L1 Transfer versus Computational Complexity in Adult L2 French: Evidence from a Comparison with Deaf L1 French Learners

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1. Introduction

In this paper, we examine the role of computational complexity versus the role of L1 transfer in a group of adult L2 learners of French based on the results of a written grammaticality judgment task which tested four constructions in French: relative clauses, passives, verb raising, and gender and number agreement on accusative clitics. We chose these constructions based on the varying degrees of complexity which are arguably involved for each one and for their degree of divergence or similarity to English. Following fruitful results in previous work comparing child L2 acquisition with L1 acquisition in children with language pathology (see for example, Paradis & Crago, 2000), the performance of the L2 group was compared to that of a group of L1 French adolescents with moderate-to-profound hearing loss. Similarities found between these groups are argued to provide support for the role of computational complexity in all types of atypical language acquisition.

This paper is organized in the following way: First, we discuss current theories that examine computational complexity and we identify the differences in complexity for the constructions we are testing. Second, we look at a number of studies on typical and atypical acquisition of these constructions. Third, we present theories which characterize the role of L1 transfer in L2 acquisition and we compare the morphosyntax of these four constructions between French and English. Fourth, we present the methodology used in this study, followed by the results. Last, we analyze these results in terms of L1 transfer and complexity.

2. Theoretical background
2.1. Complexity theories applied to four specific constructions

Much of current research on typical development (TD) and atypical development (AD) of language focuses on the notion of computational complexity in an attempt to explain why TD children acquire certain constructions later and why these constructions remain problematic in contexts of AD. Many of these proposals either implicitly or explicitly appeal to particular characterizations of computational complexity, which in turn make predictions about acquisition sequences.

Proposals such as Truncation (Rizzi, 1994; 2000) and the Unique Checking Constraint (UCC) (Wexler, 1998) make different assumptions, but share the idea that the number of computations is simplified or restricted in early grammars. The former concerns External Merge (structure) while the latter Internal Merge. Very Early Parameter Setting (VEPS) also characterizes early grammars by arguing that constructions which are acquired easily and rapidly are those which are an integral part of the derivation of most sentences in a language. For example, parameters which have to do with the position of verbs in relation to other constituents (such as verb raising in French) appear to pose no difficulty to young children (Wexler, 1998).

Some proposals explicitly point to operations such as merge and notions such as distance as being central to complexity. For example, the Derivational Complexity Metric (Jakubowicz, 2005) proposes that complexity can be measured in terms of the number of instances of Merge, defining complexity in the following way: 1) "Merging α_i n times gives rise to a less complex derivation than merging α_i (n+1) times. 2) Internal Merge of α gives rise to a less complex derivation than Internal Merge of $\alpha+\beta$". This metric predicts the order of acquisition of certain structures: less complex structures will emerge before

more complex ones. The Trace Deletion Hypothesis (Grodzinsky, 1995; 2000) states that in agrammatism, traces are deleted from syntactic representations. This accounts for the difficulty that agrammatic aphasics have in comprehending object relative clauses and passives. The trace resulting from syntactic movement is deleted and therefore the patient cannot assign theta roles correctly. In the Dependency Locality Theory (Gibson, 2000, pp.102) "structural integration complexity depends on the distance or locality between the head and dependent being integrated". Since the distance between syntactic dependencies is greater for object relatives compared to subject relatives, the former creates a higher processing load than the latter and this effect can be seen in normal adults.

Similar factors emerge from these various theories. Although a precise definition of complexity will not be proposed here, we use these different factors to attribute varying degrees of complexity to the four constructions we are testing. Following the proposals just mentioned, we consider that as the number of syntactic operations increases, so does the complexity of the derivation. In addition, the nature of certain structures, such as those involving long-distance dependencies, also adds to the complexity of the derivation. On the other hand, less complex structures entail fewer syntactic operations or require operations which are an integral part of the derivation of every sentence. Less complex structures also have more locally bound dependencies. So, how can these proposals be used to analyze the four constructions we are testing—relatives clauses, passives, gender and number agreement on pronouns, and verb raising?

Relative clauses involve wh-movement (sometimes accompanied by the pied-piping of a preposition). In addition, they involve a dependency which can be more or less long according to the type of relative (subject relatives involve a shorter dependency than object relatives). Syntactic passives involve A-movement, long-distance dependencies and the reorganization of thematic roles. Both of these constructions are thus relatively complex.

On the other hand, we saw that more locally-bound dependencies as well as operations which are present in every sentence in a given language do not appear to increase the computational complexity of a derivation. Gender and number agreement on pronouns does not involve wh-movement or NP-movement. In addition, the dependency between the pronoun and antecedent may be (relatively) local (see Section 3.2 for examples). Verb raising requires syntactic movement, but this operation is required in all sentences of French. We therefore consider number and gender agreement on object clitics (henceforth, agreement) and verb raising to be less complex than relatives and passives.

Proposals which characterize complexity predict that increasing degrees of complexity translate into late acquisition in typical language acquisition and cause difficulty in atypical language acquisition. Having evaluated the relative complexity of these four constructions, we turn to psycholinguistic research about how they are acquired. If passives and relatives are more complex than agreement and verb raising, then we should be able to find evidence of the relative ease or difficulty with which these constructions are acquired in typical and atypical acquisition.

Studies evaluating the production and comprehension of relative clauses by young TD children have revealed that subject relatives emerge before object relatives in various languages (Friedmann et al., 2009; see also Guasti, 2002 and sources cited therein). In normal adult populations, evidence for a higher processing load of object relative clauses has also been found using tests measuring reading times (Gibson, 1998; 2000). It takes adults significantly longer to read object relative clauses compared to subject relative clauses. Recent research focusing on relative clauses in atypical acquisition reveal similar results. Agrammatic aphasics, SLI and deaf children struggle in particular with the comprehension and production of object relative clauses. (Friedmann & Szterman, 2006; Santi & Grodzinsky, 2007; Friedmann & Novogrodsky, 2004). French-speaking children and adolescents with SLI, hearing loss, and rolandic epilepsy were shown to produce relative clauses with less embedding in spontaneous speech compared to controls (Delage et al., 2008). Evidence was also found for the avoidance of relative clauses by a group of French-speaking adolescents with SLI, who adopted strategies to avoid relative clauses and grammatical errors. Object relatives were found to have been particularly scarce in these atypical populations (Delage, 2008; Monjauze, 2007).

