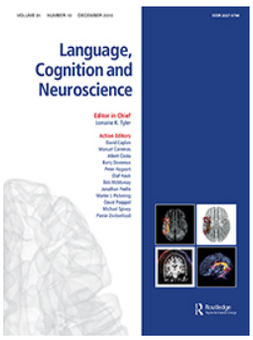

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REGULAR ARTICLE

Referential choice in a second language: evidence for a listener-oriented approach

Carla Contemori[a] and Paola E. Dussias[b,c]

[a]Department of Languages and Linguistics, University of Texas, El Paso, TX, USA; [b]Department of Spanish, Italian and Portuguese, Pennsylvania State University, Pennsylvania, PA, USA; [c]Center for Language Sciences, Pennsylvania State University, Pennsylvania, PA, USA

ABSTRACT
One central question in research on spoken language communication concerns how speakers decide how explicit to make a referential expression. In the present paper, we address the debate between a discourse-based approach and a listener-based approach to the choice of referring expressions by testing second language (L2) learners of English on the production of English referential expressions, and comparing their performance to a group of monolingual speakers of English. In two experiments, we found that when native speakers of English use full noun phrases, the L2 speakers tend to choose a pronoun, even when the use of a pronoun leads to ambiguity. Our results show that the pattern observed is not the result of cross-linguistic interference from the L1. Furthermore, a clear dissociation is found between calculating the discourse information and taking the listener's perspective into account, supporting a listener's based approach to the choice of referring expressions.

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Second language acquisition; referential choice; reference; pronouns; L2 acquisition; English

1. Introduction

The ability to refer to entities in the surrounding world constitutes a prerequisite for successful language comprehension and production. For instance, understanding the sentence in (1) would not be possible if the speaker and the hearer could not refer to the entity *Anthony*.

(1) Anthony went for a walk

Psycholinguistic research investigating the production and comprehension of referring expressions has shown that successful reference implies choosing/interpreting a form among a set of referring expressions (e.g. Arnold, 2010 for a review). Native speakers are usually very fast and efficient at making these decisions in order to keep up with the flow of normal conversation, where the requirement to comprehend and produce referring expressions needs to be fulfilled at a fast pace.

Two main approaches have been proposed to account for the choice of referring expressions across languages: the discourse-based approach and the listener-based approach. While the discourse-based approach hypothesises that speakers' choices are mainly based on properties of the discourse (i.e. speakers refer to entities that are highly accessible in the linguistic discourse with less specific forms, and they refer to less accessible referents by using more specific forms), the listener-based approach assumes that the speaker takes into account both the properties of the discourse and the listener's perspective when using referring expressions.

The shared nature of discourse information in conversation can make it difficult to distinguish listener-oriented choices from discourse-oriented choices. Furthermore, we cannot exclude that both processes are interrelated and indistinguishable in many contexts. However, some prior work has used experimental designs that independently manipulate the speaker's and listener's experience, to distinguish between discourse-oriented and listener-oriented processes in the choice of referential expressions. Recent studies that have employed such manipulations with a number of different populations (typically developing children and older adults: Hendriks, Koster, & Hoeks, 2014; children with Autism Spectrum Disorder and children with Attention Deficit Hyperactivity Disorder: Kuijper, Hartman, & Hendriks, 2015) have been able to compare listener-oriented processes against discourse-oriented processes and have provided support to the listener-based approach, demonstrating that a dissociation between the use of the discourse's properties and consideration of the listener's perspective can be observed. Furthermore, these studies have shown a correlation between certain cognitive functions (e.g. working memory, theory of mind and inhibition) and the ability to carry out the steps of choosing a referential expression.

CONTACT Carla Contemori carla.contemori@gmail.com, ccontemori@utep.edu

In the present study, we look at a new population, second language learners, providing additional evidence for the listener-based approach to referential choice. Second language learners are an interesting group to study because they have a fully developed cognitive system, but may have less automatic processing of their L2 compared to monolingual speakers (e.g. Clahsen & Felser, 2006), and the allocation of their cognitive resources during referential processing may be different than in native speakers (Abutalebi, 2008). We assume here that the task of processing a less-automatised language is cognitively effortful (Indefrey, 2006), which may lead to the inconsistent use of referential expressions that has often been associated with cross-linguistic interference from the L1 (e.g. Belletti, Bennati, & Sorace, 2007; Montrul & Rodríguez Louro, 2006; Rothman, 2008, 2009; Sorace, 2011; Sorace & Filiaci, 2006). Using two sentence-elicitation tasks, we show that learners of English present differences in the choice of referential expressions compared to native English speakers, leading to potential ambiguity in speech. We show that the inconsistent use of referential expressions is not the result of cross-linguistic interference. Furthermore, we present evidence in support for the listener-based approach, showing that L2 learners can successfully consider the listener's perspective, but may experience difficulties integrating discourse prominence in different contexts.

The paper is organised as follows. We will first present evidence from psycholinguistic research on referential choice showing how native speakers use referential expressions. Second, we will review evidence from the literature on L2 acquisition illustrating the use of referential expressions in different languages. Then, we will present two main experimental studies that adopt the story elicitation technique, used in past work, to address our research questions. In Experiment 1, we investigate the use of proper names and personal pronouns in discourse contexts in which mention of a target referent occurs with a competitor referent. In Experiment 2, we test the use of referential expressions in topic-shift contexts, to further investigate the L2 speakers' ability to update the discourse model and take the listener's perspective into account.

1.1. Choice of referring expressions in L1

Referential choice, such as the possibility of using the pronoun *he* or the proper noun *Anthony*, is an important component of meaningful language use. Psycholinguistic research investigating production has shown that speakers tend to use more explicit forms, such as proper names or descriptions, to introduce new entities in the discourse for the first time or to refer to someone/something that has not been mentioned recently (Arnold, 2010; Brennan, 1995; Givon, 1983). Conversely, they generally use reduced forms, such as pronouns or zero pronouns, to refer to the entity that is the topic of the conversation, assumed to be in the addressee's focus of attention. What these findings suggest is that speakers' choices seem to vary as a function of the accessibility of the referent: the more accessible the referent, the more reduced the referential form used in the discourse (e.g. the Givenness Hierarchy in Gundel, Hedberg, & Zacharski, 1993).

Two approaches have explained the nature of the processes underlying the choice of referential expressions: the discourse-oriented view and the listener-oriented view. According to the discourse-oriented approach, speakers do not take the listener into account when choosing a referential form, but rather tend to rely more on the accessibility of the referent, which is accessed in their own discourse model. Previous studies have observed discourse-oriented processes in referential choice, particularly in cases of processing load, with speakers using more specific referential forms (e.g. a name or a description in English instead of a pronoun) even when the use of a reduced form would be informative and appropriate (e.g. Arnold, Bennetto, & Diehl, 2009; Arnold & Griffin, 2007). For example, studies that focused on linguistic and perceptual competitors on the choice of referential expressions (Arnold & Griffin, 2007; Fukumura & van Gompel, 2011; Fukumura, van Gompel, & Pickering, 2010) have shown that both the visual presence (Fukumura et al., 2010) and/or the previous mention of another animate referent (e.g. Arnold & Griffin, 2007) can create competition for attentional resources in the speaker's representation of the discourse, leading the speaker to choose a more explicit form, even though a reduced form would be understandable by the listener. To illustrate, using a set of storytelling tasks, Arnold and Griffin (2007) demonstrated that native English speakers prefer to use pronouns when the referent is in the addressee's focus of attention, as shown in (2). However, when their own focus of attention is distributed among more than one possible referent in the discourse, they prefer to use full noun phrases (NPs) even if the two possible referents have different biological gender and the use of a pronoun could clearly distinguish the referent, as exemplified in (3):

(2) Anthony went for a walk. He picked the trail because he was an experienced hiker.

