Implicit Causality, Pronominal Form and Anaphora Resolution in Spanish

by

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Abstract

This thesis investigated the effects of implicit causality and pronominal form, i.e., null and overt pronouns, in Spanish anaphora resolution. A visual world eye-tracking experiment and a self-paced listening task were used with adult monolingual speakers of Mexican Spanish to assess two research questions: 1) whether implicit causality affects the resolution of pronominal subjects in Spanish, and 2) whether this effect was modulated by pronominal form.

Implicit causality (IC) is the semantic bias that attributes the cause of an action to the subject (NP1) or object (NP2) of a sentence (Garvey & Caramazza, 1974). IC has been shown to affect pronoun resolution in various languages, including Spanish (Goikoetxea, Pascual & Acha, 2008).

Pronominal form has also been shown to affect pronoun resolution in some pro-drop languages. Carminati (2002) proposed the *Position of Antecedent Hypothesis (PAH)* for Italian. PAH claims that null pronouns prefer to retrieve their reference from the most prominent antecedent (subject), while overt pronouns tend to be assigned to antecedents in a lower syntactic position (object). Alonso-Ovalle, Fernández-Solera, Frazier and Clifton (2002) tested the PAH in Spanish and they found similar results to Carminati's. However, Chamorro, Sorace and Surt (2016) and Chamorro (2018) showed that speakers of Iberian Spanish seem to have clear preferences for overt pronouns retrieving objects, but not for null pronouns retrieving subjects.

The effects of semantic and syntactic information on pronoun resolution in Spanish have been investigated separately; yet, to our knowledge, the combination and potential competition of the two strategies has not been examined.

Accordingly, this thesis investigated the influence of these two sources of information in ambiguous and non-ambiguous sentences in Mexican Spanish. First, the visual world eye-

tracking experiment showed that ambiguous null pronouns tend to be matched with first-mentioned antecedents, and this effect is stronger with subject-biased verbs. Ambiguous overt pronouns showed preferences in odds with the predictions of IC: with overt pronouns and NP1 verbs, participants' looks pointed toward the second-mentioned antecedent, while with NP2 verbs they pointed to the first-mentioned. This IC unpredicted pattern could be explained by how sensitive overt pronouns are to less salient entities. Ariel (1990) claimed that the more specific an expression is, the better it is at retrieving a less salient antecedent. Relative to the effect of pronominal form, overt pronouns showed stronger effects than null pronouns. This might be because null subjects lack an auditory stimulus prone to be matched with a visual stimulus, whereas overt pronouns are a phonetic realization that can be more easily matched to a visual cue.

Second, the self-paced listening task showed that non-ambiguous null pronouns are sensitive to IC information while overt pronouns not so. We found significant delays in participants' listening times when the reference of the null subjects was non-congruent with the IC bias. Moreover, overt pronouns did not show significant delays in IC incongruent contexts. Relative to the effect of pronominal form, non-ambiguous overt pronouns did not show processing penalties when they retrieved their antecedent from the subject of the previous sentence. These results indicate that non-ambiguous overt pronouns in Spanish do not have a fixed preference for object antecedents.

In addition, the role of the methodologies used was also discussed. We emphasized the importance of considering the differences in the outputs of online and offline methods; while visual world eye-tracking experiments give information about attentional preferences, self-paced listening tasks reveal actual language processing. Therefore, we treated the results of both experiments as complementary instead of assuming that both approaches revealed the same answers to our research questions.

To recapitulate, this thesis shows that in Mexican Spanish when using a visual world eye-tracking experiment, null pronouns were linked with first-mentioned antecedents, especially with NP1 verbs, and overt pronouns showed preferences in contradiction to the predictions of IC. In the self-paced listening task, null subjects, but not the overt, showed sensitivity to IC. Overall, we showed that the use of null or overt pronouns and their specific features, such as their tendency to retrieve more or less salient antecedents interacts with implicit causality. Furthermore, we support the idea that different pronominal forms are sensitive to different kinds of information on varying degrees.

Preface

This thesis is an original work by Dalia Cristerna Román. The research project, of which this thesis is a part, received research ethics approval form the University of Alberta Research Ethics Board, Project name “Implicit causality and pronoun resolution in Spanish”, Pro00092555, August 8th, 2019.

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***

In 2019 only, Mexico reported 1006 femicides. In the first six months of 2020, 489 cases were registered. I wish to dedicate this work to all those women whose voices were unfairly taken. To the women whose disappearance made it into the public numbers and to the ones that did not.

Hasta que la dignidad se haga costumbre

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Chapter 1: Introduction

The ability to solve co-referential information is essential for language processing and understanding. Since the resolution of anaphoric relations involves the interplay of syntactic, semantic, lexical and structural factors, it has captured the attention of linguists and psycholinguists. In the early stages of the research, most of the psycholinguistic studies focused on the processing of pronouns in English, which only uses overt pronouns. Nevertheless, recent studies have also brought attention to pro-drop languages (e.g., Italian, Greek, Spanish), which allow pronouns to remain unexpressed (null, henceforth) under certain circumstances.

This thesis will focus on the effect of two factors that have been shown to influence the resolution of pronouns in various languages: implicit causality bias (IC) and pronominal form alternation, i.e., null vs. overt. The motivation of the present research comes from an effort to understand how morpho-syntactic and semantic cues interact in pronoun comprehension in Spanish. The proposed research seeks to contribute to our understanding of: 1. how IC information and pronominal form interact in pronoun resolution in Spanish, 2. the potential outstanding influence of semantic over morpho-syntactic cues, or vice versa, on language processing. To this end, two experiments were conducted, a visual world eye-tracking experiment and a self-paced listening task.

The thesis is organized as follows. Section 1.1 introduces the description of the phenomenon of pronoun resolution. Section 1.2 focuses on the description of implicit causality and section 1.3 on the description of pronominal form and how they have been shown to influence pronoun comprehension. Section 1.4 discusses the effect of these two factors on Spanish pronouns. Chapter 2 provides an overview of the present study, research questions, and predictions. The methodology and the findings of this study are presented in Chapter 3 and 4. Lastly, Chapter 5 includes the discussion of the findings and conclusion.

1.1 Pronominal reference resolution

In recent linguistic research, pronoun resolution has been investigated as a phenomenon that can indicate a lot about language processing. It has been claimed that people use different strategies during pronoun resolution depending on the properties of each language. One of the prototypical characteristics of the relationship between pronouns and antecedents is that they are often ambiguous. For example, in a context like (1), what kind of resources do speakers use to determine which character the pronoun s*he* is referring to?

1. Maria saw Laura in the farmers' market yesterday. *She* was wearing a big winter jacket.

Previous research has shown that various factors can affect pronoun resolution during language processing, among these, we find both linguistic and extra-linguistic strategies. Overall, in pronoun resolution studies identify a trend for subject pronouns to co-refer with the first-mentioned antecedent. There are some accounts that have attempted to explain this bias.

On the one hand, Gernsbacher and Hargreaves (1988) have presented evidence for the *first-mention preference* account in English. Using data from probe recognition tasks, the authors claim that the first-mentioned noun phrase has a privileged status because language comprehension requires building a mental representation of the situation described in the sentence and this first entity acts as foundation stone onto which further information is mapped. The sentences investigated in this study contained two names, full noun phrases, presented to the participants and their results showed that participants responded significantly faster when the probe word was the first-mentioned name than when it was the second-mentioned. Furthermore, Carreiras, Gernsbacher and Villa (1995) also used probe recognition tasks to show that in Spanish, first-mentioned entities were preferred regardless of whether they were the syntactic subject of the sentence and regardless of whether they were proper names or inanimate objects. Although these studies

may suggest that first-mentioned entities were more likely to be retrieved as the antecedent of an ambiguous pronoun even when they were not grammatical subjects, they did not investigate pronoun resolution itself.

On the other hand, some studies have attributed pronoun resolution preferences to linguistic factors such as grammatical-role information. Under this scope, the *subject-preference* account claims that the preferred antecedent of an ambiguous pronoun is the grammatical subject of the previous clause regardless of its position in the sentence (Crawley, Stevenson & Kleinman, 1990; Frederiksen, 1981). Frederiksen (1981) used a self-paced sentence-by-sentence reading task for investigating subject-preference in English. The task presented four sentences, the last of these sentences contained a pronoun which could refer either to the preceding subject or object; he found that reaction times were significantly faster when the pronoun had its referent in the previous subject. Crawley et al. (1990) showed similar results using a reading task and an assignment task. Nonetheless, in both studies the referential subjects were also the first-mentioned phrases of the sentences. Therefore, there was no clear distinction between the first-mention preference and the subject-preference accounts.

In addition to these accounts, a *parallelism* approach has also been proposed. This theory argues that an ambiguous pronoun prefers an antecedent that has the same grammatical role Smyth (1994) and Chambers and Smyth (1998) showed that in reading experiments, participants tend to assign subject antecedents to subject pronouns and nonsubject antecedents to nonsubject pronouns. However, due to its relatively fixed subject-verb-object (SVO) word order, in English, the first-mention position is almost always also the subject of a sentence. Hence, it was difficult to make clear distinctions between the first-mention preference and the parallelism account, in the case of subject pronouns. Relative to nonsubject pronouns, they were matched with nonsubject NPs more frequently, therefore,

the authors conclude that these are more affected by parallelism, i.e., grammatical role, than subject pronouns.

In order to investigate the influence of both order-of-mention and grammatical role in pronoun resolution in a word-order flexible language, Järvikivi, van Gompel, Hyönä and Bertram (2005) studied Finnish where the grammatical role is marked morpho-syntactically and object-verb-subject (OVS) order is also admitted. Their findings from visual word eye tracking suggested that in Finnish, both order-of-mention and grammatical role had an influence in the disambiguation of subject pronouns. These results indicated that one-strategy models were not entirely adequate, rather it was the interplay of several factors that determined pronoun resolution (see also Kaiser & Trueswell, 2008).

1.2 Implicit causality bias

In addition to word order, semantic factors, such as *implicit causality* have also been shown to affect pronoun resolution. Implicit causality refers to a bias that helps listeners to attribute the cause of an event to one of the two grammatical arguments of a verb. It has been shown that this bias comes from the internal semantic information of the verb (see Bott & Solstad, 2014; Hartshorne, 2014). Additionally, non-linguistic information such as pragmatic inference and expectations are also important for defining implicit causality biases.

In the early stages of implicit causality research, Garvey and Caramazza (1974) noticed that many interpersonal verbs contain information from which listeners can infer the cause of an event and attribute this causality to either the subject or the object of the verb. Garvey, Caramazza and Yates (1975) showed that in the presence of certain stimulus-experiencer and experiencer-stimulus verbs, participants preferred to continue sentences such as *John feared/frightened Bill, because he…*, with utterances consistent with the implicit cause of the experience. In this sense, in a sentence such as *John feared Bill, because*

he..., participants would produce an utterance following the assumption that there is something in Bill (second-mentioned participant) that causes the fear in John. In the same way, the assumption is that for *frighten*, there is something in John (first-mentioned participant) that makes Bill feel frightened. As a result, this verbal bias helped participants to assign a referent to the pronoun of the subordinate sentence.

More recent studies have shown that implicit causality information has a strong effect on pronoun resolution across languages (Dutch: Cozijn, Commandeur, Vonk & Noordman, 2011; Koornneef & Sanders, 2012; Koornneef, Dotlačil, van den Broek & Sanders, 2016; Koornneef & Van Berkum, 2006. English: Garnham, Traxler, Oakhill & Gernsbacher, 1996; Garvey & Caramazza, 1974; Garvey, Caramazza & Yates, 1975; McKoon, Greene & Ratcliff, 1993, Stewart, Pickering & Sanford, 1998; Stewart, Pickering & Sanford, 2000. Finnish: Järvikivi, van Gompel & Hyönä, 2017; Pyykkönen & Järvikivi, 2010. German: van den Hoven & Ferstl, 2018).

Bott and Solstad (2014) argue that implicit causality information comes from expectations formulated by listeners through verbal semantics and that it allows them to make predictions about upcoming discourse. This subset of verbs can trigger the expectation that in the following discourse the (implied) causal relation will be explained. Although a connector is not required to create causal relations, Koornneef et al., (2016) showed that the effects of implicit causality bias surface easier when a connective such as *because* is present.

Within implicit causality literature, two accounts have been proposed to explain the time course of activation of implicit causality information during online language processing: the *integration account* (Garnham et al., 1996; Stewart et al., 2000) and the *focusing account* (Greene & McKoon 1995). The integration account claims that the effect of implicit causality occurs when the second clause of the sentence is integrated with the first, i.e. when all the semantic information of the second clause is linked to the first clause. This account states that the delay in the effect of implicit causality relates to the use of other

sources of information that become available later in the course of processing than structural information. For example, Stewart et al. (2000) used self-paced reading tasks to investigate the influence of implicit causality in sentences like *Daniel apologized to Arnold because he had been behaving selfishly*. Their results evidenced the effects of the verb bias occurred during clausal integration towards the end of the because clause, in other words when the interpretations of the main and the subordinate clause had been assigned a single interpretation as a whole.

In contrast, according to the focusing account, the effect of implicit causality should appear very early, and in very early phases of the pronoun resolution. Studies using different methodologies have found support for the focusing account; specifically, probe recognition tasks have shown very early effects of implicit causality (Greene & McKoon, 1995; McKoon et al. 1993), however, it has been argued that these kinds of experiments might not properly reflect normal language processing (Gordon, Hendrick & Foster, 2000). More recently, many studies have used EEG and eye-tracking experiments to investigate the time course of implicit causality (EEG: Koornneef & Van Berkum, 2006; visual world eye-tracking: Järvikivi et al., 2017; Pyykkönen & Järvikivi, 2010).

Most of the results in these studies indicated that participants used implicit causality information in the early stages of processing. For instance, Koornneef and Van Berkum (2006) showed that the effect of implicit causality appeared shortly after listening to a gender-marked pronoun (Koornneef & Van Berkum, 2006). Pyykkönen and Järvikivi (2010) showed that implicit causality affected participants' attention to the referents immediately after the implicit causality verb and before the causal conjunction *because*. However, the early appearance of implicit causality effects does not indicate that the semantic information provided by the verb is automatically used immediately for pronoun resolution. Even though Pyykkönen and Järvikivi (2010) found an effect of IC bias immediately after the IC verb, the effect was not persistent when the pronoun was encountered, rather it interacted with

grammatical role. One possible explanation for this is that pronoun resolution is sensitive to other factors as well as grammatical role and order of mention which interact in pronoun resolution and might mask the effect of implicit causality (McDonald & MacWhinney, 1995, make a similar point).

In a recent investigation, Järvikivi et al. (2017) examined the effects of implicit causality and syntactic cues in pronoun resolution in Finnish, a language that allows SVO and OVS word-order. They hypothesized that if implicit causality interferes with pronoun resolution at the integration stage and both order-of-mention and grammatical role have been shown to affect the immediate activation of referents, then implicit causality effects should be delayed relative to effects of first-mention or subjecthood. However, if the effects of implicit causality appear in very early stages of processing, then no delay should be found. Their findings from two visual-world eye-tracking experiments showed that implicit causality effects appeared at the same time with first-mention and grammatical role effects, thus the use of implicit causality was not delayed relative to order-of-mention and grammatical role information, in contrast to the predictions of the integration account. Particularly, when grammatical-roles were counterbalanced, the effect of implicit causality occurred at the same time or even earlier than the first-mention preference. Furthermore, the results suggested that semantic information was not affected by order-of-mention information. Overall, this study showed that neither the first-mention account nor the subject preference approach can fully explain pronoun resolution. Moreover, this investigation showed that when different types of disambiguating cues are available to speakers, some strategies might have earlier effects than others depending on the grammatical systems and their own particular features.

1.3 Pronominal form: the alternation between null and overt pronouns

Another factor that has been shown to affect pronominal resolution concerns the form of the pronoun. The grammar of many languages allows subject pronouns to remain unexpressed, i.e., these systems allow "null" pronouns; however, these "*pro*-drop" languages (e.g., Spanish, Greek, Italian) also have overt pronouns in their inventory. Therefore, these grammars are able to alternate in the use of null (Ø) and overt pronouns, as illustrated below with Spanish, cf. (2) and (3).

2. Ø ve películas todo el día
   Ø watches movies all day
   'He/she/it watches movies all day'

3. Ella ve películas todo el día
   She watches movies all day

Given this alternation, one of the aims of studies on *pro*-drop languages is to explain how the pronominal system, i.e., the null or overt realization of the pronoun, influences the processing of anaphora. Many hypotheses about the potential effects of pronominal form have been proposed. For the purposes of this thesis, the following sections will discuss the *Economy Hypothesis* (based on Cardinaletti and Starke's *Minimize Structure* principle, 1999), the *Avoid Ambiguity Hypothesis* (Carminati, 2002), as well as the *Position of Antecedent Hypothesis* (Carminati, 2002).

The *Economy Hypothesis* was intended to be a pronoun resolution projection of the *Minimize Structure* principle proposed by Cardinaletti and Starke (1999). This view states that in *pro*-drop languages as the null pronoun is more economical than the overt one, it will be preferred and used whenever possible. This means that in contexts where there is no need to use an overt form, the null will be selected. Following this idea, in (4a), where number and person are disambiguating cues given by verbal morphology, the use of an overt pronoun (4c) would be uneconomical.