Most evidence for the comprehension and production of passives seems to show that certain kinds of verbal passives (full reversible passives) are acquired relatively late in typical child acquisition (between 4;5-5;5) (Borer & Wexler 1987; Van der Lely, 1998; Guasti, 2002). Children with SLI have been shown to prefer adjectival interpretations of passives (van der Lely, 1998).

Gender and number processing in French is automatic and irrepressible in normal and in SLI children (Roulet, 2008), and although it is well known that object clitics are a source of great difficulty for learners of French (Hamann et al., 1996; Jakubowicz & Rigaut, 2000; Tuller et al., in press), comprehension of object clitics is generally much better than production in young children (Chillier-Zesiger et al., 2006) and in atypical learners (Jakubowicz et al., 1998; Grüter, 2005).

The verb raising parameter and its associated properties such as the relative position of adverbs have been shown to be acquired early and easily for young children (Pierce, 1992) and have never been shown to be problematic for children with SLI (Hamann et al., 2003; Jakubowicz & Tuller, 2008).

Summarizing, proposals such as the DCM, DLT, Trace Deletion, UCC, VEPS, and Truncation predict that more complex constructions will create difficulty in acquisition. We consider relatives and passives to be more complex, based on the notions of distance and number of movements, which are common to these proposals. Based on the idea that local dependencies and operations that are a part of every derivation do not necessarily contribute to the complexity of a construction, we consider agreement and verb raising to be less complex. After a brief review of the research, we see that in fact passives and relatives do appear to be difficult; whereas, agreement and verb raising do not appear to pose any particular difficulty in typical or atypical acquisition.

2.2. Theories of L1 transfer in second language acquisition applied to four specific constructions

Studies in second language acquisition often consider the L1 to have an important impact on the L2 grammar. However, there is no consensus as to the extent of L1 influence on the L2 (see White, 2003 for a review). The Full Access/Full Transfer Hypothesis assumes absolute L1 influence, predicting that L2 learners will initially transfer all properties from the L1, but that properties typical of the L2, such as target features or functional categories inactive in the L1, can eventually be acquired. (Schwartz & Sprouse, 1996). Other proposals argue in favor of partial transfer of the L1 grammar in the initial stages of L2 acquisition. For example, transfer may be limited to lexical categories (Vainikka & Young-Scholten, 1996); alternatively, functional categories may transfer but not feature strength (Eubank, 1993/1994). In contrast, a different approach maintains that the L1 grammar is not the basis for L2 acquisition. For example, the Full Access (without Transfer) Hypothesis states that there is no L1 transfer in second language acquisition (Epstein et al., 1996). In order to assess the role of L1 transfer, we now propose a comparison of our four constructions in French and English.

Relative clauses in both English and French involve wh-movement (either of a wh-phrase or of an empty operator). In French, pied-piping is obligatory, whereas in English the preposition can be either stranded or pied-piped. In both languages, long-distance dependencies are involved (and the distance is greater for object than for subject relatives). In English, the relative pronoun can vary in form: *that*, *which* or *who* for animates and *that* or *which* for inanimates. Omission of the relative pronoun in non-subject relatives is possible in English, but not in French. In subject relatives, the French complementizer *que* shows agreement (*qui*), whereas in object relatives it does not change. We consider this construction to be similar in French and English, as the syntactic operations necessary to correctly derive a relative clause in French and English are essentially the same.

Passives in both French and English involve A-movement, long-distance dependencies, and thematic reorganization. Passive morphology is also similar in the two languages (auxiliary *be* plus past participle). Here again, we conclude that passives are essentially similar in French and English.

French has a grammatical gender system in which gender is an inherent feature of all nouns. English, however, only has a biological or semantic gender system. English object pronouns show number agreement on both animate and inanimate antecedents, but generally only show gender agreement on singular animate objects. French object pronouns are clitics and show gender and number (but not animacy) agreement on all antecedents. Because of the inherent differences in the two gender systems and because object pronouns in French are clitics whereas in English they are not, we consider the agreement construction to be very different in French compared to English.

One major difference between French and English, illustrated in (1) – (2), concerns strong and weak V-features in I (see Emonds, 1978; Pollock, 1989). French has a strong I, which means that verbs

raise from V to I. However, English has a weak I and therefore verbs do not raise to I. This has an impact on the relative order of V and lexical adverbs and adverbs of negation. In French, lexical verbs remain to the left of adverbs, such as the adverb of negation *jamais* 'never'. This is in contrast to English, where lexical verbs stay to the right of adverbs, including *never*.

(1) a. Tes parents ne **travaillent** jamais le dimanche
     b. *'Your parents **work** never on Sunday'

(2) a. *Tes parents ne jamais **travaillent** le dimanche
     b. 'Your parents never **work** on Sunday'

There is then a basic word order difference in this regard between French and English.

2.3. Questions and predictions

The main goal of this study is to examine the influence, in these four French constructions, of their complexity versus the influence of L1 transfer from English. As we saw above, complexity is often used to explain why certain structures emerge later in very young L1 learners and remain problematic for older learners who acquired language in non-optimal conditions. Can this idea be extended to adult learners of a second language? One of the major differences between L2 and atypical L1 learners (SLI, deaf, etc) is that the L2ers have already successfully acquired an L1. Therefore, if this idea is valid for L2 acquisition, there should be evidence which shows that complexity plays a stronger role than L1 transfer in the performance of the L2 subjects.

