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Gender assignment and gender agreement in advanced French interlanguage: a cross-sectional study*

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An analysis of 519 gender errors (out of 9,378 modifiers) in the advanced French interlanguage of 27 Dutch L1 speakers confirms earlier findings that gender assignment and/or agreement remain problematic for learners at all levels. A hypothesis derived from Pienemann's Processability Theory (1998a) that accuracy rates would be higher for gender agreement in structures involving no exchange of grammatical information between constituents was not confirmed. The analysis of interindividual and intra-individual variation in gender accuracy rates revealed effects from avoidance and generalisation strategies, from linguistic variables, sociobiographical variables and psycholinguistic variables. We argue that gender errors can originate at the lemma level, at the gender node level, or at the lexeme level. Different psycholinguistic scenarios are presented to account for intra-individual variation in gender assignment and agreement.

Introduction

Comrie (1999) observes that gender assignment in languages involves two major kinds of principle: semantic principles and formal principles. In English, for example, "nouns are assigned to a gender according to their meaning" (p. 458), i.e., following a semantic principle. Formal principles play a much more important role in languages like Spanish and French: nouns are assigned to gender largely as a function of their form. Corbett (1991, 34) argues that some systems are purely semantic, but that none are purely formal. The combination of semantic and formal principles makes the French gender attribution system opaque (Corbett, 1991).

It is not surprising therefore that gender assignment and agreement are real challenges for learners of French. Even very advanced learners continue to make gender errors (Harley, 1979, 1998; Surridge and Lessard, 1984; Taylor-Browne, 1984; Carroll, 1989; Hardison, 1992; Dewaele, 1994; Hawkins, 1998; Dewaele and Véronique, 2000; Bartning, 2000a, 2000b).

To account for the differences between native and non-native speakers of French in gender assignment and agreement is problematic because of the psycholinguistic and linguistic complexity of the issue (Carroll, 1989). A recent issue of the *Journal of Psycholinguistic Research* highlights the debate on the representation and processing of grammatical gender in native language production (Friederici, Garrett and Jacobsen, 1999a, 1999b). Similar questions need to be answered for second language (L2) speech production, in addition to a range of complex L2–specific issues. Data from L2 production may however help shed light on general issues concerning gender agreement. Indeed, gender errors are abundant in L2 production, unlike in first language (L1) production where they are considered "rare events" (Schriefers and Jescheniak, 1999, 583).

Levelt's (1989) model of speech production and its recent adaptations for L2 production (de Bot, 1992; Pienemann, 1998a) provide us with a framework for further exploration of gender assignment and agreement in French interlanguage (IL). We will use our cross-sectional corpus of advanced oral French IL of Dutch L1 speakers to try to obtain a fine-grained image of gender agreement among different types of modifiers situated in different places in the syntactic structure. A number of possible explanations for the interindividual and intra-individual variation in the data will be presented.

We begin with an analysis of gender in French L1 and L2 and in Dutch L1, and move on by outlining Levelt's production model and introducing some

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aspects of Pienemann's Processability theory and its major aims. We then survey psycholinguistic research on the representation of grammatical gender, after which we introduce the seven research questions of the present study. The methodology of the study is presented in the following section. We then present the quantitative and qualitative analysis of our dependent variables and link the findings to the literature, discussing them vis-à-vis the research questions. Finally, we present the main conclusions of the study.

Gender in source and target languages

Gender in French

French distinguishes two grammatical genders: masculine and feminine (Grevisse, 1980; Surridge, 1985, 1986, 1989, 1996). Gender is an idiosyncratic diacritic feature of French nouns, the value of which has to be acquired individually for every lexical entry stored in the mental lexicon. Gender is also "a derivative property of specifiers such as determiners and adjectives" (Carroll, 1989, 545). The gender feature of the noun can thus "trigger gender agreement among modifying expressions under precise syntactic conditions" (1989, 46).

In spoken French, gender opposition cannot be perceived in two thirds of adjectives.[1] This proportion decreases to one half in the written language (Riegel, Pellat and Rioul, 1994, 359). Riegel et al. (1994) distinguish three major categories of adjectives in terms of gender agreement: (i) adjectives which are invariable in oral and written language; (ii) those which vary only in written language, and (iii) those which vary both in oral and written language. The form–function relationship for gender in adjectives is relatively simple according to Schane (1968), Matthews (1974) and Blanche-Benveniste (1990) (see Table 1): "the masculine forms are said to be derived from the feminines by a process of subtraction. Thus feminine *blanche* > masculine *blanc* by the removal of the final [ʃ], *bonne* [bɔn] > [bɔ̃] by removal of [n] (. . .). This has become the standard example of subtraction or of 'minus formation', dealt with many times since Bloomfield's classic exposition in the 1930s" (Matthews, 1974, 174).

While determiners will always precede the head noun in French, the attributive adjectives in the noun phrase (NP) can be either at the left (anteposition) as in *un(e) grand(e) Belge* ("a famous Belgian") or at the right of the noun (postposition) as in *un(e) Belge grand(e)* ("a tall Belgian") with a slightly different semantic value (Wilmet, 1986). Only a relatively small number of adjectives can be in anteposition, but those that do represent the five most frequently used adjectives (Blanche-Benveniste, 1990, 195). Predicative adjectives will be found in the verb phrase (VP) as in *La bière est bonne* ("the beer is good"). A systematic overview is given in Table 1.

Gender opposition in determiners exists only in the singular, as can be seen in tables 2 and 3. Native speakers of French make occasional gender agreement errors (cf. Barbaud, Ducharme and Valois, 1982; Coveney, 2000). Coveney (2000) suggests that this phenomenon is the result of an on-going process of neutralisation of gender distinctions in modern spoken French. Occasional gender errors in the French press could also be interpreted as evidence of this phenomenon (Cornish, 1994). Baetens Beardsmore (1971) has reported instances of interindividual and intra-individual variation in

Table 1. *Form/function relationship for French adjectives*

	singular	plural
Masculine	−e	−e(s)
Feminine	+e	+e(s)

Table 2. *Form/function relationship for French articles*

	indefinite		definite		partitive	
	singular	plural	singular	plural	singular	plural
Masculine	un	des	le	les	du	des
Feminine	une	des	la	les	de la	des

Table 3. *Form/function relationship for other French determiners*

	singular	plural
Masculine	à l'/au	aux
	ce	ces
	son	ses
Feminine	à la	aux
	cette	ces
	sa	ses

[1] The proportions are very similar in our interlanguage corpus produced in an informal situation (cf. section on methodology) where 65% of adjective types were invariable (representing 40% of adjective tokens). The proportion of invariable adjective types dropped to 47% in the corpus produced in a formal situation (representing 39% of adjective tokens).

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gender assignment in the spoken French of some bilingual speakers (French and Dutch) in Brussels. He ascribes this phenomenon to "the degree of acculturation of the individual and the extent to which he manages to keep his two language systems free from interference" (p. 142).

Two completely different causes can underlie gender errors in modifiers: firstly, the head noun may have been assigned to the wrong gender and the modifiers are being agreed accordingly; secondly, the head noun may have been correctly assigned but the gender feature did not reach the modifiers, hence a problem with agreement.

A debate has been raging about the extent to which formal characteristics (morphophonology) and semantic characteristics (natural gender) affect the acquisition of gender assignment. In her study on the acquisition of gender in L1 French, Karmiloff-Smith (1979) has shown that children distinguish the feminine and masculine forms of the singular article from very early on. This distinction does not apparently result from the form of the determiners but from the endings of the nouns (1979, 219). Children thus classified imaginary nouns like *un bicron* and *une plichette* according to morphophonological rules (i.e. formal rules; cf. Corbett, 1991). The gender of some morphologically simple nouns in French seems partly predictable on the basis of their phonological characteristics (Koehn, 1994). Some studies on the acquisition of gender in L2 Romance languages of very young learners found that morphophonological rules and phonological characteristics of nouns are very helpful (Oliphant, 1998; Möhring, 2001). Carroll (1999) however has found no support for the hypothesis that L2 learners of French are sensitive to the phonological endings of words. She argues that learners are guided in their identification of cues for gender by internal resources of a symbolic sort (1999, 73). Learners would be especially sensitive to semantic and morphological patterns (1999, 38).

We will see further that psycholinguists manipulate formal and semantic cues in order to study their effect on gender processing in L1 production (Friederici et al., 1999a, 1999b). The formal and semantic characteristics may be insufficient or even counterproductive in cases where nouns do not conform to the general pattern. The French nouns *eau* ("water") and *peau* ("skin") are feminine despite their typically masculine ending and the noun *sentinelle* ("guard") is feminine despite referring to a male soldier. Our data contain several examples where both formal and semantic characteristics were apparently ignored resulting in gender errors. It thus seems that while formal and semantic characteristics can help determine a noun's gender, learners still need to acquire gender individually for every lexical entry.

Gender in Dutch

Dutch is a language with a "relatively moderate degree of gender-marking limited to singular nouns" (van Berkum, 1997, 117). Dutch nouns have one of two possible genders which makes a difference for the singular definite article: a neuter gender which only goes with *het*, as in *het konijn* ("the rabbit"); a non-neuter or common gender (historically either masculine or feminine) which only goes with *de* as in *de olifant* ("the elephant") (1997, 116). Several constituents agree with their singular head noun in gender: the singular definite article, most adjectives in anteposition, several determiners and the relative pronoun. About 70% of words in Dutch have the common gender (Theissen and Hiligsmann, 1999). While for indefinite neuter nouns the adjective is not inflected, a suffix *-e* is added to the adjective agreeing with indefinite common gender nouns.

