]\) levado o livro.

the Manel thinks have-Agr his friends taken the book

‘Manel thinks that his friends have taken the book.’

Raposo (1987) proposed that nominative Case in the EP inflected infinitive (6b) should be assigned as follows with \(\text{terem}\) in C:

(7) O Manel pensa \([CP[C \text{ter+Agr}] [IP os amigos [I t] levado o livro]]\).

In much the same manner, Agr activation in the English subjunctive is as follows with *that* in C (updated from GB theory to Minimalist Program):

(8) I asked \([CP[C \text{that}][IP \text{he} [i +Agr] take the medicine]]\).

If *that* is missing in (8), the empty C breaks the head-to-head chain of Agr activation. This system of nominative case checking theoretically explains why *that* in subjunctives is not so readily omitted as *that* in indicatives in present-day English. Murakami (2000) statistically confirmed at a significant frequency that *that* could have been dropped in EModE subjunctives with \([+T, +Agr, +M]\), while the presence of *that* is quite obligatory in present-day subjunctives with \([+Agr]\) alone.2

2 Incidentally, Belletti (2009: 75-78) maintains that an Italian past participle with only Agr cannot check case unless it raises to C. Hence (i) is ungrammatical:

(i) * *Maria arrivata, Gianni tirò un sospiro di sollievo.

(ii) Arriva-t-a Maria, Gianni tir-ò un sospiro di sollievo.

arrive-pstptl-f Maria.nom, Gianni.nom draw-pst.3sg a sigh of relief

‘When Maria arrived, Gianni was relieved.’
Indeed, there are several similarities between English subjunctives and EP agreeing inflectives, as summarized in Table 6:

<table>
<thead>
<tr>
<th>Clause status</th>
<th>Eng. Subjunctive</th>
<th>EP Inflected Infinitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject DP</td>
<td>subordinate</td>
<td>subordinate</td>
</tr>
<tr>
<td>V feature</td>
<td>+Agr</td>
<td>+Agr</td>
</tr>
<tr>
<td>C position</td>
<td>that</td>
<td>V</td>
</tr>
<tr>
<td>Case checker</td>
<td>‘activated’ Agr</td>
<td>‘activated’ Agr</td>
</tr>
<tr>
<td>Agr activation</td>
<td>adjacent head-to-head relation thru lexically filled C</td>
<td></td>
</tr>
</tbody>
</table>

I therefore assume the following feature matrices for the three English moods in present-day English: [+T, +Agr, –M] for the indicative, [–T, +Agr, –M] for the subjunctive, and [+T, –Agr, –M] for the imperative. Recall here that [+T, +Agr, +M] characterizes the OE finite clause. The number of positive V features – whether one, two, or three – must have something to do with V movement.

2.2. V raising as feature raising

V movement has been much discussed in the split I hypothesis originally advocated by Pollock (1989), but the English subjunctive and imperative constructions have seldom been considered for any version of the hypothesis, except by Pollock (1997). The differences of V movement among the English moods, however, can be explained by the feature-oriented principle of language in the single I system as stated in Table 7. As pointed out by Murakami (1992), the dichotomy of V features – either strong or weak – does not work; instead there must be three degrees of strength involved in V movement. I therefore propose the following hypothesis on the strength of I, thereby insisting that the number of positive V features is literally to be counted with respect to V movement:

<table>
<thead>
<tr>
<th>T</th>
<th>Agr</th>
<th>M</th>
<th># of +</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>3</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>+</td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

It is true that the participle *arrivata* raised into C in (ii), but outside the CP there is nothing that should activate [+Agr] on *arrivata*. We therefore cannot conclude that this is further evidence for nominative case checking through ‘activated’ Agr.

An anonymous reviewer pointed out that the argument for these matrices in fact enforces the assumption in which AgrP and TP are distinct projections and act as independent probes. It is true that we can dub IP with only [+Agr] as AgrP and that with only [+T] as TP – this is a matter of labeling. In this article we adopt the most general term ‘IP’, a bundle of features as originally proposed by Chomsky (1986).
*The featural positiveness per se must not be confused with the strength of I. A singleton positive feature such as [+Agr] or [+T] is not strong itself. Rather, I with one positive feature is weaker than I with two positive features, which in turn is weaker than I with three positive features.

The description given above concerns overt syntax from SATISFY through SPELL-OUT in Chomsky’s (1995) terminology. I assume that these three features are specified on V in the lexicon from the beginning, and then checked off against I through V movement. Following Chomsky’s (1995: 264) notion of “generalized pied-piping,” Roberts (1998) refines V raising as Move F or feature raising. By the operation of Move F, it is not V per se but V features that raise and check themselves against I, pied-piping V when they are strong enough to attract it. If they are weak, only features invisibly raise in syntax before SPELL-OUT, leaving V behind.

This concept of feature raising seems to comply with the Chomskyan Probe-Goal relationship adequately. Taking a radical version of the lexicalist hypothesis in which a fully inflected form appears under V, its V features should be interpretable as a Goal with overt, concrete suffixes of tense, mood, and agreement. On the other hand, I is a bundle of abstract, uninterpretable features, which serves as a Probe looking for the corresponding Goal that is c-commanded by the Probe. Thus in V-to-I movement, uninterpretable I features may ‘probe’ for its interpretable V features in order to check themselves against the identical features in their c-commanding relationship from head to head. Unless both features ‘match,’ the derivation will crash, resulting in ungrammaticality (Chomsky 1995, 2001). Let us adopt this concept of Roberts (1998) here along with Chomsky (2001).

We assume the following clausal structure with the non-split, unitary I system for English (as for the position of not, see Murakami 2007 for a full discussion):4

(9)

---

4 The architecture concerning not in (9) is based on Radford (1988: 66-69), but Murakami (2007) argues for it quite independently. I would rather not go any further into this issue because of the lack of space. In the case of Italian negation, I will admit the status of a maximal projection for non in §3.2.
Below are concrete examples of derivation. No main verbs raise in English with two positive features:

(10)a. *John loves always Mary.

b. John \([i_{+T}, +Agr}] [VP always loves(+T, +Agr) Mary].

\[\text{Match}\]

The auxiliary \textit{do} should be base-generated, checking features simultaneously, rather than being inserted later (Murakami 1993):

(11) John \([i_{does(+T, +Agr)}] \text{not love } Mary.

\[\text{Match w/ do-support}\]

With two plus features, strong enough for auxiliaries, \textit{be} moves overtly in indicatives:

(12) You \([i_{are(+T, +Agr)}] \text{not } [V t] \text{lenient.}

\[\text{Match w/ V raising}\]

On the other hand, even \textit{be} cannot raise to the weaker \textit{I} with only one plus feature in either subjunctives or imperatives:

(13)a. I insist that you not be lenient.

b. *I insist that you be not lenient. (obsolete)

(14)a. Do not be lenient.

b. *Be not lenient. (obsolete)

Subjunctive derivation does not allow \textit{do} in its untensed \textit{I}, hence [+Agr] raises:

(15) I insist that you \([i_{+Agr}] \text{not } [VP be(+Agr) lenient].

\[\text{Match}\]

In the affirmative, an imperative may optionally employ \textit{do} in its tensed \textit{I}, while in the negative, it must always do so:

(16)a. \([i_{+Tense}] [VP Be(+Tense) lenient].