(3) Anthony went for a walk with Beth. Anthony picked the trail because he was an experienced hiker.

Arnold and Griffin (2007) presented native English speakers with a two-panel picture accompanied by an auditory description of the first panel. After repeating the description that they heard, participants were asked to complete the story by giving a description of the second panel. In the pictures, either only one character was depicted, or an additional character was present in one panel or both panels, to test for the effect of visual presence of the second referent on the choice of referential expressions. In the condition with two characters, the biological gender of the characters either matched or mismatched to investigate whether gender ambiguity modulated the type of referential form used. The authors found a difference due to the manipulation of prior linguistic mention: participants used significantly more pronouns when there was only one mentioned antecedent (as shown in (2) above) than when there were two (as in (3)). The effects emerged for both gender-similar antecedents and gender-dissimilar antecedents, suggesting that the choice of the explicit form (i.e. the NP) was not motivated by ambiguity avoidance, but rather by how accessible the representations are in the speaker's discourse model. Additionally, the authors found that the physical presence of the second-mentioned referent in the second picture did not affect the proportion of pronouns produced by the participants, suggesting that the visual presence did not drive the effect in their task. Arnold and Griffin proposed that the low production of pronouns when two possible referents are introduced in the previous discourse is the result of the competition between two similar entities. Because the focus of attention is distributed among more than one possible referent, this creates competition in the mental model, decreasing the activation of the two possible referents. A consequence of decreased activation is that speakers opt for a more informative repetition of the character's proper name, rather than the reduced form. According to the authors, the use of a more explicit form when no ambiguity would arise is evidence of a discourse-oriented process.

From the psycholinguistic literature, we know that accessibility of a referent plays a crucial role in the speaker's ultimate choice of a referring expression. However, it is not yet clear how much it relates to the attention that the speaker allocates to the referents in the discourse, as suggested for example in Arnold and Griffin (2007), or to the speaker's calculation about how accessible the referent is for the listener (e.g. Gundel et al., 1993; Hendriks et al., 2014). These two points of view contrast on whether the choice of referring expressions is based on the speaker's own discourse model (e.g. Arnold & Griffin, 2007; Fukumura et al., 2010), as compared to a listener's oriented choice, in which perspective taking has priority over more general discourse context effects (e.g. Gundel et al., 1993; Hendriks et al., 2014).

In contrast to the discourse-based approach, the listener-based approach hypothesises that the speaker's choice of referential expressions is guided by assumptions about the listener's knowledge and focus of attention. For instance, Hendriks et al. (2014) have argued for a more listener-oriented process on the basis of observations on referential choice across the lifespan. In their study, Dutch-speaking children, young adults and older adults took part in a storytelling task with pictures. The pictures were designed to elicit topic shifts (e.g. introduction of new characters in the discourse and reintroduction of a character that was not mentioned recently) and reference maintenance (in contexts in which there is only one possible referent, and in contexts in which two referents of the same gender are present). Dutch, like English, allows full pronouns as a reduced referential form and NPs as an explicit referential form. In the topic-shift conditions, the speaker was expected to take the listener's perspective into account and produce a high number of NPs, as opposed to pronouns. On the other hand, for reference maintenance, the pronoun was a possible option when there was only one referent in the discourse, but it was a somewhat dispreferred option when two characters with same gender had been introduced in the previous discourse (due to the gender ambiguity).

The results of the study showed the expected pattern for young Dutch-speaking adults. However, children and older adults demonstrated very different patterns of performance. Children presented a more variable behaviour, using significantly less NPs than the younger adults at various points in the story. This suggests difficulty with taking the listener-oriented reason into account. Older adults showed a very consistent pattern, producing fewer NPs than the younger adults both in the topic-shift conditions (reintroduction of a character that was not mentioned recently) and reference maintenance conditions (in contexts in which two referents of the same gender are present). The results suggest that the older adults can consider the listener's perspective, but due to declining cognitive resources (e.g. Labouvie-Vief, 2003) they cannot always keep track of the structure of the discourse, resulting in difficulty determining the prominence of the referents in the discourse. These findings provide support for the listener's oriented choice of referring expressions (e.g. Gundel et al., 1993). Additionally, in their Asymmetric Grammar Hypothesis, Hendriks et al. (2014) proposed that the choice of referential expressions in a language is a two-step process. First, reduced forms are preferred to explicit forms in the grammar, and are

automatically selected as a default option. Second, the speaker has to calculate how the reduced option would be interpreted by the listener; if the intended meaning is not recoverable by using a reduced form, then this must be discarded and another form must be used instead. While the first step is automatically derived from a constraint in the grammar, the second step involves mentalisation and requires additional cognitive resources. As observed in the study, when cognitive resources are scarce – as in the case of older adult – and the speaker needs to keep track of the prominence of the referents in the discourse, the pronoun becomes the default option. Children instead not only have reduced cognitive resources, but they are also still developing the ability of taking the listener's perspective into account, so their use of referential expressions is overall more inconsistent.

Additional evidence in support for the listener-based approach comes from a study testing children with Autism Spectrum Disorder and children with Attention Deficit Hyperactivity Disorder (Kuijper et al., 2015). Kuijper et al. (2015) examined the relationship between the production of referring expressions, Theory of Mind, response inhibition and working memory, to understand if the two steps of choosing a referential expression (i.e. updating discourse information and considering the listener's perspective) rely on different cognitive functions. Kuijper et al. found that while working memory capacity seemed to be involved more in keeping track of different referents in the discourse, Theory of Mind was related to referential choice when the choice was based not only on the speaker's discourse model, but also on the listener's perspective.

In the present study, we employ the experimental designs used by Arnold and Griffin (2007) and Hendriks et al. (2014) to investigate the accessibility of discourse referents and the consideration of the listener's perspective in L2 learners of English whose L1 is Spanish. L2 learners are an interesting case for the study for referential choice. They have intact cognitive abilities, but they may allocate their cognitive resources differently than monolingual native speakers (Abutalebi, 2008). Additionally, L2 learners have an adult ability to consider the listener's perspective; however, they may not process the L2 with the same automaticity of native speakers (Clahsen & Felser, 2006). These characteristics of the non-native system may give rise to difficulties in the L2 referential choice (e.g. Sorace, 2011). Performance of second language speakers on referential choice can therefore be potentially informative in that it can clarify whether the ability to process a less automatic L2 can independently impact the process of taking the listener's perspective and of determining the prominence of the referents in the discourse, as suggested by the listener-oriented approach.

The aim of our study is two-fold. First, we aim at understanding whether learners of a non-null subject language (English) who are native speakers of a null subject language (Spanish) differ from the English native speakers in their choice of referential expressions. Second, by using two elicitation tasks that test referential choice in different contexts, we examine factors that may cause difficulties in the L2 (competition in the mental model, taking into account the listener's perspective and cross-linguistic interference), and address the debate between discourse-oriented and listener-oriented processes in the production of referential expressions.