In sections 2.1 and 2.2, we observed that relatives and passives are relatively more complex, but are similar in French and in English. On the other hand, we observed that number and gender agreement and verb raising are less complex, but different in French compared to English. Taking this relative complexity and these differences between the two languages into account, if complexity plays a greater role than L1 transfer in L2 acquisition, L2 learners of French (L1 English) should perform well on the verb raising and agreement constructions and less well on passives and relatives. However, if L1 transfer is more influential, then the L2 group should perform better on passives and relatives, and less well on verb raising and agreement constructions. We compared the performance of the L2 group with a group of deaf speakers of oral French and to two control groups (adolescents and adults), all of whom had developed French in typical contexts (TD groups). If computational complexity constrains the grammars of both the deaf and the L2ers, then we should be able to find similarities in their performance patterns. If the L2 group is best characterized by L1 transfer, then we expect to see distinct differences in the L2ers compared to the deaf.

3. Method
3.1. Population

The L2 population is made up of 19 native speakers of English who began acquiring French at an mean age of 13;11 (*SD* = 3;3)[1]. These learners were divided into a group of 10 advanced and 9 intermediate, according to the results of Cloze and vocabulary tests (see Table 1). We compare their performance to a group of 51 moderate to profound[2] deaf subjects who acquired an oral language (French) as their first language. Nine of the deaf learners had exposure to French Sign Language, but they were not native signers. At the time of testing, over half of these learners were completely integrated into traditional hearing classrooms.[3]

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[1] The age of acquisition ranges from 5 to 20 years old.

[2] 10 of the deaf subjects had moderate hearing loss, 15 severe, and 26 profound. The average hearing loss ranged from 50 to 120 dB.

[3] Six deaf learners spent 6-15 hours per week in a traditional classroom. Fifteen of them spent 16–25 hours per week. Their remaining hours were spent in special classes where a combination of different oral and signed communication methods were used.

We used a control group of typically-developing French-speaking adolescents (TD 11-15) who were age-matches for the deaf learners and a control group of typical French-speaking adults who were age-matches for the L2ers (information on participants is summarized in Table 1).

Groups		N	Sex	Mean age	Age range
TD	Adults	18	5M 13F	20;10	17;10-26;0
	11-15	51	28M 23F	13;1	11;42-15;33
L2	Advanced	10	1M 9F	21;1	19;11-23;2
	Intermediate	9	5M 4F	21;4	19;9-25;11
Deaf	Deaf	51	31M 20F	13;8	11;1-16;9

Table 1. General characteristics of L2, deaf and control groups (TD).

3.2. Task

We used a written grammaticality judgment test (Tuller and Khomsi, 2006) which consisted of 48 items (24 grammatical and 24 ungrammatical) with 12 items per construction (see examples in 3-9). The sentences contained simple vocabulary and were equivalent in length (from 6 to 10 words). The relative clause construction items contain four different types of relative clauses: 2 subject (example 3), 4 object (as in 4), 2 indirect object (5) and 4 adjunct (6). The ungrammatical relative clause items involved the form of the relative pronoun (*qui* for subject, *que* for object relatives, and the presence of the preposition and the form of the relative pronoun for indirect object and adjunct relatives). For passives (7), the error involved the absence of *par (by)* in the *by*-phrase. Agreement items (8) involved a mismatch in gender or number agreement (7 items involved gender and 5 involved number agreement) between a left dislocated object and an accusative pronoun. Verb raising items (9) varied in grammaticality according to whether the tensed verb was raised to the left of the adverb of negation or not.

(3) a. J'ai des amis qui arrivent ce soir.   b. *J'ai des copains que viennent ce soir.
     'I have some friends who arrive tonight'   'I have friends that are coming tonight'

(4) a. Il y a une fille que j'aime beaucoup.   b. *Il y a un garçon qui j'aime beaucoup.
     'There is a girl who I like a lot'   'There is a boy who I like a lot'

(5) a. Voilà la femme à qui l'homme dit bonjour.   b. *Voilà la fille que le garçon dit bonjour.
     'Here is the woman to whom the man says hello'   'Here is the girl that the boy says hello'

(6) a. La boite dans laquelle je mets le stylo est rouge.   b. *Je vois l'arbre que le chat est caché.
     'The box in which I put the pen is red'   'I see the tree that the cat is hidden'

(7) a. L'arbre est caché par le bâtiment.   b. *Le bâtiment est caché les arbres.
     'The tree is hidden by the building'   'The building is hidden the trees'

(8) a. La moto? Je la gare dans le parking.   b. *La voiture? Je le gare dans le garage.
     'The motorbike[fem]? I it[acc-fem] park   'The car[fem]? I it[acc-masc] park in the
     in the parking lot'   garage'

(9) a. Le garçon ne veut plus faire ses devoirs.   b. *Mes copains ne pas sortent ce soir.
     'The boy no longer wants to do his homework'   'My friends not go out tonight'

3.3. Procedure

The grammaticality judgment test was performed on a computer. The instructions were presented on the computer audio-visually via a video clip. The deaf were given the choice of having instructions given in oral French only, oral French with queued speech, or in French Sign Language. For each item,

one sentence appeared on the screen with a yes and a no button just below it. The participants were told to click on the yes button if the sentence was good and on the no button if it was not. The order of the items was randomized and was the same for all participants. Reading times were recorded, but the participants were not told that they were being timed. Reading times measured how long it took the participant to read the entire sentence and click yes or no.

Each group's performance on this test was compared using a Mann–Whitney nonparametric test for independent samples. The Wilcoxon nonparametric test was used for within-group analysis. Statistical test results that revealed non-significant differences are not reported in detail.