Pienemann's Processability Theory and incremental language generation

Pienemann's Processability Theory (PT) (1998a, 1998b) is partly based on Levelt's (1989) model, and integrates it into a grammatical framework, namely Lexical-Functional Grammar (LFG) (Kaplan and Bresnan, 1982) and Kempen and Hoenkamp's (1987) procedural account of speech generation.

Levelt's model is well known and does not need extensive presentation. We will therefore concentrate on that component of the model that is relevant to understanding how gender agreement functions, namely the Formulator. According to Levelt the production of morpho-syntax takes place in the "Formulator" which "translates conceptual structures into a linguistic structure" (1989, 11). The preverbal messages activate the necessary lemmata which are stored in the mental lexicon, a part of the Permanent Memory: "a passive store of declarative knowledge about words" (1989, 185). These lemmata contain the meaning of lexical items and the syntax for each word. The syntactic building procedures are instigated by the activation of a lemma which contains categorial information. The categorial procedure matches parts of the conceptual structure with syntactic forms and functions as defined in lemmata. The result of this grammatical encoding is a hierarchical constituent structure of the phrase concerned which is stored in the Syntactic Buffer, part of the short-term memory.

It is during the first step of the translation process,

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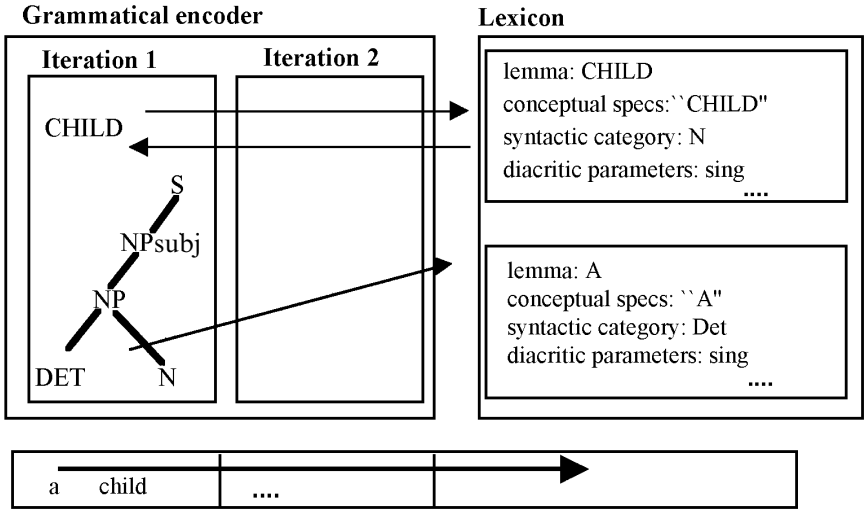


Figure 1. Incremental language generation (based on Pienemann 1998a, p. 68).

the grammatical encoding of the preverbal message, that the sort of morphology appears that is relevant to the objective of this paper. The morphological information is attached to the lemma in the lexical pointer which links all the word forms with the same conceptual specifications which are differentiated only by diacritic variables (gender, plural/singular . . .) related to the morphological forms of the lexical entry. This lexical entry contains all the different morphological variants that relate to the same conceptual specification.

Pienemann illustrates incremental language generation with Levelt's example: *a child gave the mother the cat* (1998a, 68). Figure 1 illustrates what happens in the grammatical encoder and the lexicon after the arrival of the preverbal message from the conceptualiser.

> The conceptual material produced first activates the lemma CHILD in the lexicon. The lemma contains the category information N which calls the categorial procedure NP. This procedure can build the phrasal category in which N is head, i.e. NP. The categorial procedure inspects the conceptual material of the current iteration for possible complements and specifiers and provides values for diacritic features, including those from the head of phrase.
>
> (1998a, 67)

A functorisation rule ensures that the branch Det is attached to NP, the lemma for "A" is activated, and the lemma "a" is inserted (1998a, 67). These rules thus "instigate the activation of free grammatical morphemes and the insertion of bound grammatical morphemes" (1998a, 67).

The lemma CHILD is marked "singular", and the value of the diacritic feature has to match that of the determiner. To achieve this the lemma information for CHILD has to be deposited in the NP-procedure and kept there for activation of the lemma "A". In other words, this type of morpheme is linguistically characterised as agreement between the head of phrase and another phrasal constituent (1998a, 77). Pienemann then points out that the processing of phrasal and interphrasal agreement is different. The phrase "a child" is produced in one and the same iteration (1998a, 77). He argues that this would be unlikely to apply to interphrasal agreement due to the incremental nature of language production. In other words, while the one phrase is being produced, the head of the agreeing phrase has not been conceptualised (1998a, 77). This means that the relevant diacritic information cannot be stored in the phrasal procedure. Instead it has to be stored in the S-Procedure. However, in order for it to arrive there, the functional destination of the phrase from which it originates has to be determined. This is carried out by a language-specific set of Appointment rules (1998a, 77).

Developmental trajectories

Pienemann's PT predicts developmental trajectories based on an emergence criterion. He thus posits a set of processing procedures forming an implicational hierarchy (1998a, 87) where the resource of a certain level is a prerequisite for the functioning of the higher level.[2] Pienemann (1998b) argues that the L2 learner

[2] Bialystok (1998) believes this claim to be fallacious because of a circularity in the argument: "The claim is that the production of certain structures is constrained by the availability of the

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"is initially unable to deposit information in syntactical procedures, because (1) the lexicon is not fully annotated, and, more importantly, (2) because even if L1 annotation was transferred, the syntactic procedures have not specialised to hold specific L2 syntactic information. For this reason one can predict that the beginning learner is unable to produce any structures which rely on the exchange of specific L2 grammatical information using syntactic procedures, or in LFG terms the "unification" of lexical features (1998b, 6–7). Hence his claim that "structures involving no exchange of grammatical information between constituents can be processed before structures that do require such information exchanges" (1998a, 76).

The hierarchy of processing procedures in Pienemann's model is as follows (from top to bottom):[3]

- subordinate clause procedure;
- S-procedure; interphrasal morphemes; exchange of information between internal constituents;
- simplified S-procedure; exchange of information from internal to salient constituent;
- phrasal procedures; phrasal morphemes;
- category procedure; lexical morphemes; no exchange of information – canonical word order;[4]
- lemma access; words; no sequence of constituents (1998a, p. 87).

The claim that structures involving no exchange of grammatical information between constituents can be processed before structures that do require such information exchanges can only be valid, according to Pienemann, "as long as the form-function relationships of the two sets of structures are comparable" (Pienemann, personal communication).

necessary processing resources; the corollary is that structures not supported by such resources will not be produced. The evidence however comes only from observed production" (1998, 21). Pienemann (1998c) agrees that historically, Bialystok is correct but he points to the accurate predictions of the PT for the development of a wide number of languages and correct predictions in reaction time experiments in Pienemann (1998a).

[3] Carroll (1998) wonders if Pienemann is correct in his assumption that words/lemmas are learned before the procedures which combine words/lemmas in production. She argues that "what gets stored in linguistic memory may, or may not, correspond to the units grammarians call 'words', and what gets put to use in production will consist of all sorts of units including affixes . . . idioms, and lexicalised sentence stems" (1998, 23). Pienemann seems to accept this criticism (1998c).

[4] "Lexical morphemes can be activated by the conceptual structure or be retrieved from the lexicon and do not rely on the exchange of any grammatical information which is still blocked at this stage . . . learners have a set of well-defined semantic roles which they will attempt to map onto L2 forms . . . one such procedure for the mapping of semantic roles onto surface form is a strictly serial word order" (Pienemann, 1998a, 83–84).

About accuracy rates

Accuracy rates have been used extensively in early applied linguistic research to measure the development of interlanguages. It was assumed that R. Brown's (1973) acquisition criterion, i.e. 90% correct use in obligatory context in three successive interview sessions, could be transposed to the acquisition of an L2. More sophisticated accuracy measures like TLU (target-like usage) have been introduced but doubts remained as to their value in determining the acquisition of rules and structures (Pica, 1988). It is therefore important to point out that Pienemann's predictions are limited to developmental trajectories and not to accuracy levels. According to Pienemann (1998a), accuracy levels do not "increase steadily in the acquisition process" (1998a, 304), and accuracy interacts with learner variation and development in a non-linear manner (1998a, 143). He particularly dislikes the idea of using accuracy rates as quantitative criteria for measuring development because of their arbitrary nature and prefers the emergence. Can anyone, for instance, claim that a particular rule has been acquired when it is used correctly 50% or 80% of the time? Accuracy rates might be inadequate for measuring development, but they seem perfectly suited to measuring synchronic variation in advanced ILs. Dewaele (1994) has shown that accuracy rates in advanced French IL differ significantly according the grammatical class of word, the type of structure, as well as a number of sociobiographical and situational factors. Pienemann, however, rejects this use of accuracy rates and the idea that accuracy rates would be higher for gender agreement in structures involving no exchange of grammatical information (Pienemann, personal communication). The relation between developmental trajectories and accuracy levels might be orthogonal, but given the importance of the presence/absence of constituent borders in agreement, it is probably justifiable to test this hypothesis anyway (Bartning, 2000b). One could argue that procedures that have been mastered early on in the second language acquisition process have been proceduralised more solidly and are thus less prone to error (Towell and Hawkins, 1994).