1.2. Choice of referring expressions in L2

L2 learners have a full set of referential forms in their L1 that they can draw upon when learning the L2. Additionally, they have greater general cognitive abilities than other populations tested in the literature (e.g. typically developing children: Karmiloff-Smith, 1985; Philip & Coopmans, 1996; older adults: Hendriks et al., 2014; children with Autism: Arnold et al., 2009; Kuijper et al., 2015). Psycholinguistic evidence with bilingual speakers indicates that the presence of competing strategies across languages may pose a potential conflict for L2 speakers (Kroll, Dussias, Bogulski, & Valdés Kroff, 2012).

In our study, we recruited native speakers of a null subject language (Spanish) who learned a non-null subject language (English). English and Spanish have two different sets of referential forms. For Spanish, the maximally reduced pronominal form is the null pronoun, which is used to refer to the topic antecedent (i.e. the sentential subject), as shown in (4), while the overt pronoun or the full NP can be used to refer to a non-topic antecedent, as illustrated in (5).

(4) Anthony$_i$ fue de vacaciones con Beth. *pro$_i$* Disfrutó mucho de la playa

Anthony$_i$ went on vacation with Beth. pro$_i$ Liked very much the beach

Anthony went on vacation with Beth. (He) liked the beach very much

(5) Anthony fue de vacaciones con Beth$_i$. Beth/Élla$_i$ disfrutó mucho de la playa

Anthony went on vacation with Beth$_i$. Beth/she$_i$ liked very much the beach

Anthony went on vacation with Beth. Beth/she liked the beach very much

Referential choice is a difficult task that can pose challenges to different populations (e.g. children with Autism: Arnold et al., 2009; schizophrenic patients: Phillips & Silverstein, 2003; older adults: Hendriks et al., 2014). We know that establishing reference entails the integration of lexical, syntactic and discourse information. Psycholinguistic studies, analysing how these sources of information are accessed by native speakers when processing referential relations, have shown that the simultaneous integration of syntactic and discourse level of representations in an utterance can tax processing resources (e.g. Burkhardt, 2005; Piñango & Burkhardt, 2005). Therefore, we expect L2 learners not to be immune to the processing cost associated with referential choice. Indeed, while studies on learners of non-null subject languages are limited (e.g. Roberts, Gullberg, & Indefrey, 2008; Wilson, 2009) and have only tested the comprehension of referring expression in a second language, numerous studies on learners of null subject languages (such as Spanish and Italian) have demonstrated that L2 learners exhibit residual indeterminacy in the L2 referential choice, even at the highest levels of proficiency (e.g. Belletti et al., 2007; Keating, VanPatten, & Jegerski, 2011; Montrul & Rodríguez Louro, 2006; Rothman, 2008, 2009; Sorace & Filiaci, 2006). In particular, it has been shown that the discourse distribution of overt and null subjects can be non-target-like, with L2 speakers overproducing overt pronouns in situations in which null subjects would have been pragmatically more appropriate.

The literature on null subject languages has looked at populations of L2 speakers with different levels of proficiency (e.g. intermediate, advanced and near natives). However, it is unclear if the overproduction of pronouns observed in the learners of null subject languages is the result of transfer from the L1. Interestingly, some studies have suggested that this pattern can persist in the acquisition of L2 pronouns involving two null subject languages (e.g. Spanish–Greek learners: Lozano, 2006; Margaza & Bel, 2006; Spanish–Italian bilingual children: Sorace, Serratrice, Filiaci, & Baldo, 2009). Based on these results, it has been proposed that L2 speakers use overt pronouns as a compensatory strategy to balance online processing demands (Sorace et al., 2009) when using large language units, like narratives. According to this hypothesis, adopting an overt pronoun when implementing discourse operations alleviates the individual's resources and allows for more efficient processing. However, previous studies that have looked at a combination of null subject languages (i.e. Spanish–Italian and Spanish–Greek) have tested anaphora resolution in comprehension, and did not investigate production. Therefore, it is unclear whether we can generalise the comprehension results to the production of overt pronouns as a compensatory strategy across two null subject languages.

Previous studies have also tried to disentangle the effects of morphosyntax and discourse-pragmatic constraints on null and overt subjects using various methods. However, the nature of this phenomenon is not yet clear, with some researchers showing that aspects of grammar discourse are subject to fossilisation and can never be attained by the second language learners (e.g. Belletti et al., 2007; Sorace, 2011; Sorace & Filiaci, 2006), and others hypothesising that this difficulty can be overcome at highly advanced stages of second language development (e.g. Montrul & Rodríguez Louro, 2006; Rothman, 2007). One potential way to account for the observed difficulty would be to suggest that (at least) two factors play a role in the L2 choice of referential forms: (i) L2 less automatic processing and (ii) the L2 learner's recruitment of cognitive control abilities (Sorace, 2011). We know that the processing of an L2 is often less automatic and less efficient than L1 processing (e.g. Clahsen & Felser, 2006). We also know that compared to native speakers, brain structures that are related to cognitive control are recruited to a larger extent by learners who are not fully proficient in the L2 (e.g. Abutalebi, 2008). Therefore, even though L2 learners have fully developed cognitive abilities, the amount of cognitive resources that they can allocate may depend on the demands of the tasks (i.e. processing a non-native language and making referential choices). In the case of a taxing task, such as choosing a referential expression, less automatic processing and potential cognitive overload may cause a failure in integrating the relevant lexical, syntactic and discourse information necessary to establish successful reference. As a result, L2 learners may not always choose the referential form that native speakers select, and may either experience cross-linguistic interference or may resort to a default option, by choosing a referential form that is easier to select and produce.

In the present study, we recruit highly proficient learners of English whose L1 is Spanish and test them on the production of referential expressions in different contexts, to tease apart the possible causes of the observed difficulties with referential expressions during second language production. Furthermore, we measure participants' cognitive functions (working memory and inhibition) to explore a potential relation between cognitive resources and choice of referential expressions in the L2. Finally, by measuring L2 learners' referential choice in different discourse contexts, we address the debate between listener's and discourse-oriented perspectives in referential choice.

1.3. Aims and research questions

In two experiments, we investigate the ability to produce pronouns in L2 speakers of a non-null subject language (English) whose L1 is a null subject language (Spanish). In Experiment 1, L2 speakers participated in a storytelling task to investigate their ability to produce referring expressions in English; their responses were compared to a group of native English speakers. We expect the L2 speakers to experience similar problems in the choice of referring expression as observed in learners of a null subject language. In this case, we would predict a difference between L1 and L2 speakers, with the L2 group showing either cross-linguistic interference or the adoption of a default referential form. By manipulating the discourse contexts in which referential choice is required, we will be able to tease apart the difficulty that L2 participants experience, to understand whether it is the result of cross-language interference or the adoption of a default form.

In Experiment 2, a subgroup of the L2 participants who took part in Experiment 1 participated. We used a different storytelling task that included topic-shift conditions. In this task, the discourse is manipulated so that effects of perspective taking can be teased apart from effects of the discourse context. This distinction can be informative for theories of referential choice, and will allow to better understand the difficulty observed in L2 learners.