4. a. María abrazó a los niños cuando Ø estaban tristes
b.'Maria hugged (3rd person sg) the kids when Ø were (3rd person pl) sad'
c. María abrazó a los niños cuando ellos estaban tristes
d. 'Maria hugged (3rd person sg) the kids when they were (3rd person pl) sad'

In turn, the *Avoid Ambiguity Hypothesis* argues that particular contexts, as shown in (4a), are in fact ideal for overt pronouns to show their disambiguating properties (Carminati, 2002). The general idea of this proposal is that disambiguating features such as person and number must be "stronger" in an overt pronoun than in a null because in the case of the latter, person and number features must be recovered from the inflection of the predicate. Thus, while with overt pronouns disambiguating features seem to be more accessible to listeners, null forms require "extra-processing". Thus, these two accounts make opposing predictions.

In order to test these theories in Italian, Carminati (2002) proposed the *Position of Antecedent Hypothesis (PAH)*. The PAH states the following:

5. The Position of Antecedent Hypothesis for the Italian null and overt pronouns in intra-sentential anaphora: the null pronoun prefers an antecedent which is in the Spec IP position, while the overt pronoun prefers an antecedent which is not in the Spec IP position.

The Spec IP position is where the Extended Projection Principle (EPP) (Chomsky, 1981) is satisfied. EPP captures the intuition that all clauses must have a subject. Hence, the intuition of this hypothesis is that in a context like (6), taken from Carminati (2002), the null pronoun prefers the subject antecedent, whereas the overt pronoun prefers the object.

6. a. Quando Mario$_i$ ha telefonato a Giovanni, Ø$_i$ aveva appena finito di mangiare.
When Mario$_i$ has telephoned to Giovanni, Ø$_i$ had just finished eating.

b. Quando Mario ha telefonato a Giovanni$_i$, lui$_i$ aveva appena finito di mangiare.
When Mario has telephoned to Giovanni$_i$, he$_i$ had just finished eating.

Consequently, the PAH implies that a pronoun, in its goal of finding an antecedent, is guided mainly by structural considerations and excludes non-structural properties, such as semantic factors. The hypothesis also predicts that the preference of null pronouns to retrieve entities in the Spec IP position will hold independently of whether the antecedent is

a fully referential lexical DP (e.g., a name), a non-referential quantified DP (e.g., *every boy*), or a "dummy element" (e.g., expletives *it, there*) (Carminati, 2002). Additionally, Carminati (2002) claims that by prioritizing the role of configurational notions in the process of solving pronouns, the PAH predicts that the simple matching of features between a pronoun and its potential antecedents will not necessarily ensure the resolution of a pronoun.

In order to test the Position of Antecedent Hypothesis against various hypotheses, Carminati performed a number of experiments. In what follows, I will focus on experiments that tested the PAH (structural/configurational theory) against the Economy Hypothesis (EH) and the Avoid Ambiguity Hypothesis in Italian (AAH).

First, to investigate the Economy Hypothesis, a self-paced reading experiment was designed relying on pragmatic disambiguation. The stimuli in this experiment were sentences starting with a subordinate clause, followed by a main clause. The subordinate clause introduced two characters of the same gender by proper name and the content of the main clause was pragmatically biased to be about one of the two referents (see 7 for examples biased towards the subject). The subject of the main clause was either a null or an overt pronoun. After the self-paced task, comprehension *wh*-questions (8) were administered to the participants.

7. a. Dopo che Giovanni ha messo in imbarazzo Giorgio di fronte a tutti, Ø si è scusato ripetutamente.
'After Giovanni embarrassed Giorgio in front of everyone, Ø apologized repeatedly.'

   b. Dopo che Giovanni ha messo in imbarazzo Giorgio di fronte a tutti, *lui* si è scusato ripetutamente.
'After Giovanni embarrassed Giorgio in front of everyone, *he* apologized repeatedly.'

8. Chi si è scusato? Giorgio / Giovanni
Who apologized? Giorgio / Giovanni

The prediction of this experiment was that when following the Economy Hypothesis, null pronouns must be favoured as they are the most economical option and the features of the pronouns do not help in resolving a pronoun. Hence, the Economy Hypothesis predicts

shorter reaction times for null pronouns in all cases. In contrast, the PAH predicts faster reading times for null pronouns when they are favoured by pragmatical disambiguation towards the subject, and the overt pronouns should be favoured when pragmatic disambiguation points to the object. The results of the self-paced reading task showed no evidence that null pronouns are favoured due to economic reasons, in contrast there were penalties when the position antecedent biases of the pronouns were violated. Additionally, the percentages of correct answers in the *wh*-questions were also insightful as participants chose a subject antecedent for null pronouns more often than they did for the overt pronoun (80% vs. 71%) regardless of the pragmatic bias of the main clause. This means that they found violations of the biases more disruptive with null pronouns than with overt pronouns.

In another self-paced reading experiment, Carminati investigated the three processing strategies (EH, AAH, and PAH) with the goal to test which one of them, if any, is preferred by listeners when solving anaphoras in contexts where gender information is available to disambiguate. The stimuli in this experiment were similar to the materials used in the previous experiment, however this task also included one-referent vs. two-referents manipulation.

9. **2 referents, subject antecedent**

a. Quando Mario chiama Liliana, Ø è contento.
When Mario calls Liliana, Ø is happy (masc).

b. Quando Mario chiama Liliana, *lui* è contento.
When Mario calls Liliana, *he* is happy (masc).

2 referents, object antecedent

c. Quando Mario chiama Liliana, Ø è contenta.
When Mario calls Liliana, Ø is happy (fem).

d. Quando Mario chiama Liliana, *lei* è contenta.
When Mario calls Liliana, s*he* is happy (fem).

1 referent, subject antecedent

e. Quando Mario canta, Ø è contento.
When Mario sings, Ø is happy (masc).

f. Quando Mario canta, *lui* è contento.
When Mario sings, *he* is happy (masc)

The predictions of this experiment were as follows:

i) the EH predicts that null pronouns would be preferred in all the conditions, i.e., (9a) = (9c) = (9e). The overt pronoun conditions would be generally bad; therefore, no difference is expected among (9b), (9d) and (9f).

ii) the PAH predicts a cross-over interaction for the two referent conditions; this means that in sentences (9a-b), the null pronoun would be preferred while in sentences (9c-d) the overt pronoun would be preferred. For the one referent conditions, a preference for the null form is expected.

iii) The AAH predicts an overall advantage of overt pronouns with either type of antecedent in the two-referent conditions as they are better at disambiguating than nulls. In one referent conditions, nulls should be preferred for the only antecedent available (the subject).

The results of this experiment disconfirmed the Economy Hypothesis. Carminati (2002) showed that there was no evidence that, in presence of gender disambiguation, null pronouns were preferred irrespective of the syntactic status of the antecedent. These results were in agreement with the results reported in the first experiment which did not have gender disambiguation. Relative to the Position of Antecedent Hypothesis, this experiment confirmed the preference of null pronouns towards the Spec IP antecedent. Although, there was still a numerical preference of overt pronouns retrieving object entities as antecedents, in this experiment overt pronouns appeared to be more "flexible" in their antecedent preferences.

Finally, the data from this experiment suggested that the Avoid Ambiguity Hypothesis was favoured. However, Carminati claims that if AAH was correct, we would have expected it to be less felicitous for an overt pronoun to retrieve the subject in a one-referent context, where the pronoun is unnecessary, than in a two-referent context, where the pronoun is required. But as overt pronouns were not read significantly faster when they retrieved the subject in two-referent sentences than when they did in the one-referent

sentences, an alternative explanation was required. Carminati proposed that perhaps these were cases where the grammar tolerated violations of the positional preference of the overt pronouns because the pronoun is still correctly disambiguated through its gender feature. Thus, for Carminati, since gender cues were used to identify the intended antecedent, the high acceptance of overt pronouns in non-ambiguous two- and one-referent contexts was tolerated. In other words, positional violation was tolerated because the use of an overt pronoun did not lead to miscommunication.

Overall these experiments provide evidence for the Position of Antecedent Hypothesis, specifically, Carminati (2002) showed that, in Italian, null pronouns prefer antecedents in the Spec IP position while for the overt pronouns although there was an overall tendency of them preferring antecedents in lower positions, they also showed more sensitivity to contextual factors. Therefore, overt pronouns robustly follow the PAH in globally ambiguous two-referent contexts, but less so in unambiguous one-and two-referent contexts.

1.4 Pronominal reference resolution in Spanish

Having reviewed the semantic and morphosyntactic factors that have been argued to affect pronominal resolution, I will now focus on the literature on Spanish pronouns.

1.4.1 Spanish as a pro-drop language

Spanish, like Italian and Greek, allows pronominal subjects to remain phonetically unexpressed (10).

10. Ø/Ella come muchas frutas y verduras.
    Ø/She eat.3SG.PRES.IND many fruits and vegetables.
    'She eats many fruits and vegetables'

However, the alternation between null and overt pronouns is not entirely optional. Rather, it depends on discourse considerations. Some of the factors that regulate the expression of

null/overt subjects are topic continuity/shift, contrastive focus and new information focus (Montrul, 2004; Shin, Orozco & Carvalho, 2015). Overt pronouns, for instance, are required when the subject introduces new information to the discourse (11).

11. ¿Quién cantaba? Ella/Lucía/*Ø cantaba.
'Who was singing? She/Lucía/*Ø was singing.

It has been argued that rich verbal inflection is what licenses null subjects in Spanish (Rizzi, 1982). Conjugated verbs in Spanish carry information to recover the pronominal subject. For instance, in (12) below the pronominal subject (*yo* 'I') can be retrieved based on the verbal suffix.

12. Ø Habl-**o** inglés y español.
Ø speak-1.SG English and Spanish
"**(I)** speak English and Spanish"

The complete inflectional paradigm of Spanish verbs and personal pronouns is provided in Table 1.1 and Table 1.2 with the verb *bailar* 'to dance'. Note that whereas Spanish verbs only inflect for person and number, personal pronouns inflect for person (1st, 2nd, 3rd), number (singular, plural), and gender (female, male; only in the cases of the singular and plural 3rd person and the plural 1st person). For the purposes of this thesis, I will focus mainly on third person pronouns and I will examine how implicit causality and form (null vs. overt) may affect their resolution.

Table 1.1: Verb *bailar* 'to dance' in present tense in Spanish and English

1st SG	*yo* bail-**o**	I dance
2nd SG	*tú* bail-**as**	you dance
3rd SG	*él/ella* bail-**a**	he/she dances
1st PL	*nosotros* bail-**amos**	we dance
2nd PL	*ustedes* bail-**an**	you dance
3rd PL	*ellos* bail-**an**	they dance

Table 1.2: Verb *bailar* (*'to dance')* in past tense in Spanish and English

1st SG	*yo* bail-é	I danced
2nd SG	*tú* bail-**aste**	you danced
3rd SG	*él/ella* bail-**aron**	he/she danced
1st PL	*nosotros* bail-**amos**	we danced
2nd PL	*ustedes* bail-**aron**	you danced
3rd PL	*ellos* bail-**aron**	they danced

1.4.2 Implicit causality and pronominal resolution in Spanish

Goikoetxea, Pascual and Acha (2008) conducted a study that gave normative data on the implicit causality of 100 interpersonal verbs. In order to test the presence of implicit causality in Spanish, they used two experiments: a sentence completion task and a sentence reading task. Native Spanish speaking adults and children were tested in this study. The children were divided in two groups; one of 8-9 years old and other of 11-13 years old. In this experiment, participants were presented with sentences that introduced two gender-mixed characters (subject female and object male or vice-versa), an IC verb and the connector *because* (*e.g., Helen called John because…*). In alignment with the previous literature, if the implicit causality bias is a consistent effect, a greater number of sentences with NP1 biased verbs would be completed using a pronoun referring to the subject (i.e., *Helen*) of the main clause. Likewise, in sentences with NP2 verbs, participants were expected to continue using a pronoun referring the object (i.e., *John*). In their results, Goikoetxea et al. showed effects of implicit causality in adults, as well as in children. Hartshorne, Sudo and Uruwashi (2013) clarify that in the re-analysis of these data they found that 97% of the responses used null pronouns, 3% used overt pronouns, and 0.1% used demonstratives.

In their sentence reading task, Goikoetxea et al. (2008) used sentences that were either congruent or incongruent with the implicit causality bias of the main verb;

additionally, the sentences used null pronouns. See examples in (13) and (14), taken from Goikoetxea et al. (2008):

13. NP1-Congruent:
Ana aburrió a Gabriel porque Ø hablaba lentamente.
'Ana bored Gabriel because s/he talked slowly.'

¿Quién hablaba lentamente?
'Who talked slowly?'
Ana/Gabriel

14. NP1-Incongruent:
Ana aburrió a Gabriel porque Ø ya conocía la historia.
'Ana bored Gabriel because s/he already knew the story.'

¿Quién sabía la historia?
'Who knew the story?'
Ana/Gabriel

For the analysis, they took into consideration sentence reading time and response time relative to the disambiguation question. In their results, they found that incongruent sentences, with both NP1 and NP2 verbs, had longer reading times. Furthermore, incongruent sentences also showed longer response times. The results of both experiments evidenced the existence of an implicit causality effect in Spanish. Moreover, it was proved that IC bias affects whether the subject or the object is perceived as the cause of an action.

Goikoetxea et al. (2008), therefore, showed evidence for the existence of the effect of IC in Spanish and its influence on anaphora resolution (see also Contemori & Dussias 2019 who showed that Spanish L2 speakers of English show the expected effect of IC also in their L2). Nevertheless, in their materials they used only null subjects, hence, the question regarding the interaction of IC and pronominal form in anaphora resolution remains unanswered.

1.4.3 The form of the pronoun and pronominal resolution in Spanish

Moving on to the role of pronominal form, Alonso-Ovalle, Fernández-Solera, Frazier and Clifton (2002) tested the anaphoric behaviour of Spanish null and overt pronouns using the

Position of Antecedent Hypothesis (Carminati, 2002) with monolingual participants. As stated before, the PAH predicts that null pronouns prefer to retrieve their reference from the (highest) Spec IP antecedent, while overt pronouns prefer an antecedent in a lower syntactic position.

Alonso-Ovalle et al. (2002) used several experiments to test the predictions of the PAH. Experiment 1 consisted of a list of sentences with ambiguous null or overt pronouns (e.g., *Juan pegó a Pedro. Ø/ Está enojado*. 'Juan hit Pedro. Ø/He is angry.') followed by a disambiguating question (*¿Quién está enojado?* 'Who is angry?'). Participants' responses to the question showed the basic preference observed by Carminati (2002) for Italian: null pronouns prefer a subject antecedent, while overt pronouns do not. Experiment 2 tested another aspect of the PAH; Carminati's theory claims that in Italian it should be more natural to use null pronouns referring to subjects even when there is no ambiguity (e.g., *Teresa llegó tarde al aeropuerto. Ø/Ella estaba cansada.* 'Teresa arrived at the airport late. Ø/She was tired'). The prediction in this task was that this aspect of the PAH would also apply in Spanish. Participants had to rate the naturalness of non-ambiguous sentences with null and overt pronouns. The results indicated that the PAH correctly predicted that null pronouns prefer entities in the Spec IP position regardless of the presence of ambiguity.

With these experiments, Alonso-Ovalle et al. (2002) showed evidence suggesting that the effect of pronoun form in Spanish can be explained by Carminati's Position of Antecedent Hypothesis. Furthermore, they confirm that the PAH works beyond Italian.

As pro-drop languages, Italian and Spanish share many features, Filiaci, Sorace and Carreiras (2014) compared the pronominal inventory of these two languages and demonstrated that they did not differ on the interpretation of null subjects. Filiaci et al. (2014) used self-paced reading tasks to test the PAH in Italian and Spanish with monolingual speakers. Their materials were based on Carminati's stimuli (see examples in 15). Filiaci et al. (2014) confirmed that the PAH predicts the preference of null pronouns for subject

antecedents. However, the behaviour of overt pronouns in both languages differed. Their data suggested that Spanish overt pronouns are relatively insensitive to syntactic prominence compared to Italian overt pronouns and Spanish null pronouns. This means that in Spanish, overt pronouns that retrieve their antecedent from a prominent antecedent do not incur processing penalties while Italian overt pronouns do. In conclusion, this study suggests that regardless of the close typological and morpho-syntactic similarities between Italian and Spanish, anaphoric expressions that might appear equal, differ in their anaphoric preferences. Thus, in this study the PAH theory did not show completely symmetrical results in Italian and Spanish as it was claimed by Alonso-Ovalle et al. (2002) before.

It is interesting to note that the evidence in favour of the PAH is based on experiments where the stimuli were designed with subordinate clauses before main clauses. In (15) we can see examples of the materials created by Carminati (2002) and recovered by Alonso-Ovalle et al. (2002) and Filiaci et al. (2014).

15. a. Dopo che Giovanni ha messo in imbarazzo Giorgio di fronte a tutti, Ø si è scusato ripetutamente.
'After Giovanni embarrassed Giorgio in front of everyone, Ø apologized repeatedly.'

b. Dopo che Giovanni ha messo in imbarazzo Giorgio di fronte a tutti, *lui* si è scusato ripetutamente.
'After Giovanni embarrassed Giorgio in front of everyone, *he* apologized repeatedly.'

