SYNTACTIC COMPLEXITY AND INFLECTIONS IN THE WRITTEN PRODUCTION OF L1 AND L2 FRENCH

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Abstract: Very little is known about the effect of syntactic complexity on written language production. This study investigated the effect of syntactic complexity on the accuracy of gender marking in written L1 and L2 French. We conducted two experiments in which L1 learners (n = 28) and L2 learners (n = 26) of French were asked to complete a fill-in-the-gap task. The test items were controlled for three types of gender agreement configurations with different syntactic complexity. The results show that the syntactic complexity of the agreement configuration has an effect on the accuracy of both L1 and L2 written gender marking. We conclude that, similarly to spoken L1 production, the accuracy of gender marking is influenced by syntactic complexity. Furthermore, we conclude that the observed effect of syntactic complexity does not only hold for L2 learners at the beginners level, but is still present in advanced L2 learners of French.

Keywords: inflections, L1 acquisition, L2 acquisition, French, syntactic complexity

1. Introduction

Over the past decades, many studies have shown that inflectional morphology is acquired relatively late in comparison to other language components in both L1 and L2. Contrary to lexical elements, in the spoken language nominal and verbal morphology is prone to errors (e.g. Weerman et al. 2006 for L1 Dutch, Bartning 2000 for L2 French). Within a generative approach to language acquisition, the overt expression of grammatical inflections in spoken L1 production is related to the acquisition of the functional projections in which the specific agreement structure is hosted (e.g. Radford 1990, Clahsen et al. 1993). Radford (1990), for example, shows that the lack of verbal inflections in the telegraphic speech of young children can be related to the absence of their corresponding functional projections. In a similar vein, Clahsen et al. (1993) argue that the acquisition of verbal inflections by young children correlates with the gradual extension of the verbal functional domain. In a similar vein,

Yet, the task that L2 learners are facing is slightly different. When acquiring a second language, learners have to identify the typological contrasts between their L1 and the target L2. Often, the way in which functional categories are structured in L1 vs. L2 slows down the acquisition process (the "Bottleneck Hypothesis", Slabakova 2008). Ågren (2008), for instance, shows that the gradual order in the acquisition pattern of plural inflections in the written language may be related to the reconfiguration of functional projections in L2. This implies that plural marking shows up first within the NP and only after that outside the NP. The observed order seems to be relative to the size of the syntactic domain in which the agreement takes place.

Both L1 and L2 acquisition of inflections may thus be said to correlate with the gradual extension of the functional domain in which specific agreement configurations

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are found. Within such a context, agreement configurations occurring in a small functional domain can be taken to be less complex than those occurring in a large functional domain. More specifically, the syntactic complexity of an agreement configuration can be defined best in terms of the **structural** distance between the Probe, i.e. the agreeing element, and the Goal, the element bearing valued lexical and grammatical features (e.g. Ferreira 1991, Hawkins 1994). In a nominal agreement configuration for instance, the noun may be the Goal bearing some valued feature (e.g. the gender feature), while adjectives or past participles may be the Probe, bearing the unvalued counterpart. In agreement configurations, the Probe is c-commanded by the matching Goal (Zeijlstra 2010).

The effect of syntactic complexity on language acquisition has mainly been studied in spoken language production (e.g. Moscati and Tedeschi 2009 for L1, Goldschneider and DeKeyser 2001 for L2) and in L2 processing research (e.g. the "Processability Theory", Pienemann 1989). To date, in written language production, the effect of syntactic complexity has not yet received much attention in either recent L1 or L2 literature.

This is precisely the topic of the present paper in which we report the results of two experiments investigating the effect of syntactic complexity on gender marking in the written language of Dutch learners of L2 French and monolingual L1 French native speakers.

The paper is organized as follows: in the second and third sections we will give an overview of the literature focusing on the effect of syntactic complexity on L1 and L2 language acquisition. Section 4 will present the paradigms of adjectival inflections in French and in Dutch. The research question and the hypotheses to be tested in this study will be presented in Section 5. In the sixth section, we will report the results of the experiment on written gender marking in L1 French, followed by those on written gender marking in L2 French in the Section 7. Finally, in Section 8 we will draw some conclusions based on these results.

