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Clitic pronoun production as a measure of atypical language development in French

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ABSTRACT

Three aspects of accusative clitic production, which is frequently proposed as a particularly pertinent marker of immature or impaired language in French, are explored: (1) the status of this marker after childhood in atypical language development, (2) the performance of typically-developing children after early childhood, and (3) the specificity of third person accusative clitics. These three points were examined via results on an elicited production probe administered to 36 typically-developing 6- and 11-years-olds, and to 71 adolescents whose language has developed since childhood in the context of pathologies associated with varying degrees of severity for language development: SLI, mild-to-moderate hearing loss, and Rolandic Epilepsy. It was found that accusative clitic production remained weak long after childhood in adolescents whose language developed atypically, no matter what the cause of the atypical development was and no matter how severe its effects on language are, and that this low production concerned particularly or exclusively third person accusative clitics. Moreover, a strong age-effect was found between the TD 6- and 11-year-olds, for accusative clitic production. These results are interpreted as providing evidence that difficulty with third person accusative clitics stems from non-optimal functioning of extra-linguistic systems which are sensitive to the complexity of linguistic operations.

1. Introduction

We propose to explore here elicited production of clitic pronouns as a measure of atypical language development in French. Low production rates for object clitics have been widely proposed in the literature (essentially based on studies of SLI) to be a pertinent indication of language impairment in French. They might thus be considered to be analogous to production of verb tense in the acquisition of English in that, like root infinitives in English, one sure place to look for evidence of difficulty in acquiring French is object clitic production. The notion of clinical marker raises the question of specificity to a particular language pathology. Several studies of object clitics in French-speaking children with SLI have been made (see Chillier-Zesiger et al., 2006; Hamann et al., 2003; Jakubowicz et al., 1998). Evidence has also been available for some time now that low rates of object clitic production (compared to other types of clitics) are an integral, normal part of

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the acquisition of French, in that they are found in young typically-developing children (Friedemann, 1992; Hamann et al., 1995; Jakubowicz and Rigaut, 2000), in bilingual children or in children acquiring French as a second language (Hamann and Belletti, 2006; Paradis and Crago, 2000; Paradis et al., 2003; Prévost, 2006). Jakubowicz et al. (2000) showed that children with severe or profound deafness show the same selective vulnerability on object clitics as children with SLI. There has been, however, very little systematic comparison of this marker in different developmental situations. It is perhaps not surprising that children with major hearing loss (as is the case with severe and profound deafness) have difficulties which resemble those observed in children with SLI. It might be the case that markers such as object clitic production vary with severity of language impairment. On the other hand, certain constructions might prove to be inherently difficult, and therefore observable in other developmental situations, and thus even in the context of pathologies whose impact on language development is less severe. The results reported in Tuller and Jakubowicz (2004) of a study of moderately deaf children support the idea that certain constructions are intrinsically difficult, to children with varying degrees of language impairment. Further inter-pathology comparison, in which the severity of impairment is a key variable, would provide clearer evidence for this hypothesis. The notion of clinical marker/measure also raises the question of the age at which the marker is relevant. Sources of language difficulty at early ages do not necessarily continue to pose difficulty later on. Are there time constraints on the relevance of object clitic production as a gage of language difficulty? Again, explicit, systematic comparison, at different ages, ought to shed light on these questions. Finally, the usefulness of clinical measures of language impairment for understanding the nature of language impairment is linked to understanding of the linguistic properties of the construction in question. The properties of constructions with objects clitics, as well as those with object-drop, a grammatical construction in spoken French (under restricted conditions), we will argue, have interesting implications for the status of this marker.

We take up these and related issues within the general framework of the Minimalist Program. In that framework, Chomsky (2005) proposes that there are three factors which influence the development of language: genetic endowment, experience, and principles not specific to the language faculty, but which interact with it. Following work of Jakubowicz (2005, 2011) and Jakubowicz and Strik (2008) on atypical development, and others on typical development (notably van Kampen, 1997), we will be pursuing the hypothesis that development, both typical and atypical, is indeed affected by constraints which are external to UG, but which are sensitive to computational aspects of grammar. The specific constraint that appears to play a role here is that of working memory (see Grüter, 2006; Hamann et al., 2007; Jakubowicz, 2005; Jakubowicz and Strik, 2008; Tuller et al., 2006, among others). Working memory appears to be sensitive to the degree of complexity involved in a given construction. "Complexity" is, of course, a concept in need of clarification. Jakubowicz (2005, 2011) and Jakubowicz and Strik (2008) propose that computational complexity can be measured in terms of number and nature of instances of MERGE (see also van der Lely, 1998). We have argued in previous work that other aspects of computation might also be involved, such as depth of embedding, or the locus of embedded CPs (at phase edge or not) (see Hamann et al., 2007; Tuller et al., 2006). The intuitive idea underlying these proposals is that constructions involving greater computational complexity (whatever the optimal characterization of this concept turns out to be) will be difficult to acquire/master, in that they require mobilization of greater cognitive resources.[1] This difficulty can manifest itself in a variety of ways: later emergence, high error rates, avoidance. Object clitic constructions in French have been argued to be an example of a construction which involves greater computational complexity (see Jakubowicz and Nash, in press; Zesiger et al., 2010). We will show here that complexity effects can be found in performance on a task eliciting production of object clitics in TD six-years-olds (as compared to TD 11-year-olds, who no longer show complexity effects), and in adolescents with a developmental pathology that severely affects language acquisition (SLI), in adolescents with a developmental pathology that has a moderate effect on language acquisition (mild-to-moderate hearing loss), and in adolescents with a developmental pathology that has subtle, but identifiable effects on language acquisition (Rolandic Epilepsy).

We begin in section 2 with a brief review of the literature on the production of object clitics in French and a description of object clitic and related constructions (syntax and discourse). Section 3 lays out the specific goals of this article in the form of three questions: (1) What is the status of accusative clitic production as a marker of language impairment after childhood? (2) Does performance on production of accusative clitics change after early childhood in typically-developing children? and (3) Is the difficulty with accusative clitics specific to third person? These questions are raised within the context of inter-pathology comparison, a perspective which is argued to have great potential for our understanding of the nature of (a)typical language acquisition. Section 4 presents the populations studied and the material used to test these questions. Results are presented in section 5 and are discussed in section 6.

2. Production of object clitics in French

As mentioned in section 1, there is a fairly large literature on the acquisition of object clitics in French, based on analysis of spontaneous language samples and on elicited production tasks (for a recent, thorough review, see Grüter, 2006). Studies of typical L1 acquisition of French, of L2 (child and adult) learners of French, of L1 child learners with SLI or with hearing loss

[1] We believe that these hypotheses are not incompatible with the view that there are domain-specific properties of language (contrary to one anonymous reviewer's suggestion). Indeed, Santi and Grodzinsky (2007) recently supported the specifist view that there may exist a syntactically specialized working memory in Broca's area, involved specifically in the processing of filler-gap relations (i.e. more complex constructions), compared to binding relations (which do not involve movement).

(profound, severe, and moderate) show that accusative (direct object) clitics are slow to emerge compared to other pronominal clitics (and to homophonous definite determiners). As is typical, a significant difference has been found between comprehension and production, the latter lagging significantly behind the former (Chillier-Zesiger et al., 2006; Grüter, 2006; Jakubowicz et al., 1998; Jakubowicz and Nash, in press). It is thus not the case that children do not understand sentences with object clitics, but only that they avoid producing them. Not only do typically-developing children and, in greater degrees and at later ages, children with atypical language development, use fewer object clitics (compared to subject clitics), they omit them in obligatory contexts, and use infelicitous repetitions of lexical DPs.

What is it about direct object clitics which makes them difficult to acquire? There is a clustering of (related) relevant properties, which have been presented in the literature and which we have listed in (1) and (2). We have separated properties which hold for all direct object clitics (1), which we will refer to simply as accusative clitics, and those which hold more specifically of third person (3p) clitics (2).

(1) Properties of accusative clitics
- a. Non-canonical DO position
- b. Generally co-occur with a nominative clitic in spoken French
- c. Non-locally bound

(2) Properties of 3p accusative clitics
- a. Discourse-independent
- b. Morphologically marked for both number and gender
- c. Unspecified for animacy
- d. Optional under specific discourse conditions (legitimate object omission) in spoken French

Beginning with (1a), accusative pronouns in French, like all other pronominal clitics, are cliticized to the left of the tensed verb, whereas lexical objects occur to the right of V:

(3) a. La giraffe mord Thomas.
the giraffe bites Thomas
'The giraffe is biting Thomas'

b. La giraffe **le** mord.
the giraffe him bites
'The giraffe is biting him'

Nominative clitics, for many speakers of French, typically-appear even when there is a lexical subject (Zribi-Hertz, 1994), regardless of the nature of the object (see 4a and b). This means, however, that verbs with an accusative clitic in fact are generally preceded by a sequence of (at least) two preverbal clitics, as in (4c).