Chamorro, Sorace and Surt (2016) noted this non-canonical order in the sentences and conducted a study where the stimuli used had a Main-Subordinate order, with three different groups of participants: Spanish native speakers experiencing L1 attrition ('attriters'), a second group of attriters re-exposed to Spanish prior to testing, and a monolingual control group. Chamorro et al. (2016) used a judgement task and an eye-tracking experiment to investigate the effects of L1 re-exposure on the preferences of Spanish pronominal subjects. The results of the judgement task did not show significant differences relative to pronominal subject preferences between groups. Moreover, the monolingual and re-exposed groups were not significantly different in the eye-tracking data

either. Their findings suggested that attrition does not cause a permanent change in speakers' L1 knowledge of pronominal preferences in Spanish.

However, interestingly, their results showed that participants generally had a clear preference for the object as the antecedent of overt pronouns, while the preference for null pronouns was not as clear. There were not significant differences between subjects or objects matching with null pronouns in either of the experiments, for any of the three groups.

Considering these results, Chamorro (2018) conducted an offline study with only native Spanish speakers, using an offline judgement task. The main purpose of this study was to test the PAH with sentences that had Main-Subordinate order and ambiguous null or overt pronouns. The results of this task follow the findings of Chamorro et al. (2016): native Iberian Spanish speakers seem to have clear preferences for overt pronouns retrieving objects, but not for null pronouns retrieving subjects. The findings of both Chamorro et al. (2016) and Chamorro (2018) appear to be at odds with the PAH and suggest that anaphora resolution is affected by clause order.

Relative to studies with other populations, Keating, Jegerski and Vanpatten (2014) examined the PAH with monolingual Mexican Spanish speakers and heritage bilingual Mexican Spanish speakers, using a self-paced reading task. Their items presented a subordinate clause introducing two characters, followed by a main clause with a null or an overt pronoun (e.g., *Después de que el sospechoso/policía habló con el policía/sospechoso, Ø/él admitió su culpabilidad.* 'After the suspect/policeman spoke with the policeman/suspect, Ø/he admitted his guilt.'). Their main results suggested that the PAH does apply in Mexican Spanish as null pronouns were more often linked with Spec IP antecedents and overt pronouns were linked to objects. Although the analysis of the residuals also showed evidence in favour of the PAH, it was less consistent with only antecedents in object position showing a reliable trend on anaphora resolution according to pronoun type. As for heritage speakers, they did not show a reliable use of the PAH as a

strategy, at the group level. However, there was a lot of variation within the group, which suggests that some participants behave more monolingual-like than others.

Contemori, Asiri and Perea (2019) tested the interpretation of pronouns in L2 English speakers whose L1 is Spanish. The participants recruited fell into two groups: monolingual Mexican Spanish speakers (tested in Spanish) and L1 Mexican Spanish speakers learning English (tested in English). A group consisting of native monolingual English speakers was also used to compare the results of L2 English learners. They designed three comprehension questionnaires in Spanish, applied to the monolingual Spanish speakers, and translated them to English for the other two groups. The stimuli of their first set of experiments had Main-Subordinate (16a) order but also Subordinate-Main order (16b), however, in contrast to previous research these sentences introduced cataphoras, i.e., the pronoun was introduced prior to the referents.

16. a. Yolanda conoció a Josefina mientras que ella estaba en la preparatoria.
Yolanda met Josefina while she was in high school
b. Mientras que ella estaba en la preparatoria, Yolanda conoció a Josefina.
While she was in high school, Yolanda met Josefina

As one of the purposes of this study was to investigate the potential cross-linguistic interference between English and Spanish, only overt pronouns were used. Participants were instructed to read the sentences and answer comprehension questions afterwards. They were given three possible answers (the subject, the object or someone else) to link the pronoun to a referent.

In the materials for the second set of experiments, they used only intra-sentential anaphoras but manipulated the prominence of the characters. They tested three conditions: equal prominence (17a), NP2 repetition (17b), and NP2 pronoun (17c). Multiple option questions as in the previous experiment were also provided to participants.

17. a. Carlos and Martín are at the office. While Carlos is working, he is eating lunch.
b. Carlos and Martín are at the office. Martín is one of the best employees in the company. While Carlos is working, he is eating lunch.

c. Carlos and Martín are at the office. Martín is one of the best employees in the company, he won the best employee of the month award. While Carlos is working, he is eating lunch.

In the third set of experiments, they tested inter-sentential anaphora and manipulated the salience of the antecedents. The materials were designed with a sentence introducing two referents, followed by a sentence in which either only one (18a) or both referents appeared (18b), and a final sentence with a potentially ambiguous pronoun. A third condition was created manipulating clause order (19). Each experimental sentence was followed by a comprehension question as well.

18. a. Rafael and Pablo were admitted at the hospital. Rafael was in a car wreck. After a few days, he was discharged.
b. Rafael and Pablo were admitted at the hospital. Rafael was in a car wreck with Pablo. After a few days, he was discharged

19. Rafael and Pablo were admitted at the hospital. While Pablo broke his leg, Rafael had an injury to his arm. After a few days, he was discharged.

In their results, they showed that the variety of monolingual Mexican Spanish speakers recruited did not follow the predictions of the PAH, as found by Filiaci et al. (2014). In the first and second experiments, they did not find an object preference for their overt pronouns. In the third experiment, they found that for inter-sentential anaphors, there is an overwhelming subject antecedent. As for L2 speakers, they found that intermediate learners can achieve native-like behaviour on the use of first-mention bias. However, L2 speakers' interpretations were comparable to native speakers only in relatively simple contexts. Furthermore, L2 speakers' interpretations were susceptible to discourse complexity.

To sum up, Table 1.3 shows whether the literature provided supports Carminati's PAH in Spanish or not, the order of clauses used in the materials of each study and the methodologies used.

Table 1.3: Studies supporting Carminati's Position of Antecedent Hypothesis

Study	Order of stimuli	Support PAH	Methods

Alonso-Ovalle et al. (2002)	Subordinate-Main	Yes	· Offline questionnaires
Filiaci et al. (2014)	Subordinate-Main	Yes; null pronouns No; overt pronouns	· Self-paced reading task
Keating et al. (2014)	Subordinate-Main	Yes; monolinguals No; heritage speakers	· Self-paced reading task
Chamorro et al. (2016)	Main-Subordinate	Yes; overt pronouns No; null pronouns	· Eye-tracking · Judgement task
Chamorro (2018)	Main-Subordinate	Yes; overt pronouns No; null pronouns	· Judgement task
Contemori et al. (2019)	Main-Subordinate Subordinate-Main (cataphoric) Subordinate-Main (anaphoric)	*Overt pronouns only No; monolinguals	· Comprehension questionnaires

As we can see, there seems to be no consensus relative to the effect of pronominal form in Spanish anaphora resolution. However, we can conclude that 1) the PAH does not fully explain the behaviour of Spanish null and overt pronouns, 2) clause order has an effect on the referential preferences of null pronouns and, 3) although Spanish and Italian share close typological and morpho-syntactic features their pronominal inventories vary in their preferences. Another explanation for the variation of results across studies might have its origin in dialectal differences; compare results from Filiaci et al. (2014) with Iberian Spanish vs. Keating et al. (2014) with Mexican Spanish, nevertheless, Contemori et al. (2019) found similar results as Filiaci et al. (2014) with Mexican Spanish speakers.

To sum up, the effects of implicit causality and pronominal form have been studied in Spanish separately. Nonetheless, to my knowledge, there is no research focused on the

interaction of both semantic and syntactic information on pronoun resolution. The purpose of the present study is to investigate the relationship between the two cues.

Chapter 2: Present study

The purpose of this research is to investigate the extent to which pronoun resolution preferences in Spanish are affected by IC information (NP1/NP2 biased verbs), the form of the subject pronoun (null/overt), and their possible interaction. With information from Spanish monolingual speakers, the present study will address the following research questions:

1. Is there an effect of implicit causality information in the resolution of pronominal subjects in Spanish?
2. If so, is this effect moderated by the form of the pronoun?

In order to answer these questions two tasks were designed. First, Experiment 1 used a Visual World Paradigm eye-tracking experiment was employed with a group of Mexican Spanish monolingual speakers. In this experiment, participants listened to short stories while watching a screen with the two characters mentioned in the story. Each short story contained a main sentence that had either a strongly IC biased verb (NP1/NP2) or a Neutral IC verb and a subordinate clause that started with the connector *because* and had a subject that could be a null or an overt pronoun. Eye gaze patterns were analyzed timed-locked to the pronoun onset. Furthermore, in order to examine possible individual differences effects, a Spanish proficiency test and a language background questionnaire were also administered.

In Experiment 2, a self-paced listening task was employed with a different group of monolingual Mexican Spanish speakers. The stimuli in this experiment were similar to the materials used in the eye-tracking experiment. The sentences also contained an IC verb (NP1/NP2/Neutral) in the main clause and a null or overt pronoun in the subordinate clause. For the analysis of the data, reaction times were recorded. In the same fashion as in Experiment 1, a Spanish proficiency test and a language background questionnaire were administered to the participants.

Based on the ample evidence for the effects of implicit causality and pronominal form in pronoun resolution, the prediction of these studies was that participants would show greater processing difficulty in contexts where syntactic and semantic cues conflict relative to the activation of potential referents, i.e., subject or object. On the other hand, in cases where both semantic and syntactic cues point towards the same character, participants would show less processing difficulty.

The literature suggests that IC biased verbs contain strong semantic information about the causal participant of an action. Moreover, there is a clear categorization between NP1 verbs that link causality to the subject of the sentence (e.g., to frighten) and NP2 verbs which associate it to the object (e.g., to fear). In contrast, research focused on the effects of pronominal form indicates that in Spanish, null pronouns generally tend to be related to subjects while overt pronouns tend to refer to objects (Alonso-Ovalle et al. 2002; Goikoetxea et al. 2008). Based on these theories, a sentence with an NP1 verb and an overt pronominal subject is expected to show processing difficulty as the verb bias connects the pronoun to the subject of the prior sentence, whereas the pronominal form associates the reference to the object.

Visual world eye-tracking and self-paced listening tasks are methodologies that have been widely used to test pronoun resolution. In this study both experiments were treated as complementary methods. On the one hand, visual world eye-tracking is helpful to show people's resolution preferences relative to potential antecedents in a visual scene that presents “target” and “competitor” images, (target referent antecedent, in the particular case of the experiment here exposed). Smaller differences in the looks between images suggest more uncertainty in the listeners’ preferences. Eye-tracking also measures the time course of different resolution factors which is helpful when we are comparing different sources of information.

On the other hand, self-paced listening tasks measure reaction times that provide information about processing load during comprehension. In this procedure, sentences are split into words or phrases, depending on the design of the experiment, and as participants move through each segment, they have to press a key on a keyboard or a button box. This is where reaction times are measured, hence processing difficulty would be shown as delays in their listening times.

Chapter 3: Visual world eye-tracking experiment

The purpose of this experiment was to investigate the influence of implicit causality information on the resolution of pronouns in Spanish (i.e., *él/ella/Ø* 'he/she/Ø'), using visual world eye-tracking. In this experiment, participants listened to recorded sentences where a situation with two characters was described, while they were watching a screen showing the characters. The experimental items crossed the variables implicit causality bias (NP1/NP2) and pronominal form (null/overt). The first clause presented two characters of the same gender and an interpersonal verb with bias towards the subject (e.g., *to frighten*) or towards the object (e.g., *to fear*). The second clause always started with the connective *porque* 'because' followed by a null (Ø) or overt (*él* 'he'/*ella* 'she') pronoun, which could refer to either character previously introduced.

3.1 Method

3.1.1 Participants

Thirty-nine Mexican monolingual speakers (M_{age}=22.66, SD=4.68, range=17-39, 13 male) were recruited in Mexico City, they were tested either at their places or the researcher's place. The participants were all born and raised in Mexico. Since at least one foreign language is part of the curriculum in both public and private schools in Mexico, the participants were asked whether they speak any other language besides Spanish. While eight participants out of 39 reported no knowledge of any foreign language, the rest had been exposed to English as part of the school curriculum in Mexico. All participants had normal or corrected-to-normal vision and hearing. They all received 15 CAD for their participation.

3.1.2 Individual differences measures

In order to measure individual differences, various questionnaires were administered to the participants. Although the effects of the individual variables are not going to be fully

reported in the results and discussion of this thesis, the following section describes each one of them.

3.1.2.1 Expressive One-Word Picture Vocabulary Test-4: Spanish Bilingual Edition (EOWPVT-4:SBE) (Martin, 2013).

The Expressive One-Word Picture Vocabulary Test-4: Spanish Bilingual Edition, a standardized vocabulary test for individuals aged 2 to 70+, was used to measure the participants' Spanish proficiency. During the task the participants were seated in front of a picture panel and asked to name the object in the picture. Some panels showed a single object (e.g., *microphone)* and some a group of images corresponding to a single word (e.g., *emotions*). The difficulty of the words in the picture panel is meant to increase gradually as the task goes on, the test stops when the participant has made 6 consecutive mistakes. For this task, raw and standard scores are presented in Table 3.1. Our participants scored close to the smoothed median raw score obtained in the normative sample test of the EOWPVT-4:SBE by individuals from 20 to 29 years old, which is 127.9.

Table 3.1: Scores of EOWPVT-4:SBE in Experiment 1

	Experiment 1 (n = 39)		
	M	R	SD
EOWPVT-4:SBE (RS)	127.2	101-155	12.3
EOWPVT-4:SBE (SS)	100.2	77-131	11.3

Note: EVT = Expressive One-Word Picture Vocabulary Test; RS = raw scores; SS = standard scores.

3.1.2.2. Language background questionnaire

The purpose of the language background questionnaire was to collect information about years of education, other languages spoken, and language use at home. At the moment of

testing, all participants had at least finished high school education. The questionnaire can be found in Appendix A.

3.1.2.3 Political ideology questionnaire

The participants completed in Google Forms a socio-political questionnaire adapted from a Political Ideology Questionnaire created by the Louisiana State University School of Social Work (Grenier, n.d.). It helped to get information about their attitudes towards some social and political issues which at the end would lead us to evaluate how conservative or liberal their beliefs are. The questionnaire consisted of two parts, the first one is ranked on a scale from 1 to 6 and participants had to express their approval towards topics such as political correctness, prayer in school, and same sex marriage. In the second section, we asked whether they strongly agreed or strongly disagreed on a 5-point scale with some statements. The complete questionnaire can be found in Appendix B.

3.1.2 Experimental materials

A total of 384 experimental materials were created. Additionally, 48 filler sentences were designed using proper names instead of common nouns for subject and object functions . All the sentences were counterbalanced across 8 lists, and there were 100 sentences in each list (4 practice + 48 experimental + 48 filler sentences). The sentences contained a main clause followed by a subordinate clause (e.g., *the swimmer amazed the gymnast because during the summer ø/she attended all the activities*). The structure of the sentences was as follows: the main clause mentioned two unrelated characters of the same gender (e.g., the swimmer and the gymnast, both males or both females) in a casual situation (e.g., all the activities). In order to avoid power relationships between the characters, we avoided hierarchical contexts (e.g., the coach and the player). The characters were selected considering well-known and identifiable professions. The subordinate clause started with *porque* 'because' followed by either an overt or a null pronoun *él/ella/Ø* 'he/she/Ø' and an

adverbial phrase (e.g., *durante el verano* 'during the summer'). Some examples are provided in Table 3.2 and Table 3.3.