2. Experiment 1: storytelling task

2.1. Participants

Eighteen native English monolingual speakers (mean age: 20; SD: 2) and 22 highly proficient learners of English (L1 Spanish) (mean age = 24; SD: 4) were recruited. Native English speakers were undergraduate students at a large American university and received course credits for their participation. The L2 participants were undergraduate and graduate students at the same institution and were compensated for their participation. The L2 participants were born in a Spanish-speaking country (Central/South America) and moved to the US at different times in their lives. They were all immersed in the L2 environment at the time of testing. They were first exposed to English at different times in their childhood, with some participants having early exposure. L2 participants were selected on the basis of their performance on a subsection of the *Michigan English Language Institute College English Test* (MELICET). The subsection of the MELICET contained 50 multiple-choice questions in two sections – 30 grammar questions and 20 cloze questions from a reading passage. Only those participants who scored at least 40 out of 50 were invited to participate. Table 1 shows information on the language background of the L2 learners (Language History Questionnaire, Marian, Blumenfeld, & Kaushanskaya, 2007) and their proficiency in English measured with the English proficiency test.

Table 1. Participant information: Mean (SD).

	Spanish – L1	English – L2
Age of exposure (in years)	0 (0)	5.8 (4.2)
Length of residence in a country where the language is spoken (in years)	19.1 (13.5)	6.5 (5.4)
Average daily speaking (%)	51 (0.5)	49 (1.2)
Average daily reading (%)	34 (22)	66 (22.3)
Average daily exposure (%)	36 (23.9)	64 (24.2)
Language dominance	Spanish: 19/22	English: 3/22
Language proficiency		
MELICET Score (out of 50)	–	44.5 (4.5)

Additionally, participants completed two cognitive measures tasks measuring working memory abilities (O-span) and inhibition abilities (Flanker task, adapted from Eriksen & Eriksen, 1974). The Operation Span task (Ospan) requires participants to solve a series of arithmetic operations, while trying to remember a set of unrelated words, and provides a measure of participants' working memory capacity. The task was administered in English. For the Ospan task, we calculated the number of words correctly recalled by the participants. In the Flanker task, a congruent trial is associated with the same response as the target, and in an incongruent trial, the flankers are associated with a competing response. By measuring participants' ability to suppress responses that are inappropriate in each context, the task provides a measure of executive function, and in particular of inhibition. For the Flanker task, we measure the Flanker cost, which corresponds to the average reaction times in incongruent trials minus congruent trials. We used the Ospan and Flanker measures to predict performance on the referential tasks for the L2 participants. Because our group of L2 participants is not homogeneous in terms of age of first exposure to the L2, we also included age of first exposure as a predictor together with the Ospan and Flanker measures.

2.2. Materials and procedure

The storytelling task employed a subset of the materials used in Arnold and Griffin (2007). Some of the original trials from Arnold and Griffin (2007) were substituted because they contained expressions that could have been unfamiliar to the L2 learners (e.g. "shooting hoops" and "cooking up some fun"). Participants were presented with two pictures in which the number and

Figure 1. 1 Referent.
Note: Mickey went for a walk in the hills one day.

Figure 3. 2 Referents (in one panel).
Note: Mickey went for a walk with Daisy in the hills one day

the gender of the characters presented were manipulated. The material included four conditions, shown in Figures 1–4: Condition 1: one character in the first panel and one character in the second panel (Figure 1); Condition 2: two characters in the first panel and two characters in the second panel (different gender) (Figure 2); Condition 3: two characters in the first panel and one character in the second panel (different gender) (Figure 3); Condition 4: two characters in the first panel and two characters in the second panel (same gender) (Figure 4). The characters that appeared in the same picture/panel were always of different types (a duck and a mouse) to avoid physical similarity between the characters and phonological similarity between the characters' names. Furthermore, when the second character was present in the second panel, it was smaller and relatively inactive compared to the first character mentioned in the story to discourage participants from describing it in their narration.

Two variables were manipulated: Condition (4 levels) as within-subjects factor and Group (L1 vs. L2 speakers) as between-subjects factor. Four counterbalanced lists containing 32 experimental sentences (each list containing four items per condition) were created in such a manner that each participant saw just one version of the same item. In addition, 16 filler sentences were included in each list, containing a variable number of characters in the first and second panel. Each list was presented in a pseudo-randomized order, and the order was inverted to create an additional four lists.

After listening and reading a description of the first panel, participants were asked to repeat the description and complete the story by describing the second panel. The two panels were first visible to the participant for 2000 ms, after which the second panel was covered by a blank screen. While looking at the first panel and blank screen, the participant read on the screen and heard through the headphones a description of the first panel. After repeating the prompt, the experimenter made the second panel visible, and the participant was expected to continue the story by giving a description of the second panel. In the instructions, participants were asked to complete the story with one or two sentences only and to imagine that they were telling the story to a 5-year-old child, as in the original experiment by Arnold and Griffin. Two practice items at the beginning of the task ensured that participants understood

Figure 2. 2 Referents (in both panels).
Note: Mickey went for a walk with Daisy in the hills one day.

Figure 4. 2 Referents (gender ambiguous).
Note: Mickey went for a walk with Donald in the hills one day.

the instructions. The task was programmed as a Power Point presentation, and the experimenter was present during the entire session. Participants' narrations were recorded using a microphone and a Marantz recorder. As stated earlier, Arnold and Griffin (2007) showed that English native speakers tended to use full NPs when more than one possible referent was present in the discourse. Based on their results, we expected L1 participants to complete the description with a pronoun in the 1-referent condition, as shown in (6), and a full NP in all the other conditions, as shown in (7)–(9).

(6) 1 Referent: Mickey went for a walk in the hills one day; *he* was out of shape and got very tired.

(7) 2 Referents (in both panels): Mickey went for a walk with Daisy in the hills one day; *Mickey* was out of shape and got very tired.

(8) 2 Referents (in one panel): Mickey went for a walk with Daisy in the hills one day; *Mickey* was out of shape and got very tired.

(9) 2 Referents (gender ambiguous): Mickey went for a walk with Donald in the hills one day; *Mickey* was out of shape and got very tired.

In the statistical analysis, we analysed the number of pronouns produced by each group in the four conditions out of the number of pronouns and NPs produced. We used mixed-effects logistic regression (Jaeger, 2008), with Condition (4 levels) and Group (2 levels) as fixed effects. In the model, we simplified the random effects structure until convergence was reached (Barr, Levy, Scheepers, & Tily, 2013), including random intercepts for participant and item and participant and item random slope for Condition.

We used a stepwise backward inclusion procedure and tested both first-level effects and the interactions between the fixed-effect factors. The number of NPs per subject and item was coded as 1 or 0 and analysed using glmer (*lme4* library, Bates & Sarkar, 2007).

2.3. Predictions

In Experiment 1, we explore the ability of using the appropriate referential form when only one referent is introduced, and when two referents with either same gender or different gender are introduced in the preceding discourse. In contrast to studies using narratives, the advantage of the present experiment is that participants' productions are limited by the contextual manipulations, allowing the collection of more controlled data.