(4) a. Thomas **il** triche.
Thomas he cheats
'Thomas is cheating'

b. La girafe **elle** mord Thomas.
the giraffe she bites Thomas
'The giraffe is biting Thomas'

c. La girafe **elle le** mord.
the giraffe she him bites
'The giraffe she's biting him'

Properties (1a) and (1b) hold for all object clitics—accusative, reflexive, dative, and oblique (partitive and locative):

(5) a. La girafe **elle se** mord.
the giraffe she 3sgREFL bites
'The giraffe is biting herself'

b. La girafe **elle lui** mord la main.
the giraffe she 3sgDAT bites the hand
'The giraffe is biting his/her hand'

Table 1
Pronominal forms in French.

	Nominative clitics		Accusative clitics		Reflexive clitics	Dative clitics	Oblique clitics	Strong pronouns	
	Masc.	Fem.	Masc.	Fem.				Masc.	Fem.
1 sg/pl	*je/nous*		*me/nous*		*me/nous*	*me/nous*		*moi/nous*	
2 sg/pl	*tu/vous*		*te/vous*		*te/vous*	*te/vous*		*toi/vous*	
3 sg/pl	*il/ils*	*elle/elles*	***le***/*les*	***la***/*les*	*se*	*lui/leur*		*lui/eux*	*elle/elles*
							en; y		

c. La girafe **elle en** mord beaucoup.
the giraffe she PART bites a-lot
'The giraffe is biting a lot of them'

d. La girafe **elle y** habite.
the giraffe she there lives
'The giraffe lives there'

Audollent and Tuller (2003) argued that clitic clustering is just one example of cases in which there is an immediate succession of functional categories involving multiple syntactic operations (AGREE, MERGE, etc.), and which thus are particularly subject to error in speakers with language impairment.

Turning to (1c), whereas reflexive clitics necessarily take their referent as the local subject (Condition A of the Binding Theory), non-reflexive accusative clitics must find their referent outside of their local domain, an operation which requires greater reliance on working memory (see Gibson, 2000, on the influence of syntactic distance on working memory).

While all accusative pronouns have the properties in (1), those in (2) are specific to third person accusative pronouns. The distinction between third person, on the one hand, and first and second person, on the other hand, has long been recognized (see Benveniste, 1966; Forchheimer, 1953). While first and second person pronouns are discourse-dependent, in that their reference is tied to the speech act (first person is the speaker and second person is the addressee), third person pronouns are discourse-independent, as their reference is fundamentally syntactic. As is common cross-linguistically, third person pronouns are morphologically richer in French than first and second person clitics: while the former are marked for number, the latter are marked for gender as well. It is well known that French-speaking children with SLI make errors on morphological marking of both number (see Franck et al., 2004) and gender (see Roulet, 2007; Roulet-Amiot and Jakubowicz, 2006). Third person accusative clitics show overt agreement for both of these, as do non-clitic pronouns (Table 1).

If morphological agreement is part of the complexity involved in producing third person accusative clitics, it should be expected that plural accusative clitics, which display overt number agreement should be as difficult as singular accusative clitics, which display overt gender agreement, in both typical and atypical development of French. Studies reporting on elicited production of plural accusative clitics have confirmed this prediction. Studies based on Jakubowicz' DETACNA probe (see Delamarre and Niddam Gueniche, 2002) report that *les* 'them' had production rates similar to *le* and *la* (TD 4-year-olds were at 70% for *le*, 68% for *la*, and 67 for *les*, and likewise 6- to 8-year-old children with SLI had production rates of 21% for *le* and for *la*, and 26% for *les*). Chillier-Zesiger et al. (2006), for TD and for SLI children, and Zesiger et al. (2010), for TD children, also report low production rates for all three 3p accusative clitics (masculine singular, feminine singular, and plural), and significant rates of error on gender (masculine for feminine) and number (singular for plural) marking.

The property in (2c) is a property specific to clitics, however. Clitics are not specified for animacy (they may refer to animate and inanimate expressions); strong pronouns, however, are restricted to animate referents. Jakubowicz et al. (1998) and Jakubowicz and Nash (in press) propose that this property of accusative clitics is fundamental in the difficulty they pose in acquisition. Since clitics have functional features, but lack lexical content (such as animacy), they are categorically deficient. However, they must be merged into a theta position since they are arguments. This categorial deficiency is what prevents them from being licensed by the verb and obliges them to move to a special, non-argument position for structural licensing (property (1a)), but what is proposed to be difficult for the child is merging the clitic in the argument position in the first place. As noted by Jakubowicz and Nash (in press), the lack of specificity for animacy, which they argue to be at the root of the categorical deficiency of accusative clitics, does not hold for first and second person clitics.[2]

Property (1a) (in conjunction with (2c)) is at the base of other accounts, similar in spirit in that they are based on the hypothesis that clitics are somehow deficient and thus must move to a non-argument position. Chillier-Zesiger et al. (2006), assuming a VP-internal subject position, argued that clauses containing a object clitic necessarily imply representations in which the chains formed by movement of the direct object and of the subject are crossed, leading to increased processing load. Wexler et al. (2004) argue that the Unique Checking Constraint (Wexler, 1998), a maturational constraint (which disappears with age in typical language development) having the effect of limiting instances of internal merge of a given DP to one, predicts the observed vulnerability for accusative clitics in French, if one assumes that accusative clitics, DP *pros*, move first to AgrO (for Case-checking and participle agreement) and then to the specifier of a Clitic Phrase.

[2] It is not clear to us what would require movement of 1st and 2nd person clitics, under this analysis.

Property (2d) has received relatively little attention in studies of the acquisition of object clitics. The fact that third person accusative clitics are subject to legitimate omission in colloquial French is a common cross-linguistic phenomenon (see Tuller, 1986). At least on the surface, the legitimate object omission which occurs in the input would certainly appear to be a potential source of explanation for the low production of object clitics in acquisition. Studies of legitimate object omission in French have shown that null direct objects, with a definite, specific interpretation, such as those in (6) (from Fónagy, 1985), are frequent in colloquial French, but that object omission is subject to both lexical restrictions (see Fónagy, 1985; Tuller, 2000, from which the example in (7) is taken) and discourse restrictions (see Fónagy, 1985; Lambrecht and Lemoine, 1996; Lemoine, 1997; Tuller, 2000).[3] Adopting Lemoine's (1997) characterization, a null object in French must be linked to a sufficiently salient discourse topic, or, as Fónagy puts it, must refer to the central subject of the conversation. As Fónagy (1985) points out, this topic need not be (overtly) linguistic, and can simply be physically present, as in (6c).

(6) a. —Voulez-vous que je vous donne mon numéro de téléphone? —Non, je connais __.
want-you that I you give my number of telephone no, I know
'Do you want me to give you my phone number? No, I know __'

b. Les Hauts-de-Seine, vous connaissez __?
The Hauts-de-Seine, you know
'The Hauts-de-Seine, you know __?'

c. The gardener with an upward head movement toward a tree: J'abats __?
I chop-down
'I chop down __?'

(7) Le sac à dos de Luc pèse une tonne le vendredi soir. Ca contient tous ses livres et tous ses cahiers.
the bag to back of Luke weighs a ton the Friday evening that contains all his books and all his notebooks
—*T'as déjà porté__?/ —T'as déjà vu __?
you have already carried tu have already seen
'Luke's backpack weighs a ton on Friday evenings. It's got all of his books and all of his notebooks. Have you ever worn __?/ Have you ever seen __?'

As Tuller (1986, 1993) shows, null objects of transitive verbs (and most prepositions) in French, do not behave like syntactic variables. Like other pronouns, they do not show subjacency and strong cross-over effects, unlike null arguments in Chinese or in Brazilian Portuguese. Finally, unlike null objects in German, they are not restricted to root clauses. All of these properties would seem to indicate that legitimate null objects in French are simply null pronouns licensed by a null third person clitic, as proposed by Tuller (2000). One of the properties of third person accusative clitics is thus that they may be null under restricted lexical and discourse/pragmatic conditions. Tuller (2000) proposes that the multiplicity of conditions on the legitimate omission of objects is part of the explanation for the non-target production of object omission found in atypical language acquisition.

As an anonymous reviewer notes, nominative clitics display morphological agreement and in fact may be dropped in some registers of French. In spoken French, expletive subjects may be dropped (see Tuller, 2004), and French, like many other languages, has subject-drop in the so-called diary register. We are suggesting that it is complexity which entails that object clitics are difficult to produce in AD (and in early TD), and that the complexity of object clitics is the result of a combination of several properties, the first of which is their non-canonical position. Of the properties listed for third person accusative clitics, most are not shared by third person nominative clitics. Thus, nominative clitics are in the canonical subject position (at least in terms of order with respect to the verb) and they do not generally co-occur with an accusative clitic. They can be omitted, but only in root clauses, either in an impersonal construction or in a diary context. These cases of subject omission do not require identifying a salient discourse topic the way object omission does.

Summarizing, the production of accusative clitics includes the following properties: movement to a non-argument position, clustering with nominative clitics, and reference to a non-local antecedent. Production of a third person accusative clitic involves the following additional properties: establishing non-discourse-dependent reference, agreement in both number and gender, but not animacy, and, potentially, licensing of a null clitic (conditional on both lexical and discourse restrictions). They are thus complex (morpho)syntactically, in terms of movement (whichever analysis of clitic constructions

[3] It should be noted that use of object omission appears to be tied with certain sociolinguistic variables. It appears to be more frequent in casual speech, in the speech of younger speakers, and perhaps in varieties of French which are in contact with Creole French. See Léglise (2011) for a description of object omission in the spontaneous French of Guyanese middle school students (who have spoken both French and Guyanese Creole since childhood, and for some of them, Haitian French as well).

is adopted) and agreement, and mastering their usage (knowing whether they can be null or not) requires adhering to lexical idiosyncrasies and discourse/pragmatic conditions.