4. Results

4.1. Group and grammaticality: global scores and reading times

We first compared each group's global score (out of 48 possible) on the grammaticality judgment test (see Figure 1). The results of a Mann-Whitney revealed no significant difference between the global scores for Advanced L2 group compared to the TD Adults and TD 11-15. The results also showed that the Advanced L2 group's global score was significantly higher than the Intermediate L2 group ($U = 18.0$, $p < 0.05$). The difference in global scores between the Intermediate L2 group and the Deaf group was not significant, but the Deaf scored significantly lower than the other three groups (TD 11-15: $U = 447$, $p < 0.001$; TD Adults: $U = 67$, $p < 0.001$; Advanced L2: $U = 254$, $p < 0.01$).
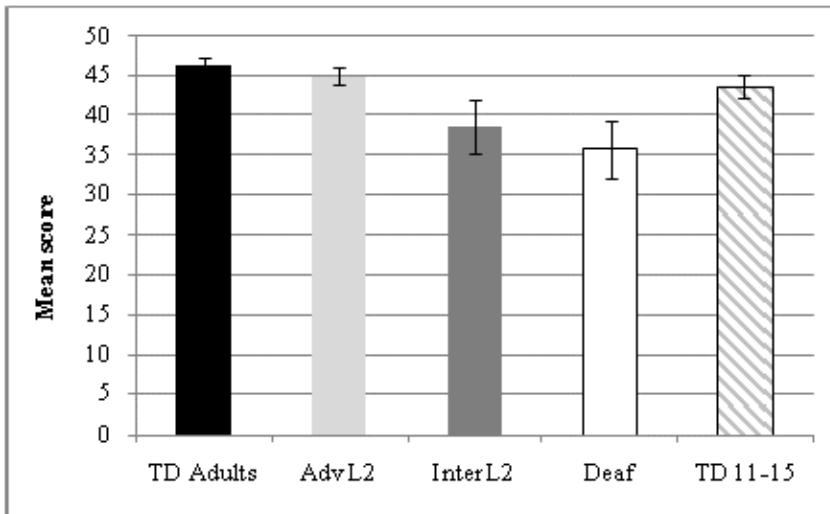

Figure 1: Global mean score by group (out of 48 possible)

Concerning scores according to grammaticality, the results of a within-group comparison showed that the Deaf ($Z = 5$, $p < 0.001$) and the TD 11-15 ($Z = 4$, $p < 0.001$) performed significantly higher on grammatical items. In other words, they incorrectly accepted ungrammatical items significantly more than they rejected grammatical items. However, the Advanced L2 group displayed the opposite trend, performing significantly higher on ungrammatical items ($Z = 2$, $p < 0.05$). They rejected grammatical items significantly more than they accepted ungrammatical items. There was no significant difference for the Intermediate L2 group's performance on grammatical versus ungrammatical items.

Global mean reading times also varied significantly among the four groups, except that the difference between the two TD groups was not significant (see Table 2). Both TD groups were significantly faster than the Advanced L2 (TD 11-15: $U = 106$, $p < 0.01$; TD Adults: $U = 28$, $p < 0.01$) and the Deaf (TD 11-15: $U = 593$, $p < 0.001$; TD Adults: $U = 146$, $p < 0.001$). The Intermediate L2ers had reading times which were significantly slower than all four groups (Deaf: $U = 64$, $p < 0.001$; TD 11-15: $U = 20$, $p < 0.001$; Advanced L2: $U = 28$, $p < 0.01$; TD Adults: $U = 6$, $p < 0.001$). Reading times also varied for grammatical items compared to ungrammatical. Both L2 groups were significantly faster for the ungrammatical items (Advanced: $Z = 2$, $p < 0.01$; Intermediate: $Z = 2$, $p < 0.05$), whereas

the TD 11-15 were significantly faster for grammatical items ($Z = 2$, $p < 0.01$), but the difference for the deaf was not significant.

Group		Total	Gr items	UnGr items
TD Adults	M	**3853**	**4255**	**3467**
	SD	*429*	*496*	*465*
Adv L2	M	**6120**	**7425**	**4787**
	SD	*962*	*1421*	*622*
Inter L2	M	**9581**	**10647**	**8580**
	SD	*1277*	*1743*	*937*
Deaf	M	**5890**	**5819**	**5952**
	SD	*998*	*1051*	*1033*
TD 11-15	M	**4206**	**4410**	**3997**
	SD	*604*	*712*	*600*

Table 2: Mean reading times (*ms*) for global, grammatical (Gr) and ungrammatical (UnGr) items.

4.2. Group performance and reading times according to construction
4.2.1. Advanced L2

The Advanced L2 group performed very well on all constructions, except relative clauses (see Figure 2). A within-group comparison shows that the Advanced L2ers scored significantly lower on relative clauses compared to verb raising (V-ADV) ($Z = 2$, $p < 0.05$) and agreement ($Z = 2$, $p < 0.05$). Their performance differs significantly from the TD Adults only for relatives ($U = 42$, $p < 0.05$). There are no significant differences between the TD 11-15 and Advanced L2ers for performance by construction[4].
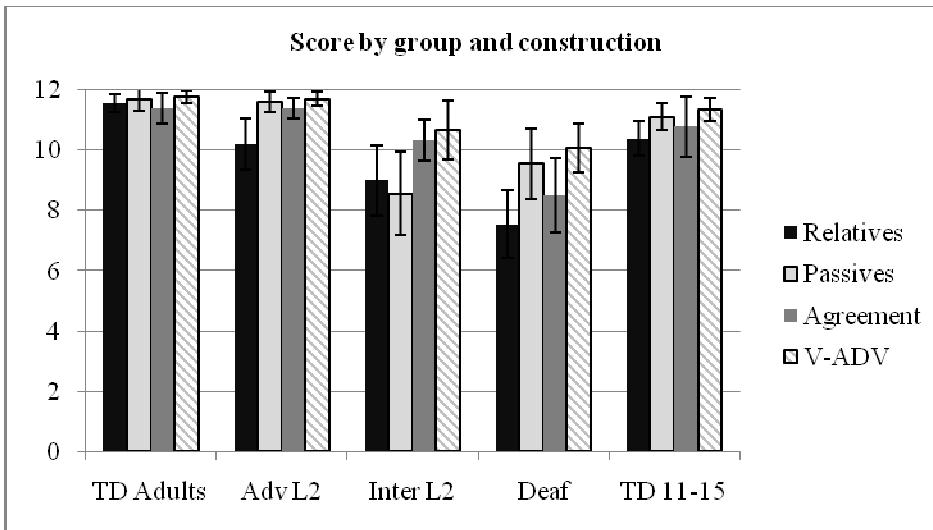