Table 3.2: Examples of materials with NP1 verbs

Main clause	Subordinate clause	Order of mention	Implicit causality bias	Pronoun second clause	Implicit Causality Congruency
La maestra aburrió a la alumna en la clase	*Porque durante una hora leyó el libro de texto*	1st mentioned teacher 2nd mentioned student	NP1	Null	Congruent: Teacher Incongruent: Student
"The teacher bored the student in the class"	"Because for one hour Ø read the textbook"				
La maestra aburrió a la alumna en la clase	*porque durante una hora ella leyó el libro de texto*	1st mentioned teacher 2nd mentioned student	NP1	Overt	Congruent: Teacher Incongruent: Student
"The teacher bored the student in the class"	"Because for one hour she read the text book"				
La alumna aburrió a la maestra en la clase	*porque durante una hora leyó el libro de texto*	1st mentioned student 2nd mentioned teacher	NP1	Null	Congruent: Student Incongruent: Teacher
"The student bored the teacher in the class"	"Because for one hour Ø read the text book"				
La alumna aburrió a la maestra en la clase	*porque durante una hora ella leyó el libro de texto*	1st mentioned student 2nd mentioned teacher	NP1	Overt	Congruent: Student Incongruent: Teacher
"The student bored the teacher in the class"	"Because for one hour she read the text book"				

Table 3.3: Examples of materials with NP2 verbs

Main clause	Subordinate clause	Order of mention	Implicit causality bias	Pronoun second clause	Implicit Causality Congruency
La gimnasta preocupó a la bailarina en la competencia	*porque el día más importante llegó tarde al encuentro*	1st mentioned gymnast 2nd mentioned dancer	Np2	Null	Congruent: Dancer Incongruent: Gymnast
"The gymnast worried the dancer in the competition"	"Because the most important day Ø arrived late to the event"				

La gimnasta preocupó a la bailarina en la competencia	*porque el día más importante ella llegó tarde al encuentro*	1st mentioned gymnast 2nd mentioned dancer	Np2	Overt	Congruent: Dancer Incongruent: Gymnast
"The gymnast worried the dancer in the competition"	"Because the most important day she arrived late to the event"				
La bailarina preocupó a la gimnasta en la competencia	*porque el día más importante llegó tarde al encuentro*	1st mentioned dancer 2nd mentioned gymnast	Np2	Null	Congruent: Gymnast Incongruent: Dancer
"The dancer worried the gymnast in the competition"	"Because the most important day Ø arrived late to the event"				
La bailarina preocupó a la gimnasta en la competencia	*porque el día más importante ella llegó tarde al encuentro*	1st mentioned dancer 2nd mentioned gymnast	Np2	Overt	Congruent: Gymnast Incongruent: Dancer
"The dancer worried the gymnast in the competition"	"Because the most important day she arrived late to the event"				

Implicit causality bias measures were based on Goikoetxea, Pascual and Acha's (2008) normative study of 100 interpersonal verbs in Spanish, and from Ferstl, Garnham and Manouilidou's (2011) work on 300 English verbs. Goikoetxea's et al. (2008) study scored verbs on a 1-100 scale regarding their NP1 interpretation according to monolingual Spanish speakers, both children and adults. To ensure a strong implicit causality bias, we selected our verbs based on the adult population. Thus, subject-biased verbs were considered if they obtained a score higher than 65% on the NP1 scale and object-biased verbs if they got a score lower than 45%. Verbs between 45% and 65% were considered neutral verbs. In total, 35 verbs were chosen from Goikoetxea et al. (2008). As these verbs were not enough, 13 verbs were picked from Ferstl et al. (2011) considering 1) that they got a strong IC bias and 2) that they had a good translation into Spanish. The final verb selection was as follows: 16 subject-biased stimulus-experiencer, 16 object-biased experiencer-stimulus, and 16 neutral verbs. A complete list of the selected verbs can be found in Appendix C.

All the items were read out loud by a female Mexican native speaker and recorded in a sound-attenuated booth onto a computer hard disk. Between the offset of the first clause and the onset of the second a 600ms pause was inserted during the building of the experiment. The subject and the object were presented as separate pictures in a single frame.

Figure 3.1: Example of pictures used in eye-tracking experiment

For the experimental items, pictures according to the professions were shown. The characters were presented side by side looking to the front; the position of the pictures was counterbalanced across items. The screen position (left, right) of the pictures was counterbalanced between items. The pictures were cartoons or drawings depicting the entire character and showing stereotypical features of the professions described. All the illustrations were created in GIMP Photo Editor (GIMP 2.10, www. gimp.org), using copyright free images.

The 384 experimental items had 4 conditions, defined by the presence of an explicit pronoun (overt, null) and verb bias (NP1, NP2). In addition, the syntactic position of the characters was counterbalanced (e.g., *the chef* first or second mentioned) within-each item. All sentences were in active voice. The materials were counterbalanced across 8 lists. Additionally, 48 fillers were included on each list. The fillers were constructed with proper names instead of professions and the gender of both characters would be different and the verbs in these sentences were not implicit causality verbs. The structure of the fillers was the same as for the experimental items but the conjunction between the first clause and the

second could either be *because* 'porque', *while* 'mientras', *cuando* 'when', or *before* 'antes'. Each list started with four practice sentences representing the possible conditions. A complete list of the experimental sentences is provided in Appendix D.

3.1.3 Apparatus and procedure

To measure participants' pronominal resolution preferences, the eye-tracking experiment was programmed using Experiment Builder (version 2.2.1: SR Research, 2011). The data were collected using an Eyelink II portable eye-tracker and a 500 Hz sampling rate. The participants were tested individually in a quiet room in either their home or the examiner's. They were seated approximately 50 cm in front of a 13-inch MacBook Air laptop, with the experimenter sitting by their right side. Before the experiment, the eye tracker was calibrated using a 9 point calibration grid. Participants were told to read the instructions on the screen in Spanish which stated that they would listen to some short stories while they saw the characters. Before each trial, calibration was corrected presenting a drift correction point in the middle of the screen. Participants were instructed to press the spacebar in order to proceed to the next trial. To ensure that the participants attended to the scenes, approximately every ten trials they were asked to answer comprehension questions from a filler item. The questions concerned the location of the characters or what was happening in the story. Four practice items preceded the first experimental item. If participants did not have any questions, the experimental session began. The procedure lasted approximately 50 minutes.

3.1.4 Analysis

3.1.4.1 Data preparation

Time-series data (relative to the subordinate pronoun onset) were processed using the R package VWPre (Porretta, Kyröläinen, van Rij & Järvikivi, 2016). We divided each recorded

event into 20-ms bins; the proportions of looks falling within and outside each interest area were calculated and converted into empirical logits with variance weights (see Barr, 2008). Figure 2 shows the average difference between first and second mentioned noun phrases in all the conditions -500 ms to 1500 ms relative to the pronoun onset. On average, after the pronoun onset participants' looks went towards the first mentioned character in both conditions of IC bias for null pronouns. For overt pronouns, in the case of NP1 verbs, looks went towards the second mentioned character which follows the theory for pronominal form, but goes against IC bias. In the case of NP2 verbs participants' gazes went towards the first mentioned character, which goes against IC and also the predictions of pronominal form. To fully analyze the data, generalized additive mixed modeling was used. In order to allow about 200 ms for saccade planning and launch (Fischer, 1992; Matin, Shao & Boff, 1993), the analyzed time window was from 200 ms to 1200 ms after the onset of the pronoun.

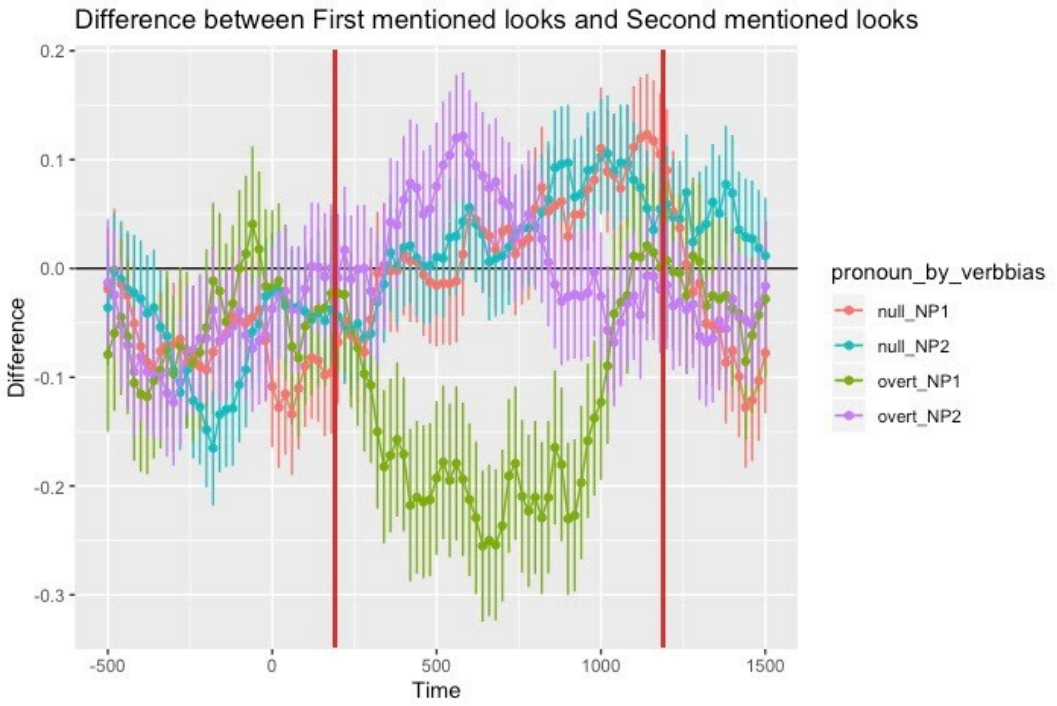

Figure 3.2: Average difference of looks between first (above 0) and second mentioned (below 0) characters in Experiment 1. On the x-axis, 0 time represents the average acoustic onset of the subordinate pronoun. Error bars represent standard error. Red lines represent the analyzed time window (200ms-1500ms after pronoun onset)

3.1.4.2 Statistical considerations

Generalized additive mixed modeling (mgcv, version 1.8-28; Wood, 2018) was used to analyze the data in R. Predictors and interactions were estimated using maximum likelihood (ML) score comparison of model variants. In order to find the best model for the data likelihood of the simpler model was tested against the most complex model considering Akaike Information Criterion [AIC]. Effects and differences were calculated using itsadug package (van Rij, Wieling, Baayen & van Rijn, 2017).

3.2 Results

The dependent variable was the empirical logit of looks to the target image (Barr, 2008), which variable represents the likelihood of looking at the target character on the screen. The analyzed time window was from 200ms to 1200ms after the onset of the pronoun. In order to calculate the proportion of looks, we binned the data into 20-ms bins by counting the number of samples in each of the interest areas and calculating proportions based on those counts. As proportions bound between 0 and 1, an empirical logit transformation was performed on the binned data. This process transforms the proportions into continuous measures.

The primary independent variable of interest was condition, which was a combination of verb bias (NP1/NP2) and pronoun form (null/overt). As neutral verbs do not have a strong bias, they do not have a clear target, hence they were left out of this analysis. The model was fitted with by-subject and by-item factor smooths for time. These factor smooths allow the shape of the average time course to vary across participants and items. The model also included a random intercept for event, which indexes each unique recorded sequence per participant. Event allows unique intercepts for each time series. In order to account for autocorrelation, an AR-1 correlation parameter calculated from the data was also

included. The results for the model are presented in Table 3.4. The complete summary of the model is provided in Appendix E.

Table 3.4: Summary of the generalized additive model for verb bias and pronoun form

Parametric coefficients	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	0.0044	0.0702	0.0625	0.9502
null_NP2	0.0708	0.0918	0.7712	0.4406
overt_NP1	-0.1889	0.1082	-1.7462	0.0808
overt_NP2	0.0229	0.0961	0.2388	0.8113
Smooth terms	***edf***	**Ref. *df***	***f*-value**	***p*-value**
Smooth: Time, null_NP1	2.0313	2.8708	3.112	0.0281 *
Smooth: Time, null_NP2	0.3481	0.569	0.0016	0.9762
Smooth: Time, overt_NP1	1.0007	1.0012	0.2449	0.6206
Smooth: Time, overt_NP2	1.734	2.1506	4.1007	0.016 *
Random effect: Time, Subject	163.91	350	19.7949	< 0.0001 ***
Random effect: Event	521.181	563	21.1877	< 0.0001 ***
Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '				

The model revealed a significant effect between target looks and Time in the null pronoun and NP1 verb condition. The partial effect of Time for both conditions (NP1 and NP2) of null pronouns can be visualized in Figure 3.3. These results suggest that whereas for null pronouns with NP2 verbs there is no effect of verb bias, null pronouns with NP1 verbs the effect of verb bias is clearer.

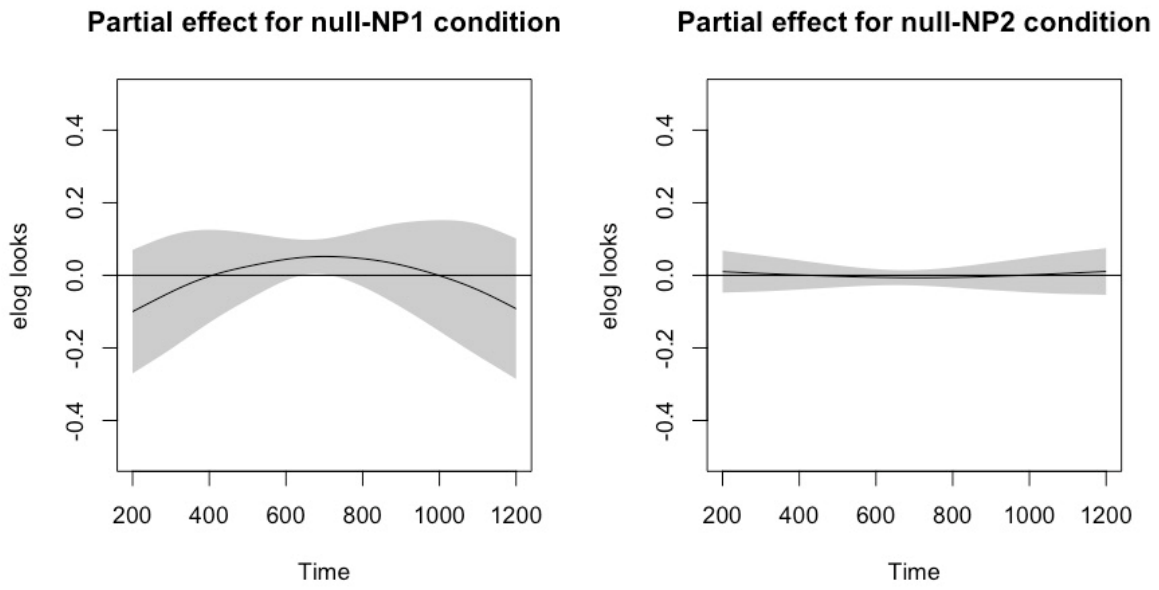

Figure 3.3: Partial effects of Time in looks for NP1 verbs (left) and NP2 verbs (right) in the null pronoun condition. The horizontal line represents the zero effect. The grey shading indicates 95% confidence interval

The smooths for time resulted in significantly different curves. These differences are displayed in Figure 3.4. The difference curves are presented by pronominal form and verb bias conditions. This upper left panel in Figure 3.4 indicates that when items had an NP1 verb and a null pronoun, participants visually preferred the character in the first mention position significantly more often than when the items had an NP1 verb and an overt pronoun. The significant period persisted from 600ms to 1000ms after the onset of the pronoun. The upper right panel shows a significant difference in participants' looks ~1200ms after the onset of the pronoun. This difference suggests that when comparing sentences with NP2 verbs, participants preferred the first mentioned character more often with null pronouns than with overt pronouns.

The two lower panels compare the NP1 and NP2 conditions for null and overt conditions separately. The lower left panel shows that there was no significant difference relative to the verb bias with null pronouns. In contrast, the lower right panel shows a significant difference between NP1 and NP2 verbs with overt pronouns. The difference

indicates that participants preferred the second mentioned participant more often with NP1 verbs than with NP2. This significant period is the earliest in all the compared conditions and persisted from ~380ms to 700ms after the onset of the pronoun. This last result is at odds with expected behaviour of overt pronouns and NP2 verbs together if we assume that both syntactic and semantic information point to the second mentioned phrase.

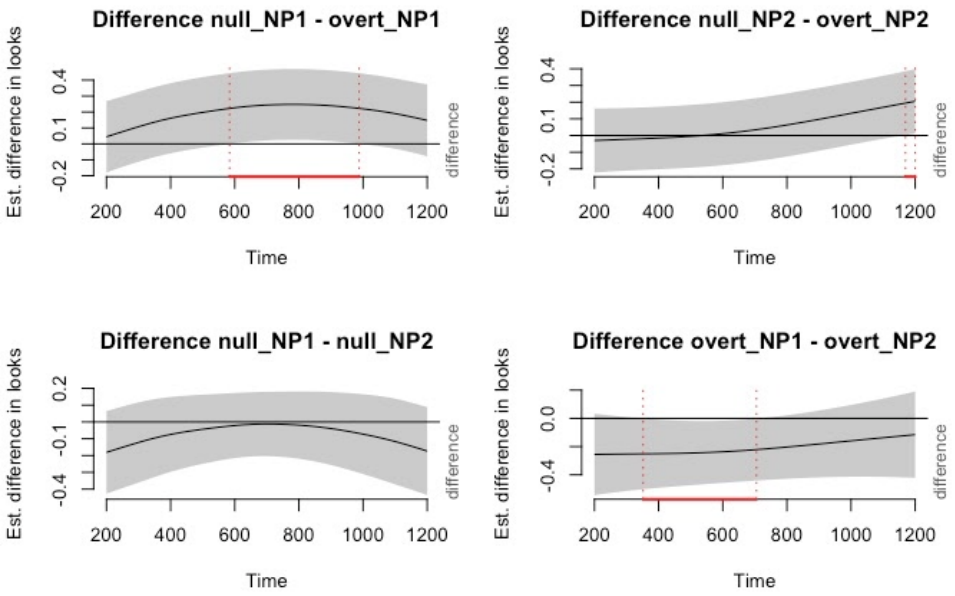

Figure 3.4: Estimated difference in the looks to the first and second mentioned entities over time from 200 to 1200 ms after the onset of the pronoun. Red dashed lines indicate the time during which the difference between conditions was statistically significant. The grey shading indicates 95% confidence interval

The results of the analysis indicated that in this experiment participants had strong preferences in some of our conditions, but not in all of them. Methodological considerations will be further discussed in the discussion chapter. As a follow up study, a self-paced listening task was designed and administered with a different group of participants.