We assume that even though language learners have fully developed cognitive functions, their processing of the L2 may be less efficient than the processing of a native language. Additionally, L2 learners may have fewer cognitive resources to employ for a taxing processing task compared to native speakers (Sorace, 2011). The task of processing a less automatised language and the concomitant potential cognitive overload may lead to the inconsistent use of referential expressions that has often been associated to cross-linguistic interference from the L1. We also measure L2 participants' general cognitive functions (working memory and inhibition) to explore the relationship between cognitive abilities and production of referential forms. Here, there are two case scenarios for the L2 group.

One possibility is that L2 participants transfer referential forms from the L1 (Spanish) into the L2 (English). Two types of responses could suggest interference from the L1 Spanish: an overproduction of pronouns or and overproduction of zero forms. The pronoun has different functions in the L1 (explicit form in Spanish) and in the L2 (reduced referential form), and has different discourse requirements across the two languages (signal a topic shift in Spanish; maintain reference in English). If the L2 participants are adopting pronouns more often than the native English speakers for reasons of cross-language interference, the overuse of pronouns should be limited to the 2-referent contexts. In these contexts, the L2 speakers need to be more explicit, and they may use the pronoun that in their L1 is indeed an explicit form. However, they would fail to be as explicit as the native speakers, who are more likely to adopt a NP in the 2-referent conditions. The alternative possibility is that cross-linguistic interference may emerge with an overproduction of zero pronouns (e.g. … and ø walked away; … while ø walking away) in L2 learners' descriptions compared to native speakers. Differently from explicit pronouns, zero pronouns do not signal a topic shift in null subject languages, and therefore match more closely the discourse requirements of the 2-referent context.

In the second case scenario, if L2 participants do not show transfer from the L1, but still experience a general difficulty due to the processing cost associated with referential processing (e.g. Burkhardt, 2005; Sorace, 2011), they may adopt a default referential form more often than the native English speakers. In this case, we expect the default option to be used in all conditions, including the condition in which only one referent is present. As a default option, the L2 participants may overproduce either NPs or pronouns. According to Arnold and Griffin (2007), in a situation of processing load a reduction in the activation of the referent is expected, leading to a higher rate of explicit referential expressions. Within this approach, full NPs are less

difficult to produce than pronouns because they can be used in all contexts and do not need to be properly licenced (Arnold et al., 2009). On the other hand, in Hendriks et al. (2014), the reduced referential form (i.e. the pronoun) seems to be preferred when the speaker is unable to take into account the listener's perspective (as observed in Dutch-speaking children) or if the speaker makes an incorrect estimation of the prominence of the discourse referent (as observed in older Dutch-speaking adults). According to the Asymmetric Grammar Hypothesis, the pronoun is not only shorter and easier to produce, but it is also preferred by the grammar in the first step of the referential form selection (Hendriks et al., 2014).

2.4. Transcription and coding

The sessions were recorded and the audio files were transcribed by a research assistant. The narratives were scored by the first author and then checked for accuracy by a research assistant who was trained on the scoring criteria. The final transcriptions and scoring were then checked by the second author. Following Arnold and Griffin (2007), we only included in the analysis productions in which a referring expression (either a pronoun or a NP) was used as a subject and referred to the most prominent character mentioned in the preceding discourse and depicted in the picture (e.g. he/Mickey Mouse in the examples in Figures 1–4). For the 2-referent conditions, we only included narratives in which the main character preceded any mention of the second character. We excluded from the analysis productions with naming errors (e.g. Daisy for Minnie) and pronoun gender errors (e.g. he for Minnie). We also excluded items in which participants produced referring expressions that denoted more than one character (e.g. Donald and Mickey, they) and cases of zero forms (e.g. … and couldn't keep up …). Based on these criteria, 62/640 (9.6%) experimental trials were discarded (34/352 for the L2 learners and 28/288 for the L1 speakers). Among the items discarded, the cases of zero pronouns were 1/288 for the L2 learners and 5/352 for the native speakers.

2.5. Results

Figure 5 illustrates the proportion of pronouns produced by the native speakers and the L2 participants out of the total number of pronouns and NPs.

In the analysis, we found a main effect of Group (ß = 0.9, SE = 0.04, $t = 2.21$, $p < .0001$) and Condition (ß = 0.3, SE = 0.04, $t = 8.99$, $p < .00001$), but no interaction between the two factors. The main effect of Group

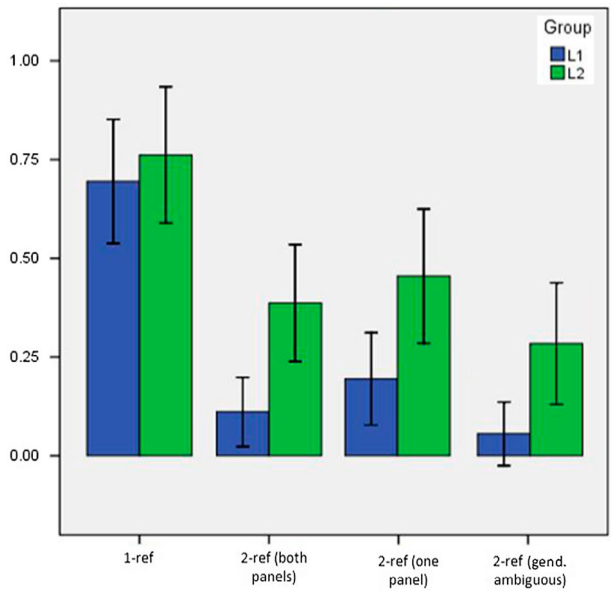

Figure 5. Proportion of pronouns produced by L1 and L2 speakers in the four conditions.

shows that L2 participants produced significantly more pronouns than the native speakers across the four conditions. The pairwise comparisons for the main effect of Condition showed that both groups produced significantly more pronouns in the 1-referent condition compared to the 2-referent conditions (2 referents both panels: ß = 0.2, SE = 0.02, $t = 10.64$, $p < .00001$; 2 referents one panel: ß = 0.2, SE = 0.02, $t = 10.58$, $p < .00001$; 2 referents gender ambiguous: ß = 0.2, SE = 0.02, $t = 13.69$, $p < .00001$). The comparisons also showed that both groups produced significantly less pronouns in the 2-referent gender ambiguous condition compared to the unambiguous conditions with two referents (2 referents both panels: ß = 0.04, SE = 0.02, $t = 2.403$, $p < .01$; 2 referents one panel: ß = 0.07, SE = 0.02, $t = 3.908$, $p < .0001$).

To understand the relationship between the production of referential expressions and L2 participants' cognitive measures, we calculated the number of words correctly recalled in the Ospan and the Flanker effect, and transformed these measures in standardised *z*-scores. These measures, in addition to age of first exposure to L2 and proportion of pronouns produced in the Picture Description Task (measured in log odds, independently of condition), were used as predictor variables in a regression model. The predictors were entered at the same time in the model. The analysis showed that none of the predictors contributed significantly to the model (Flanker effect: ß = .005, SE = .003, $t = 1.860$, $p = .083$; Ospan: ß = −.003, SE = .008, $t = -.344$, $p \leq .735$; age of acquisition: ß = .004, SE = .002, $t = 1.130$, $p = .150$).

2.6. Interim discussion

The storytelling task showed a difference between native and L2 participants. For native speakers, even when the use of a pronoun would not make the sentence ambiguous, the presence of another character in the discourse (either in the first panel or in both panels) decreased pronoun use to refer to the most prominent character in the discourse, confirming previous findings by Arnold and Griffin (2007). For the L2 group, zero pronouns were not attested, except for one production in the entire data set. Based on this result, we can reject the potential explanation that L2 learners produce zero pronouns as a result of cross-linguistic interference from the L1.