Our use of accuracy rates is linked to the fact that we work on a cross-sectional corpus (see the section on methodology) – hence our focus on synchronic rather than diachronic variation. In this perspective it could be argued that this variable in itself is a sounder empirical measure than the emergence criterion where the researcher "needs to clarify what type of observation constitutes evidence for which linguistic rule" (Pienemann, 1998a, 145). If the sample is too small, the result will be inconclusive:

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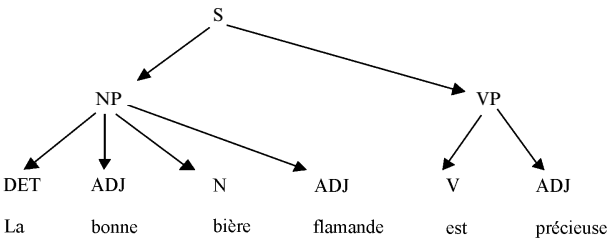


Figure 2. Gender agreement in French.

"Some degree of ambiguity remains in this analysis when it comes to judging if the number of contexts is sufficient for a given rule to decide if the rule has been applied or not" (1998a, 146). Accuracy rates on the other hand, allow for a fine-grained analysis of both intra- and interindividual variation.

We would thus expect gender agreement to be higher within the NP[5] than within the VP. The likelihood of *précieuse* being correct in the following example would be much smaller than that for any adjective or determiner within the NP (see Figure 2).

Synchronic variation in the PT

Pienemann claims that IL is limited by Hypothesis Space (1998a, 239). This means that "interlanguage variation remains within predictable confines and is thus definable in *a priori* manner: the rule system available to the learner at his or her current level also defines the range of solutions for developmental problems which are the basis for IL variation" (1998a, 243).

Pienemann illustrates synchronic variation in accuracy rates by identifying two sources of variation, one task-related variable and one linguistic variable. The number of contexts in which a rule is applied can vary as well as the actual rule application. The measures *data density* and *percentage of rule application* are numerical ways to express these concepts (1998a, 298). Pienemann analyses third person singular -s and plural -s marking in six different tasks by his informant 1 and finds accuracy levels ranging from 0% to 100% (1998a, 304). As the objective of his Hypothesis Space is not to explain this phenomenon but to "predict the range of IL variation" (1998a, 305), he predicts in this particular case that "the percentage of rule application will be greater than zero in all tasks if it is greater than zero in one task providing the sample size is sufficient" (1998a, 305–306). He observes that the overall rate of accuracy for plural -s marking is influenced by the frequent repetition of lexical items: "a highly frequent use of correctly marked nouns increases the accuracy rate" (1998a, 307) and vice-versa. Pienemann thus concludes that it has been shown that "these fluctuations in levels of accuracy that remain despite the steadiness of IL principles are due to specific lexical requirements produced by the individual communicative tasks" (1998a, 308).

[5] Meisel (personal communication) suggested that this analysis of the NP is quite general. However, it only serves as an illustration of Pienemann's prediction, using his level of analysis.

The representation of gender in the mental lexicon

Neither Levelt (1989) nor Pienemann (1998a) are very explicit about how gender is stored in memory. The issue was addressed in Jescheniak and Levelt (1994) but they are not mentioned in Pienemann (1998a). Jescheniak and Levelt (1994) argue that native speakers have a mechanism dedicated to the retrieval of grammatical gender: "to facilitate gender-marked anaphoric reference to recently introduced discourse entities, therefore contributing to the fluency of the utterance" (1994, 841). The gender of a word would be represented by a (recency-sensitive) link from the lexical-syntactical representation of that word, its lemma, to a generic gender representation (e.g., a gender node). As the question of representation of gender is crucial for the present study, a short overview of the latest findings in psycholinguistic research on this subject will be presented in the following section.

Storage or computation?

A question that has been fiercely debated in psycholinguistics concerns the storage versus the computation of grammatical gender (Schriefers and Jescheniak, 1999). Some researchers have argued in favour of a system where gender is computed on the basis of the noun's semantic, morphological and phonological properties each time it is needed anew (Corbett, 1991), but most current psycholinguistic models of language production (Levelt, 1989; Jescheniak and Levelt, 1994; Levelt, Roelofs and Meyer, 1999) "assume that gender is not computed, but rather stored as an inherent property of nouns in the knowledge of a native speaker about his/her language" (Schriefers and Jescheniak, 1999, 577). The central idea in these models is that "all nouns of a given grammatical gender are linked to a gender node specifying that grammatical gender" (p. 577). Lemma nodes are connected to nodes representing the word's syntactic properties, such as its syntactic category and its grammatical gender: "All nouns of the same grammatical gender are connected to a shared gender node. Furthermore, each lemma is

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connected to a so-called lexeme node on the phonological level, which specifies the word's phonological form. Finally, the gender nodes are connected to all agreement targets of the same gender (like pronouns, definite determiners, etc.)" (p. 577). This model has two important processing characteristics. The first is a distinction between activation and selection of nodes. Levelt and colleagues assume "that the gender of a selected lemma only becomes selected when actually needed in the local environment of the noun (e.g., in order to produce a noun phrase with a definite article as opposed to a bare noun)" (p. 578). The second processing characteristic concerns the unidirectionality of the activation flow. This entails "that the retrieval and selection of grammatical gender of a noun and the computation of gender agreement with some agreement target (such as articles) cannot be affected by phonological form" (p. 579).

Applied psycholinguistic research into gender processing

Jacobsen (1999) and Jescheniak (1999) present overviews of the literature on gender priming and conclude that the evidence is weak and dependent on specific details of the experimental procedure. Preactivation of a noun's gender does not seem to facilitate retrieval of that noun. Jescheniak and Levelt (1994) had found indirect support for the existence of dedicated mechanism for the retrieval of grammatical gender: "to facilitate gender-marked anaphoric reference to recently introduced discourse entities, therefore contributing to the fluency of the utterance" (1994, 841). The gender of a word would be represented by a (recency-sensitive) link from the lexical-syntactical representation of that word, its lemma, to a generic gender representation (e.g., a neuter gender node). Van Berkum (1997), however, objected to the fact that the experiments involved metalinguistic judgment tasks, which might not reflect the use of gender in spontaneous speech. He failed to detect a significant gender recency effect in two speech production experiments, with twice as many subjects. Jescheniak and Schriefers (1999) devised an experiment similar to van Berkum's, using pronouns. They too failed to find a gender recency effect. Recent research suggests that gender marking effect might be linked to the subject's linguistic history and to the languages involved. Guillelmon and Grosjean (2001), using auditory naming and lexical decision tasks, found that in early French–English bilinguals gender marking produced clear facilitation and inhibition effects in noun recognition. Late French–English bilinguals however turned out to be totally insensitive to gender marking, whether is was congruent or incongruent.

A study by Vigliocco and Franck (1999) on experimentally elicited speech errors, namely gender agreement between noun and a gender-marked adjective in French and Italian, showed that lack of congruence between grammatical gender and conceptual gender led to a significant increase in gender agreement errors.

Evidence for the separate representation of lexical-syntactic properties and phonological properties is provided in the study of Vigliocco, Antonini and Garett (1997) on Tip-of-the-Tongue (TOT) states in Italian. The subjects were able to report correctly the grammatical gender of words they could not produce. These speakers were able to access the lemma but could not produce the lexeme.

Support for the concept of gender node comes from experiments on picture–word interference (Schriefers, 1993; van Berkum, 1997). Gender distraction effects have been found to be robust and are interpreted as follows: "The lemma of the target noun activates its grammatical gender node. A congruent distractor will activate the same gender node, thus boosting its level of activation . . . A gender-incongruent distractor will activate a different gender node than the one activated by the target lemma" (Schriefers and Jescheniak, 1999, 590). Agreement with modifiers will thus take longer in the presence of gender-incongruent distractors. Unlike inhibition from gender-congruent primes, facilitation from gender congruent primes was found by Jescheniak (1999) to be weak and not reliable. Research in the same paradigm concerning the production of gender-marked pronouns suggests that there is lexical reaccess of the lemma of the antecedent noun and of its gender information but that the phonological word form is not reactivated (Schriefers and Jescheniak, 1999, 595).

Studies on lateralised readiness potentials (LRPs) revealed that information about grammatical gender is available before information about the noun's beginning phoneme. Van Turenhout, Hagoort and Brown (1999) suggest that a noun's lemma is selected before its phonological form: "syntax precedes phonology by about 40 milliseconds" (p. 672). It thus seems that gender agreement is computed on an abstract level of grammatical processing and is not influenced by the lemma's phonological form.

Exciting new methods have been developed to assess gender errors in L1 production. The analysis of electrophysiological activity via electrodes placed on the scalp enables the psycholinguist to analyse semantic and syntactic processing events through event-related brain potential effects (ERPs). Hagoort

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and Brown (1999) found that violation of gender agreement in sentences silently presented one word at a time to participants resulted in an brain potential pointing to syntactic problems in the sentence.

Implications for L2 production

While all these findings relate to L1 production only,[6] they open up interesting areas of research in L2 production. Some fundamental issues need to be solved. Pienemann (1998a) does not address the issue of gender representation explicitly, but as his model is based on Levelt, it can be assumed that he accepts the idea of storage of grammatical gender and the processing characteristics of Levelts' model. Pienemann does not refer to any psycholinguistic study by Levelt's colleagues. It seems imperative to us that these findings be integrated into any future model of bilingual speech production.

We assume that gender nodes are language-specific. This means that Dutch learners of French will have to develop a separate set of gender nodes.

Research questions

Pienemann states that his PT represents "a linguistic framework for the description of dynamic systems" (1998a, 10). This framework thus enables the linguist to represent "grammatical development within a variable system and to represent development and learner variation as two distinct phenomena (1998a, 10). As our corpus is of a cross-sectional nature, we will focus our analysis on synchronic learner variation in gender agreement and/or assignment. We saw in the previous section how Pienemann attributes synchronic variation in IL to variable *data density* and *percentage of rule application*. It is highly probable that these two variables are not the only ones to affect accuracy rates. We will thus identify other independent variables responsible for inter- and intra-individual variation of accuracy rates in gender agreement and/or assignment, and we will present a number of psycholinguistic scenarios to account for gender errors.