\((Do)\)

\[\text{Match}\]

b. \([i_{Do(+Tense)] } \text{not } [VP be lenient].

\[\text{Match w/ do-support}\]

Looking back to historical English, the facts of V movement indicate that not only \textit{be} and perfective \textit{have} but also main verbs unexceptionally moved from V to I in earlier English.
Figure 1 (adapted from Nakano 1994: 311; cf. Traugott 1972: 200; Roberts 2007: §1.3) indicates the time frame of obsolete and current word orders. Whether indicative, subjunctive, or imperative, all Vs used to raise in the past, with strong features [+T, +Agr, +M]. More importantly, old and new constructions occurred simultaneously in EModE:

(17) a. Indicative: How didst thou escape? How camest thou hither?  
   — Shakespeare (1611: II.ii.123) *The Tempest*

   b. Imperative: Speak not, reply not, do not answer me;  
   — Shakespeare (1594: III.v.164) *Romeo and Juliet*

Any version of Agr parameterization as to whether V raises or not (e.g. Rohrbacher 1994; Vikner 1997) will have difficulty in explaining this overlap. Such a problem does not arise in the present theory, given that the reductions of features discussed in §2.1 took place gradually, allowing variations from verb to verb, from mood to mood, and from dialect to dialect.

3. V movement in Italian

3.1. V features and word order

Italian is a Latinate language with an extremely rich variety of verbal morphology. There are at least three regular conjugations: the first, with theme vowel -a-, e.g. parlare ‘speak’; the second, with theme vowel -e-, e.g. prendere ‘take’; the third, with theme vowel -i-, e.g. dormire ‘sleep’. Here I would like to propose that all Italian finite verbs raise since they carry three positive features [+T, +Agr, +M]. Consider a paradigm of the first regular verb pagare ‘pay’, adapted from Nishimoto and Saito (1982: 19):

---

5 Following Napoli and Vogel (1990), there is no motivation for establishing a different conjugation class within -ere verbs. Many irregular -ere verbs maintain patterns of regularity, and these patterns cut across the range of verbs with theme vowel -e-. Similarly, the -isc- in -ire verbs does not count as another conjugation class, since -isc- appears only in certain person/number forms in present tense, and never affects the entire verbal paradigm.
Table 8: Weak inflection of the Italian verb pagare ‘pay’

<table>
<thead>
<tr>
<th></th>
<th>Indicative</th>
<th>Conditional</th>
<th>Subjunctive</th>
<th>Imperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>1st Sg io</td>
<td>pago</td>
<td>pagherei</td>
<td>paghi</td>
</tr>
<tr>
<td>r</td>
<td>2nd Sg tu</td>
<td>paghi</td>
<td>pagheresti</td>
<td>paghi</td>
</tr>
<tr>
<td>e</td>
<td>3rd Sg lui</td>
<td>paga</td>
<td>pagherebbe</td>
<td>paghi</td>
</tr>
<tr>
<td>s</td>
<td>1st Pl noi</td>
<td>paghiamo</td>
<td>pagheremmo</td>
<td>paghiamo</td>
</tr>
<tr>
<td>n</td>
<td>2nd Pl voi</td>
<td>pagate</td>
<td>paghereste</td>
<td>paghiate</td>
</tr>
<tr>
<td>t</td>
<td>3rd Pl loro</td>
<td>pagano</td>
<td>pagherebbero</td>
<td>paghino</td>
</tr>
<tr>
<td>I</td>
<td>1st Sg io</td>
<td>pagavo</td>
<td>pagassì</td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>2nd Sg tu</td>
<td>pagavi</td>
<td>pagassì</td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>3rd Sg lui</td>
<td>pagava</td>
<td>pagasse</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>1st Pl noi</td>
<td>pagavamo</td>
<td>pagassimo</td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>2nd Pl voi</td>
<td>pagavate</td>
<td>pagaste</td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>3rd Pl loro</td>
<td>pagavano</td>
<td>pagassero</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>1st Sg io</td>
<td>pagai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>2nd Sg tu</td>
<td>pagasti</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>3rd Sg lui</td>
<td>pagò</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o</td>
<td>1st Pl noi</td>
<td>pagammo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t</td>
<td>2nd Pl voi</td>
<td>pagaste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>3rd Pl loro</td>
<td>pagarono</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>1st Sg io</td>
<td>pagherò</td>
<td></td>
<td></td>
</tr>
<tr>
<td>u</td>
<td>2nd Sg tu</td>
<td>pagherai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t</td>
<td>3rd Sg lui</td>
<td>pagherà</td>
<td></td>
<td></td>
</tr>
<tr>
<td>u</td>
<td>1st Pl noi</td>
<td>pagheremo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>2nd Pl voi</td>
<td>pagherete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>3rd Pl loro</td>
<td>pagheranno</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The verb pagare is conjugated regularly except for the orthographic appearance of h between g and front vowels.

As illustrated in Table 8, in Italian there are basically six different verb endings for so many person/number agreement combinations. Putting aside any aspctual complex tense composed of an inflected form of avere/essere ‘have/be’ and a past participle, there are four tenses: present, imperfect, remote past, and future. There are some discernible morphemes: -[a]/- for imperfect tense, -er- for future tense and conditional mood, and -[a]/ss- for imperfect subjunctive. With these agreement, tense, and mood morphemes, Italian retains three other moods besides indicative: subjunctive in the present and imperfect tenses, and conditional and imperative in the present tense. The Italian finite verb is thus positively specified for Mood as well as Tense and Agreement.