Chapter 4: Self-paced listening task

4.1 Method

4.1.1 Participants

A group of 33 (M_{age}=21.12, SD=3.75, range=18-29, 8 male) adult Mexican Spanish speakers participated in this study. The participants were all born and raised in Mexico. For individual difference measures, they answered the same questionnaires as the group in Experiment 1. This self-paced listening task was applied 5 months later than the first experiment, 6 participants participated in both experiments. At the moment of testing, all participants had finished at least high school education. Table 4.1 shows raw and standard scores of the Expressive One-Word Picture Vocabulary Test-4: Spanish Bilingual Edition (EOWPVT-4:SBE) (Martin, 2013) applied to the participants. Our participants scored between the smoothed median raw score obtained in the normative sample test of the EOWPVT-4:SBE by individuals from 17 to 19 years old (122.9) and individuals from 20 to 29 years old (127.9).

Table 4.1: Scores of EOWPVT-4:SBE in Experiment 2

	Experiment 2 (n = 32)		
	M	R	SD
EOWPVT-4:SBE (RS)	124.3	105-146	9.03
EOWPVT-4:SBE (SS)	97.6	80-118	7.2

Note: EVT = Expressive One-Word Picture Vocabulary Test; RS = raw scores; SS = standard scores.

4.1.2 Experimental materials

A self-paced listening experiment consisting of 384 experimental, 48 filler, and four practice sentences was designed. A complete list of the materials is provided in Appendix F. All the

items were read and recorded by one female Mexican-Spanish speaker. The stimuli in this experiment were designed to investigate how listeners process IC information (NP1/NP2) in relation with null and overt subordinate subjects. The verbs used were the same as in Experiment 1 (see Appendix C). The experimental sentences were constructed with a main clause containing a singular subject and a plural subject, or vice versa, and an IC verb (NP1/ NP2 / Neutral). In order to avoid possible power relationships between subject and object, the gender of both noun phrases was the same, i.e., in each sentence, both participants would be female or male. Given this decision, in order to maintain the pronoun unambiguous a plural-singular contrast was used. The main sentence was followed by a subordinate clause introduced by the conjunction *porque* 'because'. The subordinate sentence could have a null or an overt subject that was either singular or plural. The bias of the verb in the main sentence (NP1/NP2) could be congruent or non-congruent with the reference of the subject in the subordinate clause (subject/object). Note that the reference of the subordinate subject was unambiguous even in the case of null subordinate subjects, due to the verbal morphology that encodes number distinctions (see Table 4.2 for examples of the sentences used).

Table 4.2 Examples of Experimental Sentences in Experiment 2.

Item	IC verb bias	Subordinate subject reference congruent with IC	Main subject number
El mago asombró a los niños el fin de semana porque en la fiesta Ø/él hizo varios trucos con animales. (The magician amazed the kids in the weekend because in the party Ø/he did many tricks with animals)	NP1	Yes	Singular

El mago asombró a los niños el fin de semana porque en la fiesta Ø/ellos se emocionaron mucho con el espectáculo. (The magician amazed the kids in the weekend because in the party Ø/they were very excited with the show)	NP1	No	Singular
Los niños asombraron al mago el fin de semana porque en la fiesta Ø/ellos se emocionaron mucho con el espectáculo. (The kids amazed the magician in the weekend because in the party Ø/they were very excited with the show)	NP1	Yes	Plural
Los niños asombraron al mago el fin de semana porque en la fiesta Ø/él hizo varios trucos con animales. (The kids amazed the magician in the weekend because in the party Ø/he did many tricks with animals)	NP1	No	Plural

With the list of 48 verbs also used in Experiment 1, 384 sentences were created. Additionally, 48 filler sentences were written using proper names. All the sentences were counterbalanced across 8 lists, and there were 100 sentences in each list (4 practice + 48 experimental + 48 filler sentences). For the purpose of the self-paced listening task, each sentence was divided into six segments, as seen in Table 4.3.

Table 4.3 Example of segmentation of sentences in Experiment 2.

1	2	3	4	5	6
El mago asombró a los niños	el fin de semana	porque en la fiesta	Ø/él hizo	varios trucos	con animales
The magician amazed the kids	in the weekend	because in the party	Ø/he did	many tricks	with animals

4.1.3 Apparatus and Procedure

The stimuli were programmed using E-Prime experimental software (Psychology Software Tools, Pittsburgh, PA) and were presented to the participants in 8 different lists. Each list had the same number of congruent and non-congruent sentences. Each participant listened to 100 sentences (4 practice, 48 experimental, 48 filler) presented in a randomized order.

Data from the speakers were collected in a quiet room in their place or the principal examiner's place. The environment was equipped with a 15-inch Dell computer and headphones. The participants were seated in front of the laptop and the instructions of the experiment were presented in Spanish on the screen. The participants were told they would listen to sentences, and that the items would be presented to them in a segment-by-segment fashion. Also, they were instructed to try to find the most natural pace possible while listening to the sentences. In order to start the experiment, they needed to press the space button, which would trigger the presentation of the first segment. In order to listen to the next segment of each sentence, they were instructed to press the space button again. After each filler sentence the participants were presented with yes/no questions about the last sentence they listened to in order to ensure attention throughout the task. For example, if the filler mentioned that the participants were at a party a question would be: '*Were Ana and Mario at a party?*'. In order to answer the questions, they would have to press either the M or Z button for yes and no, respectively. Prior to beginning the experimental Block, four practice items were presented to the participants. If they did not have any questions, the task began. The procedure lasted approximately 30 minutes.

4.1.4 Analysis

Considering the research questions of this study two analyses were performed in each sentence segment reported below. The first analysis had IC congruency as one of the conditions to examine. IC congruency was defined as the agreement between verb bias

(NP1/NP2) and the reference of the subordinate subject (subject/object). This means that when the verb in the main sentence was a NP1 biased verb and the subject of the subordinate sentence was also referring to the subject of the main sentence, then the condition would be congruent. Since neutral verbs do not have a clear cut or strong bias towards subject or object they were left out of this condition.

The second analysis focused on congruency according to pronominal form, which was defined as the agreement between the pronominal form of the subordinate subject (null/overt) and its reference (subject/object of the main sentence).

In the self-paced listening task, participants' reaction times (RTs, henceforth) were measured for each segment. The data were analyzed in R version 1.2.5033 (R Core Team, 2016) using the "lme4" package (Bates, Mächler, Bolker & Walker, 2015). Package "lmerTest" (Kuznetsova, Bruun Brockho & Haubo Bojesen Christensen, 2016) was used to obtain significance values. Filler trials and trials with RTs that were shorter than the duration of the segment itself were removed from the analysis (7.51% of the data). The RTs were log-transformed to ensure normal distribution. The models were fitted by taking the log transformed RTs as the response variable and the interaction of verb bias, pronoun form, number, and congruency as fixed-effects predictors, depending on the segment. The models were backward fitted starting with the most complex model in terms of random and fixed structure. Trial and previous segment RTs were included into all models in order to counter auto-correlation (Baayen & Milin, 2010). The most complex model in terms of random and fixed structure was fitted first. Following models were backward fitted by removing random effects one at a time. The likelihood of the simpler model was compared against the more complex one using Akaike Information Criterion [AIC]. The random structure of the models was simplified until the most complex model was favoured by 2/+ points lower AIC score in the model comparison. Only the models that best fit the data are reported.

4.2 Results

For the results section several conditions were considered, Table 4.4 presents a reference list of the variables used and their meaning.

Table 4.4: Reference list of the variables used in the analyses and their meaning.

Condition	Levels	Meaning
ICcongruency	congruent non-congruent	The relationship between implicit causality bias (NP1/NP2) and the reference of the subordinate subject (subject/object of the previous sentence).
formcongruency	congruent non-congruent	The relationship between the form of the pronoun (null/overt) and its reference with the subject or object of the previous sentence.
verb bias	NP1 NP2 Neutral	The implicit causality bias of the verbs used.
number	singular plural	The number of the subordinate subject.
pronoun	null overt	The form of the subordinate subject.
Block	NA	Item
logRT	NA	Reaction time of the previous segment to the analyzed one.

4.2.1 Results in the pronoun segment by IC congruency

The first set of analyses examined the RTs in the pronoun segment of the sentences. This segment contained the subordinate subject (null/overt) and the subordinate verb. The analyzed conditions were verb bias (NP1/NP2), subordinate subject pronominal form (null/overt), subordinate subject number (sg./pl.) and, IC congruency which was the combination of IC bias and subordinate subject reference. Since Neutral verbs stand in the middle of our IC range, we cannot argue for a strong NP1 or NP2 bias with them, hence, to create the IC congruency condition only NP1 and NP2 verbs were considered.

Log-transformed RTs of the pronoun segment are illustrated in Figure 4.1. Overall, plural subordinate subjects were processed slower than singular subjects. In the case of NP1 biased verbs, RTs are slower in non-congruent conditions than in the congruent ones. In contrast, for NP2 verbs, non-congruent sentences were faster than the congruent ones when the subject was singular.

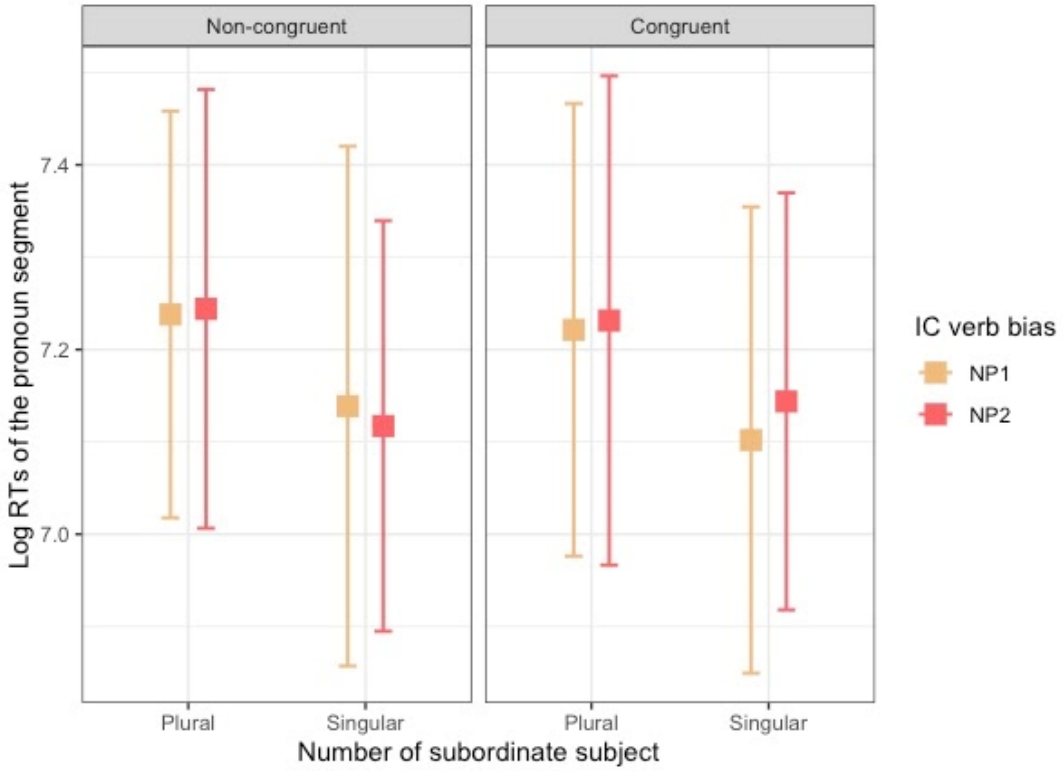

Figure 4.1: Log-transformed RTs of pronoun segment in IC congruent and non-congruent contexts by verb bias (NP1/NP2) and number (sg./pl.) conditions. Error bars represent standard deviation.

A linear mixed effects regression model was fitted taking the log-transformed RTs in the pronoun segment as the response variable with the interaction of IC congruency, pronominal form (null/overt) and, subordinate subject number (sg./pl.). The model also included a by-subject and by-item random slopes for pronominal form by number. The coefficients of the fitted model are presented in Table 4.5.

Table 4.5: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of IC congruency, pronominal form and subordinate subject number fitted to log-transformed RTs in the pronoun segment.

	Estimate	Std. Error	*t*-value	*p*-value
Intercept	5.6041	0.2529	22.1622	<0.0001 ***
verbbiasNP2	0.009	0.0287	0.3123	0.7571
ICcongruencycongruent	-0.0691	0.0241	-2.8651	0.0043 **
pronounovert	0.1679	0.03	5.6046	<0.0001 ***
numbersingular	-0.1286	0.0305	-4.221	<0.0001 ***
Block	-0.0016	<0.0001	-6.8581	<0.0001 ***
logRT1	0.2147	0.0326	6.5943	<0.0001 ***
ICcongruencycongruent: pronounovert	0.0801	0.0336	2.3876	0.0172 *
ICcongruencycongruent: numbersingular	0.1066	0.0333	3.2025	0.0014 **
pronounovert:numbersingular	0.0097	0.0378	0.2557	0.7989
ICcongruencycongruent:prono unovert:numbersingular	-0.1503	0.0466	-3.2249	0.0013 **

R Code: logpronounRT ~ verbbias + congruency * pronoun * number + Block + logRT1 + (1 + pronoun * number |Subject) + (1 + pronoun * number|Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2; ICcongruency = noncongruent, congruent; pronoun = null, overt; number = plural, singular

As seen in Table 4.5, there were significant effects of IC congruency, pronoun form and pronoun number in the pronoun segment. The positive number of the estimate of pronominal form meant that overall, with overt pronouns participants reacted slower than with nulls. On the other hand, the negative sign in the estimate of subordinate subject number meant that the RTs became faster with singular subjects than with plurals. The temporal covariates Block and previous segment RT showed significant effects as well. The estimate of Block indicates that as the experiment proceeded, participants became

significantly faster in their responses. The inclusion of both Block and previous segment RT controlled for temporal dependencies and helped the model in the estimation of effects of other predictors. The results also showed that the interactions of IC congruency with pronominal form and with pronoun number separately were highly significant. Lastly, a significant interaction of IC congruency, pronominal form and pronoun number was found in this model. To have a better understanding of this three-way interaction, two analyses were performed for null and overt pronouns separately.

4.2.1.1 Results for null subjects by IC congruency

The log-transformed RTs from the half of the data that contained a null pronoun were analyzed by fitting a linear mixed effects regression model with the interaction of IC congruency and subordinate subject number, and with a by-subject random intercept and a by-item random slope for subordinate subject number.

Table 4.6: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of IC congruency and subordinate subject number fitted to log-transformed RTs for the null subordinate subjects in the pronoun segment.

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	5.6048	0.3541	15.8289	<0.0001 ***
verbbiasNP2	-<0.0001	0.0307	-0.0141	0.9889
ICcongruencycongruent	-0.0655	0.0262	-2.5056	0.0127 *
numbersingular	-0.1274	0.0312	-4.0814	<0.0001 ***
Block	-0.0016	<0.0001	-4.4279	<0.0001 ***
logRT1	0.2154	0.0459	4.6929	<0.0001 ***
ICcongruencycongruent:numbersingular	0.1038	0.0361	2.8734	0.0043 **

R Code: logpronounRT ~ verbbias + ICcongruency * number + Block + logRT1 + (1 | Subject) + (1 + number |Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2; IC congruency = noncongruent, congruent; number = plural, singular

The results in Table 4.6 show that the effect of IC congruency was significant while the effect of subordinate subject number was highly significant. As we were analyzing only null subjects in this model, the congruency was as follows: if the reference of the pronoun was towards the subject and the main verb was NP1, then the sentence was congruent; if the reference was towards the object and the main verb was NP1, then the sentence was non-congruent. In the same fashion, if the reference of the of the null pronoun was towards the subject of the previous sentence and the main verb was NP2, then the sentence was non-congruent while if the reference of the null pronoun was towards the object with a NP2 verb, then it was congruent. Furthermore, the negative sign in the estimate of the congruent IC condition means that participants reacted faster in congruent conditions (NP1 verb and reference to the subject/NP2 verb and reference to the object) than in the non-congruent ones (NP1 verb and reference to the object/ NP2 verb and reference to the subject). Thus, this would indicate that IC bias was not moderated by pronominal form.

The negative sign in the estimate of singular subjects shows that in comparison to plural subjects, the singular null pronouns were processed faster. The control variables, Block and RT of the previous segment were significant as well. The negative sign on the estimate for Block suggests that as the experimental session proceeded, participants got faster in their RTs. Lastly, the interaction of IC congruency with subordinate subject number was also significant.

Post-hoc tests were employed to further examine this two way interaction (Tukey method for estimates was used). The pairwise comparisons revealed that in the congruent condition of IC, there was no significant difference between plural and singular null subjects (β = 0.0236, SE = 0.0326, t = 0.7239, p < 0.4718), but in the non-congruent IC condition there was a significant difference between plural and singular null subordinate subjects (β = 0.1274, SE = 0.0312, t = 4.0814, p < 0.0001).