2. Syntactic complexity and the L1 acquisition of inflections

Complex agreement structures are characterized by a larger number of syntactic projections intervening between the Probe and the Goal. For spoken L1 development, the syntactic complexity of the agreement configuration is claimed to be related to the accuracy of inflectional morphology (e.g. Moscati and Rizzi 2014, Moscati and Tedeschi 2009). Focusing on past participle agreement (henceforth: PPA) in spoken Italian, Moscati and Tedeschi (2009) have tested 56 monolingual L1 learners of Italian (age range 2;1 – 4;11) of which a first group was asked to answer a set of questions eliciting the use of a post-verbal object (i.e. no PPA with the object in Italian) and a second one was asked to answer a set of questions eliciting the use of a preverbal object clitic (i.e. overt expression of PPA was required). Besides the overt use vs. omission of PPA, the data were also analyzed for determiner-noun and subject-verb agreement. The results showed that whereas no agreement errors were found for both the determiner-noun and subject-verb context, obligatory PPA was regularly omitted in preverbal clitic contexts. The authors

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argue that the delay of the acquisition of PPA (vs. determiner-noun and subject-verb agreement) can be explained by the absence of syntactic movement of the internal argument to the preverbal position (e.g. the object clitic) at a young age. As a consequence, the absence of a Spec-Head configuration between the direct object and the past participle blocks PPA.

Within a structural approach to syntactic complexity, PPA in preverbal object constructions is more complex than determiner-noun and subject-verb agreement. More specifically, the functional domain in which the configuration of PPA is established, contains more functional projections (see 1) than the functional domain in which determiner-noun (see 2a) and subject-verb agreement take place (see 2b).

(1) $[_{TP}[_{AgrOP}\, CL_{cl}[_{Aux}[_{PastPart}\, t_{cl}[_{PastPart}\, V_i]$…..$[_{VP}[_{V}\, t_i\, [_{DP}[_{D}\, t_{cl}]]]]]]]]$ (Belletti 1999)

(2) a. $[_{DP}[_{NP}$ noun]]

b. $[_{TP}$ subject$[_{VP}$ verb]]

In a similar vein, Moscati and Rizzi (2014) observe that L1 learners of Italian made more errors in judging syntactic configurations that exhibit a larger distance between the Probe and the Goal. An experiment with 55 monolingual Italian children (age range 2;11-5;10) was set up with test items representing four syntactic configurations: Det-Noun, Subj-Verb, Clitic-PastPart and PastPart-DP. Participants (3, 4 and 5 year old children) were asked to choose the correct form corresponding to a picture on a computer screen. The results showed main effects for age and agreement type, as well as a significant interaction between them. More specifically, Det-Noun constructions were mastered in all age groups, but in constructions with increased syntactic distance between the Probe and the Goal (Subj-Verb, Clitic-PastPart and PastPart-DP constructions), more agreement errors were observed. Post-hoc testing revealed significant differences between Subj-Verb, Clitic-PastPart and PastPart-DP constructions: the Clitic-PastPart constructions were performed worse than the Subj-Verb constructions. Moreover, the PastPart-DP constructions were performed worse than the Clitic-PastPart constructions. With respect to the age of the participants, the 3 year-old children made more errors in the 'syntactically complex' conditions than the 5 year-old children. These findings thus show that syntactic distance is a good predictor for the development of syntactic complexity in language acquisition.

To the best of our knowledge, however, no studies have been dedicated to similar effects of syntactic complexity on inflectional morphology in the written language of native language learners.

3. Syntactic complexity and the L2 acquisition of inflections

Syntactic complexity seems to also influence the accuracy of grammatical inflections in initial stages of L2 acquisition. In Processability Theory (Pienemann 1989) for instance, the patterns in which agreement relations are processed are taken to derive from the distance between the agreeing elements in the sentence. Furthermore, de Jong (2005) found similar effects of syntactic complexity on spoken language in L2. In this

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experiment, 59 native speakers of L1 Dutch participated in a training setting aiming to learn (attributive and predicative) noun-adjective gender agreement in Spanish. In a picture description task, participants had to name the nouns presented in the picture, along with the corresponding article and adjective. The analysis of the results showed that feminine gender marking on attributive adjectives was performed better than on predicative ones. For masculine gender marking, however, no difference between attributive and predicative adjectives was observed.

However, not many studies have been dedicated to the potential effect of syntactic complexity on the written accuracy of grammatical inflections in L2. To the best of our knowledge, only the studies by Ågren (2008, 2009) have tackled this issue.

