Chapter 1. Introduction

1.1 Background

In the past decades many studies have been concerned with the first (henceforth: L1) and second (henceforth: L2) language acquisition of inflectional morphology and show that inflections are prone to errors. For L1 acquisition, Weerman, Bisschop & Punt (2007) demonstrated that children acquiring Dutch as their L1, make adjectival agreement errors in spoken language production until the age of 7. In addition, Blom et al. (2008) showed that children acquiring Dutch as L1 and L2 and adult L2 learners of Dutch have difficulties in the realization of the gender inflection on adjectives. Furthermore, van der Velde (2003) demonstrated that L1 learners of French and Dutch struggle with the inflection of pronouns and determiners.

For L2 acquisition, inflectional morphology has also been shown to be a stumbling block. Cornips & Hulk (2008) for instance, focused on the L2 acquisition of grammatical gender in Dutch and demonstrated that L2 learners of Dutch have problems with the gender inflection in definite determiners. In a similar vein, Bartning (2000) showed that even in language production by advanced L2 learners of French, persistent agreement errors occur with indefinite articles. Furthermore, Parodi, Schwartz & Clahsen (1997) highlighted the complexity of the L2 acquisition of inflectional morphology in German nominals and adjectives.

1.1.1 The effect of syntactic complexity on language acquisition

The fact that both L1 and L2 learners seem to have problems with the acquisition of inflectional markers seems to find a common ground in the syntactic complexity of the constructions in which they occur (e.g. Moscati & Rizzi 2014 for L1 acquisition; Ågren 2008 for L2 acquisition). In psycholinguistic research, the construct of syntactic complexity has received much attention. One of the main concerns has been to operationalize this concept in view of explaining variation in grammatical performance amongst L1 and L2 learners (e.g. Roll et al. 2007; Chen & Zechner 2011). Within such a context, several quantitative measures have been proposed, varying from the length in words of an utterance to the structural length in terms of the number of syntactic nodes within the syntactic tree. With respect to the pure length in words, it has been shown that an increased length of
the sentence does not necessarily go hand in hand with an increased level of syntactic complexity. Chomsky (1975) for instance, claimed that ‘it is apparently not the length in words of the object that determines the naturalness of the transformation but, rather, in some sense, its complexity. Thus They brought all the leaders of the riot in seems more natural than They brought the man I saw in. The latter, though shorter, is more complex’ (Chomsky 1975, p. 477).

In more recent research, structural distance in terms of the number of syntactic nodes within the syntactic tree is taken as the most relevant measure of syntactic complexity (e.g. Hawkins 1994; Roll et al. 2007). More specifically, the larger the syntactic structure, the higher the level of syntactic complexity is. Despite the fact that these constituents may have the same number of words, they can differ in syntactic complexity resulting from structural differences. Within a formal framework (e.g. Chomsky 1995), lexical items may combine into phrases and as a result, these phrases can be the building blocks of sentences. More complex sentences, thus, contain more syntactic phrases which are structured in the base word order specific for a particular language. In some syntactic constructions, one or more items can be moved from their base position to a higher position in the sentence. Consequently, the word order in these constructions is different from that of the base word order. Within such movement constructions, the length of syntactic movements also has an effect on the processing of sentences (Marcus 1980). More precisely, utterances which contain syntactic elements that have moved out of their base position, show a decreased processing accuracy, compared to those which exhibit the base word order. Moreover, the length of the syntactic movement is taken to be proportionally related to the processing costs of sentences. Sentences exhibiting longer distance movements require extra computational resources than those with shorter distance movements. These extra computational resources result in a decreased processing accuracy of these sentences (Fanselow, Kliegl & Schlesewsky 1999).