More specifically, we will address the following questions:

(i) does the presence or absence of constituent borders which grammatical information has to cross affect accuracy rates for gender in modifiers? If that is the case, does the position of an adjective in the syntactic structure (NP or VP) affect its accuracy rates for gender?
(ii) is there a relationship between the grammatical class to which the modifier belongs (determiner or adjective) and its accuracy rates for gender?
(iii) which heads and which modifiers are most frequently involved in gender errors?
(iv) is there a pattern of overgeneralisation (masculine versus feminine) in gender agreement errors and could this be traced to L1 effects?
(v) do IL learners resort to gender agreement avoidance strategies? If that is the case, what is the profile of those who use these strategies?
(vi) what factors are linked to interindividual variation in accuracy rates for gender agreement?
(vii) what possible psycholinguistic scenarios can be imagined to account for gender errors and which ones account for the largest proportion of errors?

Method

Participants

Twenty-seven university students, 8 female and 19 male, aged between 18 and 21, participated in the experiment. The subjects and the researcher were trilinguals (Dutch–French–English) although the subjects' French was weaker. Their French could be described as an "pre-advanced to advanced interlanguage" (Bartning, 1997a). Teacher and students communicated usually in French but the students knew that the teacher had native competence in Dutch. The subjects were administered a socio-biographical questionnaire which included questions about the type and frequency of contact with the target-language (TL). This revealed that 20 subjects had chosen French as an L2 and English as an L3 at secondary school while the remaining seven had chosen English as an L2 and French as an L3. The L2 was taught for five hours a week during six years in the secondary schools, instruction in the L3 was more limited with three hours a week during four years. All participants had been following intensive French courses (150 hours) for five months with the researcher as their teacher. Nine subjects declared that they had a regular functional use of French, 11 declared that they used it occasionally and seven did not use French regularly outside the classroom. The overlap between both groups (L2/L3 and frequency of use of the TL) is quite balanced. Three French L3 speakers and 12 French L2 speakers had a regular functional use of French. The subjects were also given the Eysenck Personality Inventory (Eysenck and Eysenck, 1964) in order to determine their degree of extraversion, as this was shown to have wide-ranging effects on ILs (Dewaele and Furnham, 1999, 2000; Dewaele and Regan, in press).

[6] With the exception of Guillelmon and Grosjean (2001) and Sabourin (2001).

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Linguistic material

The researcher and the subjects were recorded sitting face to face in a classroom in an informal and a formal situation. The formal situation consisted of an oral exam of about ten minutes that aimed at evaluating the learners' proficiency in the target language. Topics were politics, economics and the subjects' performance in other exams. In all five hours of speech (17,613 words) were recorded. The informal situation involved conversations between the same researcher and subjects in a relaxed atmosphere. There was no time restriction. Topics included studies, hobbies, politics and economics. In all about ten hours of speech (35,021 words) were recorded. The recordings were transcribed by the researcher into orthographical French. These transcriptions were then coded at the word level according to their grammatical nature and possible lexical or morphological errors (Dewaele, 1994).

Identification of gender errors

We reported earlier that the identification of gender errors is not always easy in French as some adjectives share the same form for the masculine and the feminine. In these cases we did not count the form as a gender error even though it may well have been. This means that the total number of gender errors for adjectives in our corpus is probably higher. The following utterance (1), where a female speaker defines her identity, illustrates the problem:

(1) Ann I-145. Moi je suis **belge**, je ne suis pas **flamand**.
"I am Belgian, I am not Flemish."

In this utterance, according to TL norms, *flamande* is expected instead of *flamand* as used by the learner. Hence it is a clear gender marking error. However, since *belge*, the other adjective cannot be marked for gender, it cannot be formally identified as a gender error even though it quite possibly is.

It is also impossible to judge whether definite articles preceding a noun starting with a vowel have the correct gender specification (example (2)). The same speaker seems to have assigned the noun *organisation* to the masculine gender, as she later refers to it with a masculine pronoun *il*, but the definite article preceding *organisation* cannot be counted as a gender error. The attributive adjective *mondial(e)* being an adjective which varies only in written language, it cannot be identified as a gender error.

(2) Ann F 37. **L'**organisation **mondial(e)** pour la santé a le jeudi le sept avril, il a organisé euh la première journée sans tabac.
"The World Health Organisation has on Thursday April 7th, it has organised err the first day without tobacco."

It is equally difficult to judge *post facto* whether a gender error was the result of assignment or agreement problems. We used the following criteria: when a particular lexical item was used in two different utterances with a determiner of the wrong gender we assumed it was wrongly assigned. This decision was strengthened if that particular lexical item was also accompanied by adjectives in the wrong gender. However, many nouns appear only once in speakers' extracts preceded by an article in the wrong gender. These gender errors were also attributed to assignment problems.

For an error to be classified as an agreement problem, we needed to have at least one modifier agreeing correctly in gender with the head, for example: une *affaire* **religieux** ("a religious affair" (+ fem)).

Analysis

Accuracy levels for gender agreement across the hierarchy of processing procedures

Our hypothesis that procedures that had been automatised for a longer time by the learners, i.e. those at the bottom of the implicational hierarchy, would result in significantly higher accuracy rates was not upheld. Figure 3 shows that accuracy rates for gender agreement are in fact higher within phrase constituents (involving determiners and attributive adjectives) than across constituents (predicative adjectives), but a t-test revealed that this difference is not significant ($t = -1.4$, $DF = 26$, *ns*). This lack of significance could be due to the relatively wide dispersion of results around the mean for accuracy rates of gender agreement outside the constituent (standard deviation *(SD)* = 9.5) (for the complete set of data, see the Appendix). A comparison between accuracy rates of attributive adjectives in anteposition (AP) and in postposition (PP), and predicative adjectives (Pred) also failed to show significant differences (see Figure 4).

Accuracy levels for gender agreement in determiners and adjectives

A significant difference was found, however, when comparing the two types of modifiers (see Figure 5). Accuracy levels for gender agreement in determiners were significantly higher ($t = -3.7$, $DF = 26$, $p < 0.001$) than those in adjectives, despite a relatively large standard deviation for the adjectives. We

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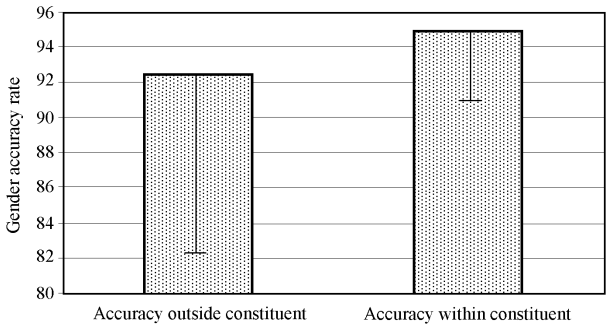


Figure 3. Mean gender accuracy rates and standard deviations for modifiers outside and within phrase constituents.

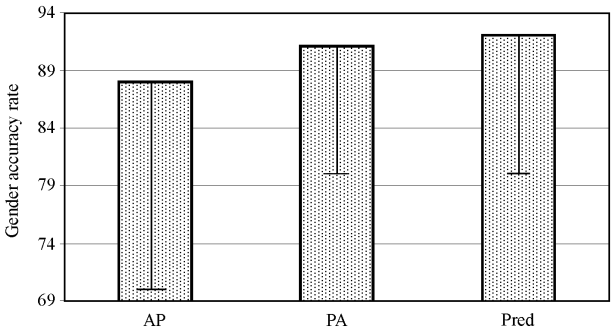


Figure 4. Mean gender accuracy rates and standard deviations for attributive adjectives in anteposition (AP) and postposition (PP), and predicative adjectives (Pred).

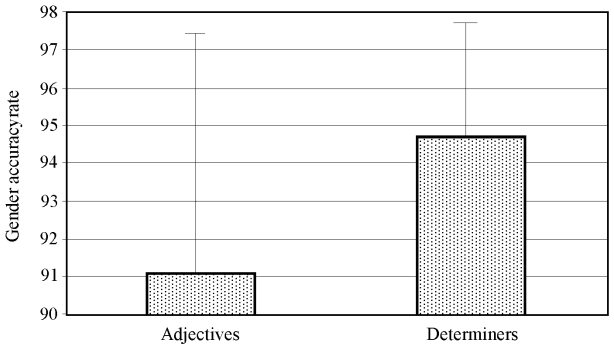


Figure 5. Mean gender accuracy rates and standard deviations for adjectives and determiners.

will later compare these results with findings from studies on gender and agreement errors in Spanish and Italian IL.