Figure 2: Mean scores by construction

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[4] The TD Adults do significantly better on the global score than the TD 11-15 ($U = 254$, $p < 0.01$) (see Figure 2). The TD Adults do significantly better than the TD 11-15 on all constructions except agreement (for relatives, $U = 187$, $p < 0.001$; for passives, $U = 276$, $p < 0.01$; $U = 313$, $p < 0.01$; for V-ADV, $U = 313$, $p < 0.05$. The differences in reading times by construction were not significant between these two groups.

The Advanced L2ers were significantly slower than both the TD groups for each construction[5] (see Figure 3). The Advanced L2ers were also faster than the Intermediates for each construction[6], but were not significantly faster than the Deaf. A within-group comparison shows that the Advanced L2ers took significantly longer to read and judge relative clause items compared to agreement items (see Figure 3) ($Z = 2$; $p < 0.05$).
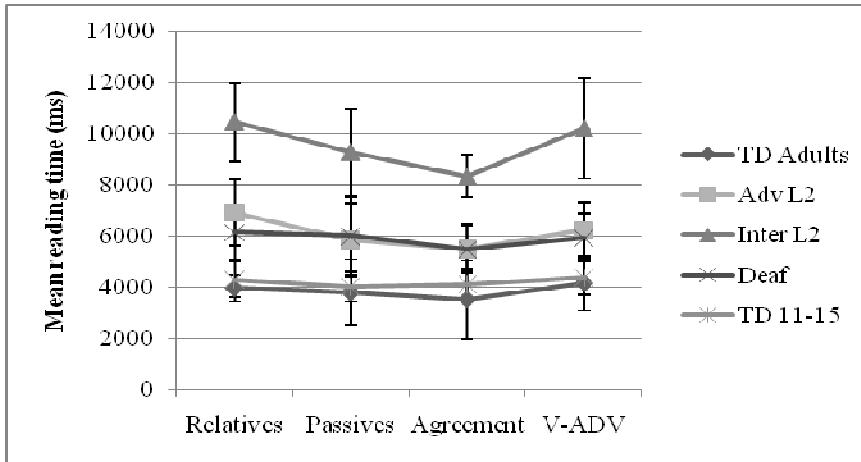

Figure 3: Mean reading times by group and by construction

4.2.2. Intermediate L2

Unlike the Advanced group, the Intermediate L2ers performed significantly lower than the TD Adults on all constructions except verb raising (for relatives, $U = 16$, $p < 0.001$; for passives, $U = 18$, $p < 0.001$, for agreement, $U = 41$, $p < 0.05$). The Intermediate L2ers and the TD 11-15 had similar performances for all constructions, except for passives, where the L2ers scored significantly lower ($U = 93$, $p < 0.01$). When we compare the Intermediate L2ers to the Advanced, we see that the passive was the only construction for which their performances varied significantly ($U = 11$, $p < 0.01$) (see Figure 2). A within-group comparison revealed that the Intermediate group had significantly weaker performances for relatives compared to agreement ($Z = 2$, $p < 0.05$) and passives compared to verb raising ($Z = 2$, $p < 0.05$).

The Intermediate L2ers had significantly longer reading times for each construction type compared to the other three groups.[7] Within the Intermediate group, the reading times for relative clauses were significantly longer than for agreement ($Z = 2.07$; $p < 0.05$).

4.2.3. Deaf

The deaf group scored significantly lower than the TD 11-15 and the Advanced L2ers on all constructions[8] (see Figure 2). However, the deaf and Intermediate L2ers had similar scores, except for

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[5] TD Adults: for relatives, $U = 22$, $p < 0.01$; for passives, $U = 42$, $p < 0.05$; for agreement: $U = 29$; $p < 0.01$; for V-ADV, $U = 27$, $p < 0.01$; TD 11-15: for relatives, $U = 92$, $p < 0.01$; for passives, $U = 141$, $p < 0.05$; for agreement, $U = 130$, $p < 0.05$; for V-ADV: $U = 104$, $p < 0.01$.

[6] For relatives, $U = 15$, $p < 0.05$; for passives, $U = 19$, $p < 0.05$; for agreement, $U = 12$, $p < 0.01$; for V-ADV, $U = 14$, $p < 0.05$.

[7] TD Adults: for relatives, $U = 8$, $p < 0.001$; for passives, $U = 10$, $p < 0.001$; for agreement, $U = 4$, $p < 0.001$; for V-ADV, $U = 4$, $p < 0.001$; TD 11-15: for relatives, $U = 21$, $p < 0.001$; for passives, $U = 24$, $p < 0.001$; for agreement, $U = 20$, $p < 0.001$; for V-ADV, $U = 24$, $p < 0.001$; Deaf: for relatives, $U = 58$, $p < 0.001$; for passives, $U = 88$, $p < 0.01$; for agreement, $U = 63$, $p < 0.001$; for V-ADV, $U = 64$, $p < 0.001$.