This formal framework is taken to reflect the psychological representation of syntactic structures. More precisely, syntactic operations, such as movements, represent the way in which the human brain functions when parsing sentences. In agreement with the minimalist approach (Chomsky 1995) syntactic constructions are considered to be pure and simple. This means that all features that are not relevant to the cognitive system, need to be removed during the derivation. Furthermore, the economy principle (Zwart 1996) involves that syntactic structures have to be built by means of the shortest and the fewest possible steps. Within such a context, more complex grammatical structures are taken to be cognitively more demanding than less complex ones (e.g. Moscati & Rizzi 2014). As more complex structures contain more syntactic phrases, these structures may be considered to require more computational efforts for the cognitive system. Roll et al. (2007) for instance, showed that differences in disfluency of sponta-
neous speech are strongly related to the number of syntactic phrases in the sentence and may therefore be considered to be a robust measure of syntactic complexity.

As a result of additional computational resources in the processing of complex sentences, fewer resources remain for the execution of other language processes, such as the comprehension process. Pichora-Fuller (2003) for example, demonstrated that, in hearing impaired listeners, the comprehension accuracy decreases when confronted with complex sentences. This finding is due to the fact that the processing of these sentences leaves insufficient resources for the comprehension process.

1.1.2 The effect of phonological expression on written language production

Besides the fact that the syntactic complexity of sentences constrains the acquisition of grammatical inflection, there seem to be also non-syntactic factors by which the acquisition of inflectional morphology is constrained. Polišenská (2010) for instance, showed that the perceptual salience of verbal inflections has an effect on the acquisition of these inflections in spoken native language production. More specifically, the more salient the verbal inflection in spoken language input is, the fewer errors are made in spoken language production. In a similar vein, Goldschneider & Dekeyser (2001) demonstrated that, in second language acquisition, the perceptual salience of inflections also has an effect on the acquisition order of inflections in spoken language production. More precisely, the more salient the inflection morpheme is, the earlier it is fully mastered in spoken language production. A similar effect has also been shown in the written modality. Largy & Fayol (2001) demonstrated that phonologically expressed inflections are acquired earlier in written French than ‘silent’ ones. This finding can be best explained by the fact that in L1 acquisition, the written modality is taken to reflect the spoken modality. Under such a view, in languages exhibiting large differences between the number of phonemes and graphemes, are claimed to be more complex when it comes to sound-letter mapping (Frost 1994). In English for instance, the sound/letter ratio is highly unbalanced: #letters = 26, #phonemes = 44, ratio = .59 (Coene et al. 2013). Therefore, this language is taken to be orthographically less transparent than languages that show a more balanced sound/letter ratio (e.g. Spanish: #letters = 28, #phonemes = 24, ratio = 1.17). In some particular languages, however, the sound/letter ratio is highly balanced, but the orthography is quite complex (e.g. French: #letters = 33, #phonemes = 36, ratio = .92). The relatively complex orthography of French can be explained by the existence of multiple sound/letter mappings (e.g. soit ‘fool’, hôtel, haut ‘high’. All pronounced as [o] (Coene et al. 2013, p. 1854)). Within such a context, native speakers of languages exhibiting a complex orthography (e.g. French), have to call upon their morpho-
syntactic knowledge in the written production of inflectional morphology, instead of using phonological cues. Therefore, more writing errors are found in inflections which are not phonologically distinct (e.g. Brissaud & Chevrot 2011 for French).

With respect to second language acquisition, the (lack of) phonological expression has been shown to be a posthoc effect in written language production. Ågren (2008, 2009) for instance, demonstrated that the absence vs. presence of phonologically overt expression of inflections did not explain the acquisition order of agreement structures. Instead, the syntactic complexity of the sentence and the lexical category of the word to be inflected, revealed a main effect in the written production of French inflections.

1.1.3 Digital grammar and spell checkers as a remedy?

In the context of language teaching, both to native and second language learners, most teachers struggle with the students’ difficulties in acquiring inflections in their written productions. From a pedagogical point of view, digital grammar and spell checkers have been shown to be an effective tool to improve the students’ written productions. More precisely, Heift & Schulze (2007) showed that these grammar and spell checkers effectively detect and correct grammatical errors in writing exercises. Furthermore, Vernon (2000) highlighted the enriched pedagogy in language education when using grammar and spell checkers. As such, students will reflect, discuss and edit their written productions on the basis of corrective feedback provided by these checkers.