Some of the properties of accusative clitics in French summarized here have been explored in studies of the (a)typical acquisition of pronominal clitics in other languages. Difficulty with object clitics has been reported for languages such as Catalan (Wexler et al., 2004), European Portuguese (Costa and Lobo, 2007), Italian (Bottari et al., 1998, 2001; Schaeffer, 1997), and Greek (Tsimpli, 2001; Tsimpli and Mastropavlou, 2007; Tsimpli and Stavrakaki, 1999). Although it is extremely hard to compare difficulty (rate of omission or age at which target performance is reached) due to differing materials used to obtain measures, it appears to be the case that in some language object clitics are a source of greater difficulty than in others (see Costa and Lobo, 2007, for discussion). Two properties which have been explored which are of particular interest for comparison with object clitics in French are the link between accusative clitic production and grammatical null objects (our property (2d) and the question of third person vs. 1p/2p clitics). Costa and Lobo (2007) explored the correlation between accusative clitic production and grammatical null objects in Portuguese by running an experiment based on the methodology used by Schaeffer (1997) with 21 TD 2- to 4-year-olds. They reported a very low rate of clitic production (10% in the 2- to 3-year-old group and 14% in the 4-year-old group). As expected, adult controls produced both null objects and clitics, except inside syntactic islands, a context in which null objects are excluded in European Portuguese (contrary to spoken French, and to Brazilian Portuguese). Children omitted clitics in all contexts, but the rate of lexical DPs in island was higher than in non-island contexts. The first result shows that child clitic omission is not simply adult object omission. The latter result is argued to suggest that children are learning the contexts in which omission is in complementary distribution with clitics and that there is clitic omission in child Portuguese. They conclude, as did Tuller (2000), for French, that difficulty in acquisition of object clitics in Portuguese, and in particular persistent omission with age, comes from more than one source—the position of clitics, and the existence of null objects in the target language, the latter requiring discourse knowledge. Tsimpli (2001), Tsimpli and Mastropavlou (2007) and Tsimpli and Stavrakaki (1999) explored the question of the person in the acquisition of accusative clitics in Greek, a language which does not have grammatical object omission. It is suggested that 3p accusative clitics consist solely of uninterpretable features, whereas 1p/2p clitics include the interpretable [person] feature, making them referential, and that this distinction predicts differential performance because uninterpretable features are elusive in atypical development (SLI or L2). Tsimpli (2001) reported that seven SLI children aged 3;5–7;0 showed a tendency for omission of 1p and 2p object clitics, but that omission of 3p object clitics was predominant. Tsimpli and Mastropavlou (2007) reported results of analysis of spontaneous language samples from six (different) Greek-speaking SLI children aged 3;5–7;0 for production of accusative first, second, and third person clitics which show that production of all three persons appears to be difficult for these children, though numbers for non-third person were too small to allow for firm conclusions. In stark contrast with what has been found for French-speaking children with SLI, the "older" SLI children in this study (ages 5;6, 5;9, and 6;2) already performed target-like on 3p clitics.

3. Goals of the present study

3.1. Questions about the object clitic production marker

Many questions remain regarding object clitic production as a measure of atypical development of French. We concentrate on three questions in this study. First of all, what happens to the production of accusative clitics in individuals with atypical language development after childhood is over? In other words, what is the status of this marker in the outcome of atypical acquisition of French? Do accusative clitics continue to pose problems? If so, is this difficulty manifested in the same way after childhood? Audollent and Tuller (2003) reported results of an in-depth study of a monolingual French-speaking 19-year-old with a childhood diagnosis of SLI. Based on analysis of a spontaneous language sample containing over 800 utterances, 21.8% of which were ungrammatical, it was found that pronominal object clitics had a much higher error rate (nearly one-fifth of all obligatory object clitic contexts) than other pronouns (clitic or non-clitic) and than other functional categories. Audollent and Tuller also reported results of a methodologically identical analysis of a spontaneous language sample from a profoundly deaf 18-year-old whose first language was French (and whose first contact with French Sign Language was at age 14). Of the 675 utterances in this sample, 21% were ungrammatical. Specific difficulty for object clitics was also observed for the deaf subject, with a production rate equivalent to that of the SLI subject. Besides the high error rates associated with object clitics, it was also noted that both subjects had object/subject clitic ratios of around 1:5.5, which resemble those found by Hamann et al. (2003) for typically-developing children at around age three, and which are far from those found for adults (1:3).[4] These results suggest that difficulty with object clitic production does indeed continue long after childhood in atypical acquisition of French, but are in need of support from systematic group studies.

Secondly, and related to the first issue, studies of typically-developing children have used elicited production tasks of TD children up to about age six. It is well known that highly complex constructions continue to be avoided by children at that age. In French, this is the case, for example, for certain relative constructions (Labelle, 1990, 1996). If accusative clitics are difficult to compute, we expect that TD children may continue to avoid them for some time, at least in sufficiently taxing situations. The published studies report what appear to be ceiling performances beginning around age five. Chillier-Zesiger

[4] This measure must be handled with same care, as it will also depend on the rate at which a subject doubles lexical subjects with a nominative clitic. This rate tends to be much higher in speakers with less normative speech, which, of course, will be the case for subjects with SLI.

et al. (2006) administered an elicited production task to a group of 99 TD children aged 3;5–6;5 divided into five age groups (mean ages, respectively, of 4;0, 4;9, 5;3, 5;9, and 6;3). While production of all types of clitic pronouns tested (nominative, accusative and reflexive) increased significantly with age, accusative clitics were produced significantly less often than nominative and reflexive clitics. The 4.0 group produced on average only 68.5% (*SD* = 33.8) accusative clitics, whereas the other groups had means of 88.1, 88.7, 93.9, and 90.0, respectively. Interestingly, object omission, which was very frequent in the 4.0 group (*M* = 21%) continued to decrease with age, even up to the 6.3 group. Likewise, also in an elicited production experiment, Van der Velde (2003) reports 44.1% production of accusative clitics in a group with a mean age of 3.3, 78.6% in a group with a mean age 4;2, and 91.7% in a group with a mean age of 6;7. These results suggest that accusative clitic production continues to be avoided for quite some time in typical acquisition, and thus that it would be interesting to pursue this question by looking at older TD children. If avoidance is a performance strategy, we would expect that performance in TD children will continue to increase significantly with age, beyond age six, in that, presumably, performance systems such as working memory become more and more efficient as children mature.

The final aspect we have sought to explore concerns the person feature on accusative clitics. To our knowledge, all elicited production studies of accusative clitics have exclusively targeted third person clitics. Is difficulty with accusative clitics a general difficulty related to all accusative clitics or is there something specific about third person accusative clitics? Third person clitics have the particularity of being subject to legitimate object-drop in spoken French in the discourse conditions reviewed in the previous section. Discourse pronouns (first and second persons) do not have this possibility (a typical cross-linguistic pattern). If part of the difficulty involved in the production of accusative clitics is the existence of legitimate object omission, it is expected that production of non-third person accusative clitics will be less difficult than that of third person accusative clitics. On the other hand, if the non-canonical position of accusative clitics is solely responsible for the difficulty with accusative clitics, however this is formalized (see section 2), we would expect to find that non-third person accusative clitics are as difficult to produce as third person accusative clitics.

3.2. Inter-pathology comparison

Understanding a given type of atypical language acquisition such as SLI, quite logically, entails comparison not only with typical language acquisition, but also with other types of atypical language acquisition. Likewise, construction of linguistic explanations for the semiology of atypical development clearly stands to benefit from a comparative approach. If, for example, as will be argued here, the patterns seen in atypical acquisition are related to mechanisms involved in linguistic performance, but which are sensitive to grammatical computation, one would expect therefore that these patterns will be recurrent, and not specific to any given pathology. Inter-pathology comparison is a delicate operation in that several variables must be juggled at the same time. While obviously wanting to focus on pathologies posing interesting questions for theory of language acquisition, the investigator also clearly needs to compare pathologies that are both different enough to merit comparison and similar enough to make that comparison interesting. We propose here a three-way comparison between SLI, mild-to-moderate hearing loss (MMHL), and rolandic epilepsy (RE).

While the interest of SLI for linguistic theory is by now well-known (as the contributions in this special issue illustrate), the other two cases of atypical development presented here are much less frequently studied. Mild-to-moderate hearing loss (MMHL) is an interesting group for the study of atypical language development. All other things being equal, these children have normal intelligence, a normal language faculty, but have restricted access to language input due to hearing loss, which involves not only lowered hearing thresholds, but also distortion of the speech signal. Generally these children are not exposed to sign language (and thus bilingualism can be excluded). Importantly, children with MMHL do display (some) spontaneous language acquisition, one of the results of which is that hearing loss is usually detected several years after birth (average age around 4 or 5, see Delage and Tuller, 2007), and therefore amelioration of lowered hearing thresholds and sound distortion begins only after several years of degraded and partial language input. Studies of language in this population have shown significant language impairment (see Delage and Tuller, 2007, for a literature review), and considerable inter-subject variability.