Ågren (2009), for instance, analyzed texts written by advanced L1 and L2 learners of French. 30 texts by advanced Swedish L1 - French L2 learners and 30 texts of advanced L1 learners of French were taken from the CEFLE corpus and the number morphology was analyzed based on four different lexical categories: nouns, personal pronouns, verbs and adjectives. The analysis revealed that plural marking on nouns was fully acquired in both the advanced L1 and L2 learners. With respect to the personal pronouns (e.g. *il* 'he' vs. *ils* 'they'), L2 learners had an even higher accuracy rate than L1 learners. Moreover, the number morpheme on verbs showed more incorrect instances in L1 texts than in L2 texts. In contrast, number marking on adjectives was performed better in L1 learners than in L2 learners. With respect to the position of the adjective, in the L1 learners, number marking on attributive adjectives showed more correct inflections than on predicative ones. In the L2 learners, however, no difference was observed between the accuracy of number marking on attributive and predicative adjectives.

4. Gender marking on adjectives and past participles in French and Dutch

In this section, we will present the syntactic configuration of gender agreement in (prenominal) attributive adjectives, in past participles with a clitic object and in past participles with a fronted object noun. We will also show how gender marking in these configurations is expressed in French and Dutch.

4.1 Gender marking in French

The French language has a twofold gender system: masculine and feminine. The masculine gender selects the definite article *le* and the indefinite article *un,* as in (3a), while the feminine gender selects *la* as its definite article and *une* as its indefinite article, as in (3b).

(3) a. Le / Un grand**ø** cadeau
the.M.SG / a.M.SG big-M.SG. present.M.SG
'The / A big present.'

b. La / Une grand**e** voiture
the.F.SG / a.F.SG big- F.SG car.F.SG
'The / A big car.'

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With respect to gender marking on adjectives, the masculine gender is not overtly reflected (see 3a). The feminine gender, however, is overtly reflected by the inflection *-e* on the adjective, as in (3b).

Concerning the structural configuration in which the gender agreement between the noun and the attributive adjective takes place, Kayne (1994) claims that the attributive adjective finds its origin in the predicative one and involve a reduced relative clause (see 4 for the predicative adjective and 5 for the attributive one).

(4) $_{CP}$[$_{IP}$ La voiture$_i$ [$_{VP}$ [$_{V}^{o}$[est $_{XP}$ [$_{DP}$ [t$_i$] $_{A\,P}$[grand**e**]]]]]]
La voiture est grand**e**
the.F.SG car. F.SG is big- F.SG
'The car is big.'

(5) $_{DP}$[$_{D}^{o}$ La [$_{CP}$ [$_{AP}$ grand**e**$_i$ [$_{C}^{o}$ [$_{IP}$ [$_{NP}$ voiture [$_{I}^{o}$ [$_{AP}$ t$_i$]]]]]]]]
La grand**e** voiture
the.F.SG big- F.SG car. F.SG
'The big car.'

In (4), the copula *est* '(the car) is' selects a small clause (i.e. XP) in which the noun and the adjective originate. Within this XP clause, the Goal (i.e. the noun) c-commands the adjective being the Probe. As a result, the unvalued gender feature on the adjective is checked against the valued one on the noun. Then, the noun raises to [Spec, IP], which gives rise to the predicative use of the adjective.

In (5), however, the copula in the predicative construction has been removed, which leads to the 'reduced' clause of the attributive construction. Moreover, in the attributive construction, it is a DP which selects the 'reduced' clause as its complement. The adjective, then, moves from the head position of IP to the specifier of CP. As in the predicative configuration, the unvalued gender feature on the adjective is checked against the valued counterpart on the c-commanding noun in its base position.

On top of gender agreement in adjectives, the French language also exhibits gender agreement in past participles. More specifically, the past participle agrees with the direct object, such as an object clitic (see 6) or an NP (see 7). In such a context, the direct object must be in a higher position than the past participle.

(6) a. Je l' ai arrosé**ø**, (l'arbre)
I it.M.SG have watered- M.SG (the tree. M.SG.)
'I watered the tree'

b. Je l' ai arrosé**e**, (la plante)
I it.F.SG have watered-F.SG (the plant. F.SG)
'I watered the plant.'

(7) a. Le ballon qu' on a trouvé**ø**
the.M.SG ball.M.SG thatwe have found- M.SG.
'The ball (that) we found.'

b. La boutique qu' on a trouvé**e**
the.F.SG shop.F.SG that we have found- F.SG
'The shop (that) we found'

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In the syntactic configuration of past participle agreement (henceforth: PPA), the raised direct object, such as the noun or the object clitic, is the Goal bearing a valued gender feature. The past participle is the Probe which bears an unvalued gender feature. Feature checking between the direct object and the past participle is claimed to take place in a particular functional projection, such as PastPartP (Kayne 1994, Belletti 1999). Belletti (1999) for example, argues that PPA with an object clitic originates in PastPartP, as in (8).