Gender-error-prone heads and adjectives

Did the participants have more difficulties with the gender of particular heads? Table 4 shows the 30 heads out of a total of 243 which failed most frequently to command proper agreement with modifiers. The most frequent head is "X" referring to a personal pronoun in subject position. Table 5 presents the adjective lemmas that showed incorrect agreement most frequently. They were coded according to the type of vocalic variation between the masculine and the feminine lexeme forms. This

Table 4. *Heads commanding wrong gender agreement in modifiers (Frequency > 3)*

Head (lemma)	Frequency of gender errors
X (subject pronoun)	25
politique (fem)	11
chose (fem)	9
VUB (fem)	8
année (fem)	6
auto (fem)	6
région (fem)	6
maffia (fem)	5
personne (fem)	5
classe (fem)	4
cours (masc)	4
école (fem)	4
femme (fem)	4
organisation (fem)	4
problème (masc)	4
salle (fem)	4
Amérique (fem)	3
Croix -rouge (fem)	3
direction (fem)	3
gens (fem + masc)	3
groupe (masc)	3
heure (fem)	3
histoire (fem)	3
journal (masc)	3
mère (fem)	3
niveau (masc)	3
pays (masc)	3
plupart (fem)	3
session (fem)	3

Table 5. *Probable psycholinguistic causes for gender error*

Probable cause of gender error	Number of occurrences	Proportion (%)
Wrong assignment	294	56.6
Temporary wrong assignment	69	13.3
No agreement	61	11.8
No agreement (premature deactivation)	22	4.2
No agreement followed by correction within utterance (monitoring)	38	7.3
TOT state	13	2.5
Transfer	21	4.0
TOTAL	519	100

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ranges from no vocalic variation, to simple vocalic variation, complex vocalic variation and change in final consonantal sound or suffix.

Overgeneralisation and L1 effects

The phenomenon of overuse of masculine forms exists in our corpus, though with slightly different proportions for determiners and adjectives. While 294 out of 400 determiners with incorrect gender were masculine forms (73.5%), this proportion dropped to 63% for adjectives (75 out of 119 adjectives with incorrect masculine gender). This might suggest that the functorisation process did activate the free grammatical morpheme but that no insertion of bound grammatical morphemes took place, because the diacritic information was either absent or unavailable.

Avoidance of gender agreement

Accuracy rates for gender agreement in predicative adjectives can also be boosted by learners. When the head of the phrase contains diacritic features other than (''masculine'', ''singular''), the learner inserts an almost formulaic ''Ça/C'est + Adjective'' structure instead of a VP where both the verb and the adjective need to have agreement. This left dislocation is illustrated in the following two utterances (example (3)) where the determiners have correct agreement with the head noun and where the variable predicative adjective *intéressant* escapes the need for agreement because of the insertion of *c'est* and *ça* in front of it:

(3) Martine I-4380. La profession, c'est très **intéressant**.
4381. Mais les études ça ça n'est pas très **intéressant**.
''The profession, it is very interesting. But studying that that is not very interesting.''

A quantitative analysis of the *Y, c'est X* structure reveals that it represents an average of 38.5% of the third person constructions (singular and plural) of finite verbs in the informal interviews ($SD = 10.2$). The participants who had had less formal instruction in French (L3) used this structure more (M = 46.4%) than those who had had a longer and more intense formal instruction in French (L2) (M = 36.2%). A one-way analysis of variance (ANOVA) reveals that this difference is significant ($F(1, 25) = 5.4$, $p < .028$). Proportion of use of the *Y, c'est X* structure was found to correlate positively with the proportion of filled pauses ($r = .56$, $DF = 26$, $p < .002$) and negatively (albeit not significantly so) with speech rates ($r = -.32$, $DF = 26$, $p < .09$). These two fluency indicators were also found to correlate significantly (and negatively) with overall gender accuracy rates (Dewaele and Véronique, 2000, 221). Proportion of use of the *Y, c'est X* structure correlated negatively with accuracy rates for prepositions ($r = -.52$, $DF = 26$, $p < .005$).

While the proportion of use of *Y, c'est X* structures does not correlate with accuracy of gender agreement in determiners ($r = -.25$, $DF = 26$, $p = ns$) nor attributive adjectives ($r = .12$, $DF = 26$, $p = ns$); it does come close to statistical significance in predicative adjectives ($r = .38$, $DF = 26$, $p < .057$).

Interindividual variation

A number of one-way ANOVAs were carried out in order to pinpoint possible sources of interindividual variation in gender-agreement accuracy rates. The degree of extraversion did not correlate significantly with accuracy rates. No single independent sociobiographical variable could explain any of the variance in the accuracy rates of attributive adjectives in anteposition and postposition and of predicative adjectives.

One independent variable, namely the frequency of use of the TL outside the classroom, was found to have an effect on gender agreement accuracy in determiners and in adjectives. Those who speak French more often make significantly fewer gender agreement errors in determiners ($F(2, 24) = 6.24$, $p < 0.006$) and tend to make fewer errors in adjectives ($F(2, 24) = 2.95$, $p < 0.072$) (see Figure 6).

Intra-individual variation: the ontogenesis of gender errors

Qualitative and quantitative data will be presented to illustrate seven psycholinguistic accounts for gender errors in modifiers and for instances of intra-individual variation. We assume that gender errors may result from a variety of causes at different stages and at different places in the production process.

Variation is one of the essential features of ILs (Tarone, 1988). While intertask variation could be explained by global psychological mechanisms, it is harder to formulate general principles explaining intra-individual variation within an extract or even within the same utterance. The following scenarios offer tentative explanations as to what might have happened in the speech production process that led to specific gender errors. This exercise is highly speculative however and alternative explanations are always possible.

Wrong gender assignment. Some gender errors may be explained, not by lack of agreement but by gender assignment errors in the learner's mental lexicon. In

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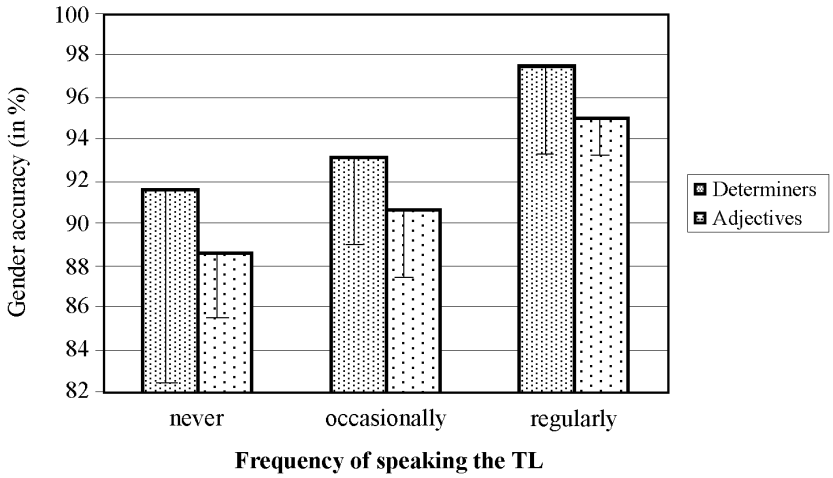


Figure 6. Mean gender accuracy rates and standard deviations in determiners and adjectives according to the frequency of talking the TL outside the classroom (never: n = 9, occasionally: n = 11, regularly: n = 7).

many cases learners seem to have ignored the gender cues present in morphophonological endings or semantic gender. Examples (4) and (5) present striking illustrations of both cases. First the noun *possibilité* which is of feminine gender in the TL like most nouns with this ending. Secondly the noun *homme*, which is obviously of masculine gender in the TL:

(4) Johan I-22. Euh monsieur De Benedetti a **le** possibilité de de dire non
"Err mister De Benedetti has the possibility of of saying no."

(5) Frank I-3035. Allez c'était **une** homme fantastique.
"Well it was a fantastic man."

Consistent use of the wrong gender, like the determiners and adjectives attached to *bête* in example (6) suggests a gender assignment error:

(6) (The speaker retells the story of the science fiction movie "Alien")
Filip I-189. Il y a **un bon** bête **spatial(e)** et **un mauvais** bête **spatial(e)**.
190. Et **le bon** bête **spatial(e)** est entré dans un bon garçon alors.
191. Et **le mauvais** bête **spatial(e)** il tue tout le temps des gens.
"There is a good beast from space and a bad beast from space. And the good beast then possessed a good guy. And the bad beast he kills people all the time."

The wrong diacritic information concerning gender is attached to the lemma, resulting in the activation and selection of the wrong gender node. The agreement rule might have been applied but carried the wrong information. The problem in this case is one of gender assignment, not gender agreement.

This category is the largest, with 294 tokens, representing 56.6% of the total number of gender errors in our corpus.

Temporary wrong gender assignment. Gender assignment errors can be temporary in nature, however. The speaker could be become conscious in the course of the conversation that she/he has assigned the wrong gender to a noun. In example (7) a speaker uses masculine determiners and adjectives for the feminine noun *région* in the first few utterances but then uses a determiner in the correct gender in a later utterance.[7]

(7) Frank F-4. Et maintenant euh il y a euh **un un petit** région avec des Arméniens.
5. Mais euh **ce ce petit** région est membre **d'un d'un d'un** plus **grand** région avec un un euh autre parlement.
7. Et **le petit** région qu'on parle, c'est Haute Karabach.
14. Et ils veulent, je ne sais pas euh, devenir membre de de **la** région de d'Arménie.
"And now err there is err a a small region with Armenians. But err this this small region is member of a of a of a bigger region with a a err other parliament. And this this small region we are talking about is High Karabach. And they want, I don't know err, to become members of the region of Armenia."

One possible explanation for this phenomenon is that the speaker might have sensed that something was wrong with the gender of *région*, and tried the other gender when the noun reappeared later in the conversation. Alternatively, one could argue that the feminine gender was in fact a momentary error, and that this lemma was encoded as a masculine in the speaker's lexicon.

[7] No corrective feedback was provided by the interviewer.

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We identified 69 tokens in this category, representing 13.3% of the total number of gender errors.

Lack of gender agreement. In some cases gender agreement errors can be established. The head (N) may not have triggered agreement with the determiners or adjectives in the NP or with adjectives in the VP. In the following example (8) the speaker talks about his girlfriend using the feminine third person pronoun but fails to agree the following predicative adjective *vieux* with the subject *elle.*

(8) Stefaan F-65. Mais elle est elle est plus **vieux** que moi.
"But she is she is older than I am."