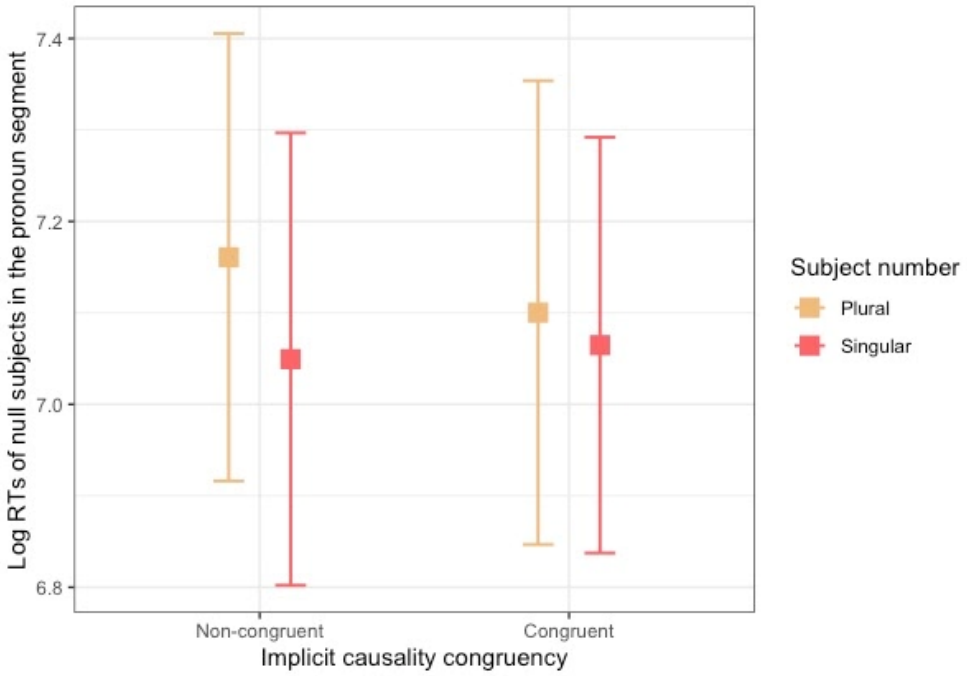

Figure 4.2: Log-transformed RTs of null subjects in the pronoun segment in IC congruent and non-congruent contexts by subject number (sg./pl.) conditions. Error bars represent standard deviation.

Moreover, the comparison of null plural subjects only in congruent and non-congruent IC conditions showed another significant effect (β = 0.0655, SE = 0.0262, t = 2.5056, p < 0.0127). This result suggested that with null plural subjects, participants reacted significantly faster in the congruent IC condition than in the non-congruent. The log RTs of singular and plural null subjects in congruent and non-congruent conditions are illustrated in Figure 4.2.

4.2.1.2 Results for overt subjects by IC congruency

For the analysis of the overt subjects in the pronoun segment, a linear mixed effects regression model was fitted considering log-transformed RTs from the sentences that used an overt pronoun as subordinate subject in the experiment. In the same fashion as the null subjects, the model for overt pronouns had an interaction of IC congruency and subordinate subject number. Additionally, a by-subject random intercept and a by-item random slope for IC congruency by subordinate subject number was included.

The results in Table 4.7 show an effect of subordinate subject number which means that singular overt subjects were processed faster than plural overt subjects. Block and previous segment RT also show significant effects.

As this model focused only on overt subjects, the congruency conditions were as follows: NP1 verbs with subordinate reference to the subject where congruent while with reference to the object were non-congruent. In sentences with NP2 verbs, subordinate subjects with reference to the subject were non-congruent while subordinate subjects referring to the object were congruent. Although this model did not show a significant effect of congruency, the positive sign in the estimate indicates that congruent sentences were processed slightly slower than the non-congruent ones with overt pronouns. No interaction between conditions was found in this model. Hence, no further tests were performed.

Table 4.7: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of IC congruency and subordinate subject number fitted to log-transformed RTs for the overt subordinate subjects in the pronoun segment

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	5.737	0.3264	17.5761	< 0.0001 ***
verbbiasNP2	0.0192	0.0346	0.5537	0.584
ICcongruencycongruent	0.0112	0.0231	0.4855	0.6294
numbersingular	-0.1152	0.041	-2.8108	0.0085 **
Block	-0.0014	< 0.0001	-4.7184	< 0.0001 ***
logRT1	0.2176	0.0424	5.1321	< 0.0001 ***
ICcongruencycongruent: numbersingular	-0.0444	0.0349	-1.2704	0.2103

R Code: logpronounRT ~ verbbias + ICcongruency * number + Block + logRT1 + (1 | Subject) + (1 + number |Item)

Note: Significance codes = 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’

Note: verb bias = NP1, NP2; IC congruency = noncongruent, congruent; number = plural, singular

4.2.2 Results in the pronoun segment by pronominal form congruency

The second part of the analysis considered congruency by form as one of its conditions. Congruency by form was defined as the agreement between the pronominal form of the subordinate subject (null/overt) and its anaphoric reference with the main sentence (subject/object). Congruent conditions were null subordinate pronouns referring to the subject of the previous sentence and overt subordinate pronouns referring to the object of the main sentence. Since congruency in this analysis was with respect to pronominal form and not IC bias, Neutral verbs were included in the data.

The analyzed conditions in the models reported below were verb bias (NP1/NP2/Neutral), pronoun form (null/overt), pronoun number (sg./pl.) and, pronominal form congruency. Log-transformed RTs of pronominal form in congruent and non-congruent conditions with plural and singular subordinate subjects are illustrated in Figure 4.3.

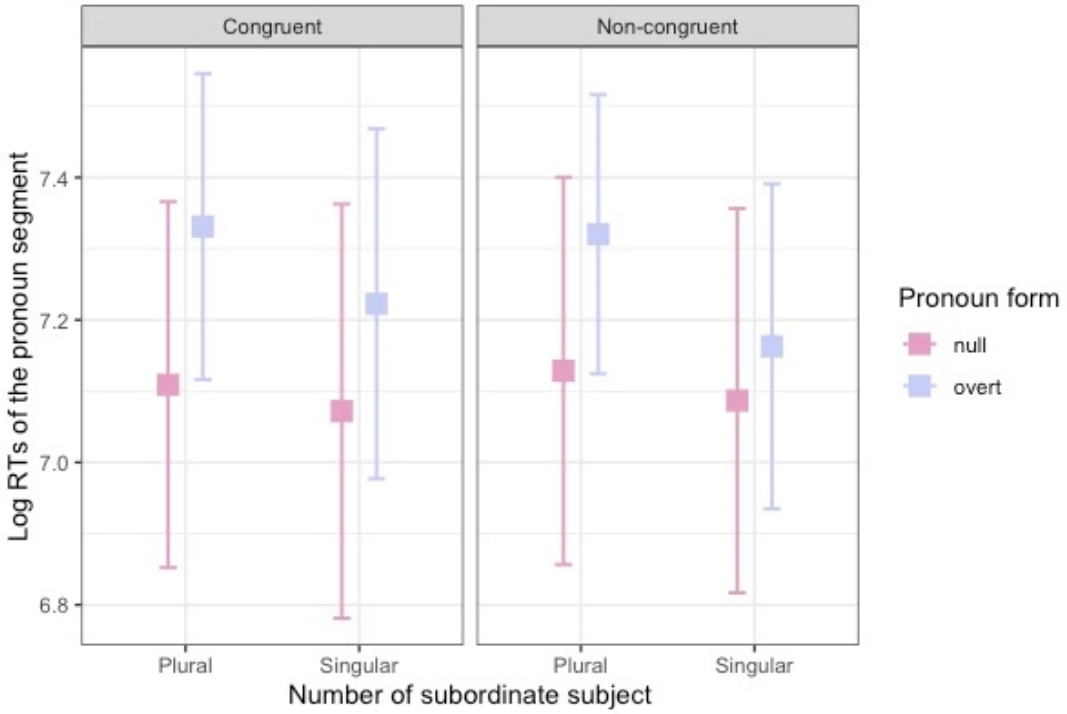

Figure 4.3: Log-transformed RTs of the pronoun segment in pronominal form congruent and non-congruent contexts by subject number (sg./pl.) conditions. Error bars represent standard deviation.

Since the pronoun segment differs in length according to whether it has a null or an overt pronoun, it was expected that RTs would be longer for overt subjects. In Figure 4.3 we can also see that across conditions plural subjects were processed slower than singulars.

To fully analyze the data, a linear mixed effects regression model was fitted taking the log-transformed RTs in the pronoun segment as the response variable with the interaction of congruency by form, verb bias (NP1/NP2/Neutral) and, subordinate subject number (sg./pl.). The model also included a by-item random intercept and a by-subject random slope for pronominal form by subject number. Models with more complex random structure did not reach significance level or they failed to converge. The coefficients of the fitted model are presented in Table 4.8.

Table 4.8: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of congruency by pronominal form and subordinate subject number fitted to log-transformed RTs in the pronoun segment

	Estimate	Std. Error	*t*-value	*p*-value

(Intercept)	5.0504	0.2305	21.9122	< 0.0001***
verbbiasNP2	0.0412	0.0448	0.9203	0.3604
verbbiasNeutral	0.0389	0.0453	0.8583	0.3934
formcongruencynoncongruent	0.0449	0.0271	1.6588	0.0974
numbersingular	-0.0904	0.0271	-3.3401	0.0009 ***
pronounovert	0.1624	0.0137	11.8411	< 0.0001***
Block	-0.0013	< 0.0001	-6.2432	< 0.0001***
logRT1	0.2828	0.0297	9.5228	< 0.0001***
verbbiasNP2: formcongruencynoncongruent	-0.0689	0.0372	-1.8534	0.0641
verbbiasNeutral: formcongruencynoncongruent	-0.0442	0.0379	-1.1682	0.2430
verbbiasNP2:numbersingular	-0.0442	0.0367	-1.2031	0.2292
verbbiasNeutral:numbersingular	0.0467	0.0395	1.1829	0.2371
formcongruencynoncongruent:number singular	-0.0777	0.0373	-2.0869	0.0371 *
verbbiasNP2: formcongruencynoncongruent:number singular	0.1181	0.0518	2.2813	0.0227 *
verbbiasNeutral: formcongruencynoncongruent:number singular	0.055	0.0544	1.0106	0.3124

R Code: logpronounRT ~ verbbias * formcongruency * number + pronoun + Block + logRT1 + (1 + pronoun * number|Subject) + (1|Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2, Neutral; form congruency = congruent, noncongruent; number = plural, singular; pronoun = null, overt

The results of the model showed a significant effect of subject number. As seen in the first analysis, singular subjects were processed faster than plurals. Pronominal form had a significant effect as well. This means overt pronouns had slower RTs. In the same fashion as the first analysis, Block and previous segment RT also showed significant effects. This model

showed two interactions: a two-way interaction between congruency, and pronoun number and a three-way interaction between verb bias, congruency by form, and pronominal number. As a first step to further examine the nature of this interaction, the data set was split and analyzed with null and overt pronouns separately.

4.2.2.1 Results for null subjects by pronominal form congruency

This part of the analysis focuses on null subordinate subjects only. Figure 4.4 shows the log-RTs of null subjects IC verb bias conditions in pronominal form congruent and non-congruent contexts.

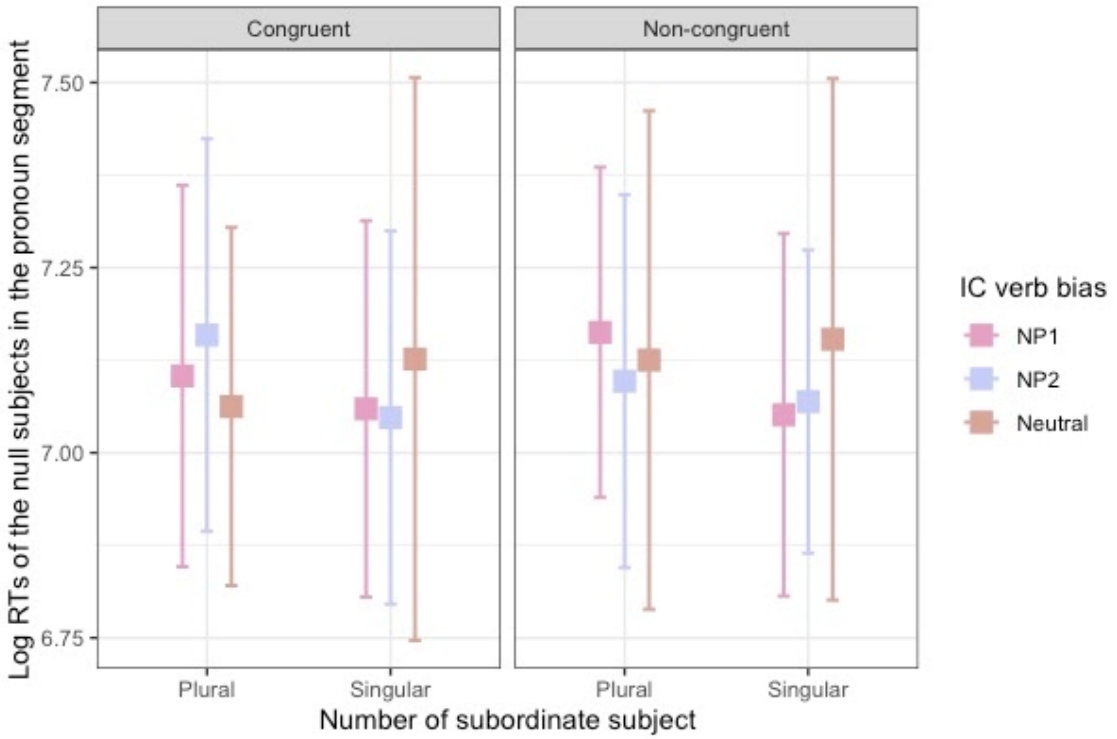

Figure 4.4: Log-transformed RTs of null pronouns in the pronoun segment in pronominal form congruent and non-congruent contexts by IC verb bias (NP1/NP2/Neutral) and subject number (sg./pl.) conditions. Error bars represent standard deviation.

The latter figure shows that in the congruent condition of pronominal form, i.e., when null subordinate pronouns refer to the subject of the main sentence, plural pronouns were processed slower than singulars in NP1 and NP2 biased sentences. By contrast, with the Neutral verbs, singular pronouns show longer RTs. For the non-congruent condition of

pronominal form, i.e., null subordinate subjects referring to the object of the main sentence, plural subjects show longer reaction times than singulars with NP1 and NP2 biased verbs, but not with Neutral verbs.

From Figure 4.4 we can also observe that IC verb bias has diverse results across conditions, hence in order to investigate the effects and significance of these results, a linear mixed effects regression model was fitted. The log-transformed RTs of null pronouns in this segment were fitted in a linear mixed effects regression model with the interaction of pronominal form congruency, verb bias (NP1/NP2/Neutral) and subordinate subject number (sg./pl.). This model also included a by-subject random intercept and a by-item random slope for subordinate subject number. Table 4.9 shows the coefficients from this model.

Table 4.9: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of verb bias, congruency by pronominal form and subordinate subject number fitted to log-transformed RTs for null pronouns in the pronoun segment

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	4.8302	0.3261	14.8107	< 0.0001 ***
verbbiasNP2	0.0637	0.056	1.1366	0.2598
verbbiasNeutral	0.0297	0.0577	0.5146	0.6084
formcongruencynoncongruent	0.0941	0.0408	2.3097	0.0213 *
numbersingular	-0.0342	0.0534	-0.6397	0.5243
logRT1	0.3059	0.0424	7.2169	< 0.0001 ***
Block	-0.0014	< 0.0001	-4.4244	< 0.0001 ***
verbbiasNP2:formcongruency noncongruent	-0.1295	0.0551	-2.351	0.0191 *
verbbiasNeutral:formcongruency noncongruent	-0.0351	0.0568	-0.6177	0.5371
verbbiasNP2:numbersingular	-0.1014	0.0723	-1.4031	0.1651
verbbiasNeutral:numbersingular	0.0851	0.0773	1.0997	0.2746

formcongruencynoncongruent:number singular	-0.093	0.0557	-1.6682	0.0959
verbbiasNP2: formcongruencynoncongruent:number singular	0.2049	0.0765	2.6787	0.0076 **
verbbiasNeutral: formcongruencynoncongruent:number singular	0.02	0.0829	0.2412	0.8095

R Code: logpronounRT ~ verbbias * formcongruency * number + logRT1 + Block + (1 | Subject) + (1 + number | Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2, Neutral; form congruency = congruent, noncongruent; number = plural, singular

For this part of the data, null subjects with reference to the subject of the previous sentence were considered congruent, and null subjects with reference to the object were non-congruent. This model showed an effect of congruency by pronominal form. This effect suggests that overall participants processed the non-congruent pronouns significantly slower than the congruent ones. This means that when null pronouns were referring to the object of the previous sentence, listeners' RTs were slower than when the null pronouns were referring to subjects. The temporal covariates Block and previous segment RT also showed main significant effects. The negative sign in the estimate for Block means that as the experiment was progressing, participants started reacting faster to the stimuli. The results of this model show two significant interactions. The three-way interaction shows that in the non-congruent condition of pronominal form, NP2 biased verbs were processed significantly slower than the intercept when the pronoun was plural.

4.2.2.2 Results for overt subjects by pronominal form congruency

In this part of the analysis, only overt subjects were analyzed based on their interaction with pronominal form congruency, verb bias (NP1/NP2/Neutral), and subordinate subject number.