(8) $[_{TP}$ Je $[_{AgrOP}$ l'$_{cl}[_{Aux}$ ai$[_{PastPart}$ $t_{cl}[_{PastPart}$ arrosé**e**$_i$]…..$[_{VP}[_V t_i$ $[_{DP}[_D t_{cl}]]]]]]]$

Je	l'	ai	arrosé**e**,	(la plante)
I	it.F.SG	have	watered-F.SG	(the plant.F.SG)

'I watered the plant.'

More precisely, the object clitic *l'* 'it' has moved from DP to [Spec, PastPartP]. The past participle *arrosé* 'watered', then, has raised from VP to the head position of PastPartP. After feature checking in PastPartP, the object clitic raises further to AgrOP.

In a similar vein, PPA with a fronted noun also takes place in PastPartP (Kayne 1994). Namely, as Kayne (1994) argues, PPA with a fronted noun finds its origin in a relative clause selected by an DP, as in (9).

(9) $[_{DP}$ La $[_{CP}$ boutique$_i[_{C^o}$ qu' $[_{TP}$ on $[_{Aux}$ a $[_{PastpartP}$ $t_i[_{Pastpart}$ trouvé**e**$_j[_{VP}[_V t_j[_{DP}$ $t_i]]]]]]]]$

La	boutique	qu'	on	a	trouvé**e**
the.F.SG	shop.F.SG	that	we	have	found- F.SG

'The shop (that) we found.'

In (9), the noun *boutique* 'shop' moves from DP to [Spec, PastPartP]. The past participle, then, raises to the head of PastPartP. Consequently, the noun c-commands the past participle and checks the unvalued gender feature on the past participle. Finally, the noun raises further to [Spec, CP].

4.2 Gender marking in Dutch

The gender system in Dutch is a twofold system: neuter and non-neuter (henceforth: N and NON-N respectively) (Corver and van Koppen 2009). Neuter nouns select the definite article *het* (e.g. ***het*** *huis* 'DEF.N house.N'), while non-neuter nouns select the definite article *de* (e.g. ***de*** *auto* 'DEF.NON-N car.NON-N'). The indefinite article, however, is *een* in both the neuter and non-neuter nouns (e.g. ***een*** *huis* 'INDEF.N house.N' and ***een*** *auto* 'INDEF.NON-N car.NON-N').

With respect to agreement in adjectives, an attributive adjective in a definite context always takes the inflection *-e*, regardless of gender (see 10a for neuter and 10b for non-neuter).

(10) a. Het klein**e** huis
DEF.N little-SUF house.N
'The little house'

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b. De groen**e** auto
DEF.NON-N green-SUF car.NON-N
'The green car.'

In an indefinite context, however, the adjective is not inflected with a neuter noun, as in (11a), while overt inflection on the adjective is present with a non-neuter noun, as in (11b):

(11) a. Een klein**ø** huis
INDEF.N little-ø house.N
'A little house.'
b. Een groen**e** auto
INDEF.NON-N green-SUF car.NON-N
'A green car.'

In contrast to French, past participles in Dutch never exhibit overt inflections in predicative constructions, regardless of the definiteness and the gender of the noun (cf. 12a and 12b).

(12) a. Het/ Een huis dat gerepareerd**ø** is
DEF / INDEF.N house.N which repared-ø is
(door de monteur)
by the mechanic
'The/ A house which has been repaired (by the mechanic).'
b. De / Een auto die gerepareerd**ø** is
DEF/ INDEF.NON-N car.NON-N which repared-ø is
(door de monteur)
by the mechanic
'The/ A car which has been repaired (by the mechanic).'

5. The research question and hypotheses

In this study we focus on gender agreement in (prenominal) attributive adjectives, past participles with an object clitic and past participles with a fronted object noun in French. We will address the following research question: does syntactic complexity have an effect on the accuracy of gender marking in Dutch L1-French L2 and French L1 learners?

We hypothesize that in both L1 and L2 French:

(i) more agreement errors are made in constructions with a larger Probe-Goal distance;
(ii) less agreement errors are made in attributive adjectives than in past participles with an object clitic or a fronted object noun;
(iii) less agreement errors are made in past participles with an object clitic than in past participles with a fronted object noun.

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6. Experiment 1: written gender marking in L1 French

In order to test the hypotheses for L1 French, we presented a fill-in-the-gap elicitation task to monolingual speakers of French. The task consisted of test items exhibiting different levels of syntactic complexity. We report the details of the experiment in the next sections.