The common word order in Italian is SVO, and the position of medial adverbs is between V and O, while the position between S and V is ungrammatical, in the same way as French, another Romance language (cf. Emonds 1978; Pollock 1989). This is true of all the four moods; the (a)-versions below are grammatical while the (b)-versions are ruled out.6
(18)a. Indicative: Rita pag-a sempre $t_V$ tutto.
   Rita pay-prs.ind.3sg always all
   ‘Rita always pays all.’

   b. ?*Rita sempre pag-a tutto.
      always pay-prs.ind.3sg

(19)a. Conditional: Rita pagh-er-ebbe sempre $t_V$ tutto, se
      av-ess-e tant-i sold-i.
      have-impf.sbj-3sg many-m.pl money-m.pl
      ‘Rita would always pay all, if she had a lot of money.’

   b. ?*Rita sempre pagh-er-ebbe, se avesse tanti soldi.
      always pay-cond-prs.3sg

(21)a. Subjunctive: Pens-o che Rita pagh-i sempre $t_V$ tutto.
      think-prs.ind.1sg that Rita pay-prs.sbj.3sg always all
      ‘I think Rita would always pay all.’

   b. ?*Penso che Rita sempre pagh-i tutto.
      always pay-prs.sbj.3sg

(22)a. Imperative: Pag-a sempre $t_V$ tutto.
      pay-prs.imp.2sg always all
      ‘Always pay all.’

   b. *Sempre pag-a tutto.
      always pay-prs.imp.2sg

Researchers agree that finite Vs may move up to the highest inflectional head in Italian (Belletti 1990, 1994, 2009; Cinque 1999; Zanuttini 1997a, 1997b). For Belletti (1990, 1994, 2009), it is AgrsP, which can even multiply in her AgrsP recursion. Let us, however, maintain the non-split I/C system, in which ‘always’ modifies VP at its left boundary, and all finite Vs raise from V to I in all the four moods in Italian. Take (18a) as an example:

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6 Some native speakers say that the (b)-versions sound better if *sempre* is stressed. But even so (21b) is still ungrammatical, perhaps because imperative verbs raise higher than other inflected forms (see §3.3). On the other hand, Belletti (1990: 61) in her analysis refers to (i) below, in which the subject is left-dislocated and *spesso* is exceptionally topicalized, as grammatical:

   (i) Gianni spesso sbagli-a.
       ‘John often makes a mistake.’
The three V features, interpretable, strong enough to lift an inflected V, do so by moving from V to I over sempre ‘always’, in order to check themselves against uninterpretable features in I (see §2.2), and bring out the grammatical word order.\(^\text{7}\)

The same holds true for ‘light’ or more functional verbs such as essere/avere ‘be/have’:

(23) a. Indicative: Rita è sempre allegra.

Rita be.prs.ind.3sg always cheerful-f.sg

‘Rita is always cheerful.’

b. ?*Rita sempre è allegra.

always be.prs.ind.3sg


Rita be-cond-prs.3sg always cheerful-f.sg if can-impf.sbj-3sg sing well

‘Rita would always be cheerful, if she could sing well.’

b. ?*Rita sempre sa-r-ebbe allegra, se sapesse cantare bene.

always be-cond-prs.3sg


think-prs.ind.1sg that Rita be-prs.sbj.3sg always

\(^{7}\) According to Belletti (1990: 70-76), the infinitive verb patterns exactly the same as the finite verb with respect to positions of adverbs. This means that it raises from V to I when it carries the weakest specifications, namely [−T, −Agr, −M], which should not lift any verb. We will leave this matter open.
Verb movement

allegr-a.
cheerful-f.sg
‘I think Rita would always be cheerful.’

b. ?*Penso che Rita sempre si-a allegra.
always be-prs.sbj.3sg

(26)a. Imperative: Si-i sempre tV allegr-a.
be-prs.imp.2sg always cheerful-f.sg
‘Always be cheerful.’
b. *Sempre si-i allegra.
always be-prs.imp.2sg

Just as in the examples of the main verb, the imperative in (26b) is the worst in grammaticality of all, and the other (b)-examples improve if *sempre* is stressed.8

Indeed, the range of distributional possibilities is wider in sentences containing a complex tense (Belletti 1990: 46):

(27)a. Probabilmente Gianni ha sbaglia-to.
Probably Gianni have.prs.ind.3sg mistake-pastptpl
‘Gianni probably made a mistake.’
b. Gianni probabilmente ha sbagliato.
c. Gianni ha probabilmente sbagliato.
d. Gianni ha sbagliato, probabilmente.

The following sentences are cited from Cinque (1999: 49):

(28)a. Mi ero francamente purtroppo evidentemente formato una pessima opinione di voi.
me be-past.ind.1sg frankly unfortunately clearly form-pastptpl a worst opinion of you
‘Frankly I unfortunately had clearly formed a very bad opinion of you.’
b. Francamente mi ero purtroppo evidentemente formato una pessima opinione di voi.
c. Francamente purtroppo mi ero evidentemente formato una pessima opinione di voi.
d. Francamente mi ero purtroppo evidentemente formato una pessima opinione di voi.

Assuming his multiple layers of functional heads with adverbs in their respective specifiers, Cinque (1999) argues that all examples in (28) are derived by raising

8 Emilio Servidio (p.c.) cited this pair of examples, saying that (ii) is quite fine if *sempre* ‘always’ is focalized:
(i) Rita è spesso allegra.
(ii) No, Rita SEMPRE è allegra.
*SEMPRE* might then be located in (the specifier of) FocP in Rizzi’s (1997 among others) cartography, and this analysis could be applied to (i) in fn. 6. Suffice it to say that this Adv – V word order does not result from V remaining in situ. We leave this matter still open.
(mi) ero ‘(me) was’ step by step from head to head; in other words, while positions of adverbs are fixed, finite V moves and stops in various heads to the right of adverbs.

(29) Mi ero francamente $t_V$ purtroppo $t_V$ evidentemente $t_V$ formato

Belletti (p.c.) would now like to extend this analysis for (27) as well, but we will not go into Cinque’s (1990) hypothesis any further in this article. Limiting the number of maximal projections to the minimum in the spirit of Iatridou (1990), I traditionally assume that adverbs can adjoin to (any level of) these maximal projections (Murakami 2007). No matter how adverbs are analyzed and/or ordered, we agree on the point that all finite Vs raise in Italian. (See also fn. 6 and 8.)

In the interrogative construction, inversion does not usually take place, but rising intonation conveys the speaker’s intention of asking (Ichinose 2001: 90):

(30)a. Lei parl-a italiano?
   you.hon speak-prs.ind.2hon Italian
   ‘Do you speak Italian?’

b. Parl-a italiano?
   speak-prs.ind.2hon Italian

As is well-known since Rizzi (1982), Italian is a null subject language in which an overt subject is not required as in (30b). We assume that either in (30a) or (30b), the derivation is exactly the same as that in declaratives; with respect of V movement, V raises to I with three plus features, that is \([+T, +Agr, +M]\).