However, results showed a higher production of pronouns in the L2 learners compared to native English speakers in all conditions. At first glance, the findings from the L2 participants may be interpreted as resulting from cross-linguistic interference from the L1. In particular, we could hypothesise that L2 participants failed to suppress the assumption from their native language that overt pronouns are interpreted as referring to a non-topic referent. The learners may have produced more overt pronouns in 2-referent contexts than native speakers of English because an overt pronoun is more explicit for them than a null form. While it may seem that they are being more explicit, in fact they were not yet explicit enough as an English native speaker. However, this explanation does not account for the higher number of pronouns produced by the L2 speakers in comparison to the native speakers when only one referent is present in the preceding discourse. In the condition with one referent, there is no variation in the speakers' attention to the discourse model, and the speaker does not need to be more explicit. If the higher production of pronouns in the L2 group is the result of L1 transfer, we would not expect to observe a difference between L1 and L2 participants in the 1-referent context, in which no competition arises. We hypothesise that the L2 speakers adopted the pronoun as a default strategy to avoid the processing cost associated with the task of choosing a referential expression. Contrary to what Arnold and Griffin (2007) would predict, we did not find an overproduction of explicit forms in the L2 results, but instead we observed more reduced forms compared to the monolinguals. This is in line with the predictions in Hendriks et al. (2014), where it is suggested that the pronoun may be the easiest referential form to select. As demonstrated by previous studies, maintaining reference is a challenging task that may be problematic for certain populations (e.g. Hendriks et al., 2014; Karmiloff-Smith, 1985; Philip & Coopmans, 1996). Assuming that the process of choosing a referring expression takes place in two steps as proposed by Hendriks et al. (2014), the L2 participants should have selected a (reduced) form (i.e. a pronoun), which is preferred by the grammar, and then should have calculated how the form would be interpreted by the listener. From Experiment 1, however, it is unclear which step in the process, L2 learners sometimes failed to perform. We can hypothesise that occasionally, the L2 learners cannot take the listener's perspective into account and their speech may result in ambiguity (e.g. the 2-referent gender unambiguous condition). Alternatively, we could speculate that L2 learners are in fact efficient in calculating the listener's interpretation, but have problems keeping reference in specific contexts. In particular, they may sometimes be less explicit than the native speakers because keeping track of the prominence of referents in the discourse model can be too demanding. This difficulty may then result in a less-consistent use of referring expressions when referring to a topic antecedent.

To pin down the potential cause of the learner's overuse of pronouns, and to further understand the pragmatic use of referential expressions by L2 learners in different contexts, we conducted a second experiment. In Experiment 2, we used a storytelling task adapted from Hendriks et al. (2014). The task is designed to explore two contexts in the speaker's choice of a referential expression: a situation in which the speaker can rely more on the discourse (reference maintenance) and a situation in which the speaker needs to consider the listener's perspective (topic shift).

3. Experiment 2: storytelling task

3.1. Participants

Twenty-nine native English monolingual speakers (mean age: 20; SD: 2) and 19 highly proficient learners of English (L1 Spanish) (mean age = 23.8; SD: 3.4) participated in Experiment 2. The native English speakers were undergraduate students at a large US institution at the time of the testing and received course credit for their participation. The 22 L2 speakers who participated in Experiment 1 were invited to take part in Experiment 2; however, only 19 of the original participants returned.

3.2. Materials and procedure

The storytelling task employed materials used in Hendriks et al. (2014). Participants were shown six pictures that were presented one by one on a computer screen,

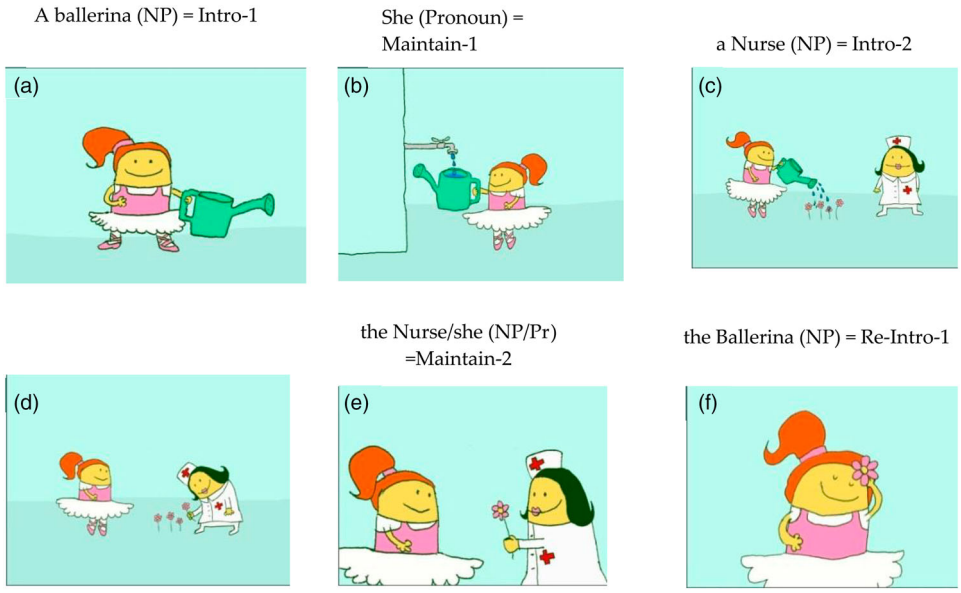

Figure 6. An example of a story used in Experiment 2.

as illustrated in Figure 6. The pictures were organised as a sequence of actions that created a story, featuring two characters with same gender. The original material by Hendriks et al. included four stories, to which we added another four with similar organisation. The structure of the stories was the following: (1) a character in the first picture is introduced (e.g. a ballerina in Figure 6(a)); (2) the same character performs an action (Figure 6(b)); (3) a new character is introduced, and now the scene includes both the previously introduced and the new character (e.g. the ballerina and the nurse in Figure 6 (c)); (4) the second character performs an action (Figure 6(d, e)); (5) the first character is now reintroduced and presented alone in the picture. For each picture, when the second character was present, it had similar size as the main character.

Participants were asked to describe the pictures as they appeared on the computer screen one at a time. They were instructed to use one or two sentences only to describe each picture and to imagine that they were telling the story to a 5-year-old child. Even though this last instruction was not present in the original experiment by Hendriks et al., we introduced it so that the procedures of Experiment 1 and 2 would be similar. Participants were also told that someone else would later listen to the recording and would have to be able to understand their stories without the privilege of seeing the pictures.

A slide with all the characters included in the stories was presented at the very beginning of the task to ensure that participants could name the characters. One 2-picture practice item at the beginning of the task ensured that participants understood the instructions. The task was programmed as a Power Point presentation, and the experimenter was present during the entire session. Participants' narrations were recorded using a microphone and a Marantz recorder.

Approximately two-thirds of the L2 participants were tested on the same day on both Experiment 1 and 2 (the order of administration of the two tasks was counterbalanced, and between the two tasks L2 participants performed the language proficiency, language background questionnaire and cognitive tasks). The remaining one-third was tested in two separate sessions, at least eight weeks after Experiment 1.