6.1 Method

6.1.1 Participants

The participants of this experiment were monolingual native speakers of French (n = 28) from the west of France. The age range was 14 – 15 years. Each participant had to confirm that the home language was French and that he/she had no language disorder, such as dyslexia. Moreover, both the participant and one of the parents signed a consent form by which he/she agreed to participate in the experiment.

6.1.2 Materials

The materials consisted in a fill-in-the-gap elicitation task which aimed to test the participants' accuracy of written gender marking in L1 French. More specifically, the task consisted of 120 test items which were controlled for three types of agreement configurations: gender agreement in attributive adjectives, past participles with an object clitic and past participles with a fronted object noun. These configurations are taken to represent different levels of syntactic complexity (see Table 1). Furthermore, 30 filler items were added to verify whether the participants were able to comply with the task requirements.

Table 1. Overview of agreement configurations

Agreement configuration	Projections between Probe and Goal
Noun with attributive adjective	0
Past participle with object clitic	1
Past participle with fronted noun	2

Each test condition contained 40 sentences which were all in a feminine singular context. The reason for this choice is to be sought in the fact that in masculine contexts, the adjective or the past participle does not exhibit overt gender marking in French. As such, null marking does not offer the possibility to verify whether participants are actually making the appropriate agreement between the Probe and the Goal. For this reason, all test items triggered overt feminine agreement marking. In contrast, the filler items were all in a masculine context. Participants thus had to decide whether the adjective or the past participle takes *-e* as gender marking (i.e. in a feminine context) or not (i.e. in a masculine context). Furthermore, the gender of the noun or the object clitic was overtly expressed in all conditions so that the task did not require any lexical knowledge with respect to lexical gender on the Goal. In order to be sure that none of the

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test items had an ambiguous interpretation, the task was first checked by four French-speaking adult informants. In (13)-(15), we will present some examples of the test items.

(13) **Attributive adjective**
La meilleur___ joueuse a été sélectionnée for
DEF.F.SG best.F.SG player-F.SG has been selected pour
la competition.
the competition
'The best player has been selected for the competition.'

(14) **Past participle with object clitic**
La plante n' avait plus d' eau.
DEF.F.SG plant.FM.SG not had any of water.
Je l' ai arrosée_____
I it.F.SG have watered-F.SG
'The plant did not have water. I watered it.

(15) **Past participle with fronted noun**
C' est la fleur exotique que j' ai vu____
It is DEF.F.SG flower.F.SG exotic.F.SG that I have seen-F.SG
dans le jardin
in the garden
'It's the exotic flower (that) I saw in the garden'

6.1.3 Procedure

The experiment was carried out in a class room setting at a secondary school in the west of France. All participants were in the same class room and were asked to write down on paper the correct gender inflection in each test item. The task was done individually and under supervision of the teacher. The presentation order of the test items was counter-balanced in three versions. The participants got 50 minutes to complete the task. All participants finished the task well within the 50 minutes.

6.2 Results

Since a Kolmogorov-Smirnov test revealed that the data were not normally distributed ($p < .05$), we conducted a Friedman's Anova with the accuracy scores on each of the test conditions as dependent variable and the type of agreement configuration as independent variable. The accuracy scores were expressed in terms of the percentage of correct responses per condition. As a follow-up analysis, Wilcoxon tests were used to analyze the contrasts between the types of agreement configurations. For all statistical analyses the α level of significance was set at .05. An overview of the overall results is given in table 2 and figure 1.

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Table 2. Descriptives of the overall results in %

Type of agreement	minimum	lower quartile	median	upper quartile	maximum
Adjective	75	85	95	100	100
Object clitic	0	42.50	95	100	100
Fronted noun	3	45	76.50	85.75	100

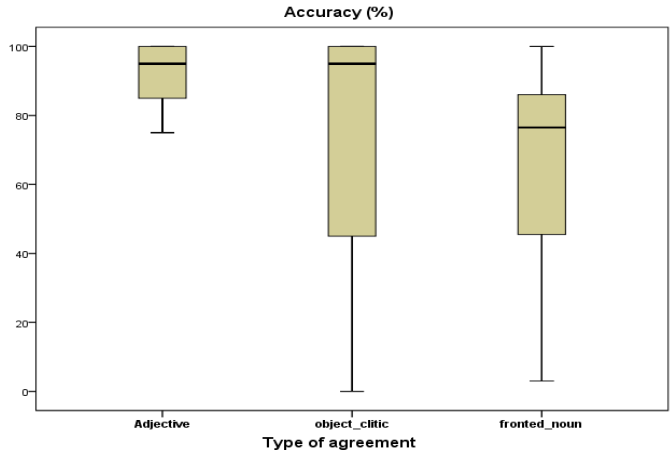


Figure 1. Overview of the overall results in %

The results show that there is a main effect of Type of Agreement (X^2 (2) = 24.53; p = .000), indicating that the type of the agreement configuration has an effect on the written accuracy of gender marking.