In wh-questions, the subject is located at the end of a sentence (Ichinose 2001: 91):

(31)a. Dove abit-a tua sorella?
   where live-prs.ind.3sg your sister
   ‘Where does your sister live?’

b. Che cosa prendi tu?
   which thing take-prs.ind.2sg you.nom
   ‘What will you have?’

Since Italian is a null subject language, overt subjects make an indexing effect, so that (31a), for example, sounds like ‘How about your sister?’ compared with the other people in the context (Emilio Servidio, p.c.). Putting aside the pragmatic effect, as deduced from the wh VS order, V has further moved from I to C in (31), confirming the strength of three V features again.

Italian subjects may come at the end of yes/no-questions, too, and whether in yes/no- or wh-questions, when the subject does not immediately follow the verb, it looks ‘extraposed’ at the end of a sentence:
(32) a. Dev-e partire domani Marco?
   must-prs.ind.3sg depart tomorrow Marco.nom
   ‘Does Marco have to leave tomorrow?’

b. Marco, dev-i partire domani?
   Marco, must-prs.ind.2sg depart tomorrow
   ‘Marco, do you have to leave tomorrow?’

c. Devi partire domani, Marco?
   ‘Do you have to leave tomorrow, Marco?’

In (32a), Marco is nominative, not vocative like (32b) and (32c), since the verb is inflected for third person singular and there is no pause between Marco and its preceding word. Here, however, I do not assume that the subjects are actually ‘extraposed,’ nor that the V is located in C position in (32a). Rather, following Wiland (2010) who discussed the VOS/OVS order for Polish, remnant movement of the I’ predicate should have applied after head movement in (32a).\(^9\) So the sentence should be derived as follows:

(33)

Thus in (32a), deve ‘has to,’ once its features are checked, remains in I with its subject Marco in Spec/IP.

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\(^9\) One might wonder whether an incomplete or intermediate projection such as I’ can ever move in syntax. One point I can defend is that constituents at one-bar level are not so incomplete as they appear, considering the fact that one is a pro-form for N’ and do so for V’ in English (Radford 1988). Otherwise, following the mainstream, I should introduce vP just above VP, so that I could move vP around as remnant movement. I will leave this matter open.
3.2. Negation

In Italian negation, the sentential negative adverb *non* appears in front of a finite verb or auxiliary:

(34) a. Rita non pag-a tutto.
Rita not pay-prs.ind.3sg all
‘Rita doesn’t pay all.’

b. *Rita paga non tutto.
pays not

(35) a. Rita non ha pag-ato tutto.
Rita not have.prs.ind.3sg pay-pastptpl all
‘Rita didn’t pay all.’

b. *Rita ha non pagato tutto.
has not

(36) a. Rita non è allegr-a.
Rita not be.prs.ind.3sg cheerful-f.sg
‘Rita is not cheerful.’

b. *Rita è non allegra.
is not

Unlike some other European languages such as Polish and Lithuanian (Murakami 2011a; c), pronominal clitics may intervene between *non* and the following finite verb or auxiliary:

(37) a. Non ci sono tant-e person-e in questa aula.
not here be.prs.ind.3pl many-f.pl person-f.pl in this classroom
‘There are not many people in this classroom.’

b. *Ci non sono tante persone in questa aula.
here not

(38) a. Non mi ricord-o.
not me.rflx remember-prs.ind.1sg
‘I don’t remember.’

b. *Mi non ricordo.
c. *Non ricordo mi.

(39) a. Non lo so.
not it.m.sg know.prs.ind.1sg
‘I don’t know it.’

b. *Lo non so.
c. *Non so lo.

(40) a. Non te lo do.
not you.dat it.acc give.prs.ind.1sg
‘I won’t give it to you.’

b. *Te lo non do.
c. *Non do te lo.

(41) a. Non me ne import-a nulla.
not me.dat that matter-prs.ind.3sg nothing
‘I don’t care at all.’

b. *Me ne non importa nulla.
c. *Non importa me ne nulla.
Neither finite Vs (as in the (b)-examples from (34) to (36)) nor clitic pronouns (as in those from (37) to (41)) can come in front of *non*.

Considering the two facts that finite Vs never move over *non* and that pronouns may intervene between *non* and V, it seems reasonable to place Italian *non* under the head of NegP (unlike English *not*, see (9) above):

This structure partially follows Belletti (1990; 1994; 2009) and Zanuttini (1997a; b) in that they regard *non* as the head of NegP. Belletti (2009: 20-27; 92-100; originally 1990; 1994) further analyzes *non* as a syntactic clitic which left-joins to V at the end of derivation, so that the Head Movement Constraint (Rizzi 1990) can be avoided in her structure as in (44):

(43)  Gianni non ha mai/più/ancora parla-to.
      Gianni not avere.prs.ind.3sg never/no longer/yet talk-pastptpl
      ‘Gianni did not talk at all/any more/yet.’
As is seen in (44), nominative subjects must occupy a certain position in front of *non*. Here are a couple of pronominal examples.

(45)a.  
I do not know.

b.  
He doesn’t say anything to us.

Assuming the structure in (42), the question that immediately arises is where these subjects should be. The position which looks readily available for them is the specifier of NegP. However, we would not address this issue any further in this article.

To summarize, *non* is a fixed head rather than a movable clitic, projecting its own maximal projection which prevents V from raising over *non*. The NegP is thus located immediately above IP (or any highest inflectional projection) in Italian.

3.3. Imperatives

Looking back into the paradigm in Table 8, the only imperative form that is morphologically distinct from the other indicative, conditional, and subjunctive

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Adriana Belletti (p.c.) rejected this possibility because she insists that negative adverbs such as *mai* and *più* occupy Spec/NegP as in (44). I would still put emphasis on the flexible distribution of adverbs, considering the fact that they can also come at the end of a sentence:

(i)  
Gianni non ha parlato mai/più/ancora.
forms for the same person is *paga*, i.e., the second person singular imperative. The remaining four forms of the imperative are identical to those of the subjunctive. Following Zanuttini (1997a: 105) and others, let us call the distinct form ‘true’ imperative, and the other imperative forms ‘surrogate’ or ‘suppletive’ imperative.

There are two great puzzles in Italian imperative syntax. One is the fact that ‘true’ imperatives cannot be negated. Instead of ‘true’ imperative forms, infinitive forms must be employed with *non*. Hence (46b) is ungrammatical, while (46c) is a good sentence:

    eat-prs.imp.2sg this-f.sg pizza
    ‘Eat this pizza.’

b. *Non mangi-a questa pizza.
   not eat-prs.imp.2sg
   ‘Don’t eat this pizza.’

c. Non mangi-are questa pizza.
   not eat-inf this pizza
   ‘Don’t eat this pizza.’