Rolandic epilepsy (RE), also referred to as benign epilepsy of childhood with centrotemporal spikes, is the classic focal, idiopathic epilepsy. It involves limited abnormal electrical discharges over the centrotemporal region beginning in childhood (age 3–13), but ending before adulthood. As electrical discharges in this form of epilepsy are localized in perisylvian language areas, and as they take place during development, it is of particular interest for the study of language development in exceptional circumstances. Though traditionally characterized as benign, recent studies have brought to light subtle, but identifiable effects on language (Monjauze et al., 2005, 2007). As is the case for SLI, absence of neurological and intellectual deficits is one of the criteria for RE.

These three pathologies form an interesting constellation, we believe, in that, while all three involve individuals who are normally intelligent, have no brain lesions, and who have been exposed to their native language since birth, language development in childhood differs from typical language development (all three of these pathologies are also known to be, or highly suspected to be, largely hereditary). The source of difficulty for language acquisition, however, varies: for SLI, it is (notoriously) undetermined at this time, and, although the neurophysiological discharges that define RE are well established, their etiology is the subject of debate; the ultimate source of language difficulty for MMHL is, however, clear. And, while the immediate developmental disruption is temporary in RE, the deficit is presumably permanent in SLI and in MMHL, though in all three cases, disruption is presumably alleviated by therapy (and, in the case of MMHL, the immediate cause is alleviated, to varying degrees, by auditory prostheses). These situations allow for investigation of various

Table 2
Participants.

Group	*N* participants	Sex	Age range	Age: *M* (*SD*)
SLI[a]	37	24 M 13 F	11;5–20;5	14;8 (2;11)
MMHL	19	9 M 10 F	11;9–15;1	13;8 (1;1)
RE	15	8 M 7 F	11;3–16;10	13;6 (1;9)
TD-6	24	13 M 11 F	6;1–6;11	6;7 (0;3)
TD-11	12	6 M 6 F	11;1–11;9	11;4 (0;4)

[a] While the mean age and the age ranges for the SLI group is higher than for the MMHL and the RE groups, this does not increase heterogeneity within this group. As the case study reported on in Audollent and Tuller (2003) suggested, there is no age effect between ages 16 and 20 on measures of clitic production, as the reader can verify by inspecting Appendix B which contains individual rates of clitic production for the participants in the SLI group.

acquisition questions (timing, input, etc.). For our purposes here, they offer the possibility to explore a particular clinical marker (accusative clitic production) in contexts in which the severity of language impairment is known to vary. While SLI involves severe language impairment, language impairment stemming from MMHL appears to be somewhat less severe, and RE entails the least severe impairment of the three; however, all three involve high inter-subject variability.

4. Method

4.1. Participants

We sought to address these questions through study of clitic pronoun production in a large group of adolescents and young adults with a childhood diagnosis of SLI. These participants were compared to typically-developing children, and to two other groups of adolescents with atypical development: a group of adolescents with prelingual mild-to-moderate hearing loss and a group of adolescents with RE. All participants in all groups are monolingual speakers of French; their participation in this study was voluntary and subject to parental consent.

The SLI group consists of 37 participants aged 11–20 (*M* = 14;8 and *SD* = 2;11). The ratio of males to females is 1.9:1, a finding typical for SLI (see Tomblin, 1996, for example). All subjects were diagnosed for SLI as children in the same neuropediatric service of a university teaching hospital in France, which practices the usual exclusionary criteria (absence of sensory deficit, intellectual deficit, etc.). These participants all have normal non-verbal performance, as measured by WISC (PIQ > 80), or an equivalent evaluation.

The MMHL group consists of 19 participants who were recruited via the otolaryngology service of a university pediatric hospital and a center which provides services for children with deafness. All participants had bilateral, sensorineural, prelingual hearing loss with a PTA (pure tone average) between 20 and 70 dB. The group was composed of nine males and 10 females ranging in age from 11;9 to 15;1 (*M* = 13;8 and *SD* = 1;1). Participants were fairly evenly distributed in terms of PTA: seven participants with mild HL (20–40 dB), six participants with hearing thresholds between 41and 50 dB, and six participants with hearing thresholds between 51 and 70 dB. All attended regular schools. Non-verbal reasoning was controlled via a spatial problem-solving task similar to Raven's Progressive Matrices (Khomsi, 1998). None of the 19 adolescents scored below the fifth percentile.[5]

The RE group is comprised of 15 adolescents who were recruited from neuropediatric services in four different university hospitals and included eight males and seven females ranging in age from 11;3 to 16;10 (*M* age = 13;6 and *SD* = 1;9). Non-verbal reasoning was controlled via administration of Raven's Progressive Matrices. All participants scored above the tenth percentile.[6]

Two groups of TD children were studied. 24 TD 6-year-olds and 12 TD 11-year-olds were randomly selected from two primary schools and a middle school, after exclusion of children having received language therapy and children who were behind grade level. The 11-year-olds correspond to the youngest of the participants in the atypically-developing groups. The 6-year-olds, compared to the 11-year-olds, allowed us to look at the development of pronoun clitic production in TD children; they also provide rough language matches for the SLI group based on our finding, in related work, that mean MLU of TD 6-year-olds does not differ significantly from that of adolescents with SLI (see Hamann et al., 2007; Tuller et al., 2007).

The characteristics of the three atypically-developing and two TD groups investigated in this study are summarized in Table 2.

4.2. Material and procedure

In order to test production of pronoun clitics for these groups, we developed a Production Probe for Pronoun Clitics (PPPC, Tuller et al., 2004), which elicits production of first and third person nominative, reflexive, and accusative clitics, by requiring a response to a question about a drawing appearing on a computer screen.[7] The probe contains 32 items in all (see Tables 3a

[5] For additional information on the MMHL participants, see Delage and Tuller (2007), which summarizes some of the findings reported here within the context of wider study of this population.

[6] Performance of these adolescents with RE has been previously reported within the context of a wider study of RE (see Monjauze et al., 2007, and for a longitudinal study of these and other subjects with RE, Monjauze, 2007).

[7] Thanks to Celia Jakubowicz for her generous advice, and to Cécile Audollent for her active participation in the construction of this probe.

Table 3a
Pronoun clitics elicited by the PPPC: forms and *N* of items.

		Nominative	Reflexive	Accusative
1st person		je (8)	me (8)	me (8)
3rd person	Masc.	il (12)	se (8)	le (4)
	Fem.	elle (12)		la (4)

Table 3b
Reponses to third person accusative clitic items (*M*% and *SD*): SLI, TD-6, MMHL, RE.

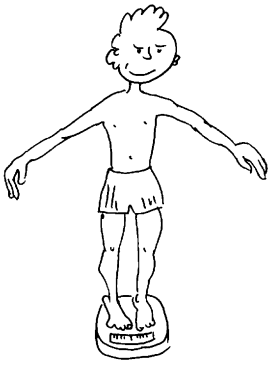
	Lexical DP	Omission	Non-target response	Reflexive/dative clitic[a]
TD-6	11.5 (11.6)	9.9 (14.7)	7.3 (9.7)	0
SLI	33.8 (24.8)	7.1 (9.6)	7.4 (9.1)	1.1 (3.5)
MMHL	8.6 (11.8)	5.9 (14.7)	3.3 (7.0)	0.7 (2.9)
RE	12.5 (25.4)	0	1.7 (4.4)	0.8 (3.2)

[a] Reflexive/dative clitic responses refer here to ungrammatical use of a reflexive or a dative clitic in place of an accusative clitic. There were also some grammatical reflexive or dative clitic responses (in inalienable constructions such as *Elle **se** nettoie le bras* 'She's washing herself the arm' or *Elle **lui** mord les doigts* 'She's biting to him the fingers') for items eliciting an accusative clitic. Such responses, which amounted to 8% of the total 3p ACC responses in the TD-11, 6% of TD-6, 4% of MMHL, and 0% in the SLI and the RE groups, were counted as clitic production (following the procedure used in the elicited production by Jakubowicz and colleagues). We return to the question of dative clitics in the following section.

and 3b); referents for pronoun clitics included both animate and inanimate arguments (humans, animals, objects). Sample items with drawings are given in (8–10).

(8) Experimenter: Que fait Marie avec le chien? 'What's Mary doing to the dog?'
what does Mary with the dog
Expected response: **Elle le** lave. he it washes 'She's washing it'

(9) Experimenter: Que fait Thomas? Que fait Thomas? what does Thomas 'What's Thomas doing?'
Expected response: **Il** **se** pèse. he 3sgREFL weighs 'He's weighing himself'



(10) Experimenter: Lui, il dit «Eh, Marie, que fait l'abeille?» 'He says «Hey, Marie, what's the bee doing?»'
he, he says hey Mary what does the bee
Toi, tu es Marie, qu'est-ce que tu réponds? '*You* are Marie: what do you answer?'
You you are Mary what you answer

Expected response: **Elle me** pique. 'It's stinging me.'
she me stings

The direct object in this material never corresponds to a salient discourse topic and thus a clitic pronoun is obligatory in all items in normal (spoken) adult French.