We identified 61 tokens of this type of gender error (11.3% of the total).

Lack of gender agreement due to premature deactivation of the gender node. In this scenario it is assumed that the correct diacritic information concerning gender is attached to the lemma, the gender node is activated and selected but the phrasal procedure or S-procedure fails to deliver the information systematically to (all) the modifiers. This could be due to a deactivation of the gender node before all the targets have been "served".

The explanation of premature deactivation of the gender node could be used to account for example (9) where determiners and adjectives differ in gender agreement with their following masculine noun:[8]

(9) Danny I-1949. Oui oui il y a **un grosse** groupe dans le parti social qui est droite quand même.
"Yes yes there is a large group in the social party that is right-wing in fact."

This gender error, namely *grosse* instead of *gros* indicates that the speaker thinks *groupe* is feminine and agrees the preceding adjective correctly but forgets to agree the determiner at the beginning of the NP or deactivates the gender node prematurely. However, another possibility is that the speaker knows *groupe* is masculine, agreeing the determiner accordingly, but is unable to produce the masculine adjective lexeme and therefore produces the feminine form. He could also have assumed that *grosse* belonged to the category of invariable adjectives.

The same speaker provides another example (10) of free variation later in the interview:

(10) Danny I-2092. Et ils sont des gens **fortes** et **grands**.
"And they are strong and tall people."

The noun *gens* is notoriously difficult for learners as it requires feminine agreement for left-hand side determiners and adjectives and masculine agreement for right-hand side adjectives, pronouns and participles (Grevisse, 1980, 257). The correct agreement would have given: *des gens forts et grands*. One possible explanation in this case is again deactivation of the gender node before all modifiers have been served. An alternative explanation could be imagined however, namely that no diacritic information concerning gender is attached to the lemma, both gender nodes remain lowly activated and the rule is applied but carries no grammatical information. The result is free variation or the production of the unmarked masculine form.

This category contains 22 tokens, representing 4.2% of the total number of gender errors.

Non-systematic gender agreement due to monitoring. Conscious intervention by the monitor may also produce intra-individual variation. The learner seems to have monitored a gender error in the first loop, i.e., before the actual production of the noun lexeme in example (11). The intervention of the monitor in the second loop (overt speech) could explain the correction in example (12).

(11) Yves F-29 Je ne comprends pas ce texte parce que je ne suive pas **le la** politique.
"I don't understand this text because I don't follow politics."
(12) Stefaan I-97 Oui je crois que **le** mentalité est très **bonne** ici.
"Yes I think the mentality here is very good."

The gender error in the determiner preceding the noun might in fact be a slip of the tongue (Poulisse, 1999). In that case, the lemma containing the correct diacritical information would have activated and selected the correct gender node, but the wrong lexeme would have been retrieved. The monitor would then have discovered the mismatch between gender node activation and the lexeme, interrupting the production in example (11), and ensuring the next agreement target would match the gender node activation in example (12).

Thirty-eight tokens were identified in this category, representing 7.3% of the total number of gender errors.

Apparent gender errors. TOT states (Vigliocco et al., 1997) may also account for a number of (apparent) gender errors. In TOT states, the preverbal message activates the noun lemma which releases the diacritical information, including gender, allowing the speaker to produce the determiner, but the noun lexeme cannot be retrieved. The speaker then activates another lemma, resulting in the production of a new determiner and noun lexeme. If the gender of the second lemma is different from the first one, two de-

[8] No corrective feedback was provided by the interviewer.

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terminers of different gender will precede the noun; creating the impression of a gender agreement error. This is what could have happened in example (13) where two determiners of different gender, separated by an empty pause, precede the noun:

(13) Bart F-18. Euh il y a **une, un** centre médical à Bruxelles et euh ce centre donnait euh un centre médical pour des toxicomanes.
"Err there is a, a medical centre in Brussels and err that centre gave err a medical centre for drug addicts."

What looks like a gender error might therefore only be an aborted attempt at retrieving a particular lexeme, which in the example could be the feminine nouns *clinique* or *maison de santé*.

We have identified 13 tokens in this category, which is the smallest with 2.5% of the total number of gender errors.

Gender errors resulting from transfer. Transfer from lemmas belonging to other languages known to speaker might further complicate the picture on the production of gender errors.

We assumed the existence of separate gender nodes for the different languages known to the speaker because gender oppositions in Dutch, English and French are not parallel. It is therefore unlikely that gender errors would result from direct transfer from the Dutch or English gender nodes. This does not, however, exclude occasional influence from Dutch or English lemmas creating (apparent) gender errors. Dewaele (1998) used the spreading activation model to account for lexical inventions created by the insertion of morphemes attached to lemmata with similar conceptual information but belonging to other languages.

(i) Some high frequency cognates of homophones in the L1 might slip into the IL creating *apparent* gender errors. A common error in our corpus is the use of the feminine plural *sociales* instead of the masculine target form *sociaux* as illustrated in example (14).

(14) Gita I-33. Et deuxième aussi ils font des actions dans les tissus **sociales**.
"And secondly they also undertake actions in the social tissue."

Two possible causes can be identified. First an intralingual reason: the fact that *sociaux* [sɔsjo] is the only lexeme attached to the lemma *social* to be audibly different morphophonologically (the other lexeme *social* is pronounced identically for the masculine and feminine singular and the feminine plural: [sɔsjal]). A second possible cause is "conspiracy" of an interlingual nature: namely the effect of the Dutch lemma *sociaal* and/or the English lemma *social*, which do not have a different form for the masculine plural. The probability of the French lexeme *sociales* being retrieved rather than *sociaux* is thus raised considerably.

(ii) In example (15) the gender error could result from a complex interplay of an intralingual and an interlingual cause, namely the existence of an English cognate in the speaker's lexicon. As English is the L2 of this particular speaker (French is his L3), it can be assumed that his English lemmas are highly activated, or not sufficiently inhibited (see Dewaele, 2001).

(15) Danny I-2048. Je vais euh, **un** part de l'argent je vais déposer sur une banque.
"I will err, part of the money I will put into a bank."

The word *part* [paːʳ] exists in French and is of feminine gender, just like its synonym and near homophone *la partie*. The English cognate *part* has the same meaning. Code-switched words and English borrowings usually have "default" masculine gender in French (Walter, 1999). It is probable that the French lemmas *partie*, *part* and the English lemma *part* were activated simultaneously, the last one providing the clue for gender: a "default" masculine.

(iii) There are also cases where the intended lemma has been activated, with or without the correct gender information, but where the target lexeme either cannot be retrieved, or can only be partially retrieved (a partial TOT state for adjectives) and where the speaker transfers morphemes from lemmas belonging to other ILs or his L1. The resulting form is a lexical invention based on interlingual influences (Dewaele, 1998). The attributive adjective *financiel* (target: *financière*) in example (16) follows the noun *branche*, which is feminine but is preceded by a masculine definite article *le*. The adjective has the stem of the French lemma combined with a non-target-like suffix. The suffix is phonologically adapted to the target language but bears a morphological resemblance to the ending of the equivalent L1 Dutch lemma *financ**ieel*** and the English lemma *financ**ial***.

(16) Rich I-2480. Aussi dans **le** branche **financiel** mais pas je n'ai pas encore précisé- précisément pensé.
"Also in the financial course but I haven't thought about it precis- precisely."

We identified 21 tokens of this type of gender error (4% of the total).

Table 6 presents a overview of the number of cases grouped according to the probable cause of gender error.

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Table 6. *Adjective lemmas with wrong gender agreement (lexeme frequency > 2) and type (feminine form involving no vocalic variation: 0, simple vocalic variation: +; complex vocalic variation: ++, change in final consonantal sound or suffix: +++)*

Adjective lemma	Type	Frequency of tokens
premier	+	9
petit	0	7
tout	0	7
grand	0	5
important	0	5
mort	0	5
nouveau	++	4
social	++	4
vieux	++	4
américain	+	3
différent	0	3
fort	0	3
beau	++	2
dernier	+	2
flamand	0	2
humain	+	2
intelligent	0	2
italien	+	2
jaloux	0	2
mauvais	0	2
religieux	0	2
sérieux	0	2

Discussion

Accuracy and constituent boundaries

The lack of significant differences between accuracy rates of attributive adjectives in anteposition (AP) and postposition (PP), and predicative adjectives (Pred) suggests that the question whether grammatical information needs to cross constituent boundaries is not relevant in advanced IL. Corroboration for this finding can be found in four studies which set out to verify the predictions formulated in earlier versions of the PT. The first study, by Bruhn de Garavito and White (in press) shows similar results for adjectives ending in -a or -o in the oral Spanish IL of 42 native speakers of French. A reanalysis of their data shows a slightly higher accuracy rate for attributive adjectives (78.7%) than for predicative adjectives (74.3%). The second study, which has already been mentioned, is that of Bartning (2000a) in her analysis of advanced French IL produced by four Swedish L1 speakers. She found that accuracy of gender agreement for 189 attributive adjectives was not consistently higher than that for 205 predicative adjectives. In a subsequent study, Bartning (2000b) analysed 1352 cases of gender agreement (of which 254 were non-target-like) in the French IL of six advanced and nine preadvanced Swedish learners. She found that while the advanced learners obtained higher accuracy rates in determiners (90%) than in adjectives (81%), the preadvanced learners showed an opposite pattern: lower accuracy rates in determiners (74%) and higher rates in adjectives (80%).[9] Bartning's analysis of accuracy rates in attributive and predicative adjectives shows similar differences between the advanced and the preadvanced learners. The former obtained significantly lower accuracy rates in adjectival agreement in anteposition ($M = 74\%$) than in predicative position ($M = 84\%$), in contrast to the predictions of the PT (2000b, 232). However, the preadvanced learners obtained lower accuracy rates in adjectival agreement in the predicative position ($M = 77\%$) than in the anteposition ($M = 82\%$) (thus confirming Pienemann's hierarchy) (2000b, 234). The fourth study is that of Hammarberg (1996), who obtained comparable inconclusive results in his longitudinal study on Swedish L2 acquisition by six learners who had Chinese, Greek and Portuguese as L1. He found that attributive agreement was acquired before predicative agreement "when the same category was compared in attributive and predicative position, i.e. lexical neuter with lexical neuter and plural with plural" (1996, 86), but he failed to find the same order across different morphological categories, and concludes "that a general statement about the order between attributive and predicative agreement without regard to the contents and communicative use of the categories is not tenable" (1996, 86).