The other puzzle is the behavior of pronominal clitics in imperatives. If the object DP in (46) becomes pronominal, imperatives pattern as follows: In positive imperatives, the object must be encliticized like (a)-examples, and it cannot be a proclitic as ruled out in (b)-examples:

(47)a. Mangi-a-la.
    eat-prs.imp.2sg-it.f.sg
    ‘Eat it.’

   it eat-prs.imp.2sg
   ‘Eat it.’

(48)a. Mangi-ate-la.
    eat-prs.imp.2pl-it.f.sg
    ‘Eat it.’

b. *La mangi-ate.
   it eat-prs.imp.2pl
   ‘Eat it.’

On the other hand, pronominal objects can be either proclitic or enclitic onto a negative imperative V. Both (a)- and (b)-versions below are thus grammatical:

(49)a. Non mangi-ar-la.
    not eat-prs.imp.2sg-it.f.sg
    ‘Don’t eat it.’

b. Non la mangi-are.
   not it eat-prs.imp.2sg
   ‘Don’t eat it.’

(50)a. Non mangi-ate-la.
    not eat-prs.imp.2pl-it.f.sg
    ‘Don’t eat it.’

b. Non la mangi-ate.
   not it eat-prs.imp.2pl
   ‘Don’t eat it.’

In this section, we attempt to find an optimal solution to these two intricate problems in the Italian imperative.

3.3.1. Negative imperatives
Let us first of all answer this question: why cannot ‘true’ imperatives be negated with *non*? Rivero (1994) and Rivero & Terzi (1995), by discussing the same pattern
for negative imperatives in Spanish as in Italian, suggest that ‘true’ imperatives must raise up to C, but this I-to-C raising is prohibited due to the HMC by the intervening negative head, and this is the reason why ‘true’ imperatives are incompatible with negation in most Romance languages.

Recall here that the Adv – V word order of imperatives sounds worse in grammaticality than that of any other mood. To repeat the imperative examples:

(21)b. *Sempre pag-a tutto.
    always pay-prs.imp.2sg all
(26)b. *Sempre si-i allegra.
    always be-prs.imp.2sg cheerful

We may suspect that this is because ‘true’ imperative paga and sii occupy the C position and lower adverbs such as sempre may not adjoin so highly as above C. Let us therefore follow Rivero’s (1994: 91) line of reasoning:11

“In languages like Spanish, C is an indicator of Illocutionary force, and holds the Imperative feature that the verb with imperative morphology must reach.

… The negation prevents V from reaching this position, so [‘true’] imperative sentences cannot be negated.”

However, we have a slight modification here. It may be not only the imperative feature, but also all those three positive features, i.e. [+T, +Agr, +M] that exist there in C. These features should be checked off as uninterpretable, after attracting the same interpretable features of ‘true’ imperative V. Interpretable features do not disappear but remain on V, to be often reused for double-checking. (See below. See also Murakami (2011c: §3.3) for the argument of double-checking V features.)

The second point to consider is why infinitive forms are employed for second person singular imperatives in the negative. Kayne (2000) argues that in that case, there should exist a null modal corresponding to the auxiliary stare ‘be’ in this Paduan example (Kayne 2000: 102):

(51) No sta parl-are!
    not.be.imp.2sg speak-inf
    ‘Don’t speak!’

Importantly to his argument, there is a striking contrast between negative imperatives and infinitives. Compare (46c) above with authentic infinitive clauses such as in (52), where proclitics are banned and enclitics are exclusively permitted:

(52)a. Gianni pensa di non mangi-ar-la da solo.
    Gianni thinks of not eat-inf-it by sole
    ‘Gianni thinks that he shouldn’t eat it by himself.’

---

11 By adopting Rivero (1994) and Rivero & Terzi (1995), we reject Zanuttini (1994; 1997a). It neither holds true that non and ‘true’ imperative V do not compete for the same position (Zanuttini 1994), nor that ‘true’ imperative V cannot raise due to its poor morphology into MoodP immediately below non (Zanuttini 1997a).
b. *Gianni pensa di non la mangiare da solo.
   not it eat-inf

Recall that in negative imperatives, both patterns are well-formed:

(49)a. Non mangiare-la.
   b. Non la mangiare.
(50)a. Non mangiare-ate-la.
   b. Non la mangiare-ate.

Kayne (2000: 99) insists that in negative infinitive imperatives, clitics may climb up and left-adjoin the empty modal, thus making (49b) a good imperative, while the infinitive in (52b) is ungrammatical without such a null modal.

Cardinaletti (1995) finds this empty modal hypothesis problematic. She illustrates that if there were a null modal, the following (b)-examples would be grammatical, but they are actually not:

(53)a. Non devi mai dire questo!
   not must-prs.ind.2sg never say this!
   ‘Don’t ever say this!’
   b. *Non φ mai dire questo!
   c. Non dire mai questo!
(54)a. Non devi mai dirlo!
   say-it.m.sg
   ‘Don’t ever say it!’
   b. *Non φ mai dirlo!
   c. Non dirlo mai!
(55)a. Non lo devi mai dire!
   it.m.sg
   ‘Don’t ever say it!’
   b. *Non lo φ mai dire!
   c. Non lo dire mai!

Here Cardinaletti (1995: 6-7) explains:
   “the infinitival verb follows a negative adverb such as mai when the modal is overt, but precedes it with the putative covert modal. … In order to exclude the (b)-sentences …, movement of the infinitive to the empty modal must be forced somehow (before Spell-out). This results into[ sic] the order ‘infinitive – adverb’ ….”

Following Cardinaletti (1995), we conclude that infinitival imperative verbs move from V to I. That is to say, they look morphologically infinitive, but syntactically finite. Under the present hypothesis, ‘infinitive’ imperatives carry the V features [+T, +Agr, +M] – this is just like archaic English imperatives are positively

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12 I am opposed to the concept of null modals in general. Many researchers, e.g. Nomura (2006), contend that an empty modal exists in English subjunctives. However, the subjunctive I is composed of abstract features [−Tense, +Agr] as discussed in §2.2.
specified for Tense, Agr, and M, so V raising occurs there due to the strong features. (See §2.2.)