At each point in the story, we measured how participants made reference to the two characters presented. Following Hendriks et al. (2014), we analysed participants' productions focusing on reference at five positions. The first position is Intro-1, which corresponded to the presentation of the first picture. In this case, we expected participants to produce a high number of NPs to introduce the main character (e.g. the ballerina in Figure 6(a)). The second position is Maintain-1, which matched the presentation of the second picture. At Maintain-1, we expected participants to use a low number of NPs, and adopt instead a third person pronoun to maintain reference to the main character that is now highly salient in the preceding discourse. The third position is Intro-2, which corresponds to the first topic shift in the story. This occurred when the third (or sometimes fourth) picture was presented. At this point, participants are expected to introduce the second character by producing a high number of NPs. At the fourth position (Maintain-2), the narration

focused on the second character that was now highly salient. Maintain-2 occurred at the fourth or sometimes fifth picture. Based on previous findings on native English speakers (e.g. Arnold & Griffin, 2007), we expected participants to produce a high number of NPs rather than pronouns. Although the second character has been introduced and is the focus of the speakers' attention, the presence of the additional (main) character in the discourse should create competition, resulting in the choice of a more explicit referential form, the NP. Finally, the last condition in the task is Reintro-1, the second topic shift in the story, which typically occurred when the last picture was presented. Similar to the previous topic shift, at this point, we also predict the use of a high number of NPs.

Two variables were manipulated in the experiment: Position (5 levels) as within-subjects factor and Group (native vs. L2 speakers) as between-subjects factor. A list containing the eight stories was created. The order of the stories was then inverted to create a second list. In the statistical analysis, we analysed the number of NPs[1] produced by each group in the four conditions. We used mixed-effects logistic regression (Jaeger, 2008) with Condition (5 levels) and Group (2 levels) as fixed effects, random intercepts for participant and item and participant and item random slope for Condition. The number of NPs per subject and item was coded as 1 or 0 and analysed using glmer (*lme4* library, Bates & Sarkar, 2007).

We used a stepwise backward inclusion procedure and tested both first-level effects and the interactions between the fixed-effect factors. We performed pairwise comparisons using mixed-effects logistic regression with Group as a main factor to compare the two groups on the five conditions.

3.3. Predictions

In Experiment 2, we test the L2 speakers' ability to take the listener's perspective into account, with a series of conditions in which either topic shift or reference maintenance is required. By manipulating the context, the results of the task will shed light on the differences between L2 and native speakers observed in Experiment 1. The experiment could have three possible outcomes. In one case, L2 participants could overproduce pronouns in both the topic shift and reference maintenance conditions, with no clear predictability, mirroring the pattern observed by Hendriks et al. (2014) in the study on Dutch-speaking children. This would suggest that L2 learners cannot always take the listener's perspective into account in their L2. In a second case, L2 participants may sometimes be unable to keep track of the prominence of the referents throughout the task, because the task is too demanding. In this case, we would expect the L2 speakers to produce more pronouns than the native speakers towards the end of the narration, at the Maintain-2 and Reintro-1 positions, like the older adults in the Hendriks et al.'s study. Alternatively, in a third case scenario the L2 speakers consider the listener's perspective and perform in a native-like fashion in the topic-shift conditions, but produce more pronouns than the native speakers at the two Maintain positions. This result would match the pattern observed in Experiment 1, suggesting that L2 adults choose referential forms in English in a listener-oriented fashion, and that their difficulty is limited to the contexts of reference maintenance.

Additionally, similar to Experiment 1, in Experiment 2, we explore the relationship between the performance on the referential task and measures of cognitive abilities, to uncover a potential relation between working memory, inhibition and the production of referential expressions in L2 in contexts of maintaining reference and topic shift.

3.4. Transcription and coding

The sessions were recorded and the audio files were transcribed by a research assistant. The narratives were scored by the first author and then checked for accuracy by a research assistant who was trained on the scoring criteria. Based on Hendriks et al. (2014), we identified the discourse topics in the narratives and coded for the use of pronouns or NPs. We only included in the analysis narratives that contained a topic shift (380/384). The topic shift was coded when the topic in the discourse was different from the topic in the previous utterance. The topic shift did not occur when a participant focused too strongly on the first character. Three additional narratives were excluded due to a coding error, resulting in a total of 377 complete stories.

We coded as Intro-1 the first reference to the first character and as Intro-2 the first reference to the second character in the story. The first reference to the first character as sentence subject after the topic shift was coded as Reintro-1. Finally, the second reference to the first character, after mention in the previous utterance was coded as Maintain-1 and for the second character as Maintain-2. For each of the five positions, we coded the grammatical form used by the participants (NP vs. pronoun). For the analysis, we calculated the total amount of NPs produced by the participants at each position, out of the number of NPs and third person pronouns produced.

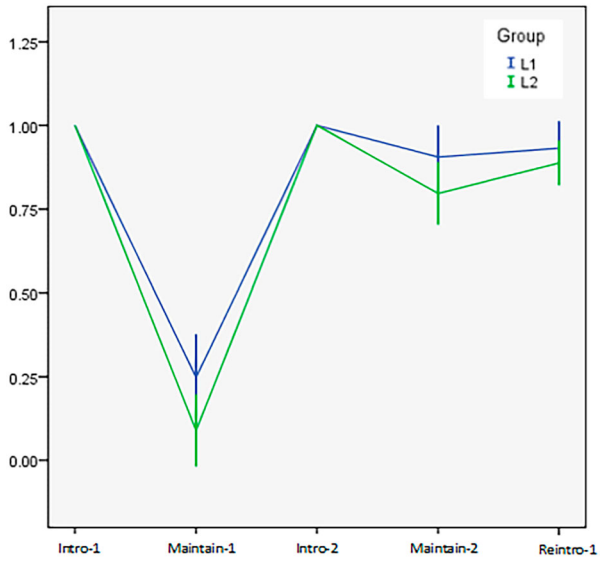

Figure 7. Proportion of NPs produced by L1 and L2 speakers at the five positions.

3. 5. Results

Figure 7 illustrates the proportion of NPs produced by the native speakers and the L2 participants out of the total number of pronouns and NPs.

In the analysis, we found a main effect of Condition (ß = 0.09, SE = 0.004, $t = 22.32$, $p < .00001$), a main effect of Group (ß = 0.03, SE = 0.01, $t = 2.43$, $p < .02$) and an interaction between Group and Condition (ß = 0.01, SE = 0.004, $t = 3.47$, $p < .00001$). The pairwise comparisons for the interaction showed that the L2 and the native speakers differed marginally on the Maintain-1 condition (ß = 0.07, SE = 0.04, $t = 1.937$, $p < .057$) and on the Maintain-2 condition (ß = 0.05, SE = 0.04, $t = 1.927$, $p < .058$), with L2 speakers producing less NPs than the native speakers.