Wilcoxon follow-up comparisons reveal a significant difference between noun-adjective constructions and past participles with a fronted noun (T = 1.23; p = .000; r = .87). More precisely, gender marking in noun-adjective constructions is performed better than in past participles with a fronted noun. Furthermore, a significant difference between past participles with an object clitic and past participles with a fronted noun is observed (T = .86; p = .004; r = .60). Gender marking in past participles with an object clitic is performed better than in past participles with a fronted noun.

However, no significant difference between noun – adjective constructions and past participles with an object clitic was found (T = .38; p = .48; r = .27).

6.3 Discussion

The results of this experiment clearly show that the type of the agreement configuration has an effect on the written accuracy of gender morphology in L1 French. Bearing in mind that these types of agreement configurations reflect differences in syntactic complexity, this implies that the accuracy of written gender inflection in French native speakers is influenced by the syntactic complexity of the agreement configuration. More specifically, gender marking on attributive adjectives triggers less writing errors than gender marking on past participles with a fronted noun. This finding confirms our first hypothesis predicting that gender marking in constructions with a larger Probe-Goal

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distance yields more agreement errors in written production. However, this finding only partially confirms our second hypothesis. According to this second hypothesis, we expected that less agreement errors would be made in attributive adjectives than in past participles with an object clitic or with a fronted object noun. Yet, the observed difference between attributive adjectives and past participles with an object clitic did not reach significance. Finally, past participles with an object clitic were correctly inflected more often than past participles with a fronted noun. This confirms our third hypothesis.

Within a structural approach to syntactic complexity, past participle constructions with an object clitic are claimed to be less complex than past participle constructions with a fronted noun. This implies that in past participles constructions with an object clitic, one functional projection (i.e. AuxP) intervenes between the Probe (i.e. the past participle) and the Goal (i.e. the object clitic), while in past participle constructions with a fronted noun, two functional projections (i.e. TP and AuxP) intervene between the Probe and the Goal. In addition, the fact that attributive adjectives yielded less writing errors than past participles with a fronted noun can also be explained by differences in Probe – Goal distance. More precisely, in noun – adjective constructions, there is no intervening functional projection between the Probe (i.e. the adjective) and the Goal (i.e. the noun). This configuration thus is less complex than past participle constructions with a fronted noun.

These findings are in line with earlier research on the acquisition of gender inflections in language production (e.g. Moscati and Tedeschi 2009, Moscati and Rizzi 2014). Namely, in the studies by Moscati and Rizzi (2014) and Moscati and Tedeschi (2009), it is shown that the syntactic complexity of the agreement configuration is related to the accuracy of inflectional morphology in the initial stages of L1 production. In this respect, Moscati and Rizzi (2014) claim that the natural scale of complexity is based on the applications of syntactic movement. A syntactic construction exhibiting a larger Probe-Goal distance is taken to be more complex as the number and the distance of syntactic movements increase. Consequently, the processing of complex syntactic configurations engage more computational effort in terms of memory requirements. This leads to more agreement errors in the production of complex syntactic constructions.

With respect to our experimental results, the fact that syntactic constructions exhibiting a larger Probe-Goal distance elicited more writing errors, can also be related to more computational resources. In past participles with a fronted noun for instance, the number of syntactic movements is equal to that in past participles constructions with an object clitic, but the distance between the noun and the past participle is bigger than that the past participle and the object clitic. More specifically, in both constructions, the past participle moves to PastPartP, but whereas the object clitic raises to AgrOP, the noun needs to raise further to [Spec, CP]. The syntactic movement of the noun thus is more demanding in terms of computational effort. The fact that more writing errors are found in past participles with a fronted noun than in past participles constructions with an object clitic might thus be related to this difference in syntactic distance between the Probe and the Goal in these two types of agreement configurations.

As for noun-adjective constructions, the adjective raises to [Spec, CP], while the noun remains *in situ*. In comparison with PPA with a fronted noun, the functional domain in which adjective-noun agreement is hosted, yields less and more local syntactic movements. The latter thus engage less computational effort than an PPA configuration with a fronted noun. Therefore, less writing errors are made in adjective-noun constructions than in PPA constructions with a fronted noun.