However, these checkers are not able to correct all grammatical writing errors. Whereas some errors seem to be easily detected, others are rather persistent. For French digital grammar and spell checkers for instance (e.g. BonPatron, Antidote and Scribens), Biesemans (2005) observed that the correction rate of inflection errors differ with respect to the type of agreement structure. More specifically, writing errors in subject-verb agreement constructions are corrected more often than errors in past participle agreement constructions. The usefulness of digital grammar and spell checkers in language education, thus, seems to be related to the grammatical structure in which writing errors are made.

1.2 Central research questions and method

The main purpose of this dissertation is to investigate whether the syntactic complexity of sentences and the phonological expression of inflectional morphology have an effect on the accuracy of inflections in the written production of French. The rationale behind the choice of these factors is to be found in Kellogg’s (1996)
writing model. Within this model, written language production is taken to be influenced by several cognitive processes, such as the cognitive efforts involved in the processing of sentences and the formulation/translation, execution and monitoring processes. More specifically, in the formulation/translation process, the ideas need to be formulated in order to be graphically executed in the execution process. Subsequently, in the monitoring process, the written production is edited and gives rise to new ideas to be formulated in the formulation/translation process. This model shows that both the formulation/translation and the monitoring process are influenced by spoken language. Within such a context, French inflectional morphology provides an interesting test bed to investigate the effect of spoken language on its written modality. The reason for this can be sought in the partially ‘silent’ nature of French inflections.

Another purpose of this dissertation is to test to what extent French digital grammar and spell checkers could be effective to improve the accuracy of written gender inflection in both native speakers and second language learners of French.

To investigate the potential effect of syntactic complexity on the written production of gender inflection, an experiment was set up to test the writing performance of both native speakers and second language learners of French. More precisely, 28 native speakers and 26 Dutch speaking second language learners participated in a fill-in-the-gap task. The test items of this task were controlled for three types of syntactic structures exhibiting different levels of syntactic complexity: adjective-noun, clitic-past participle and noun-past participle agreement constructions. Here, I specified the type of adjectives tested in this dissertation. The reason for this can be sought in the fact that the research question of this dissertation only focuses on the written production of gender inflection. Therefore, only regularly inflected adjectives are taken into account (i.e. grand ‘big’ vs. grande ‘big’). Adjectives with stem change (e.g. beau ‘beautiful’ vs. belle ‘beautiful’) or consonant doubling (e.g. bon ‘good’ vs. bonne ‘good’) are not at the core of this dissertation. Another methodological decision concerns number inflection. More specifically, only singular contexts were included. The reason for this choice can be sought in the fact that the inclusion of the Number variable would have had an effect on the written accuracy of gender agreement as a confounding variable.

Furthermore, a third methodological decision was taken with respect to the choice of the lexical category of the test items. Here, I opted to focus on gender inflection in adjectives and past participles. Functional categories which are also able to reflect gender, such as determiners or pronouns, are not at the core of this dissertation.

The participants were recruited at mainstream secondary schools in the West of France and the West of The Netherlands and were asked to fill in the correct
gender inflection in each of the test items. Finally, the accuracy rate of gender
inflection was computed per type of syntactic structure.

The second experiment is concerned with both syntactic complexity and pho-
nological expression of gender morphology. More precisely, 40 native speakers
and 45 Dutch speaking second language learners of French were recruited at sec-
ondary schools in the Walloon region of Belgium and the West of The Nether-
lands respectively. They completed a fill-in-the-gap task in which they had to
choose the correct gender inflection out of four variants. The test items were
sentences which were controlled for syntactic complexity (i.e. attributive vs. pre-
dicative position), lexical category (i.e. adjective vs. past participle) and phonolo-
gical expression (i.e. overt vs. covert inflection). In this experiment, a fourth
methodological decision has been taken with respect to the phonological expres-
sion of gender inflection. More precisely, I only focused on the overt vs. covert
expression of gender inflection. In a similar vein as the first experiment, the par-
ticipants’ accuracy of gender inflection was computed per test condition.