Participants were tested individually (testing time was approximately 10 min) and (digitally) recorded for subsequent transcription and coding. Statistical analysis was performed using nonparametric tests: between-group comparisons were made with the Mann–Whitney rank test, within-group comparisons were made with the Wilcoxon test, and the Spearman rank correlation coefficient was used to measure correlations.

5. Results

Following the questions we posed at the outset, we first look at clitic production after childhood in SLI, concentrating on third person clitics, the clitics studied in previous elicited production studies. The results for these same elements are then reported for TD 6- versus 11-year-olds, in order to check for developmental trends. We then explicitly take up the question of the specificity of third person (3p) accusative clitics, presenting results of third versus first person clitics. The comparative pathology results are presented in the final part of this section.

5.1. Accusative clitic production after childhood in SLI

Our elicited production probe results show that accusative clitics continue to pose significant difficulties for individuals with SLI after childhood. 3p accusative clitics, which were produced with a mean rate of 49.7% (SD = 31.9), were produced significantly less often than both 3p nominative clitics (Z = 5.0, $p < .0001$) and 3p reflexive clitics (Z = 5.0, $p < .0001$), which were produced at mean rates of 86.6% (SD = 17.5) and 93.6% (SD = 11.6) (Fig. 1).

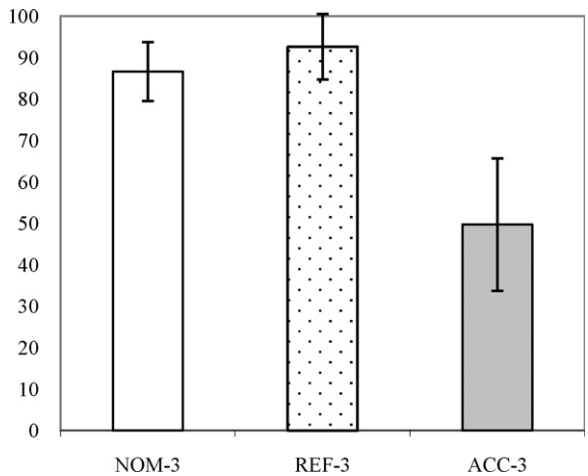


Fig. 1. Production (%) of nominative, reflexive and accusative clitics (third person): SLI.

Clitic production rates include production of a clitic which contains an error in gender (errors in number were inexistent). SLI participants made gender errors for about 10% (*M*) of 3p accusative clitics produced. With the notable exception of the single item, *Il le cache* 'He's hiding it', where *le* 'it' referred to *l'argent* 'the money' in which feminine was frequently substituted for masculine (an error found in all groups studied), virtually all gender errors consisted of masculine in place of feminine.[8]

Responses to items requiring production of a 3p accusative clitic which did not contain an accusative clitic were of three types: a lexical DP in place of the direct object clitic, omission of the direct object, and various non-target responses not requiring production of an accusative clitic. These are illustrated in (12).

(12) a. Expected Response: Il le pèse. 'He's weighing him'
he him weighs

b. Lexical DP: Il pèse le bébé. 'He's weighing the baby'
he weighs the baby

c. Omission of direct object: Il pèse 'He's weighing'
he weighs

d. Non-target response: Il regarde combien il pèse. 'He's seeing how much he weighs'
he looks-at how-much he weighs

Of the three strategies, production of lexical DPs was by far the most frequently used: 33.8% of 3p accusative clitic contexts. Omissions and non-target responses had means of 7.1% and 7.4%, respectively (*SD*s = 9.6 and 7.4, respectively). Interestingly, when the lead-on question was reformulated with an explicit request to use the target verb requiring an accusative clitic, participants continued to avoid the structure, as illustrated in (13) and (14), more often than not.[9]

(13) a. Experimenter: Que fait Marie avec la voiture? 'What's Mary doing with the car?'
what does Mary with the car
(Expected Response: Elle la regarde. 'She's looking at it')
she her looks-at

b. First Response (SLI, RB 11;11): Elle joue. 'She's playing'
she plays

c. Reponse after prompt with target verb (SLI, RB 11;11): Elle regarde la voiture. 'She's looking at the car'
she looks-at the car

(14) a. Experimenter: Que fait le médecin avec le bébé? 'What's the doctor doing with the baby?'
what does the doctor with the baby
(Expected Response: Il le pèse. 'He's weighing him')
he him weighs

b. First Response (SLI, MC 13;2): Il prend son poids. 'He's taking his weight'
he takes his weight

c. Reponse after promt with target verb (SLI, MC 13;2): Il pèse l' enfant. 'He's weighing the child'
he weighs the child

The group mean for 3p accusative clitic production is very low in the SLI group. Furthermore, no correlation was found between accusative clitic production and age in this group ($r_s = -.271$, *ns* at $p < .05$), even though the age range, from 11;5 to 20;5, is wide. Likewise, when the entire SLI group is divided into two subgroups according to age—11- to 14-year-olds ($N = 21$) and 15- to 20-year-olds ($N = 16$), no differences are found on any language measures between the two groups (for 3p accusative clitics, $U = 140.5$, $p = .395$). In other words, low accusative clitic production appears to persist long after childhood.

5.2. Accusative clitic production in older TD children

TD 11-year-olds, as expected, displayed ceiling performance for all pronominal clitics tested—3p accusative clitics (*M* 97.9%, *SD* = 4.9), 3p reflexive clitics (*M* 96.9%, *SD* = 7.8), and 3p nominative clitics (*M* 94.4%, *SD* = 8.6%) (Fig. 2). None of the 11-year-olds omitted accusative (or any other) clitics, and only two participants produced a (single) lexical DP in place of an accusative clitic. TD 6-year-olds were at ceiling performance for both 3p nominative (*M* 97.4%, *SD* = 3.2) and 3p reflexive

[8] This result is typical—see, for example, Jakubowicz and Nash (in press) and Chillier-Zesiger et al. (2006) on gender errors in SLI children.

[9] As reformulations were systematically provided only to the second half of participants tested, all scores reported here are those without reformulation. Differences between the two do not change the over-all results reported here.

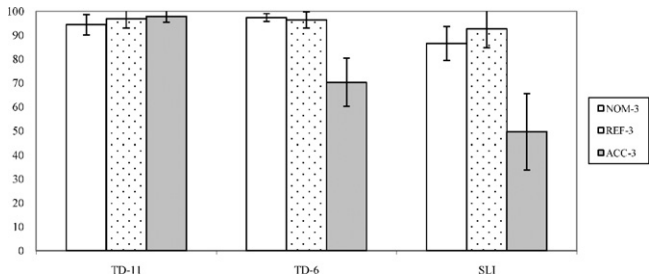


Fig. 2. Production (%) of nominative, reflexive and accusative clitics (third person): TD-11, TD-6, and SLI.

(96.4%, *SD* = 6.9) clitics. However, 3p accusative clitics were produced only 70.3% of the time (*SD* = 20.1), a rate significantly inferior to 3p nominative ($Z = 4.2$, $p < .0001$) and reflexive ($Z = 4.0$, $p < .001$) clitics. TD-6 children produced significantly fewer accusative clitics than TD-11 did ($U = 18$, $p < .0001$); for reflexive and nominative clitics, the two groups did not differ significantly.

The low mean production rate for 3p accusative clitics in the TD-6 group was, however, significantly higher than that in the SLI group ($U = 245.5$, $p < .01$). TD-11 had significantly higher rates than the SLI for 3p accusative clitics ($U = 11$, $p < .00001$), but the two groups did not differ significantly for either 3p reflexive ($U = 171.5$, $p = .136$) or nominative ($U = 149.5$, $p = .084$) clitics. In place of accusative clitics, TD-6 participants, like SLI participants, produced mostly lexical DPs: SLI participants produced lexical DPs 33.8% of the time (*SD* = 24.8), significantly more often than the TD-6 children (*M* 11.5%, *SD* = 11.6). Omission of accusative clitics was also relatively high in both of these groups: 9.9% (*SD* = 14.7) for TD-6 and 7.1% (*SD* = 9.6) for SLI. Levels of non-target responses were also equivalent: 7.3% (*SD* = 9.7) for TD-6 and 7.4% (*SD* = 9.1) for SLI.

TD-6 participants showed the same pattern of gender errors found in the SLI group. They in fact produced even more gender errors: 17% of accusative clitics produced—and 10%, if the item *Il le cache* 'He's hiding it' (see section 5.1) is not included, had a gender error.

5.3. Third person accusative clitics are special

The low production rates for accusative clitics especially concerns 3p accusative clitics, as can be seen in Fig. 3, which shows production rates by clitic type and person. In both the SLI and the TD-6 groups, 3p accusative clitics were significantly less produced than 1p accusative clitics. While SLI participants had a mean rate of 3p accusative clitics of only 50% (*SD* = 19.1), 1p accusative clitics had a mean rate of 85% (*SD* = 10.5), a difference which is highly significant ($Z = 4.8$, $p < .00001$). Rates for reflexive clitics did not differ for person, but 3p nominative clitics were also less produced than 1p nominative clitics ($Z = 4.4$, $p < .0001$). For TD-6, the 3p/1p distinction is significant only for accusative clitics ($Z = 3.6$, $p < .001$).