[8] TD 11-15: for relatives, $U = 372$, $p < 0.001$; for passives, $U = 863$, $p < 0.01$; for agreement, $U = 542$, $p < 0.001$; for V-ADV, $U = 682$, $p < 0.001$; Advanced L2: for relatives, $U = 93$, $p < 0.01$; for passives, $U = 119$, $p < 0.01$; for agreement, $U = 70$, $p < 0.001$; for V-ADV, $U = 91$, $p < 0.01$.

agreement, where the deaf scored significantly lower ($U = 129$, $p < 0.05$). A within-group comparison reveals that the deaf obtained scores that differ significantly for each construction[9], with verb raising representing the highest score and relative clauses the lowest (see Figure 2).

The reading times for the deaf were significantly shorter than the Intermediate L2ers for each construction, but did not differ significantly when compared to the Advanced L2ers. The deaf were also significantly slower than their age-matched TD 11-15 group for each construction.[10] The deaf had reading times for relative clauses and verb raising which were significantly slower than for the agreement construction (relatives: $Z = 3.12$; $p < 0.01$; V-ADV: $Z = 2$; $p < 0.05$), but other differences were not significant.

5. Discussion

Summarizing our results, we found that Advanced L2ers scored as well as the TD Adults and TD 11-15 for the number of correct responses. The Intermediate L2 and deaf groups had similar global scores. The reading times do not entirely follow the same pattern. For reading times, the deaf performed more like the Advanced L2 group and the Intermediate L2ers were the slowest. Although the Advanced L2ers had global scores which were similar to the TD groups, the Advanced L2ers were significantly slower.

Concerning the grammaticality of the item being judged, the Advanced L2 group obtained significantly better scores on ungrammatical items compared to grammatical. This is in sharp contrast to the deaf group, who did very well on the grammatical items and poorly on the ungrammatical ones. This, in addition to the surprisingly quick reading times, may suggest that a strategy was adopted by some of the deaf learners which consisted of defaulting to 'yes' answers[11].

For all groups except the TD Adults, the overall trend for performance by construction appears to be weaker scores on relative clauses and higher scores on verb raising. The Intermediate L2 group's performance is a good example of this trend, given that these learners performed better on both agreement and verb raising and weaker on relatives and passives. In addition, verb raising is the one construction that does not distinguish them from the TD adult group. Performance on relative clauses was the only result that distinguished the Advanced L2 group from the TD Adults. In addition, the fact that both the TD 11-15 and the Advanced L2 group performed significantly lower on relative clauses compared to the TD Adults shows that relative clauses were a particularly difficult construction.

The Deaf group displayed similar trends, scoring the lowest for relatives and the highest for verb raising. However, one difference between the Deaf and the L2 groups was that the Deaf had lower scores for agreement compared to passives. We speculate that reading strategies adopted by the deaf may have involved ignoring functional words, which may have also contributed to the deaf group's strong performance for verb raising and overall poor performance on relatives and passives. However, despite obvious differences between the L2 and deaf groups, including some evidence for different strategies adopted by the deaf learners, the L2ers and the deaf showed remarkably similar trends with respect to performance by construction, suggesting that complexity played an important role for both groups.

The reading time data also underline the difficulty with relative clauses found in all groups except the TD Adults. If we assume that longer reading times reflect a heavier processing load, the reading times for relative clauses show that an additional effort was required to read and judge this type of sentence. Although these reading times measure a time period which cannot be attributed to a specific process (as they include both reading and judging the sentence), we can still observe the overall slower times that relative clauses cause in all groups.

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[9] For example, verb raising scores were higher than passives ($Z = 2.02$; $p < 0.05$); passives were higher than relatives: ($Z = 5.45$; $p < 0.0001$) and higher than agreement ($Z = 3.36$; $p < 0.001$); agreement scores were higher than relatives ($Z = 3.01$; $p < 0.01$).

[10] For relatives, $U = 590$, $p < 0.001$; for passives, $U = 624$, $p < 0.001$; for agreement, $U = 682$, $p < 0.001$; for V-ADV, $U = 638$, $p < 0.001$

[11] For example, two deaf subjects answered 'yes' 41 times and one answered 'yes' 40 times. Removing these subjects from the statistical analyses did not change the results.

This pattern of lower scores for relative clauses and higher scores for verb raising is interesting for two reasons: 1) both L2 groups, but especially the Intermediate group, had more difficulty correctly judging the grammaticality of the constructions which were more complex, but similar to their L1. 2) the L2 groups and the deaf group exhibit similar performance patterns. This supports the idea that complexity, and not L1 transfer from English, was a more influential factor in the L2ers' performance on this task.[12]

Our results also indicate that verb raising, as evaluated by the position of the adverb of negation, was not a problem in any of the four groups. This goes in the same direction as other studies which have examined spontaneous speech in atypical populations (see Hamann et al., 2003). However, in certain studies examining transfer in L2 acquisition, L2 learners demonstrated an asymmetry in their ability to correctly place the adverb of negation while incorrectly placing other lexical adverbs (White, 1990; 1991). Our results can only speak to verb raising as measured by the placement of the adverb of negation. Nevertheless, it appears that this consequence of verb raising, which is different in English versus French, is not problematic for Intermediate and Advanced L2 learners of French. We therefore suggest that L1 transfer does not play a strong role in the processing of these sentences.

Overall, our results suggest that complexity was an important factor in the grammatical performance involved in this task, overriding the influence of L1 transfer. Moreover, the performance of the deaf group, which patterns in a way similar to the L2 groups, cannot be explained by the influence of English as an L1.

6. Conclusion

In conclusion, our results suggest that the performance of the L2 groups on a grammaticality judgment task was influenced by the complexity of the construction and not by the differences between French and English. Moreover, despite major differences in the linguistic profiles of the deaf and L2 groups, similar trends were observed regarding which constructions were successfully judged. The performance of the deaf learners cannot be explained by the influence of English as an L1. Therefore, our results suggest that complexity was a crucial factor in the grammatical performance involved in this task, overriding the influence of L1 transfer.