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Despite the difference in syntactic complexity, no significant difference, however, was observed between attributive adjectives and past participles with an object clitic. Firstly, one should observe that the results do not reach significance due to a large between-subject variance with respect to PPA with an object clitic. This variation can probably best be explained by the fact that syntactic complexity interacts with other factors, such as the lexical category (see Polišenská 2010 for similar results on interacting factors in the L1 acquisition of verbal and adjectival inflections in spoken Dutch). To put it into more detail, the results show that adjectives trigger less agreement errors than past participles. In the latter, large error bars in the data can be observed, which suggests that there is much individual variance in the acquisition of past participles. In contrast to adjectives, past participle agreement thus seems to be a vulnerable domain in the L1 acquisition of French. The vulnerability of past participle agreement is in line with earlier observations of language change. Bonnaud (1972), for instance, already observed that past participle agreement in spoken French was expressed differently with respect to the region in France. This suggests that past participle agreement in French also seems to be an example of a language change in progress which might manifest itself in the group of adolescents under investigation in this study.

Further research needs to be done in order to figure out which other linguistic factors might have an effect on the written production of gender agreement in L1.

7. Experiment 2: written gender marking in L2 French

In order to test the hypotheses for L2 French, we tested L2 learners of French who are native speakers of Dutch with the same fill-in-the-gap elicitation task. The task consisted of sentences exhibiting different levels of syntactic complexity. We report the details of the experiment in the next sections.

7.1 Method

7.1.1 Participants

The participants of this experiment were Dutch learners of French (n = 26) from the west of The Netherlands. The age range was 17-18 years. All participants attended courses in French language for 5 years at the highest level of the Dutch secondary school system (i.e. *voorbereidend wetenschappelijk onderwijs* 'academic university preparatory education'). Participants did not have any known language disorder, such as dyslexia. All participants gave written informed consent before the test; in case of a minor, one of the parents co-signed the consent form.

7.1.2 Materials and procedure

The fill-in-the-gap elicitation task which was used in the present experiment, was the same as in the L1 experiment. The test items in the present experiment, however, were slightly different with respect to those in the L1 experiment. More specifically, the

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task contained test items focusing on both number and gender inflections. Since we are interested in gender marking, we only focused on test items which were in a feminine singular context. The reason for this is that gender marking in French is only expressed in feminine contexts (i.e. adjective/past participle + -*e*). The test items targeting number morphology and masculine gender, were used as filler items.

More precisely, 5 test items were included in the noun-adjective agreement condition, 7 test items were included in the clitic-past participle agreement condition and 34 test items were included in the noun-past participle agreement condition.

In the same experimental setting as in the L1 experiment, participants had to decide which inflection the adjective or the past participle takes in the test item (i.e. in a feminine singular context -*e*, in a feminine plural context -*es*, in a masculine singular no inflection and in a masculine plural -*s*). In order to be sure that none of the test items had an ambiguous interpretation, the task was first checked by four native French-speaking informants.

7.2 Results

We computed the accuracy score of each test condition, which was expressed in terms of the percentage of correct responses per condition. An one-way repeated measures Anova was conducted in which the independent variable was the type of agreement configuration. This variable contained three test conditions: agreement in attributive adjectives, in past participles with an object clitic and in past participles with a fronted noun. The dependent variable was the accuracy score of each test condition.

Post-hoc tests with Bonferroni correction were conducted to analyze the contrasts between the types of agreement configurations. For all statistical analyses the α level of significance was set at .05.

An overview of the overall results is given in Figure 2:

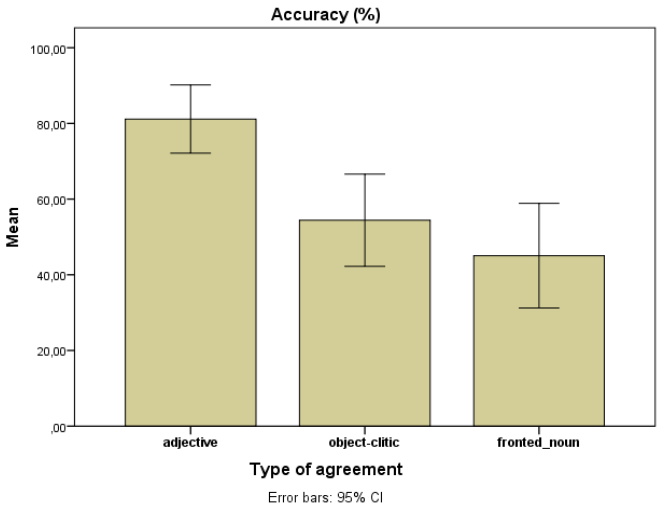


Figure 2. Overview of the overall results in %

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Mauchly's test indicated that the assumption of sphericity had been violated (X^2 (2) = 11.33; p = .003). Therefore, Greenhouse-Geisser corrected tests are reported (ε = .73). The results show that there is a main effect of Type of Agreement (F(1.45;36.33) = 14.91; p = .000; ω^2 = .37), indicating that the type of the agreement configuration has an effect on the written accuracy of gender marking.