The structure in (56) illustrates what we have so far arguing for:

\[(56)\]

\[
\begin{array}{c}
\text{CP} \\
\text{NegP} \\
\begin{cases}
+T \\
+Agr \\
+M
\end{cases}
\end{array}
\]

Landing site for ‘true’ imperatives

Spec

I

\[
\begin{array}{c}
\text{Non} \\
\text{I’}
\end{array}
\]

VP

V

Landing site for ‘infinitive’ imperatives

3.3.2. The position of clitics

Let us next solve the other puzzle: the behavior of clitics. Unlike negative imperatives, both ‘true’ and ‘surrogate’ imperatives pattern as follows with respect to the position of object clitics. To repeat the relevant examples:

(47)a. Mangi-a-la.  
\[\text{eat-prs.imp.2sg-it.f.sg}
\text{‘Eat it.’}\]

\[\text{it eat-prs.imp.2sg}\]

(48)a. Mangi-ate-la.  
\[\text{eat-prs.imp.2pl-it.f.sg}
\text{‘Eat it.’}\]

b. *La mangi-ate.  
\[\text{it eat-prs.imp.2pl}\]

First person plural imperatives exhibit the same pattern as the above examples:

(57)a. Mang-iamo-la.  
\[\text{eat-prs.imp.1pl-it.f.sg}
\text{‘Let’s eat it.’}\]

b. *La mang-iamo.  
\[\text{it eat-prs.imp.1pl}\]

In the case of third or honorific second persons, however, even positive imperative Vs must follow clitics (Ichinose 2001: 223):

\[\text{eat-prs.imp.3sg-it.f.sg}
\text{‘Eat it.’}\]

b. La mang-i.  
\[\text{it eat-prs.imp.3sg}\]
Verb movement

(59) a. *Mangi-no-la.  b. La mangi-no.
   eat-prs.imp.3pl-it.f.sg  it eat-prs.imp.3pl
   ‘Eat it.’

Compare the above examples with indicative sentences, which only allow proclitics:

(60) a. *Mangi-o-la.  b. La mangi-o.
   eat-prs.ind.1sg-it.f.sg  it eat-prs.ind.1sg
   ‘I eat it.’

It is relatively simple to explain why the pattern in (47b) is ruled out. As argued in the previous section, the ‘true’ imperative V is located in the C position, and proclitics just cannot climb up to the specifier of CP.

In much the same line of reasoning, Cardinaletti (1995: 13) suggests that in positive inflected imperatives, proclitics must not climb up to the specifier next to the inflected imperative V, which should have raised higher, perhaps with more features to check, than infinitival imperative Vs. Let us partially adopt this solution and call MoodP or MP the functional phrase to accommodate the higher-positioned imperative V. For (48a), for instance, the derivation should be diagrammed like this:

(61)
Since there is no possibility for clitics to be in the Spec/MP, la must attach onto the end of mangiate when the V raises further up to M. The suggestion here is that M, as well as I, carries uninterpretable features [+T, +Agr, +M], which still probe for its corresponding interpretable features, and that the interpretable features [+T, +Agr, +M] remain on the V mangiate after V-to-I raising is complete. Following Chomsky (2001), uninterpretable features are to disappear after being checked, but it is only uninterpretable features that are deleted, while interpretable features remain the same until LF. What I propose here is that interpretable features serve the purpose of double-checking (see Murakami (2011c) for a similar discussion on the Polish subjunctive). Essentially the same argument may also apply for ‘true’ imperatives with V in C position after I-to-C raising; if V is found in any head higher than I, it has been triggered to move up there by double-checking the three strong features, perhaps with the imperative illocutionary force (Rivero & Terzi 1995).

In ‘surrogate’ imperatives for third persons as in (58) and (59), the word order ‘clitic – V’ attests that the V is located in I (for reasons unclear to me). Table 9 thus summarizes the positions of V in Italian imperatives:

<table>
<thead>
<tr>
<th>Position of V in Italian imperatives</th>
<th>Position of V</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘True’ imperative</td>
<td>C</td>
</tr>
<tr>
<td>‘Surrogate’ imperative for 1st and 2nd person</td>
<td>M</td>
</tr>
<tr>
<td>‘Surrogate’ imperative for 3rd person</td>
<td>I</td>
</tr>
<tr>
<td>Negative imperative</td>
<td>I</td>
</tr>
</tbody>
</table>

The behavior of clitics has turned out to be invariant. Rather, the landing sites of imperative Vs are different from one another, depending on the kinds of imperatives. Here it is reasonable to speculate that NegP must always select IP as its complement, hence nullifying MP, just as Zanuttini (1996) suggested that NegP must select TP in Italian negative imperatives. However, we would not pursue this possibility any further in this article.

4. Conclusion
The conclusion that I had drawn earlier for other European languages in Murakami (1992, 2003, 2011a, b, c) has been reached here again with the Italian data adding further support. I have provided a unified account of V movement in English and Italian within essentially the single I system where I is a bundle of features which should be checked against by V features. Whether or not V may raise with the interpretable V features is determined by the number of positive features: the more, the stronger. To repeat Table 7 here, integrating Italian:

13 When and how the clitic object is encliticized onto V is beyond the scope of this article. See Rizzi (2000) for a discussion.
In general, the different behavior of V movement between English and Italian can be accounted for, not by building up numerous maximal projections, but in terms of feature matrices. It has been argued in §2 that the English verb has undergone natural reduction of finiteness after the demise of mood morphology, resulting in the different verbal behavior among the three moods.

By contrast, all finite Vs in Italian raise to I due to three strong features, including ‘infinitive’ imperatives in the negative. ‘True’ imperatives even move up to C, and certain positive imperatives up to M, perhaps due to some imperative illocutionary force. The tree diagram below illustrates the landing sites for Italian imperatives:

Since the sentential negative adverb non and proclitics are, if present, fixed in the head of NegP and the specifier of IP respectively, the positions where imperative Vs may land are deduced from them, depending on the kinds of imperatives.
Although the behavior of subjunctive and imperative VVs looks ‘idiosyncratic’ in both English and Italian, the syntactic facts can be explained quite simply and systematically by assuming the feature matrices we have argued for thus far.

References
Verb movement


Some notes on *only*, maximization, and a certain historical advance

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The present text is intended as a probe into the meaning of the focus-sensitive operator ‘only’. Special attention is devoted to the interaction between the operator and partition orders, also known as exact scales. A discussion about the problematic predictions apparently generated by standard treatments is offered. A repair mechanism of scales is presented and treated as part of a general dynamics of linguistic maximization.

1. Prologue
As a political activist in Italy, I know all too well that the Roman Catholic Church needs to be patiently sustained, sometimes assisted, or even directed, while it strives, ancient institution that it is, to reform herself. Yet, as convinced of this insight as I might have been, I certainly wasn’t expecting that I would be assisting the Roman Church as a researcher on language.

A few days ago, the Italian newspaper *La Repubblica*\(^1\) published an article entitled: “Divorced People Are Not Only Sinners, the Roman Church Says”. The problem I was presented with was the following. To acknowledge that the Roman Church was indeed achieving some form of historical advance, I had to interpret the reported quote along the lines of something like (2). Yet, given the possible interpretations that might be assigned to the exclusive particle ‘only’, (1) was available to me as well.