As in Experiment 1, we entered *z*-transformed Ospan and Flanker measures in addition to age of first exposure to English and NPs produced by L2 speakers (measured in log odds) as predictor variables in a regression model. We analysed the performance on the two Maintain and Intro conditions together and on the Reintro-1 condition separately. The predictors were entered at the same time in a series of multiple regression models. The analysis showed that none of the predictors contributed significantly to the model (Maintain positions – Flanker effect: ß = –.002, SE = .002, $t = -1.133$, $p = .265$; Ospan: ß = .001, SE = .006, $t = -118$, $p = .907$; age of acquisition: ß = .002, SE = .003, $t = .980$, $p = .340$; Intro positions – Flanker effect: ß = .542, SE = .310, $t = -.120$, $p = .906$; Ospan: ß = –.452, SE = .127, $t = .691$, $p = .551$; age of acquisition: ß = .001, SE = 0.001, $t = .982$, $p = .372$; Reintro-1 position – Flanker effect: ß = .–037, SE = .310, $t = -.–120$, $p = .906$; Ospan: ß = .150, SE = .291, $t = .517$, $p = .614$; age of acquisition: ß = .000, SE = 0.001, $t = .872$, $p = .240$).

4. General discussion and conclusion

The results of the second study demonstrated that L2 learners did not differ from the native speakers on the topic-shift conditions (Intro-1, Intro-2 and Reintro-1). The L2 learners consistently used explicit referential forms when a new character was introduced or when an old referent was reintroduced in the discourse after a topic shift, showing that they can take into consideration the listener's perspective. This result shows that the L2 group is pragmatically successful in calculating that the use of pronouns in these contexts would be infelicitous and possibly ambiguous. Even though differences between the native English speakers and L2 learners were only marginally significant in this task, we found that our participants used less NPs than the native speakers at the Maintain-1 and Maintain-2 position. At the Maintain-1 position, the referent of a pronoun can be clearly identified because only one character has been introduced in the discourse at that point. Conversely, at the Maintain-2 position, the use of a pronoun gives rise to potential ambiguity because two referents with same gender have been introduced and are present in the same picture. This marginally significant result is in line with what we observed in Experiment 1, and suggests that L2 participants showed reduced sensitivity to the presence of an additional referent in the discourse, and produced more pronouns than the native speakers even if two characters with same gender had been introduced (i.e. Maintain-2 position).

The results of Experiment 1 and 2 show that when the learners need to maintain reference across utterances, they show a different pattern than native speakers of the target language, both when there is one referent and when there are two possible referents in the preceding discourse (with either similar or different gender). This suggests that maintaining reference is the context in which L2 learners experience more difficulties. Interestingly enough, our results point to a different profile in L2 English speakers compared to Dutch-speaking older adults (Hendriks et al., 2014), who have native language skills, but low cognitive abilities due to aging. In Hendriks et al., Dutch-speaking older adults produced more pronouns than the young native speakers at the Maintain-2 and Reintro-1 positions in the task, showing a difficulty to determine the prominence of the referents in the discourse towards the end of the story.

The L2 results point to a dissociation between the ability to take the listener's perspective into account

and the ability to integrate and make use of the discourse information to choose a referring expression. This dissociation is in line with a listener-oriented approach to reference choice (e.g. Gundel et al., 1993; Hendriks et al., 2014), which predicts that referential choice is influenced by assumptions about the listener's knowledge and focus of attention in discourse. Because the L2 speakers who participated in this study did not choose a referential form only on the basis of the accessibility of the referent in the discourse, without considering the listener's perspective, our findings are not in line with a more discourse-oriented approach (e.g. Arnold et al., 2009). It still needs to be established why maintaining reference in the discourse is a source of indeterminacy for the L2 learners.

The results from Experiment 1 and Experiment 2 suggest that the difference observed between native and second language use of referential expressions is not the result of transfer from the L1. While cross-linguistic influence may explain the higher number of pronouns produced in maintaining reference when two referents have been introduced in the preceding discourse, it cannot account for the same result observed in the one-referent only contexts. We propose that the strategy used by the L2 speakers is to adopt the pronoun as a default option in those contexts that are costly for them to compute (e.g. Chamorro, Sorace, & Sturt, 2016). As it has been shown in previous psycholinguistic studies (e.g. Burkhardt, 2005; Piñango & Burkhardt, 2005), choosing a referential form may be associated with an increased processing cost. In the case of L2 learners, failure to efficiently integrate the lexical, discourse and syntactic information at the same time may result in the adoption of a default option (Sorace, 2011), which for L2 English speakers is the pronoun.

We hypothesised that two factors may play a role in the difficulty observed in L2 learners: cognitive functions and less automatic processing. In the work presented here, we explored the contribution that working memory (measured with an Ospan task) and inhibitory control (measured with a Flanker task) have in the choice of referential expressions in L2 participants. The working hypothesis was that difficulties with referential choice in L2 learners may stem from a depletion of the cognitive control network. This assumption is based on neuroimaging findings showing that in L2 learners who are not highly proficient, the brain structures related to cognitive control are recruited to a larger extent compared to the processing an L1 or a highly proficient L2 (e.g. Abutalebi, 2008). In our study, participants were very proficient in the L2, and so their processing should have been more similar to that of native speakers. However, the task of establishing reference may require increased processing resources due to the integration of different sources of information; thus, we speculate that processing a second language and establishing reference may be competing for the same set of cognitive resources, resulting in a cognitive overload. In our results, we did not find evidence for a relationship between the cognitive measures and the amount of pronouns/NPs produced in the two tasks. Nevertheless, we cannot completely rule out the contribution of individual cognitive resources, and future studies need to explore the interaction between cognitive functions and referential choice using more sensitive measures of cognitive control, and testing a larger group of participants, possibly with a wider range of L2 proficiency.[2]

We proposed that another factor that may have contributed to the observed difficulty with referential expression is the well-documented fact that the processing of an L2 is less automatic compared to the processing of an L1. Automatic processing could be defined as rapid and effortless processing, possibly closely related to cognitive efficiency (Segalowitz, 2010). Specifically, we speculate that lexical access in the L2 may have played a role in the observed difference between L1 and L2 referential choice. In the task of selecting a referential form, lexical, discourse and syntactic information have to be integrated. However, we know that L2 speakers have slower lexical access compared to monolingual speakers, likely due to language co-activation and competition (e.g. Schwartz & Van Hell, 2012). Although we can exclude that in our study, the L2 learners used more pronouns because they did not remember the characters' names or description (i.e. we ensured before the beginning of each task that they knew how to describe the characters), we cannot exclude the possibility that less automatic lexical retrieval may have played a role in the retrieval of the full NP, determining the more frequent use of a pronoun. Indeed, previous studies have demonstrated that during L2 syntactic processing, native-like parsing preferences can be found when speed of lexical access is controlled for (Hopp, 2015). Ongoing research is currently investigating the influence that lexical access may have in L2 referential choice, and the extent to which it is modulated by language proficiency.

To conclude, our study demonstrated that L2 English speakers make choices that are listener-oriented and calculate which form would be best interpreted in a context by a hypothetical interlocutor. This result is in line with predictions made by the listener-oriented account of referential choice (e.g. Hendriks et al., 2014). Based on our results, we further speculated that the processing cost associated with maintaining reference, less

automatic processing and possibly cognitive efficiency may be a cause of the observed difficulty in the L2 speakers.

Notes

1. Unlike Experiment 1, in Experiment 2 we analyse the number of NPs produced for consistency with the analysis presented by Hendriks et al. (2014).
2. Our working memory task was administered in English rather than in the L1 Spanish, which may have resulted in a less accurate assessment of working memory capacity.

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