Predefined contrasts show a significant difference in the accuracy of gender marking between noun – adjective constructions and past participles with an object clitic (F(1.25) = 11.33; p = .002; r = .31). More precisely, gender marking in noun – adjective constructions (M = 81; SD = 22) is performed better than in past participles with an object clitic (M = 54; SD = 30). Moreover, a significant difference in the accuracy of gender marking between past participles with an object clitic and past participles with a fronted noun is observed (F(1.25) = 4.85; p = .037; r = .16). Gender marking in past participles with an object clitic (M = 54; SD = 30) is performed better than in past participles with a fronted noun (M = 45; SD = 34).

7.3 Discussion

The results of this experiment show that the type of the agreement configuration also has an effect on the written accuracy of gender marking in L2 French. Bearing in mind that these types of agreement configurations reflect differences in syntactic complexity, this implies that the accuracy of written gender inflection in L2 French is influenced by the syntactic complexity of the agreement configuration. This finding confirms our first hypothesis.

More precisely, in terms of Probe-Goal distance, gender marking in noun – adjective constructions is taken to be the least complex with respect to gender marking in past participle constructions with an object clitic. Our results show that, also in L2 French, noun – adjective constructions elicited less writing errors than past participle constructions with an object clitic. This confirms our second hypothesis. Furthermore, gender marking in past participles with an object clitic yielded less writing errors than in past participles with a fronted noun. In terms of Probe-Goal distance, the latter is claimed to be more complex than past participles constructions with an object clitic. This finding also confirms our third hypothesis.

With respect to earlier research on the acquisition of inflectional morphology in L2 French, the results of this experiment are in line with Ågren (2008). Ågren (2008) observed a gradual pattern in the acquisition of inflections in written L2 French. More precisely, more correct inflections were found within the NP domain than outside the NP domain. The size of the syntactic domain in which agreement takes place, seems to correlate with the L2 acquisition of inflections. The study by Ågren (2008), however, focuses on the initial stages of L2 acquisition. Our results show that the constraints imposed by the syntactic domain also correlate with the L2 acquisition of inflections at an advanced level. In this respect, as argued by Moscati and Rizzi (2014) for L1 acquisition, more complex agreement constructions yield more and longer syntactic movements and therefore, engage extra computational effort. Based on our experimental results, this might also hold for the processing of gender inflection in the second language (cf. the Processability Theory; Pienemann 1989). Therefore, the agreement configurations in

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which more syntactic movements take place (e.g. noun- or clitic-past participle constructions vs. noun-adjective constructions), elicited more writing errors.

More research needs to be done in order to figure out which other linguistic factors might have an effect on the written production of L2 inflections.

8. Conclusions

In this study we conducted two experiments on the potential effect of syntactic complexity on the accuracy of L1 and L2 gender marking. More specifically, we focused on the written gender inflection in L1 and L2 learners of French. The results of the L1 experiment showed that the syntactic complexity of the agreement configuration has an effect on the **written** accuracy of the feminine gender marking. Agreement configurations which exhibited a larger Probe-Goal distance, elicited more writing errors than those exhibiting a smaller Probe-Goal distance. In more complex agreement configurations, the number and the distance of syntactic movements increase. This requires extra computational effort in terms of memory requirements, which leads to more errors in the production of inflectional morphology. Furthermore, the data showed that the accuracy of written gender marking in L1 French seems to be influenced by multiple interacting factors, such as the lexical category and the syntactic complexity.

On top of the results for L1, the results of the L2 experiment also showed that the syntactic complexity of the agreement configuration has an effect on the **written** accuracy of gender marking by advanced L2 learners. More precisely, agreement configurations which exhibited a smaller Probe-Goal distance, yielded less writing errors than those exhibiting a larger Probe-Goal distance. The fact that the processing of more complex agreement structures in L1 engages more computational effort, also holds for the processing of inflections in L2.

Finally, gender marking on past participles is very hard to acquire in the written production in L1 and L2 French. Large variance is observed in past participle agreement in both experiments. We argued that past participle agreement in written French is a vulnerable domain which might manifest itself as a language change in progress.

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