(1) **Conservative Reading**
*Divorced people are in fact sinners, and they may be of poorer moral quality than their marital status implies*

(2) **Progressive Reading**
*Divorced people are not in fact sinners, they are more or perhaps better than that*

\(^1\) *La Repubblica*, 22 October 2012.
As it turns out, it is far from obvious that a standard treatment of ‘only’, to which I had immediately resorted in order to derive (2), can in fact account for the kind of progress we would all like to encourage.

2. The ingredients

2.1 Focus

I shall treat ‘only’ (henceforth: O) as a sentential operator that modifies a praeciacens proposition by associating with a proper constituent bearing focal stress (the praeciacens proposition here being the proposition obtained via subtraction of the exclusive particle from the initial sentence). Being a sentential operator, I maintain that structures like [X O [Y f] Z] get parsed as [O [X Y f] Z]]. In addition, O is ranging over a set of propositional alternatives, call it C. This counts as a subset of (i.e. is formally constrained by) the focus structure set, i.e. a set of propositional alternatives obtained by substituting the focussed constituent with alternative denotations of the same semantic type within the focussed-marked phrase. Take the following sentence (3), for instance.

(3) Only Vittorio Grigolo can boast a genuine claim of being Pavarotti’s heir

(3') O [C] [Vittorio Grigolo f can boast a genuine claim of being Pavarotti’s heir]

In order to explain how focus is affecting this sentence, one has to begin by deriving what I shall call the constituent alternatives of the focussed element, in this case pertaining to semantic type <e>. If we are sensible enough, we will force contextual restriction to apply at this level, for it is obvious, if we further consider that I’m quoting (3) from an Opera magazine, that tenors are the sole candidates for being the heirs of Pavarotti, and, quite likely, many of them would not be able to convincingly promote their own candidacy for such a role. Next, one needs to transfer the constituent alternatives to a higher level of the computation, so to speak, so as to yield set C of propositional alternatives of the form x can boast a genuine claim of being Pavarotti’s heir. That is how an alternative semantics treats focus in the general case; I shall gloss over discussions regarding, for instance, when does the set of constituent alternatives exactly ‘gets elected’ to be the set of propositional alternatives C, for any further details of this derivation would bore me in the extreme. What I’m really interested in here is what one should do with such a set. Suppose that likely candidates for being considered the heirs of Pavarotti are Vittorio Grigolo, Roberto Alagna and Salvatore Licitra. By using (3) the journalist would be excluding the possibility that Alagna and Licitra might also claim to be Pavarotti’s heir. But that doesn’t end the story.

2.2 Meaning contribution

Let me offer a preliminary analysis of what I’ve referred to in the opening section as the standard account of O with regard to its meaning contribution (henceforth: StO). According to StO, O makes a twofold contribution to the overall meaning of the exclusive sentence. The first, negatively oriented contribution, to which I have already alluded, is assumed to carry the asserted content of the sentence (pace Atlas
(1991), (1993), (1996)). It is described as the negation of all of the alternative propositions in C that are more informative than the praeiacens. The second positively oriented contribution is treated as a definiteness condition imposed on the sentence (a presupposition, that is), and it is said to be an inference to the truth of the praeiacens. Versions of a StO are famously argued for in Horn (1969) and Roberts (1996). Putting the pieces together, in what immediately follows we can see the semantic value of O, along with an informal translation.

\[(O) = \lambda C \lambda w \lambda p : p(w) = 1. \forall q \in C [ q(w) = 1 \rightarrow [p \subseteq q]] .\]

A sentence is defined if the praeiacens \(p\) is the case. If defined, it is True if \(p\) and its entailment are the only true propositions in \(C\).

2.3 Orders
It is important to notice that \(O\) is normally interacting with (or else inducing) a partial order, or, as they are also called, a scale. This is a lexically-constrained combination of an underlying set of semantically comparable elements plus an ordering relation. In case the latter is quantity of information, namely classic logical entailment, a StO will predict a pattern of inference that clearly coincides with our intuitions. \(C\) will now appear as below.

\[(5) \quad O [C] [Vittorio Grigolo can boast a genuine claim of being Pavarotti’s heir]
\]

\[\iff \quad \text{Vittorio Grigolo can boast a genuine claim of being Pavarotti’s heir} \]

\[\iff \quad \text{Nobody beyond Vittorio Grigolo can boast a genuine claim of being Pavarotti’s heir} \]

\[(6) \quad \neg O [C] [Vittorio Grigolo can boast a genuine claim of being Pavarotti’s heir]
\]

\[\iff \quad \text{Vittorio Grigolo can boast a genuine claim of being Pavarotti’s heir} \]

\[\iff \quad \text{There are other people who can boast a genuine claim of being Pavarotti’s heir} \]

\[C: (\uparrow \text{direction of entailment})\]

\{
(boast)Grigolo; (boast)Alagna; (boast)Licitra;
(boast)Grigolo@Alagna; (boast)Alagna@Licitra; (boast)Licitra@Grigolo;
(boast)Grigolo@Alagna@Licitra
\}

3. The problem
Let us now return to the problematic reading in (2) above. The crucial observation to be made is that in (2) \(O\) is interacting with a *partition* order, in which the relevant ordering relation is not quantity of information, but, rather, something that
resembles a contextually-enriched relation of “closeness to God”. In a partition order, or equivalently in what the literature calls an *exact scale*, every single element does not entail, nor is it being entailed by, any of its scale-mates. A StO device appears to break down quite soon when it encounters a partition order. The fact is that, with regard to the positive case, the content that the assertion is trying to establish, namely that no alternative propositions in C are the case except for the praeiacens, could also be established by asserting the pure praeiacens, as a result of which O would seem to apply vacuously. With regard to the negative case, things get even worse, for the content that is being asserted, namely that alternative propositions in C are in fact the case, is incompatible with the presuppositional status of the praeiacens.

(8) \(O \lbrack C \rbrack \lbrack \text{Divorced people are sinners} \rbrack\)

\[\begin{align*}
\text{presupposition} & \quad \text{Divorced people are sinners} \\
\text{assertion} & \quad \text{Divorced people are (just) sinners}
\end{align*}\]

(9) \(\lnot O \lbrack C \rbrack \lbrack \text{Divorced people are sinners} \rbrack\)

\[\begin{align*}
\text{presupposition} & \quad \text{Divorced people are sinners} \\
\text{assertion} & \quad \text{Divorced people are more than just sinners}
\end{align*}\]

(they are not in fact sinners)

C: (→ direction of increasing closeness to God)

\[\{ \text{(sinners)}Dp; \ (\text{ordinary moral agents})Dp; (\text{good Christians})Dp \}\]

There must be something we are missing.