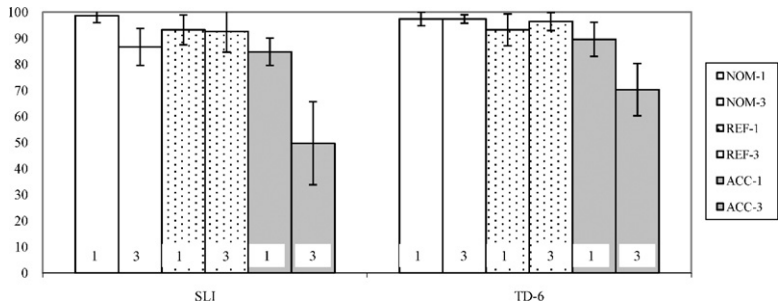


Fig. 3. Production (%) of first versus third person nominative, reflexive and accusative clitics: SLI, TD-6.

When 1p clitics are not produced, we find the same types of unexpected responses as with 3p clitics. In other words, lexical DPs were definitely produced in place of 1p accusative clitics (as illustrated by (15)), but, as was seen above, significantly less frequently than 3p accusative clitics. Omissions of 1p clitics, illustrated in (16), were very infrequent.

(15) Experimenter: Lui, il dit: «hé, Thomas, que fait le chien?» Toi maintenant tu es Thomas, qu'est-ce que tu
he he says hey Thomas what does the dog you now you are Thomas what you
réponds?
answer
'He says: «Hey, Thomas, what's the dog doing?» Now you're Thomas. What do you answer?'

Expected response: Il me lèche. 'It's licking me'
he me licks
MAR (SLI, 11;6): Euh, il lèche euh la main. 'Uh, he's licking the hand'
uh he licks uh the hand

(16) Experimenter: Elle, elle dit: «hé, Marie, que fait la voiture?» Toi, tu es Marie. Qu'est-ce que tu réponds?
she she says hey Mary what does the car you you are Mary what you answer
'She says: «Hey, Marie, what's the car doing?» You be Marie. What do you answer?'
Expected reponse: Elle m'éclabousse. 'It's splashing me'
she me splashes
EME (SLI, 11;6): Elle mouille. 'It's getting (me) wet'
she gets-wet

5.4. Inter-pathology comparison of accusative clitic production

We have seen that adolescents with SLI had difficulty producing 3p accusative clitics. These clitics had significantly lower production rates than other pronominal clitics for these adolescents. While TD-11 had ceiling performance for all clitic types and persons, TD-6 displayed the same weaknesses found in the adolescent SLI group, though they performed significantly better than this group for accusative clitics. What about other contexts of atypical development of French—is there evidence for persistent, selective difficulty for 3p accusative clitics, at adolescence?

Strikingly, the mean production rates for 3p accusative clitics for both the MMHL (M 80.9%, SD = 21.4) and the RE (M 85%, SD = 25.5) are lower than that of the TD-11 (M = 97.9%, SD = 4.9) (Fig. 4). Each of these groups, whose mean age is over 13 years, performed significantly below the TD-11, for this element (RE vs. TD-11: U = 53, $p < .05$ and MMHL vs. TD-11: U = 54, $p < .01$). However, the mean rate of production of 1p accusative clitics in TD-11 (M 94.8, SD = 8.4) was not significantly higher than that in either MMHL (M 88.8, SD = 18.6; U = 97.5, p = .4425) or RE (M 95, SD = 9.2; U = 86, p = .8079).

As was the case for the SLI and the TD-6 groups, when 3p accusative clitics were not produced, the most frequent response was a lexical DP. As was the case for the TD-6 and the SLI groups, the MMHL also displayed a sizeable rate of object omission (though notice that inter-subject variation is extremely high—11/19 MMHL participants, 21/37 SLI participants, and 13/24 TD-6 participants had 0% omission). This latter measure is also the only one for which the means between MMHL and RE differ significantly: for all other measures, including 3p clitic production, mean performance between these two groups does not differ significantly.

As was the case for the SLI group, performance in the MMHL and RE groups on the 3p accusative clitic does not correlate with age (r_s = .1470 and.1653, respectively). In the case of RE, the likely source of language impairment (the focal epileptic discharges) has entirely disappeared for many of these subjects. Indeed, one of the defining characteristics of RE is that remission generally occurs before age 16;8 of the 15 RE participants were in remission (two 11-year-olds, two 12-year-olds, one 14-year-old, one 15-year-old, and two 16-year-olds). The adolescents in remission did not differ from the adolescents still in active phase for production of 3p accusative clitics (U = 21.5, p = .421), or any other measure. In other words, performance did not improve with cessation of epileptic discharges.

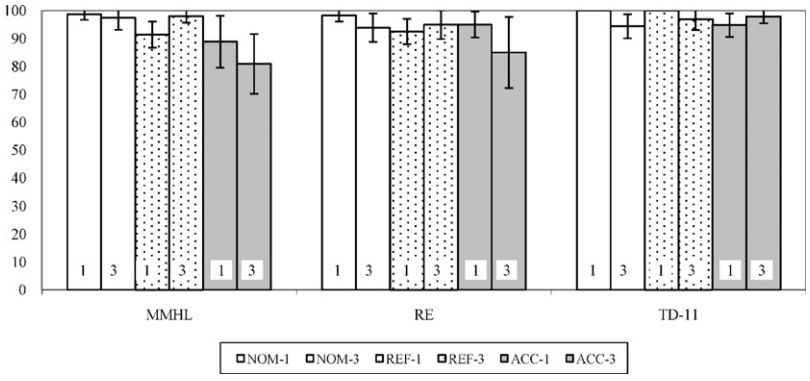


Fig. 4. Production (%) of first and third person nominative, reflexive and accusative clitics: MMHL, RE, TD-11.

Table 4
Clitic combinations elicited by the PPPC.

	Reflex 1p	Reflex 3p	Acc 1p	Acc 3p masc.	Acc 3p fem.
Nom 1p	je me	–	–	je le	je la
Nom 3p masc.	–	il se	il me	il le	il la
Nom 3p fem.	–	elle se	elle me	elle le	elle la

6. Discussion

Several clear points emerge from our results. First of all, there is evidence that accusative clitic production rates increase in TD after age six. Indeed, while production rates for nominative and reflexive clitic were essentially identical in the TD-6 and TD-11 groups, the mean production rate for accusative clitic was much lower in the TD-6 group compared to the TD-11 group. The TD-11 mean was just as high as that for nominative and reflexive clitic production (well over 90%), whereas the mean for the TD-6 group (around 70%) was way below that of other clitic types.[10] This low rate for a group of TD 6-year-olds merits commentary. Why did the TD-6 participants perform so poorly, at such a late age? We believe that the production task used in this study was not an easy task. Several different pronominal forms were elicited: both third and first person, both feminine and masculine gender, and three different types of pronouns (nominative, reflexive and accusative). Each item required production of two pronominal clitics in immediate succession. While the first clitic, the subject clitic, was always nominative, sequences varied as to whether the two clitics were of the same person and/or the same gender. The combinations were elicited as shown in Table 4.

These 6-year-olds clearly were not incapable of producing accusative clitics: none of them had a 0% production rate for 3p accusative clitics, and only one of the 24 children had a rate of less than 50%. On the other hand, only two participants had a perfect score for production of 3p accusative clitics.

Recall that clitic production rates included production of the appropriate clitic with a gender error. TD-6 participants had trouble producing accurate gender on accusative clitics: 17% of accusative clitics were erroneous. And, even if we exclude the word *argent* 'money', for which a feminine (instead of masculine) accusative clitic was very frequently used, there were still 10% remaining accusative clitics with a gender error. The most common pattern was that illustrated in (17), where, in items in which the subject and direct object DPs do not match in gender, the child appears to have used the gender of the last DP of the question for the first pronoun of the response, and then the opposite gender for the second pronoun. The self-correction, which is only partial, in (18), is particularly telling of the heavy load on working memory that this task imposed.[11] Again, with the possible exception of the word *argent* 'money', all of these children clearly know the gender of these words.

(17) Experimenter: Que fait Pierre à la dame? 'What is Pierre doing to the lady?'
what does Pierre to the lady
Expected response: Il la coiffe. 'He's doing her hair'
he her doing-hair
LAR (TD-6): Elle le coiffe. 'She's doing his hair'
she him doing-hair

(18) Experimenter: Que fait Marie avec le fil de téléphone?
what does Mary with the wire of telephone
'What's Marie doing with the telephone wire?'
Expected response: Elle le coupe. 'She's cutting it'
she him cuts
LIL (TD-6): Il la coupe, il le coupe, je veux dire.
he her cuts he him cuts I want to-say
'He's cutting it (fem.), he's cutting it (masc.), I mean'

[10] These results are further confirmed by recent results of this same experimental probe with a group of TD 8-year-olds (see Delage, 2008). The TD-8, like the TD-11, had production rates well over 90% for all types of clitics tested, and there were no significant differences in clitic production according to type or person. These 8-year-olds performed significantly better than the TD-6 (and the SLI) on all measures related to 3p ACC clitics (clitic production, omission, lexical DPs, and non-target responses), and, contrary to the TD-11, did not differ significantly (on any measures) from either the RE or the MMHL, due to higher intra-group variation than had been observed in the TD-11.