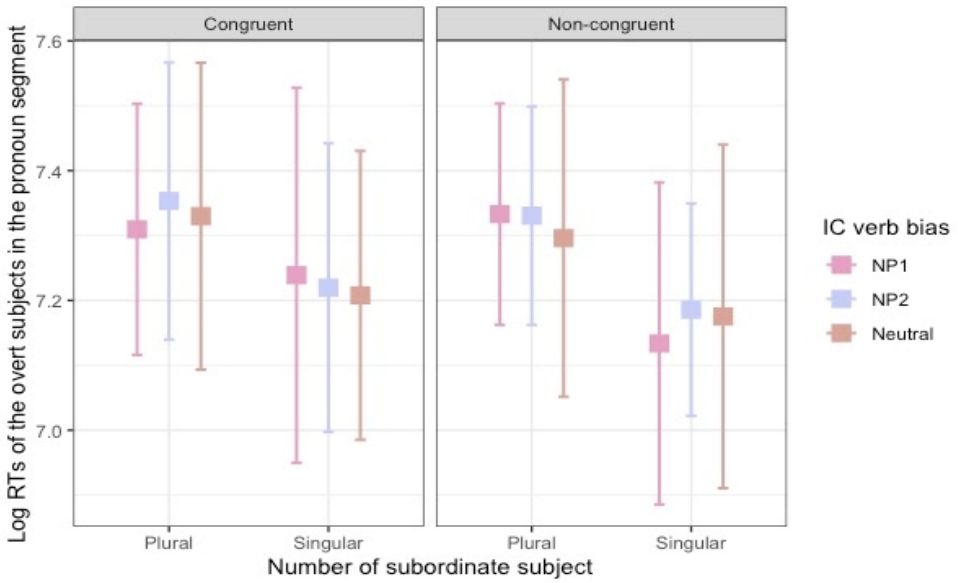

Figure 4.5: Log-transformed RTs of overt pronouns in the pronoun segment in pronominal form congruent and non-congruent contexts by IC verb bias (NP1/NP2/Neutral) and subject number (sg./pl.) conditions. Error bars represent standard deviation

Figure 4.5 shows that across conditions, plural subjects were processed slower than singulars, nevertheless the differences are minimal. To investigate significant effects, these conditions were fitted in a linear mixed effects regression model where they interacted with log-transformed RTs. Additionally, a by-subject random intercept and a by-item random slope for pronominal form congruency by subordinate subject number were included. Table 4.10 shows the coefficients from this model.

Table 4.10: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of verb bias, congruency by pronominal form and subordinate subject number fitted to log-transformed RTs for overt pronouns in the pronoun segment

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	5.4066	0.2666	20.2831	< 0.0001 ***
verbbiasNP2	0.0301	0.0533	0.5642	0.5754
verbbiasNeutral	0.0244	0.0535	0.4551	0.6512
formcongruencynoncongruent	-0.0073	0.0349	-0.2107	0.8338
numbersingular	-0.1058	0.0554	-1.9092	0.0629
logRT1	0.2613	0.0344	7.6018	< 0.0001 ***

Block	-0.0012	< 0.0001	-4.992	< 0.0001 ***
verbbiasNP2:formcongruency noncongruent	-0.0172	0.0481	-0.3574	0.7221
verbbiasNeutral: formcongruencynoncongruent	-0.0299	0.049	-0.6095	0.5445
verbbiasNP2: numbersingular	-0.0419	0.0772	-0.5427	0.5902
verbbiasNeutral:numbersingular	0.0035	0.0792	0.0447	0.9645
formcongruencynoncongruent: numbersingular	-0.0702	0.0473	-1.4816	0.1421
verbbiasNP2: formcongruencynoncongruent: numbersingular	0.077	0.0658	1.1692	0.2457
verbbiasNeutral: formcongruencynoncongruent: numbersingular	0.054	0.0694	0.7778	0.4386

R Code: logpronounRT ~ verbbias * congruency_by_form * pronoun_number + logRT1+ Block + (1 | Subject) + (1 + congruency_by_form * pronoun_number | Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2, Neutral; form congruency = congruent, noncongruent; number = plural, singular

This analysis did not reveal significant effects or interactions; hence no further tests were performed.

4.2.3 Results in the spill-over segment by IC congruency

To catch possible spill-over or late effects, another set of analyses examined the RTs in the segment following the pronoun segment (spill-over segment henceforth). The spill-over segment contained the complement of the verb in the subordinate sentence. The analyses were performed in the same fashion as in the pronoun segment. First, the results of the models that focused on IC congruency were reported and secondly, place the results of the models that focused on pronominal form congruency.

For the first analysis, the conditions considered were verb bias (NP1/NP2), subordinate subject pronominal form (null/overt), subordinate subject number (sg./pl.) and, IC congruency which was the combination of IC bias and subordinate subject reference. It is important to note that sentences with Neutral verbs were excluded, the data set only considered strongly biased verbs (NP1/NP2).

Log-transformed RTs of the spill-over segment are illustrated in Figure 4.6. Overall, plural subordinate subjects were processed slower than singular subjects. Also, NP1 biased verbs showed longer RTs in this segment. Additionally, in both congruent and non-congruent conditions of IC, singular subjects seemed to be processed slower than plural subjects, regardless of the IC verb bias.

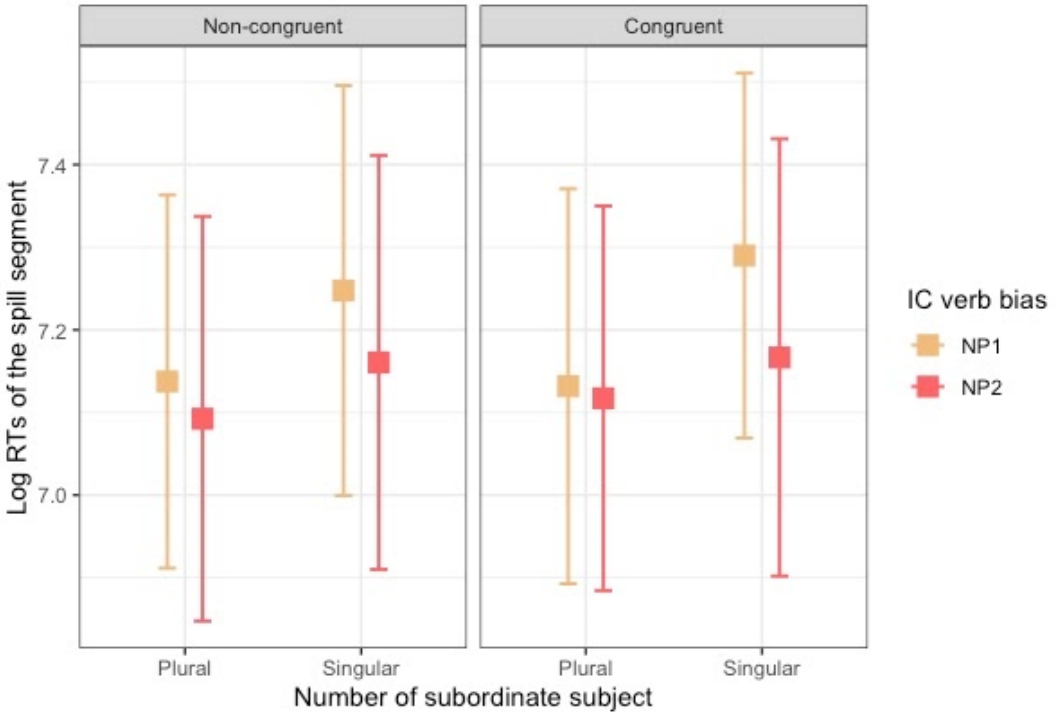

Figure 4.6: Log-transformed RTs of the spill-over segment in IC congruent and non-congruent contexts by verb bias (NP1/NP2) and number (sg./pl.) conditions. Error bars represent standard deviation.

A linear mixed effects regression model was fitted taking the log-transformed RTs in the spill-over segment as the response variable with the interaction of IC congruency, pronominal form (null/overt), verb bias (NP1/NP2), and subordinate subject number

(sg./pl.). The model also included a by-subject random intercept and a by-item random slope for IC congruency by subordinate subject number. Models with more complex random structure did not reach significance level or failed to converge. The coefficients of the fitted model are presented in Table 4.11.

Table 4.11: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of verb bias, IC congruency, pronominal form and subordinate subject number fitted to log-transformed RTs in the spill-over segment

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	6.038	0.1865	32.3819	< 0.0001 ****
verbbiasNP2	-0.0847	0.0625	-1.3554	0.1837
ICcongruencycongruent	-0.0293	0.039	-0.7523	0.4549
numbersingular	0.15	0.064	2.3424	0.024 *
pronounovert	-0.0203	0.0315	-0.6456	0.5187
Block	-0.0013	< 0.0001	-6.2568	< 0.0001 ****
logRT2	0.1643	0.0245	6.7015	< 0.0001 ****
verbbiasNP2: ICcongruencycongruent	0.0588	0.0534	1.1002	0.2758
verbbiasNP2:numbersingular	-0.0032	0.0883	-0.0364	0.9711
ICcongruencycongruent:number singular	0.0654	0.0584	1.1193	0.2675
verbbiasNP2:pronounovert	0.0503	0.0424	1.1868	0.2357
ICcongruencycongruent: pronounovert	0.0425	0.043	0.989	0.323
numbersingular:pronounovert	-0.0731	0.0445	-1.6432	0.1007
verbbiasNP2: ICcongruencycongruent:number singular	-0.109	0.0792	-1.3758	0.1745
verbbiasNP2: ICcongruencycongruent: pronounovert	-0.0672	0.059	-1.1385	0.2553

verbbiasNP2:numbersingular: pronounovert	-0.0209	0.06	-0.3475	0.7283
ICcongruencycongruent: numbersingular:pronounovert	-0.0112	0.0627	-0.1781	0.8587
verbbiasNP2: Iccongruencycongruent:number singular:pronounovert	0.0579	0.0846	0.6843	0.494

R Code: logspillRT ~ verbbias * ICcongruency * number * pronoun + Block + logRT2 + (1 | Subject) + (1 + ICcongruency * number | Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '

Note: verb bias = NP1, NP2; congruency IC = nonconguent, congruent; pronoun = null, overt; number = plural, singular

The results of this model showed a small effect of subordinate subject number. This means that in the spill-over segment, participants reacted significantly slower to singular subordinate subjects than to plural subordinate subjects. Regarding congruency, even though it did not show a significant effect, the positive sign in the estimate indicated that congruent sentences were processed slightly faster than the non-congruent ones. The temporal covariates Block and previous segment RT showed highly significant effects in this model. The negative sign in the Block estimate indicates that as the task was progressing, participants' RTs became significantly faster. This model did not show any interactions, hence further analysis was not required.

4.2.3.1 Results for null subjects by IC congruency

This analysis focuses only on null subordinate subjects in the spill-over segment. The data was analyzed by fitting a linear mixed effects regression model with the interaction of IC congruency and subordinate subject number. A by-subject random intercept and a by-item random slope for subordinate subject number were also included. Table 4.12 shows the results of this model.

Table 4.12: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of verb bias, IC congruency, and subordinate subject number fitted to log-transformed RTs of null subjects in the spill-over segment

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	6.3013	0.2119	29.7332	< 0.0001 ***
verbbiasNP2	-0.1032	0.0641	-1.6096	0.1163
ICcongruencycongruent	-0.0528	0.0293	-1.8037	0.0721
numbersingular	0.1349	0.0598	2.2556	0.0297 *
Block	-0.0014	< 0.0001	-4.82	< 0.0001 ***
logRT2	0.1299	0.0282	4.6147	< 0.0001 ***
verbbiasNP2:ICcongruencycongruent	0.0815	0.0398	2.0506	0.041*
verbbiasNP2:numbersingular	0.0089	0.0818	0.1086	0.9141
ICcongruencycongruent: numbersingular	0.0909	0.0422	2.1515	0.0321 *
verbbiasNP2:ICcongruencycongruent: numbersingular	-0.1295	0.0562	-2.3042	0.0218 *

R Code: logspillRT ~ verbbias * ICcongruency * number + Block + logRT2 + (1 | Subject) + (1 + number | Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2; congruency IC = nonconguent, congruent; number = plural, singular

The table shows a main significant effect of subordinate subject number which indicates that in the spill-over segment, singular null subjects were processed slower than plurals. Furthermore, Block and previous segment RT also show highly significant effects. Regarding possible interactions, this model presented a two-way interaction between IC congruency and subordinate subject number and a three-way interaction between verb bias, IC congruency, and subordinate subject number. In order to further examine these interactions, a model with the data split into IC congruent and non-congruent null subjects only was also performed. In the model with only congruent null subjects, there was an effect of subordinate subject number (β = <0.0001, SE = <0.0001, t = 3.081, p = 0.0046) which

indicated that singular congruent null pronouns in the spill-over segment were processed slower than plurals. Also, effects of Block and previous segment RT were found. In the case of non-congruent null subjects, the results showed a smaller effect of number (β = <0.0001, SE = <0.0001, t = 2.437, p = 0.0215). Neither of these models showed interactions. The log transformed RTs of singular and plural null subjects in congruent and non-congruent conditions are illustrated in Figure 4.7.

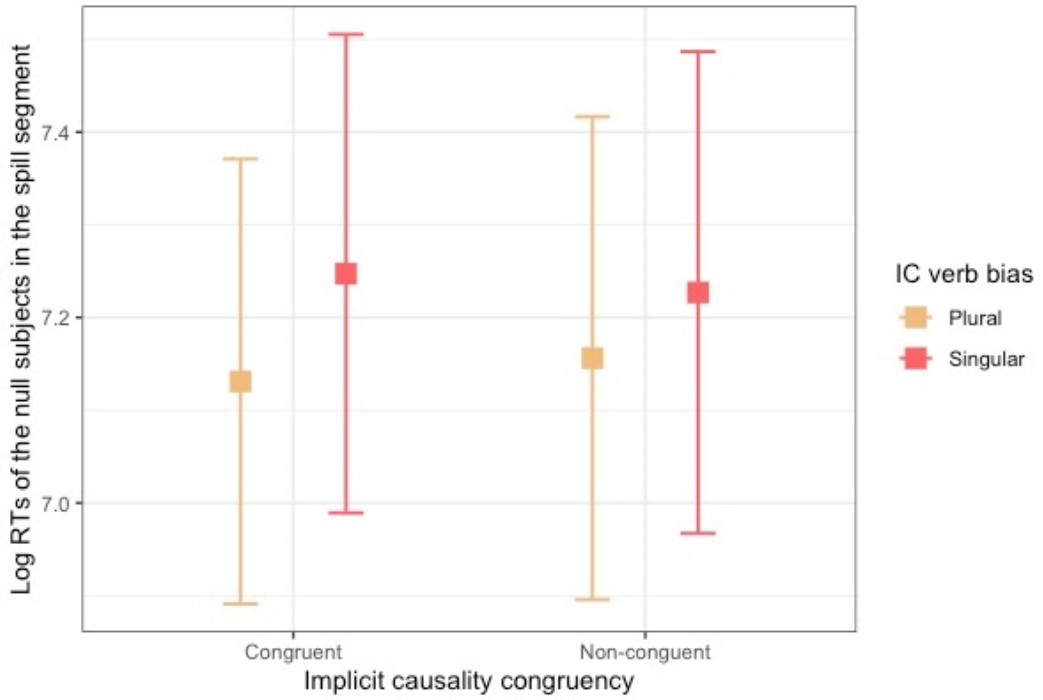

Figure 4.7: Log-transformed RTs of the spill-over segment in IC congruent and non-congruent contexts by subordinate subject number (sg./pl.). Error bars represent standard deviation

4.2.3.2 Results for overt subjects by IC congruency

A similar analysis was also performed for overt subjects taking only the interaction of IC congruency and subordinate subject number as the independent variables. This linear mixed effects regression model included a by-subject random intercept and a by-item random slope for the interaction of IC congruency and subordinate subject number. Table 4.13 shows the results of the model.

Table 4.13: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of verb bias, IC congruency, and subordinate subject number fitted to log-transformed RTs of overt subjects in the spill-over segment

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	4.9949	0.3288	15.1903	< 0.0001 ***
verbbiasNP2	-0.0078	0.0589	-0.1318	0.8961
ICcongruencycongruent	0.0304	0.0379	0.8026	0.4291
numbersingular	0.1173	0.0735	1.5946	0.1213
Block	-0.001	< 0.0001	-2.8978	0.004 **
logRT2	0.2972	0.0435	6.8303	< 0.0001 ***
verbbiasNP2:ICcongruencycongruent	-0.016	0.0519	-0.3091	0.7596
verbbiasNP2:numbersingular	-0.0509	0.1006	-0.5065	0.6164
ICcongruencycongruent: numbersingular	0.0247	0.0731	0.3385	0.7375
verbbiasNP2:ICcongruencycongruent: numbersingular	-0.0258	0.0986	-0.2615	0.7957

R Code: logspillRT ~ verbbias * ICcongruency * number + Block + logRT2 + (1 | Subject) + (1 + ICcongruency * number | Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2; congruency IC = non-congruent; congruent; number = plural, singular

This model did not show significant interactions. As in previous analyses, only Block and previous segment RT indicated significant effects, hence no further analyses were performed.

4.2.4 Results in the spill-over segment by pronominal form congruency

In the spill-over segment, an analysis with congruency by pronominal form was also performed. Congruency by form is the combination of pronominal form (null/overt) and the reference of this pronoun (subject/object). A linear mixed effects model was fitted with the interaction of verb bias (NP1/NP2/Neutral), subordinate subject number (sg./pl.), pronoun form (null/overt), and congruency by pronominal form. A by-subject random intercept and

a by-item random slope for subordinate subject number were also included. Since congruency in this analysis was related to pronominal form rather than IC bias, Neutral verbs were included in the data. Log-transformed RTs of pronominal form in congruent and non-congruent conditions with plural and singular subordinate subjects are illustrated in Figure 4.8.