4. The proposal

4.1 A repair mechanism

Theorists might be tempted to abandon a good old StO and to replace it with certain more recent treatments of O. Here I shall not investigate in any details such proposals, but I should like to mention the innovative hearer-leaning line of inquiry proposed in Beaver and Clark (2008). While foundational reasons keep me away from (enthusiastically) endorsing their account (some of these I shall mention in the conclusion), I take their idea to be intuitively on the right track (see also Klinedinst (2004)). Indeed, the proposal I shall present below might be intended as a way to (promise to) implement their intuition in a different framework. Never mind how reactionary this might make me seem; after all I’m doing all this to support the Roman Church.

I shall say that the piece we are missing is a sort of ‘repair mechanism of scales’, that I define along the lines of (10) below. It amounts to a reinterpretation rule that gets activated when certain conditions obtain. What these conditions may be will be partially explained with example (12), where we see that the very same

\[\begin{align*}
\text{(freshman, sophomore, junior, senior)}; \ (\text{general, colonel, lieutenant}); \ (\text{full professor, associate professor, assistant professor}); \ \text{et cetera.}
\end{align*}\]
rule is to be at work in environments with specific logical properties. I should like to emphasize that the line of action I’m proposing here is intended to restore the centrality of logical orders and to describe contextually-enriched orders as part of ‘logical’ dynamics. At the end, we will have our StO back on track again. Let me show how I intend such mechanism to be implemented. Suppose that alpha[^5], member of a partition order, falls within the scope of a suitably defined operator, call it $q$. As a result, the following interpretation rule gets activated:

\[(10) \quad \text{If } q \ [\ldots \alpha \ldots] \]
\[
\text{Then, read } [\alpha] \text{ as } [\bigvee^n i \alpha]
\]
\[
i \text{ is the original position of the element in the order, and } n \text{ is the position of the order’s maximal item}
\]

As I’m presenting it here, such a mechanism is tantamount to inserting an implicit ‘at least’ operator internally, that is at the level of the constituent. The outcome of the insertion is a canonical order, i.e. an order in which the right hand elements a-entail the left hand elements. Being a local mechanism, (10) can feed the computation of the praeiacens, and modify the ordering in C. Hence, in cases where $q=O$, alternative treatments of O are plainly unnecessary. Let me make this point clearer by presenting a simplified calculation of the positive exclusive sentence.

\[(11) \quad [YP \ O \ C] \ [XP \ Divorced \ people \ are \ sinners|f] \[
[XP]= [ \ Divorced \ people \ are \ sinners| \lor \ ordinary \ moral \ agents| \lor \ good \ Christians|] \[
[YP] \text{ is defined if divorced people are sinners| } \lor \ ordinary \ moral \ agents| \lor \ good \ Christians|. \text{ If defined, it is True if divorced people are not ordinary moral agents } \lor \ good \ Christians. \]
\[
C: (\rightarrow \text{ direction of entailment}) \[
\{ \ (\text{sinners})Dp; \ (\text{ordinary moral agents})Dp; \ (\text{good Christians})Dp \}
\]

As readers can easily verify, there is no vacuous application of O in our last prediction. Similarly, they can see that the contradictory content, previously predicted by a StO in the negative case, has now been eliminated. I argue, further, that this approach explains the so-called ‘qualitative flavor’, clearly produced with partition orders, as a result of the reiterated operations that such orders are now predicted to undergo. However, I maintain that the concrete implementation of the meaning of the sentences should have to be considered as independent from global consequences possibly generated in context. At this point, I will pass over the

[^5]: For concreteness, I’m turning to constituent alternatives here.
details of a more complete rendering of the approach, for what interests me now is to discuss why, on balance, it should be considered a theoretical option.

4.2 Maximization
Up to now, I have merely shown that there may be a way to preserve a StO while giving an account of the problematic reading in (2). But then what principle is responsible for activating the repair mechanism here? I take it that such a mechanism is to be intended as part of a general dynamic of linguistic maximization, as a result of which a scalar sentence gets normally parsed on the basis of the most informative interpretation available. As part of this general dynamics, vacuous or contradictory applications of any exhaustifying operators, like overt O we have been discussing, are avoided. But, in addition, and crucially if our reasoning is correct, we predict the very same mechanism to be at work, for instance, in the case \( q = \text{DownwardEntailing-operator} \), for in such environments the insertion of an ‘at least’ operator would result in a more informative overall contribution. The pattern reported in (12) seems to corroborate our prediction\(^4\).

\[(12) \; [ZP [ \text{If} [XP \text{ Mark is an ordinary moral agent}] \; [YP \text{ Mark will go to heaven}] ] \\
[XP]= \text{ [Mark is a ordinary moral agent} \; \lor \text{ Mark is a good Christian} \; ] \\
[YP] \text{ is True in case Mark is an ordinary moral agent} \; \lor \text{ Mark is a good Christian and Mark will go to heaven} \]

It should be underlined that alternative treatments of O cannot explain this fact, since there is no instance of an exclusive operator in (12).

5. Epilogue
In the preceding section, I proposed a solution to the problem of apparently complicated readings of exclusive sentences. Further investigation may demonstrate that the proposed line of action is indeed preferable to the opposing approaches that might be taken. I shall mention the following three reasons in support of such a consideration: first, we needn’t abandon a StO that works effectively in crucial cases; second, we needn’t assume the centrality of the notion of a contextually-enriched order; third, the solution I proposed is rooted in an independently motivated principle of linguistic maximization.

I consider that the mentioned principle of linguistic maximization affects the meaning contribution of sentences non-monotonically, hence it produces interpretations that, while cannot be detached if the detachment would result in contradictions or ineffective applications, can in fact be weakened if other considerations suggested speakers to do so. While I should be introducing new

\(^{4}\) Up to this point, we have been dealing with a ‘two-faced’ order (different from the orders reported in fn. 2). So, since in a DE environment we need to pick an orientation, I’m now turning to the positive portion of the order. I take it that this is due to reasons that are ‘internal’ to a DE environment, and hence I do not consider the (partial) switch to be problematic for our current proposal. One should remember that our whole story can be rephrased in terms of one of the exact scales mentioned above, so as to avoid any such complications from emerging.
discussions at this point (for instance: what is the general form of the principle? What are the connections of the resulting account with a grammatical view of scalar implicatures? What is the status of such a ‘weakened’ interpretation?), I cannot, and will not. For I need to go celebrate the great news.

References