What do these results say about the nature of L2 acquisition and about the role of L1 transfer? Our results suggest that L2 learners react like other atypical L1 learners or like younger TD learners when faced with complex structures. If L1 transfer played a role, it was so minimal that it remained undetected by our task. This may be explained by the rather advanced proficiency level of our L2

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[12] One possible objection is that the differences between French and English for the form of the relative pronoun could be a factor in the L2ers' lower scores for relative clauses. Any potential transfer effect might have been seen in the following three items in which the word-for-word translation results in a grammatical sentence in English whereas the French sentence was ungrammatical:

    Item 30: *Il y a un garçon qui j'aime beaucoup.
        'There is a boy who I like a lot'
    Item 32 : *J'ai des copains que viennent ce soir.
        'I have friend that are coming tonight'
    Item 37: *Voici l'homme qui j'ai vu hier.
        'Here is the man who I saw yesterday'

Items 30 and 37 are object relative clauses, which have been shown to be notoriously difficult for all typical and atypical learners alike. Not surprisingly, the L2ers, the deaf, and the TD 11-15 do poorly on these two items (For item 30, 11 out of 19 L2ers, 42 out of 51 TD 11-15, and 30 out of 51 deaf learners responded correctly. For item 37, 13 out of 19 L2ers, 31 out of 51 TD 11-15, and 22 out of 51 deaf learners responded correctly). Therefore, the difficulty already observed for object relative clauses and the low scores obtained by the deaf and TD 11-15, point to complexity as being the stronger factor involved in processing these sentences. In addition, the third item that is different in French and English is a subject relative clause (and thus an arguably less complex type of relative clause) and 17 out of the 19 L2ers answered it correctly. Although, due to the low number of items, we cannot entirely rule out the idea that the different forms of relative pronouns in French versus English caused the L2ers to do poorly on these items, there is no evidence supporting this.

groups. Proposals such as the Full Access/Full Transfer hypothesis assume that L1 transfer is the linguistic base for learners in the beginning stages of L2 acquisition (Schwartz and Sprouse, 1996). Therefore, it would be interesting to evaluate the role of L1 transfer and complexity in less proficient learners.

Finally, we might also consider the role of L1 transfer as a way of avoiding complex constructions in the L2. Using transfer to avoid complexity would predict very limited evidence of L1 transfer in cases where the L2 equivalent is less complex than in the L1. Some evidence for this prediction exists in which L2 speakers of French (L1 English) produce a minimal amount of subject-verb inversion in the formulation of simple wh questions in French (Scheidnes, 2008). However, in cases where the L2 construction is different and complex, transfer and complexity might both play a role. For example, certain studies have found that L2 speakers of French (L1 English) sometimes use the strong pronoun *ça* in French instead of object clitics (Paradis, 2004; White, 1996), but it remains to be seen whether this is due to L1 transfer (Paradis, 2004) or to the complexity of the target construction (Adiv, 1984). Our goal here has merely been to show that at least at some level of proficiency, complexity may play a greater role than L1 transfer in explaining difficulties.

References

Adiv, Ellen (1984). Language learning strategies: The relationship between L1 operating principles and language transfer in L2 development. In Roger Anderson (Ed.), *Second languages: A cross-linguistic perspective* (pp. 125–142). Rowley, MA: Newbury House.

Borer, Hagit & Wexler, Kenneth (1987). The Role of Maturation in the Explanation of Linguistic Development. In Tom Roeper & Edwin Williams (Eds.), *Parameter-setting and Language Acquisition* (pp. 123-172). Dordecht: Reidel.

Chillier-Zesiger, Laurence, Arabatzi, Marina, Baranzini, Lara, Cronel-Ohayon, Stéphany, & Deonna, Thierry (2006). *The acquisition of French pronouns in normal children and in children with Specific Language Impairment (SLI)*. Unpublished manuscript, University of Geneva.

Delage, Hélène (2008). *Évolution de l'hétérogénéité linguistique chez les enfants sourds moyens et légers : Etude de la complexité morphosyntaxique*. PhD dissertation, University of Tours, France.

Delage, Hélène, Monjauze, Cécile, Hamann, Cornelia & Tuller, Laurice (2008). *Relative Clauses in Atypical Acquisition of French. Language Acquisition and Development: Proceedings of GALA 2007*. Cambridge Scholars Publishing (CSP).

Emonds, Joseph (1978). The verbal complex V'-V in French. *Linguistic Inquiry, 9*, 151-75.

Epstein, Samuel, Flynn, Suzanne, & Martohardjono, Gita (1996). Second language acquisition: Theoretical and experimental issues in contemporary research. *Brain and Behavioral Sciences, 19*, 677-758.

Eubank, Lynn (1993/1994). On the transfer of parametric values in L2 development. *Second Language Acquisition 3*, 182-208.

Friedmann, Naama, Belletti, Adriana, & Rizzi, Luigi (2009). Relativized relatives: Types of intervention in the acquisition of A-bar dependencies. *Lingua, 119*, 67-88.

Friedmann, Naama, & Novogodsky, Rama (2004). The acquisition of relative clause comprehension in Hebrew: A study of SLI and normal development. *Journal of Child language, 31*, 661-681.

Friedmann, Naama & Szterman, Ronit (2006). Syntactic movement in orally-trained children with hearing impairment. *Journal of Deaf Studies and Deaf Education, 11*, 56-75.

Gibson, Edward (1998). Linguistic Complexity: Locality of Syntactic Dependencies, *Cognition* 68, 1-76.

Gibson, Edward (2000). The dependency locality theory: A distance-based theory of linguistic complexity. In Alec Marantz, Yasushi, Miyashita & Wayne, O'Neil (Eds.), *Image, language, brain: Papers from the first mind articulation project symposium* (pp 95-126). Cambridge, MA: MIT Press.