Finally, the third experiment is concerned with the implementation of the
grammatical rule concerning gender inflection by three digital grammar and spell
checkers for French: BonPatron, Antidote and Scribens. To test these checkers, I
used the same experimental task as in the first experiment. More precisely, the
test items of both the L1 and L2 task were submitted to Antidote / Scribens and
Antidote / BonPatron respectively. Subsequently, the correct implementation rate
of gender inflection was computed for each condition.

To assess the performance of these digital grammar and spell checkers, the im-
plementation rates were contrasted to those of both the native speakers and sec-
ond language learners tested in the first experiment. The rationale behind this
comparison between digital and human language performance is to be found in
the potential educational valorization of its outcomes: if French digital grammar
and spell checkers outperform L2 language users, they could be useful to improve
the performance of particular subgroups of French language learners with respect
to the correct implementation of gender inflection in written language.

The experiments reported in this dissertation are published or submitted as
stand-alone papers. Therefore, some partial overlap of the theoretical framework
may be observed throughout the dissertation. More precisely, chapter 2 § 2.2.3
and 2.2.4 are partially repeated in chapter 4 § 4 and chapter 5 § 6. Furthermore,
chapter 2 § 2.5.1 is partially repeated in chapter 4 § 4 and chapter 5 § 6. Parts of
chapter 3 are also repeated in the experiment chapters. Partial overlap may be
observed between: § 3.1.1 and chapter 5 § 4; § 3.1.2 and § 2 of chapters 4 and 5; §
3.2.2 and chapter 5 § 5 and finally, § 3.2.3 and § 3 of chapters 4 and 5.
1.3 Outline of this dissertation

In accordance with the central research questions, this dissertation consists of two parts: a detailed theoretical framework and three experiments aiming to get insight in the complexity of the L1 and L2 acquisition of written inflections on the one hand, and the performance of French digital grammar and spell checkers on the other. More specifically, chapter 2 provides a detailed analysis of the syntactic context in which gender agreement takes place in French and how syntactic complexity may influence the acquisition process. This theoretical analysis has been mainly inspired by the current state of the art of both generative and psycholinguistic approaches to agreement. The main motivation for this choice of framework is to be found in the fact that the size of the syntactic domain in which gender agreement occurs is both a very relevant measure of syntactic complexity and an important factor determining the processing effort of the language learner. As such, the combined generative and psycholinguistic approaches to gender agreement presented in chapter 2, provide a robust basis to predict which types of agreement constructions in French will be more difficult to acquire for native and second language learners. Chapter 3 is concerned with the state-of-the-art of the L1 and L2 acquisition of gender inflection. In this chapter I also provide evidence from the literature that the syntactic complexity of utterances and the phonological expression of inflections have a clear effect on the written language of L1 and L2 learners. In Chapter 4 I will present the results of my own investigations concerning such a potential syntactic complexity effect in French language learning. I report the results of an experiment concerning the expression of gender in written French and discuss them in the light of the computational resources engaged to process particular agreement constructions. Chapter 5, then, addresses the question of whether the phonological expression of gender inflection has an effect on the written production of French. It also reports on the interactions of phonological expression with syntactic complexity and the lexical category of the word to be inflected. In chapter 6 three digital grammar and spell checkers for French are tested. I compared the results of the experiment reported in chapter 4 to these checkers in order to test to what extent the checkers could be effective for L1 and L2 learners of French. Finally, in chapter 7, the main findings are summarized, their implications for language education and publishers are discussed and suggestions for future research are made.