Accuracy and the nature of the modifier

Higher accuracy levels for gender agreement in determiners, compared to adjectives, were also found for the group of advanced learners in Bartning's (2000b) study (M Det = 90% versus M Adj = 81%), but not for the preadvanced learners (M Det = 74% versus M Adj = 80%). Bartning suggests that "this is probably due to the random use of the gender distinction on the determiner at earlier stages" (2000b, 235). Higher accuracy rates for determiners have been reported in studies on gender and agreement errors in Spanish

[9] A more detailed analysis of accuracy in determiners revealed that advanced learners commit significantly more gender errors with the indefinite article (Mean accuracy = 83%) than with the definite article (Mean accuracy = 93%). The advanced learners also tend to overgeneralise the masculine gender on the definite article but not on the indefinite article, these differences are non-significant in the speech of the preadvanced learners (Bartning, 2000b, 230–231).

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and Italian L2. Finnemann (1992) found that his three anglophone subjects obtained higher accuracy rates for determiners than for predicative adjectives in their Spanish IL. Bruhn de Garavito and White (in press) observed the same phenomenon: accuracy in gender agreement was significantly lower for adjectives than for determiners in Spanish IL. Chini (1995) analysed the development of correct gender use in Italian L2 and found that articles preceded adjectives in correct gender agreement. These results confirm findings in L1 acquisition (Tucker, Lambert and Rigault, 1977) concerning the importance of determiners in the characterisation of gender. This could mean that both in French L1 and L2 acquisition the gender of nouns is learnt primarily through determiners. We will return to possible reasons for this later.

The results presented in Figure 5 suggest that accuracy levels of gender agreement in advanced interlanguage are less affected by the level of the procedure in the processing hierarchy than by the nature of the lemma itself.

It is important to remember that, while determiners and adjectives obtain the diacritical information from the head NP through a functional procedure, their lemmata are of a different nature. Determiners are so-called "syntactic" lemmata which, unlike adjectives, do not have a matched concept in the preverbal message. It is possible that the operation of matching a concept with a particular lemma of an adjective is more onerous than the activation of a syntactic lemma, since it would mean a double match within one iteration. In the case of predicative adjectives, there would be only one activation of a lemma within one iteration, hence reducing the risk of error. The results shown in Figure 4 indeed suggest a (non-significant) higher accuracy rate for predicative adjectives. This effect might have been cancelled out by a more important effect, namely a frequency effect (Dell, 1990; Levelt et al., 1999). There are fewer types of determiners than of adjectives, and moreover determiners are shorter and more frequent, hence there is a smaller risk of error. Indeed, determiners are at the top of frequency lists (Gougenheim, Rivenc, Michéa and Sauvageot, 1967) and consist of single morphemes. Adjectives, on the other hand, are scattered along the frequency lists and are often more complex morphologically. The speaker may thus possess the correct diacritic information for gender in the head but may be unable to find the corresponding lexical item in the class of adjectives. The probability of finding the correct form among a limited number of high frequency determiners (there are only three lemmata of articles which represent 85% of the tokens of determiners) is much higher. Meisel (personal communication) offers an alternative explanation for the higher gender accuracy of determiners in IL. He suggests that learners associate a particular determiner with any new noun they acquire. Hence the increased likelihood of the correct determiner being produced with any noun, unlike adjectives whose link with nouns is much weaker. The adjectives, moreover, are not systematically learned in pairs with the noun. The phenomenon could be an effect of teaching and might thus be an illustration of what Selinker (1972) calls "transfer of training". The lack of any significant differences in our data between the accuracy rates of attributive adjectives in anteposition and postposition and predicative adjectives might also be due to their small number. The standard deviations are quite high, suggesting a wide spread around the mean (see Figure 3).

Gender-error-prone heads and adjectives

We reported earlier that gender errors most often involved the use of masculine gender instead of feminine. It is not surprising therefore to find 21 feminine nouns amongst the 30 heads most frequently involved in gender errors. One of these is the abbreviation *VUB* which stands for *Vrije Universiteit Brussel* but which should have feminine gender because *université* is of feminine gender. There are some surprises in this list: nouns with a very clear natural gender like *femme* (woman) and *mère* (mother) were accompanied by modifiers in masculine gender whereas the noun *père* (one occurrence) was accompanied by a modifier in feminine gender. This does not seem to be so exceptional however. Granfeldt (2000, 276) reports similar cases in his corpus of adult Swedish–French interlanguage (*le le petit eh fille* "the (+ masc) the (+ masc) little (+ masc) girl"). The rule of thumb that nouns ending in *-ion* generally belong to the feminine gender does not seem to have been applied systematically in our data. There are 25 noun lemmas of this type that occasionally command masculine agreement.

The analysis of the adjective lemmas that most often showed incorrect agreement in our corpus shows that the majority (N = 13) belongs to the category where there is no vocalic variation between masculine and feminine, followed by the category with simple vocalic variation (N = 5) and finally the category with complex vocalic variation. There are no cases of adjectives with change in the final consonantal sound (*neuf*/*neuve*) or a suffix (*directeur*/*directrice*) that showed wrong agreement more than once. This distribution probably reflects a frequency effect. Adjectives that are very frequent are more likely to make it to the top of the list.

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Overgeneralisation and L1 effects

Overgeneralisation of a particular gender is very rare in the French of early bilinguals (Pupier, 1982; Müller, 1990) but our results suggest that it is much more frequent in French IL. Our finding that it generally involves the choice of the masculine form instead of the feminine form confirms earlier research on this subject. Taylor-Browne (1984) elicited articles and attributive adjectives from 158 children in early-total, continuing-partial and late French immersion programs. She discovered that across the groups the subjects overused masculine determiners and adjectives, which led to the conclusion that the acquisition of gender attribution was not affected by more hours of exposure, greater cognitive maturity, or earlier exposure. Bartning (2000b) found that her advanced subjects – but not the preadvanced ones – overused the masculine gender of definite determiners and of adjectives. She suggests that "the pre-advanced learner has not yet started using the strategy of overgeneralisation of the masculine gender" (p. 231). She argues that the masculine is the unmarked form, acquired before the feminine. Bruhn de Garavito and White (in press) found that the masculine form of the article and the adjective was frequently overgeneralized in the Spanish IL of French learners.

Carroll (1989, 573) presents an interesting theory to account for the generalisation of the masculine in the French IL of English L1 speakers and also for their difficulty in mastering gender agreement. She argues that there is transfer in the acquisition of the French gender system by Anglophones once they reach the age of 5, and thinks that the universal feature of gender distinction atrophies and disappears for those speakers whose L1 has no grammatical gender system. Carroll argues that Francophones learn determiners as part of nouns and that a simple look-up mechanism function allows them to retrieve the morphosyntactic features of known nouns (1989, 573). Anglophones, on the other hand, "transfer their noun-category – crucially without an inherent gender feature – to the task of acquiring new words" (1989, 581). They consequently learn determiners as independent phonological units and use rules of thumb and guessing mechanisms for the gender of new items. These rules may each be accurate over subsets of the lexicon, but when they conflict, the learners "will have difficulty making a categorization" (1989, 580). There is a risk of overgeneralisation, i.e. the use of the masculine. Learners could therefore develop a reasonably accurate system of gender agreement but never acquire native-speaker competence (1989, 581). The masculine form is also generally the unmarked form in French. It can thus be used as "a generic, to include the feminine – a form of polysemy which operates at both the lexical and grammatical level" (Wise, 1997).

Carroll's theory about the problems which an English native speaker has with mastering French gender agreement echoes that of Rivers (1983), who attributed the difficulties to a conceptual interlingual contrast between French and English gender systems. The view that conceptual transfer might be responsible for difficulties with gender in the L2 has also been defended in Pavlenko (1999).

A number of researchers (White, Valenzuela, Kozlowska Macgregor, Leung, and Ben Ayed, 2000; Franceschina, 2001; Sabourin, 2001) have tried to determine whether the presence of a grammatical gender system in the L1 has an effect on the acquisition of gender in the L2. The results are not clear-cut. While White et al. (2000) did not find any significant differences between the performance on gender in advanced Spanish IL of English L1 and French L1 speakers, Sabourin (2001) found that German L1 learners of Dutch L2 had less difficulty in picking out sentences with incorrect gender agreement than Romance L1 learners, who in turn performed significantly better than English L1 learners who had not learned another language with a gender system previously – in contrast with White et al.'s English learners. Sabourin (2001) argues that the L1 has a strong effect on performance for grammatical gender as the results per group correlate with the amount of gender congruency between the languages (high between Dutch and German, lower between Dutch and Romance languages, and absent between Dutch and English). Franceschina's (2001) preliminary findings on gender agreement in oral Spanish IL from Italian L1 and English L1 speakers also suggest that the degree of gender congruency between the L1 and the L2 affects accuracy.