Grodzinsky, Yosef (1995). Trace deletion, theta-roles, and cognitive strategies. *Brain & Language, 51*, 467-497.

Grodzinsky, Yosef (2000). The neurology of syntax: language use without Broca's area. *Behavioral and Brain Sciences*, 1–21.

Grüter, Theres (2005). Comprehension and production of French object clitics by child second language learners and children with specific language impairment. *Applied Psycholinguistics, 26*, 363–91.

Guasti, Maria Teresa (2002). *Language Acquisition: The Growth of Grammar*. Cambridge, MA: MIT Press.

Hamann, Cornelia & Belletti, Adriana (to appear). Developmental Patterns in the Acquisition of Romance Complement Clitics: Comparing Different Acquisition Modes with an Emphasis on French. *Language Acquisition*.

Hamann, Cornelia, Rizzi, Luigi & Frauenfelder, Uli (1996). The acquisition of subject and object clitics in French. In Harald, Clahsen (Ed.), *Generative perspectives on language acquisition* (pp. 309–334). Amsterdam: John Benjamins.

Hamann, Cornelia, Cronel-Ohayon, Stéphany, Dubé, Sébastien, Frauenfelder, Uli, Rizzi, Luigi, Starke, Michal, et al. (2003). Aspects of grammatical development in young French children with SLI. *Developmental Science, 6*, 151-158.

Hamann, Cornelia, Tuller, Laurice, Delage, Hélène, Monjauze, Cécile, & Henry, Célia (2007). (Un)successful subordination in French-speaking children and adolescents with SLI, In *Proceedings of BUCLD 1* (pp. 286-297).

Jakubowicz, Celia, Nash, Lea, Rigaut, Catherine & Gérard, Christophe-Loic (1998). Determiners and Clitic Pronouns in French-Speaking Children with SLI. *Language Acquisition, 7*, 113-160.

Jakubowicz, Celia & Rigaut, Catherine (2000). L'acquisition des clitiques nominatifs et des clitiques objets en français. *Revue canadienne de linguistique, 45*, 1/2, 119-157.

Jakubowicz, Celia (2005). The Language Faculty: (Ab)normal Development and Interface Constraints, Paper presented at the *GALA conference*, University of Sienna, September 8-10.

Jakubowicz, Celia & Tuller, Laurice (2008). Specific Language Impairment in French. In Ayoun, Dalila (Ed.), *Studies in French Applied Linguistics* (pp. 97–133). Amsterdam: John Benjamins.

Monjauze, Cécile (2007). *Language and Epilepsy with centro-temporal spikes: deficits and long-term effects*. PhD dissertation, University of Tours, France.

Paradis, Johanne & Crago, Martha (2000). Tense and temporality: Similarities and differences between language-impaired and second-language children. *Journal of Speech, Language and Hearing Research, 43*, 4, 834-848.

Paradis, Johanne (2004). The relevance of specific language impairment in understanding the role of transfer in second language acquisition. *Applied Psycholinguistics*, 25, 67–82.

Pollock, Jean-Yves (1989). Verb Movement, Universal Grammar and the structure of IP. *Linguistic Inquiry, 20*, 365-424.

Pierce, Amy (1992). *Language Acquisition and Syntactic Theory*. Dordrecht: Kluwer.

Rizzi, Luigi (1994). Some notes on linguistic theory and language development: The case of root infinitives. *Language Acquisition, 3*, 371-393.

Rizzi, Luigi (2000). Remark on Early Null Subjects. In Marc-Aurel Friedemann & Luigi Rizzi (Eds.), *The acquisition of syntax* (pp. 269-292). London: Addison-Wesley Longman.

Roulet, Leslie (2008). *Traitement de l'accord grammatical chez des enfants avec un trouble spécifique du langage oral*. PhD dissertation, University of Paris V, France.

Santi, Andrea & Grodzinsky, Yosef (2007). Working memory and syntax interact in Broca's area. *NeuroImage, 37*, 8–17.

Scheidnes, Maureen (2008). *Syntactic movement in the production of French Wh-questions: The role of computational complexity versus L1 transfer in adult L2 acquisition*. Paper presented at the Facing Movement workshop, August 23, 2008, Barcelona Linguistic Institute.

Schwartz, Bonnie & Sprouse, Rex (1996). L2 cognitive states and the Full Transfer/Full Access Model. *Second Language Research, 12*, 40-72.

Tuller, Laurice & Khomsi, Abdelhamid (2006). Jugement de Grammaticalité sur Phrase Ecrites [*Grammaticality Judgment of Written Sentences*]. Laboratoire Langage et Handicap, Université de Tours, France.

Tuller, Laurice, Delage Hélène & Monjauze, Cécile (in press). Clitic pronoun production as a measure of atypical language development in French. *Lingua*.

Vainikka, Anna & Young-Scholten, Martha (1996). Gradual development of L2 phrase structure. *Second Language Research*, 12, 7-39.

Van der Lely, Heather. K. J. (1998). SLI in children: movement, economy and deficits in the computational-syntactic system. *Language Acquisition, 7*, 161-192.

Wexler, Kenneth (1998). Very Early Parameter Setting and the Unique Checking Constraint: A New Explanation for the Optional Infinitive Stage. *Lingua, 106*, 23-79.

White, Lydia (1990). The Verb-Movement Parameter in Second Language Acquisition. *Language Acquisition, 1,* 4, 337 – 360.

White, Lydia (1991). Adverb Placement in Second Language Acquisition: Some Effects of Positive and Negative Evidence in the Classroom. *Second Language Research, 7*, 2, 133-161.

White, Lydia (1996). Clitics in child L2 French. In Harald, Clahsen (Ed.), *Generative approaches to first and second language acquisition* (pp. 335-368). Amsterdam: John Benjamins.

White, Lydia (2003). *Second language acquisition and universal grammar*. Cambridge: Cambridge University Press.

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