[11] These results would seem to constitute support for the crossing chains analysis proposed by Zesiger et al. (2010) (see section 2).

The TD-11 participants were not bothered by the non-matching gender items. Although there were mistakes for the gender of *argent* 'money' (4 of the 12 participants made this mistake), all other accusative clitics had correct gender marking (and there were only 3 gender errors on 3p nominative clitics, out of a total of 281 nominative clitics produced by the 12 participants). Gender accuracy, like over-all production of 3p accusative clitics, displayed a clear developmental trend, supporting the hypothesis that production of 3p accusative clitics is dependent on mature performance systems, and specifically a well-operating working memory.[12] Indeed, the pattern in (17) and (18) is reminiscent of so-called proximity concord or attraction effects found in adult speech errors involving agreement (see Bock and Miller, 1991). Franck et al. (2004:169), in an experimental study of subject number agreement on verbs in French, argue that agreement can go wrong either because of interference between two nouns encoded in the same syntactic (/time) unit (as in a phrasal subject postmodifier) or because the speaker forgets the number specification on the head nouns because "encoding of the subject is separated from encoding of the verb by a resource-consuming constituent" which involves working memory resources (as in an adjunct clause interpolated between the subject and the verb). They argued, following Cardinaletti (2003), that interpolation of an adjunct clause between the subject and the verb involves movement of the subject to a higher position, and that it is the presence of the subject trace that makes this configuration structurally more complex and thus possibly necessitating greater use of working memory to keep the number of the head noun available while processing the intervening material and thereby provoking errors. While it might be argued that the two clitics (nominative and accusative) in (17)–(18)) are encoded in the same (phonologico-syntactic) unit, giving rise to interference, notice also that the configurations in (17)/(18) involve storage of a morphological feature of a noun while a numeration is undergoing both external and internal Merge. If the complexity of the latter places a burden on working memory, as Franck et al. suggest, then high agreement error rates are expected. These results point to the relevance of including an independent measure of working memory, something that is lacking in our study.

Given the fact that it was difficult for TD-6 children to systematically and accurately produce 3p accusative clitics, it is not surprising that much older subjects with SLI continue to have significant problems with theses elements, long after childhood: the SLI adolescents produced only 50% of the 3p accusative clitics, and among these, 10% were erroneous in gender (7% if the item *argent* is excluded). This second major result is all the more striking in that within the wide age range of the SLI group (age 11–20), no improvement was found (see Appendix B). Although this would warrant confirmation via longitudinal study, it would appear as though accusative clitic production constitutes a lasting difficulty for individuals with SLI, and therefore, that it is a pertinent measure of the LONG-TERM effects of SLI, and not just of language impairment in CHILDREN.

In our presentation of object clitic constructions in French, we argued that third person accusative clitics are to be distinguished from other persons for several reasons. There is first of all the distinction between discourse-dependent pronouns and discourse-independent pronouns, the reference of the former being tied to the discourse roles (speaker or addressee), whereas the latter have a referent which is necessarily syntactically non-local. The fundamentally syntactic nature of third person pronouns (see Benveniste, 1966) is also what accounts for the fact that they are the pronouns subject to discourse-restricted omission in languages such as French. Object omission is grammatical in (spoken) French only when the third person referent is sufficiently salient in the discourse, and there appear to be lexical restrictions on which transitive verbs allow accusative clitic omission.[13] Morphologically, 3p accusative clitics display both number and gender marking, whereas pronominal clitics in the first and second person are inflected only for number. We argued in section 2 that these properties entail that production of accusative clitics in the third person involves more complex computation than that of such clitics in the first or second person. The third major result of our study is that there is indeed something special about 3p accusative clitics. While all accusative clitics were less produced by the SLI participants than corresponding nominative and reflexive clitics, in both first and third person, the latter were significantly less produced than the former: 50% vs. 85%. This same dichotomy is found in the other language impaired groups, though it did not reach significance, due to high inter-subject variation: 81% vs. 89% for MMHL and 85% vs. 95% for RE. For both of these groups, it is the mean for production of third person accusative clitics which is significantly different from that of TD-11, but not that of first person accusative clitics. Finally, while TD-11 means are over 90% for all clitics types and persons, TD-6 participants, like the adolescents with atypical development, produced significantly fewer 3p accusative clitics than 1p ones: means were 70% vs.90%. In other words, third person accusative clitics are more subject to avoidance than 1p accusative clitics. Part of this might be due simply to the person difference. Support for this is the fact that the 1p/3p difference is also found for nominative clitics in the SLI group, whereas reflexive clitics, which never have a non-local referent, do not display a 1p–3p distinction. However, this alone would not explain why the person difference shows up only in the accusative in the TD-6 group.[14] In other words, 3p accusative clitics are both third person and accusative, each of these properties adding complexity, separately and conjointly.

[12] The TD8 group results, presented in Delage (2008), are similar to those of the TD11: 6 out of the 12 participants erroneously produced a feminine clitic for the masculine word *argent* 'money', and there were a total of only three gender errors on nominative clitics.

[13] An anonymous reviewer suggests that it should be possible to test verbs which allow object omission in the adult language versus those that do not, and that our analysis predicts that accusative clitics would be less produced in contexts in which null objects are favored lexically. This certainly would be interesting to try. However, we do not believe that the prediction is so straightforward, as it is likely to be the case that speakers take time sorting out the contexts is which omission is permissible from those in which is it not, as it argued by Tuller (2000), and also by Costa and Lobo (2007) for EP.

[14] As an anonymous reviewer suggests, we would expect that younger TD children ought to display the 1p–3p distinction even for nominative clitics. The fact that TD6 do not, and yet do display this distinction for accusative clitics, is taken to support the idea that both person and clitic type are relevant in determining complexity.

Third person dative clitics share many, but not all, of the properties of third person accusative clitics (see Table 1): they are in a non-canonical IO position, they are unspecified for animacy, they generally co-occur with a nominative clitic in spoken French, they are non-locally bound and discourse independent. However, they are morphologically marked for number, but not for gender, and they do not seem to be subject to legitimate object omission in spoken French. If, as we have argued here, the difficulty with 3p accusative clitics is due to the cumulative effects of the series of properties discussed here, and since only not all of these properties hold for dative clitics, we might expect them not to be as difficult as 3p accusative clitics. These clitics have yet to be systematically studied in (a)typical development of French. However, in the spontaneous language corpus of the young man with SLI reported on in Audollent and Tuller (2003) (see section 3.1) dative clitics were not omitted the way accusative clitics were (93% dative clitic production in obligatory contexts). This is an area in need of systematic exploration.

The inter-pathology comparison revealed that adolescents with pathologies whose effect on language development is, on average, moderate to very subtle, also avoid producing 3p accusative clitics. Adolescents with MMHL, for whom language acquisition is similar in several respects to that of adolescents with SLI, in that development during childhood is significantly delayed, but for whom the source of language impairment is quite different, produce both substantial rates of object omission (6%) and of discourse infelicitous lexical DPs (9%), in place of 3p accusative clitics, though these rates are much lower than those for adolescents with SLI (7% and 39%, respectively). The results of the group of adolescents with RE are perhaps the most striking. These adolescents are generally indistinguishable from the TD-11, but not for production of 3p accusative clitics, which reached only 85%. Like the TD 11-year-olds, the RE participants did not produce any responses with omission of the direct object. However, their mean rate of responses with lexical DPs in place of clitics was 12.5%, whereas TD-11 had a rate of 2%. This fourth major result shows that this marker of language impairment is not specific to SLI. Pathologies with very divergent etiologies give rise to this same difficulty. In addition, although the pathologies studied here, MMHL and RE, have, on average, relatively mild effects on language development, and thus it might be expected that these effects would disappear by adolescence, the difficulty with accusative clitics is still apparent, in the group, at this age. Moreover, this difficulty not only does not lessen with age in either of these groups, whose ages range from 11 to 16, it does not at all improve with cessation of epileptic discharges within the RE group. The "damage", so to speak, "is done". 3p accusative clitic production would seem to constitute one way of ascertaining lingering language impairment after childhood, no matter what the initial source or severity of that impairment might be, and thus is a persistent mark of atypical language development in childhood.