Avoidance strategies

The *Y, c'est X* structure seems to be common both in native French (Blanche-Benveniste and Jeanjean, 1987; Blanche-Benveniste, 1990; Morel, 1992) and in other French learner varieties (Véronique, 1994; Bartning, 1997b; Bartning and Hammarberg, 2000). Morel (1992) states that *c'est* is a specific rheme marker in identificational and existential structures in French. Blanche-Benveniste (1997) argues that the relation between *Y, c'est X* is one of a macrosyntactic nature. The element *c'est très* ***intéressant*** from example (3) (*La profession, c'est très* ***intéressant***) is the kernel, while *La profession* is the prefix. Bartning (1997b) compares the frequency of use of *c'est* in native and non-native French and reports a

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higher frequency of left dislocation structures in the advanced French interlanguage of four Swedish students. Bartning hypothesises that non-native speakers "use *c'est* to compensate for not finding the appropriate subject (pronoun or noun), agreement endings and determinant choice" (1997b, p. 21). She concludes that both native and non-native speakers use this structure but that it does not have the same paradigmatic or syntagmatic status. The results of the quantitative analysis suggest that the use of the *Y, c'est X* structure could be a conscious strategy of the learner to avoid gender agreement. Its proportion of use is inversely linked to the amount of formal instruction in the TL and to fluency indicators. The fact that the proportion of Y, *c'est X* structures does not correlate with accuracy of gender agreement in determiners nor attributive adjectives but does correlate with gender agreement in predicative adjectives in the VP suggests that its use is quite effective as an avoidance strategy for gender agreement.

Interindividual variation

The relation between accuracy rates for gender agreement and other sociobiographical variables, such as the amount of formal instruction in the TL (L2 or L3), which proved to affect other linguistic variables (Dewaele, 1998, 2001), failed to attain a level of statistical significance for determiners, adjectives and different subtypes of adjectives.

This suggests that the amount of teaching has less effect on target-like gender assignment and agreement than frequency of authentic communication in the TL outside the classroom. The TL must be used actively in situations of spontaneous communication with native speakers for correct gender agreement to be acquired. Dewaele and Regan (2001, in press) reported similar effects of these independent variables on the omission of "ne" in negations and the use of colloquial words in Dewaele's French IL corpus.

Psycholinguistic scenarios to account for gender errors

It thus seems that about a quarter of the gender errors in our data could be tentatively attributed to agreement problems, while more than half point to assignment errors. This is not overly surprising given the fact that our participants were advanced speakers of French and knew the agreement rules although they occasionally forgot to apply them. This intra-individual variation seems to be a fairly typical phenomenon in Romance ILs (cf. Bartning, 2000b and Franceschina, 2001). Gender errors resulted more often from ignorance of the lexical item's correct gender or from an incapacity to retrieve it. Ignorance of the noun's gender forces the speaker to guess, which results in different choices at different times, resulting in turn in patterns of free variation. Approximately a third of gender errors occur in free variation. These results show that variation in gender accuracy rates cannot solely be accounted for by different use of grammatical rules across different tasks as Pienemann suggests (1998a, 297). Moreover, we would claim that Pienemann's statement that variation in accuracy rates "may be related either to the number of contexts produced or to the actual rule application" (p. 298) is insufficient. The equation between accuracy rate and *percentage of rule application* is an overgeneralisation. The absence (or the violation) of agreement in a particular modifier does not automatically mean that the rule has not been applied.

Asked whether other possible sources of synchronic variation might be possible in French IL, Pienemann (personal communication) replied that "on the question of French gender agreement one would, in my view, also have to consider the different form-function relationships which may add another source of variation to accuracy levels". We disagree with this because we do not think there is a complex form–function relationship for gender in French (see Tables 1, 2 and 3). The non-native speaker, unlike the native speaker, will have to learn the value of the gender feature individually for every lexical entry stored in the mental lexicon because the relation between the noun and the gender is most often arbitrary (except when grammatical gender is congruent with natural gender: *la chatte* ("the cat" + fem.) (Comrie, 1999). Gender agreement on the determiners or on predicates is of a binary nature. All the elements sensitive to gender agreement will take the (+ fem) morphology if the head noun is feminine.

Conclusion

Accuracy of gender agreement was found not to be higher for determiners and attributive adjectives (in anteposition and postposition) than for predicative adjectives where the diacritical feature "gender" has to cross clauses. This finding, which confirms earlier research in advanced ILs (Hammarberg, 1996; Bartning, 2000a, 2000b), suggests that the question of whether grammatical information has to cross constituents or clauses becomes irrelevant in terms of accuracy once the learner masters (albeit imperfectly) the different procedures (Pienemann, 1998a). The higher accuracy rates for determiners than for adjectives show that advanced learners may possess the correct diacritic feature for gender for a particular noun, but that frequency effects will prop up

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accuracy rates for these syntactical lemmata while the higher number of lemmata of adjectives will have adverse effects on the accuracy rates for gender agreement for this grammatical class.

The present study clearly shows that variation in accuracy rates for gender agreement cannot be reduced to variation in data density, to non-application of the rule or to different form–function relationships as Pienemann suggests. Possible causes for the large amount of both intra-individual and interindividual variation in our data have been suggested. Interindividual variation has been linked to specific generalisation and avoidance strategies, which are in turn linked to level of proficiency and length/intensity of formal instruction in the TL, and to frequency of language use outside the classroom.

Intra-individual variation has been linked to a number of very complex and diverse psycholinguistic scenarios: some gender errors are agreement errors, while others are gender assignment errors. Errors can originate at the lemma level, at the gender node level, or at the lexeme level. Influence from lemmas belonging to other languages cannot be excluded even though no direct transfer of gender information is possible because of language-specific gender nodes.

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Appendix

A: *Absolute numbers of native-like (N) and non-native-like (NN) instances of gender agreement in anteposed attributive adjectives (AP), postposed attributive adjectives (PP) and predicative adjectives (Pred) and their accuracy rates in %*

Speakers	AP N	AP NN	Accur AP	PP N	PP NN	Accur PP	Pred N	Pred NN	Accur Pred
Ann	12	1	92.3	27	0	100	24	2	92.3
Anton	5	0	100	36	0	100	25	1	96.2
Bart	4	0	100	15	0	100	7	3	70
FrankA	6	0	100	11	1	91.7	21	2	91.3
JohanA	3	1	75	9	3	75	18	0	100
Guy	7	0	100	6	2	75	16	1	94.1
Karl	9	1	90	26	1	96.3	52	1	98.1
Danny	20	2	90.9	40	2	95.2	52	1	98.1
Gitta	8	1	88.9	27	3	90	17	0	100
Richard	12	1	92.3	34	8	81	20	0	100
FrankB	1	5	16.7	17	7	70.8	24	3	88.9
Tamara	11	0	100	16	1	94.1	17	0	100
Nicolas	19	0	100	24	0	100	20	0	100
Jan	16	2	88.9	12	0	100	16	0	100
JohanB	11	0	100	16	0	100	13	0	100
Martine	41	1	97.6	41	9	82	56	3	94.9
Peggy	5	1	83.3	13	0	100	11	5	68.8
Peter	11	3	78.6	20	2	90.9	16	0	100
Stefaan	21	2	91.3	12	0	100	32	2	94.1
Filip	34	8	81	58	1	98.3	29	3	90.6
Yves	8	2	80	6	4	60	20	0	100
Paul	5	0	100	7	0	100	10	2	83.3
Serge	7	0	100	6	0	100	8	2	80
Sigried	7	0	100	20	4	83.3	26	0	100
Bettina	8	0	100	16	1	94.1	19	3	86.4
Angelo	8	1	88.9	15	1	93.8	6	0	100
Joke	6	1	85.7	5	1	83.3	3	1	75
TOTAL	305	33		535	51		578	35	

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B: *Absolute number of determiners and adjectives with target-like (N) and non-target like (NN) instances of gender agreement and their accuracy rates in %*

Speakers	DET N	DET NN	Accur DET	ADJ N	ADJ NN	Accur ADJ
Ann	416	27	93.9	63	3	95.5
Anton	218	16	93.2	66	1	98.5
Bart	156	13	92.3	26	3	89.7
FrankA	157	4	97.5	38	3	92.7
JohanA	193	18	91.5	30	4	88.2
Guy	167	23	87.9	29	3	90.6
Karl	371	16	95.9	87	3	96.7
Danny	518	33	94.0	112	5	95.7
Gitta	274	10	96.5	52	4	92.9
Richard	377	28	93.1	66	9	88.0
FrankB	286	37	88.5	42	15	73.7
Tamara	216	0	100.0	44	1	97.8
Nicolas	227	2	99.1	63	0	100.0
Jan	271	25	91.6	44	2	95.7
JohanB	188	4	97.9	40	0	100.0
Martine	904	7	99.2	138	13	91.4
Peggy	196	16	92.5	29	6	82.9
Peter	349	21	94.3	47	5	90.4
Stefaan	368	19	95.1	65	4	94.2
Filip	642	36	94.7	121	12	91.0
Yves	223	16	93.3	34	6	85.0
Paul	111	2	98.2	22	2	91.7
Serge	172	2	98.9	21	2	91.3
Sigried	242	4	98.4	53	4	93.0
Bettina	305	10	96.8	43	4	91.5
Angelo	151	2	98.7	29	2	93.5
Joke	143	9	94.1	14	3	82.4
TOTAL	7,841	400		1,537	119	

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