We believe that all of these results point in the same direction: the difficulty with 3p accusative clitics has to do with a problem in processing load. The PPPC task required, apart from the derivational computation involved in the syntax of object clitics, finding the correct pronominal forms (type, gender, and person), while keeping in mind the referents in the previous discourse (in order to match phi-features) and keeping in mind whether the discourse referent is salient enough to require pronominalization, on the one hand, or to allow omission, on the other hand. In this task, omission is not merely a wrong decision about discourse saliency (as discourse saliency is never high enough to warrant object omission), it is also a way of avoiding finding the right pronoun, and merging it (externally and internally). Production of a lexical DP results only in infelicity, not in ungrammaticality. It means the speaker can avoid having to decide whether the discourse referent is salient enough to permit object omission, a potential cause of ungrammaticality, and he/she can at the same time avoid choosing the proper pronominal form, another potential source of ungrammaticality. It thus appears to be the best alternative strategy, in that the result is never ungrammatical. Interesting, this is the strategy that is favored by all of the groups displaying avoidance of 3p accusative clitics; omissions never exceed 10% in any group. This is also the only one found in the RE group, that for whom language impairment is the least severe. The relatively more frequent use of this strategy would also seem to support the hypothesis that difficulty with 3p accusative clitic production is not a difficulty with language competence, but rather with performance: avoiding potential ungrammaticality implies that the speakers' linguistic competence distinguishes between what is grammatical and what is not. Finally, the high inter-subject variation for production rates of 3p accusative clitics, both within the TD-6 group and within each of the groups of adolescents with atypical development is compatible with a performance account[15]: variability in both maturation of working memory in typically-developing 6-year-olds and in functioning of working memory in adolescents with atypical development in childhood are expected.

The interface between typical development of language and development of working memory is certainly an area in need of further study. There is reason to believe that in each of the three AD populations studied here, working memory is not optimal. It is known that working memory is moderately affected in children with RE (at least during the active phase of epilepsy), leading to a possible persistent immaturity of computational resources even after remission (see Monjauze, 2007). It has also been shown that working memory deficit is correlated to language performance in children with SLI (see, for example, Leonard et al., 2007), who perform notoriously badly on tests which rely heavily on working memory (such as non-word repetition). Recent evidence exists that children with MMHL are subject to abnormal auditory maturation (see Delage, 2008), which may be linked to immature working memory. These hypotheses are in need of further independent support.

7. Conclusion

This study has explored three aspects of accusative clitic production: (1) the status of this marker after childhood in atypical language development, (2) the performance of typically-developing children after early childhood, and (3) the specificity of third person accusative clitics. These three points were examined via results on an elicited production probe

[15] See standard deviations reported in section 5. All means and standard deviations are also listed in the appendix.

administered to typically-developing 6- and 11-year-olds, and to three groups of adolescents whose language has developed since childhood in the context of pathologies associated with varying degrees of severity for language development: SLI, mild-to-moderate hearing loss, and Rolandic Epilepsy.

With regard to (1), our study indicates that individuals whose language development has been protracted in time do not "catch up" by the time they arrive at adolescence, and, apparently, their performance does not improve during adolescence. There are long-term effects, and production of accusative clitics in French is one of them. This vulnerability of accusative clitics was not specific to the group of adolescents with a childhood diagnosis of SLI, but was found, albeit with a quantitative difference, in the adolescents with mild-to-moderate hearing loss and the adolescents with Rolandic Epilepsy. In these latter two situations, the source of language difficulty is clearly not a (genetically) deficient UG. In MMHL, the clearest case, the insult to language, rather, is due to disruption of normal access to language input, which results in protracted language development. In each of these contexts, at the end of the critical period for language development, and even at the end of childhood, language, in the broad sense, remains immature.

The results regarding (1), we believe, are entirely consistent with those concerning (2), the surprisingly low rate of accusative clitic production found for typically-developing 6-year-olds compared with that of TD 11-year-olds (who had ceiling performance). The elicited production task we used was extremely taxing, involving changing of person, gender, and type of clitics from item to item, and it contained no "distracter" items. 11-year-olds had no problem with this. They clearly have both a mature linguistic system and mature performance systems. Assuming that at age six, the linguistic system, at least with regard to pronominal clitics is mature (and this conclusion is supported by comprehension studies, see Grüter, 2006), we conclude that the TD-6 results are indicative of immature language performance.

This interpretation implies that language impairment could be the result of either extended immaturity of working memory, or due to a particular pathology irrevocably impairing aspects of working memory that are necessary to handle linguistic complexity, as pointed out by a reviewer.

If our taxing production probe was just taxing, we should have found difficulty with the production of any of the clitics elicited in it. The fact that it was taxing for accusative clitics in particular indicates that the computation involved in the production of these elements places a particularly heavy load on performance systems. Taking up point (3), the fact that third person accusative clitics were more affected than first person accusative clitics is support for the hypothesis that legitimate object omission, which is restricted to third person, as well as the additional morphological complexity third person pronouns, contribute to the complexity involved in the production of accusative clitics. This greater complexity, we have argued, is what is taxing for working memory.

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Appendix A. Elicited clitic production (M% and SD) for SLI, TD-6, TD-11, MMHL, and RE groups

		Accusative clitics			Reflexive clitics			Nominative clitics		
		Acc-1	Acc-3	Acc	Ref-1	Ref-3	Ref	Nom-1	Nom-3	Nom
SLI	*M*	84.8	49,7	67.2	93.2	92.6	92.9	98.6	86.6	92.6
	SD	10.5	31.9	19.1	11.4	15.8	11.4	5.3	14.2	8.3
TD-6	*M*	89.6	70.3	79.9	93.2	96.4	94.8	97.4	97.4	97.4
	SD	13.1	20.1	14.0	12.2	6.9	7.7	5.2	3.2	2.8
TD-11	*M*	94.8	97.9	96.4	100	96.9	98.4	100	94.4	97.2
	SD	8.4	4.9	5.6	0	7.8	3.9	0	8.6	4.3
MMHL	*M*	88.8	80.9	84.9	91.4	98	94.7	98.7	97.4	98.0
	SD	18.6	21.4	18.1	9.4	4.7	5.6	3.9	8.6	4.5
RE	*M*	95	85	90	92.5	95	93.8	98.3	93.9	96.1
	SD	9.2	25.5	14.1	9.2	10.4	8.2	4.4	10.2	5.6

Appendix B. Individual results for elicited clitic production (M% and SD) for SLI

SLI	Age	Accusative clitics			Reflexive clitics			Nominative clitics		
		Acc-1	Acc-3	Acc	Ref-1	Ref-3	Ref	Nom-1	Nom-3	Nom
1	11;5	75	62.5	68.8	100	100	100	100	95.8	97.9
2	11;5	100	100	100	100	100	100	100	100	100
3	11;6	75	75	75	100	87.5	93.8	100	100	100
4	11;6	87.5	50	68.8	100	87.5	93.8	100	87.5	93.8
5	11;8	87.5	62.5	75	100	100	100	100	100	100
6	11;8	87.5	87.5	87.5	87.5	87.5	87.5	100	95.8	97.9
7	11;9	100	50	75	100	100	100	100	100	100
8	11;11	100	37.5	68.8	100	100	100	100	87.5	93.8
9	11;11	100	75	87.5	87.5	87.5	87.5	100	95.8	97.9
10	12;2	87.5	75	81.3	87.5	87.5	87.5	100	95.8	97.9
11	12;3	75	37.5	56.3	100	100	100	100	91.7	95.8
12	12;4	100	75	87.5	87.5	100	93.8	100	95.8	97.9
13	12;5	87.5	25	56.3	100	87.5	93.8	100	95.8	97.9
14	12;6	75	50	62.5	87.5	100	93.8	100	100	100
15	12;10	87.5	50	68.8	100	100	100	100	83.3	91.7
16	12;10	62.5	50	56.3	87.5	87.5	87.5	87.5	75	81.3
17	13;2	87.5	0	43.8	100	100	100	100	45.8	72.9
18	13;8	75	75	75	87.5	75	81.3	100	95.8	97.9
19	13;7	100	25	62.5	100	100	100	100	20.8	60.4
20	14;1	87.5	37.5	62.5	87.5	100	93.8	100	100	100
21	14;2	75	25	50	87.5	75	81.3	100	66.7	83.3
22	15;4	75	50	62.5	87.5	100	93.75	100	83.3	91.7
23	15;7	87.5	12.5	50	100	87.5	93.8	100	95.8	97.9
24	15;9	87.5	87.5	87.5	100	100	100	100	100	100
25	16;1	75	0	37.5	87.5	87.5	87.5	100	83.3	91.7
26	16;8	75	0	37.5	87.5	62.5	75.0	100	83.3	91.7
27	16;8	87.5	62.5	75.0	100	100	100	100	91.7	95.8
28	16;8	87.5	87.5	87.5	100	100	100	100	100	100
29	17	87.5	37.5	62.5	100	100	100	100	87.5	93.8
30	17;9	75	12.5	43.8	62.5	100	81.3	87.5	95.8	91.7
31	18;1	87.5	37.5	62.5	75	50	62.5	100	87.5	93.8
32	18;8	100	87.5	93.8	100	88	94	100	100	100
33	18;9	100	62.5	81.3	100	100	100	100	62.5	81.3
34	19;3	62.5	37.5	50	87.5	100	93.8	100	70.8	85.4
35	19;7	75	50	62.5	100	100	100	100	95.8	97.9
36	19;6	87.5	12.5	50	87.5	87.5	87.5	87.5	83.3	85.4
37	20;5	75	75	75	87.5	100	93.8	87.5	54.2	70.8
M	14;8	84.8	49.7	67.2	93.2	92.6	92.9	98.6	86.6	92.6
SD	2;11	10.5	31.9	19.1	11.4	15.8	11.4	5.3	14.2	8.3

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