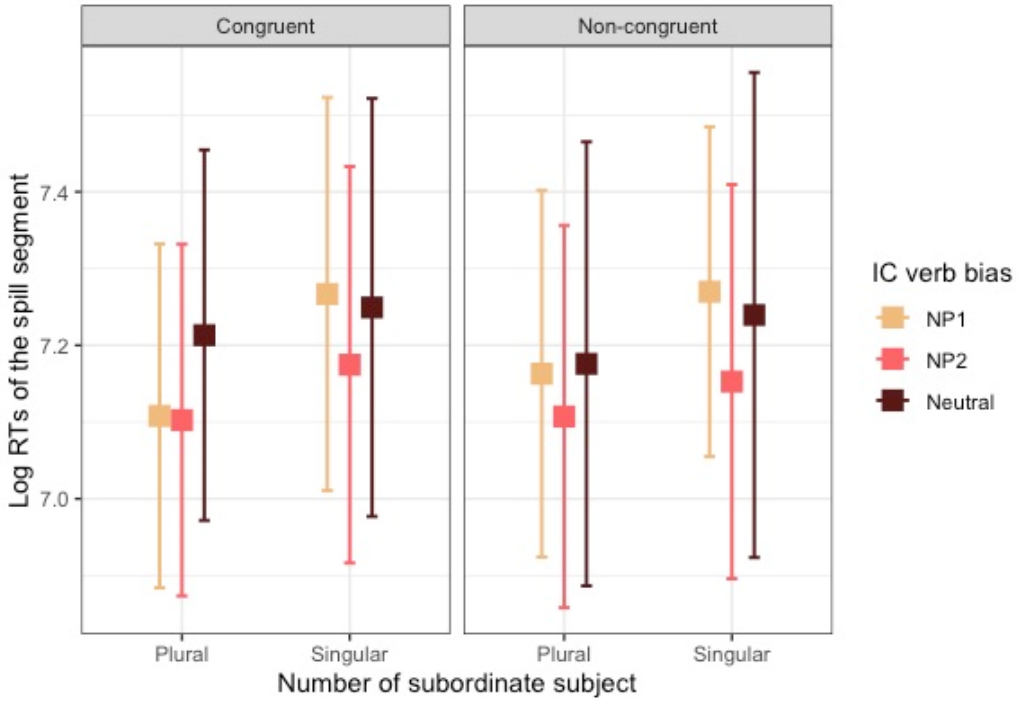

Figure 4.8: Log-transformed RTs of the spill-over segment in pronominal form congruent and non-congruent contexts by subject number (sg./pl.) and IC bias (NP1/NP2/Neutral) conditions. Error bars represent standard deviation.

In Figure 4.8 we can observe that comparing the conditions of IC verb bias in both form congruent and non-congruent conditions, participants reacted slower with singular subjects than with plurals. In order to fully examine these data, a linear mixed effects model was fitted with the interaction of verb bias (NP1/NP2/Neutral), subordinate subject number (sg./pl.), pronoun form (null/overt), and congruency by pronominal form. A by-subject random intercept and a by-item random slope for subordinate subject number were also included. Models with more complex random structure did not reach significance level or they failed to converge. The coefficients of the fitted model are presented in Table 4.14.

Table 4.14: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of verb bias, pronominal form congruency, pronoun form and subordinate subject number fitted to log-transformed RTs in the spill-over segment.

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	6.0897	0.1577	38.6154	< 0.0001 ***
verbbiasNP2	-0.053	0.0637	-0.8315	0.4088
verbbiasNeutral	0.1353	0.0638	2.1197	0.0379 *
formcongruencynoncongruent	0.0445	0.0322	1.3796	0.168
numbersingular	0.2235	0.0629	3.5547	< 0.0001 ***
pronounovert	0.0156	0.0319	0.4882	0.6255
Block	-0.0014	< 0.0001	-7.6538	< 0.0001 ***
logRT2	0.1532	0.0208	7.3683	< 0.0001 ***
verbbiasNP2:formcongruency noncongruent	-0.0127	0.0442	-0.2873	0.7739
verbbiasNeutral:formcongruency noncongruent	-0.0775	0.0461	-1.6813	0.093
verbbiasNP2:numbersingular	-0.0789	0.0877	-0.8998	0.3716
verbbiasNeutral:numbersingular	-0.2602	0.0925	-2.8117	0.0063 **
formcongruencynoncongruent: numbersingular	-0.0879	0.0465	-1.8912	0.0589
verbbiasNP2:pronounovert	0.0211	0.0434	0.4856	0.6273
verbbiasNeutral:pronounovert	-0.0352	0.047	-0.7484	0.4544
formcongruencynoncongruent: pronounovert	-0.0354	0.0457	-0.7742	0.439
numbersingular:pronounovert	-0.1539	0.0465	-3.3084	0.001 ***
verbbiasNP2:formcongruency noncongruent:numbersingular	0.0459	0.0628	0.73	0.4656
verbbiasNeutral:formcongruency noncongruent:numbersingular	0.1225	0.0706	1.7356	0.0829
verbbiasNP2:formcongruency noncongruent:pronounovert	-0.0024	0.0622	-0.0392	0.9687

verbbiasNeutral:formcongruency noncongruent:pronounovert	-0.0364	0.0685	-0.5308	0.5957
verbbiasNP2:numbersingular: pronounovert	0.0661	0.0628	1.0535	0.2923
verbbiasNeutral:numbersingular: pronounovert	0.1801	0.0715	2.5208	0.0118 *
formcongruencynoncongruent: numbersingular:pronounovert	0.1617	0.0657	2.4609	0.014 *
verbbiasNP2:formcongruency noncongruent:numbersingular: pronounovert	-0.1203	0.0886	-1.3577	0.1748
verbbiasNeutral:formcongruency noncongruent:numbersingular: pronounovert	-0.0734	0.1012	-0.7255	0.4683

R Code: logspillRT ~ verbbias * formcongruency * number * pronoun + Block + logRT2 + (1 | Subject) + (1 + number | Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2, Neutral; form congruency = congruent, non-congruent; number = plural, singular; pronoun = null, overt

The results of this model showed two significant effects, one for Neutral verbs and one for subordinate subject number. The positive sign in the estimate of Neutral IC verb bias means that participants reacted significantly slower with these kinds of verbs than with NP1 verbs. Since Neutral verbs do not have a "strong" bias it makes sense that participants take longer to process these sentences. On the other hand, the positive sign in the estimate of the singular condition of subordinate subjects means that participants reacted significantly slower with these subjects than with plurals. Block and previous segment RT also showed significant effects. The negative sign in the estimate of Block shows that as the experiment progressed, participants reacted faster. Regarding possible interactions this model shows a highly significant interaction between singular subordinate subjects and overt pronouns (β = <0.0001, SE = <0.0001, t = -3.308, p = 0.0001); an interaction between Neutral verbs and singular subordinate subjects (β = <0.0001, SE = <0.0001, t = -2.812, p = 0.0063); an interaction between Neutral verbs, singular subordinate subjects and overt subjects (β =

<0.0001, SE = <0.0001, t = 2.521, p = 0.0118); and finally an interaction between congruent contexts, singular subjects and overt pronouns (β = <0.0001, SE = <0.0001, t = 2.461, p = 0.014). In order to examine these interactions, the data was split into null and overt subjects.

4.2.4.1 Results of null subjects by pronominal form congruency

This analysis focuses only on null subordinate subjects in the spill-over segment. The data was analyzed by fitting a linear mixed effects regression model with the interaction of pronominal form congruency, verb bias and subordinate subject number. A by-subject random intercept and a by-item random slope for subordinate subject number were also included. Table 4.15 shows the results of this model.

Table 4.15: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of verb bias, pronominal form congruency, and subordinate subject number fitted to log-transformed RTs for null subjects in the spill-over segment

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	6.2245	0.1886	33.0008	< 0.0001 ***
verbbiasNP2	-0.0493	0.0665	-0.7412	0.4619
verbbiasNeutral	0.1392	0.0666	2.0901	0.0415 *
formcongruencynoncongruent	0.0557	0.0303	1.8402	0.0663
numbersingular	0.228	0.0657	3.4702	0.0011 **
Block	-0.0014	< 0.0001	-5.6625	< 0.0001 ***
logRT2	0.1331	0.0251	5.2953	< 0.0001 ***
verbbiasNP2:formcongruency noncongruent	-0.026	0.041	-0.6334	0.5268
verbbiasNeutral:formcongruency noncongruent	-0.0844	0.0429	-1.9685	0.0496 *
verbbiasNP2:numbersingular	-0.0826	0.091	-0.908	0.3682
verbbiasNeutral:numbersingular	-0.2196	0.0963	-2.2814	0.0262 **
formcongruencynoncongruent: numbersingular	-0.0947	0.0437	-2.1674	0.0307 **

verbbiasNP2:formcongruency noncongruent:numbersingular	0.0539	0.0584	0.9244	0.3557
verbbiasNeutral:formcongruency noncongruent:numbersingular	0.0735	0.0676	1.0881	0.2771

R Code: logspillRT ~ verbbias * formcongruency * number + Block + logRT2 + (1 | Subject) + (1 + number |Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2, Neutral; form congruency = congruent, non-congruent; number = plural, singular

These results show an effect of Neutral verbs, which means that with sentences that contained a neutral verb, participants reacted significantly slower in the case of the null subjects. There is also an effect of singular subordinate subjects which indicates that for the null subjects in the spill-over segment when they were singular, participants processed them significantly slower than plural subjects. As in previous analyses, Block and previous segment RT also show significant effects. In terms of the possible interactions the model showed two: one between singular subordinate pronouns and neutral verbs and another one between non-congruent contexts and singular subordinate subjects.

4.2.4.1 Results of overt subjects by pronominal form congruency

A similar analysis was performed for overt subjects only taking the interaction of pronominal form congruency, subordinate subject number and verb bias. This linear mixed effects regression model included a by-subject random intercept and a by-item random slope for subordinate subject number. Table 4.16 shows the results of the model.

Table 4.16: Summary of the fixed-effects from the linear mixed-effects regression model with interaction of verb bias, pronominal form congruency, and subordinate subject number fitted to log-transformed RTs for overt subjects in the spill-over segment

	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	5.2799	0.2697	19.5801	< 0.0001 ***
verbbiasNP2	-0.0018	0.0632	-0.0289	0.9771
verbbiasNeutral	0.0919	0.0685	1.342	0.1849

formcongruencynoncongruent	0.0221	0.034	0.6495	0.5163
numbersingular	0.0927	0.0664	1.3948	0.1688
Block	-0.0012	< 0.0001	-3.9986	< 0.0001 ***
logRT2	0.2609	0.0355	7.3481	< 0.0001 ***
verbbiasNP2:formcongruency noncongruent	-0.0373	0.0463	-0.8056	0.4208
verbbiasNeutral:formcongruency noncongruent	-0.1293	0.0536	-2.4131	0.0162 *
verbbiasNP2:numbersingular	-0.0301	0.0912	-0.3304	0.7425
verbbiasNeutral:numbersingular	-0.05	0.0975	-0.5125	0.6103
formcongruencynoncongruent:number singular	0.0649	0.0497	1.3051	0.1924
verbbiasNP2:formcongruency noncongruent:numbersingular	-0.0587	0.0669	-0.8774	0.3807
verbbiasNeutral:formcongruency noncongruent:numbersingular	0.0471	0.077	0.6119	0.5408

R Code: logspillRT ~ verbbias * formcongruency * number + Block + logRT2 + (1 | Subject) + (1 + number | Item)

Note: Significance codes = 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Note: verb bias = NP1, NP2, Neutral; form congruency = congruent, non-congruent; number = plural, singular

The results of this model show, as in previous analyses, effects for Block and previous segment RT. Regarding possible interactions, only a small significant effect of the interaction between Neutral verbs and non-congruent contexts was found.

Chapter 5: General discussion

The current study investigated the effects of implicit causality information and pronominal form, i.e., null and overt pronouns, in anaphora resolution in Spanish. An eye-tracking study and a self-paced listening task were used with adult monolingual speakers of Mexican Spanish to assess two research questions. The first research question was whether implicit causality has an effect on the resolution of pronominal subjects in Spanish. The second research question concerned whether this effect was modulated by pronominal form, i.e., null vs. overt subjects. In addition, we investigated whether there were differences in the processing of implicit causality in by-null and by-overt pronoun analyses.

5.1 Summary of the results

In the eye-tracking experiment, we measured the eye-gaze patterns of adult speakers of Mexican Spanish with respect to the realization of subordinate pronominal subjects (null or overt) in contexts that had implicit causality biased verbs (NP1 or NP2). The results showed that with null pronouns, participants consistently looked at the first-mentioned entity regardless of the bias of the verb. In contrast, there was a significant effect of implicit causality when the sentences had an overt subject. In this case, when the main verb of the sentence was NP1 biased, participants looked at the second-mentioned entity (object) and when the verb was NP2 biased they looked at the first-mentioned entity (subject), this is to say, we found an inverse pattern relative to what would have been expected based on verb bias. We will return to these results below.

In the case of the self-paced listening task, two analyses were performed: one considering congruency by implicit causality and another one considering congruency by pronominal form. Overall, overt pronouns were processed significantly slower than null pronouns. This might be an effect of segment length since for null pronouns only a verb is presented, while for overt pronouns it is the phonetic realization of the pronoun and a verb.

In the first analysis, implicit causality congruency was defined as the link between verb bias (NP1/NP2) and the reference of the subordinate subject (subject/object of the main sentence), determined by number morphology. The results showed evidence for the effects of implicit causality information in sentences with null pronouns. Specifically, when the reference of the null subject was incongruent with the implicit causality bias, there was a significant delay in the participants' listening times, compared to congruent sentences. This congruency effect was not found in sentences with overt pronouns.

The second analysis, relative to the form of the pronoun, treated form congruency as the relationship between the form of the subordinate subject (null/overt) and its reference (subject/object of the main sentence). The congruent condition consisted of null pronouns referring to subjects and overt pronouns referring to objects, whereas the incongruent condition consisted of null pronouns referring to objects and overt pronouns referring to subjects. The results of this analysis showed a significant form congruency effect for null pronouns, but not for overt pronouns. This means that participants reacted slower when the antecedent of a null pronoun was the object of the sentence than when it was the subject. In contrast, with overt subjects there was no penalty in the participants' listening times when the antecedent of the pronoun was the subject of the previous sentence.

Thus, relative to our first research question, we can conclude that in the self-paced listening task, we found that null pronouns in Spanish are sensitive to implicit causality, whereas overt pronouns are not. Our second research question asked whether the form of the pronoun modulated the effect of implicit causality. We did not find interactions between verb bias and pronominal form, which suggests that these two conditions by themselves do not conflict.

Relative to the timing of the effect of implicit causality, two accounts have been proposed: 1) the integration account (Garnham et al., 1996) which suggests that the use of implicit causality occurs only after the semantic information of the second clause is

integrated with the first clause, and 2) the focusing account (Greene & McKoon, 1995; McKoon et al. 1993) which claims that implicit causality information can act on comprehension much more rapidly, in the beginning of the *because*-clause or in the verb itself, for instance. In our study, the effects of implicit causality, when found, emerged in the pronoun segment, hence our findings support the focusing account (see Koorneef & Van Berkum, 2006; Pyykkönen & Järvikivi, 2010; Järvikivi et al., 2017 for similar results).

Please note that even though our two experiments included null and overt pronouns, the experimental items differed. Whereas in Experiment 1 the sentences were globally ambiguous, in Experiment 2 they were not. More precisely, in Experiment 2 we had number disambiguation, that is, the subject of the main sentence was singular while the object was plural, or vice versa. Hence, the morphology of the subordinate verb was congruent in number with only one of the arguments in the main sentence.

5.2 Resolution of null subjects in Spanish

5.2.1 Effect of implicit causality in null subjects

Recall from the literature review, that, in Spanish, the effect of implicit causality has been studied and shown with null pronouns (Goikoetxea et al., 2008; Hartshorne, Sudo & Uruwashi, 2013). Our experiments, though, gave rise to conflicting results. On the one hand, our eye-tracking data suggests that regardless of IC information, in terms of attentional preferences, null pronouns in Spanish tend to prefer the first-mentioned entity. On the other hand, our findings in the self-paced listening task indicate that null pronouns are sensitive to implicit causality information during language processing.

5.2.2 Effect of pronominal form in null subjects

With respect to the effect of pronominal form, Carminati's (2002) Position of Antecedent Hypothesis (PAH) predicts that null pronouns would retrieve their antecedent from the

(highest) Spec IP antecedent, in other words, the subject of a sentence. However, Carminati (2002) used sentences with Subordinate-Main order in Italian. Chamorro et al., (2016) and Chamorro (2018) who used Main-Subordinate order in Spanish found that null pronouns did not have a clear preference toward the subject or the object. Differently from Chamorro et al. (2016) and Chamorro (2018), and in line with the PAH, our results showed the expected effect of form. More precisely, in our eye-tracking experiment we found a tendency in the looks to the first-mentioned than the second-mentioned character. This effect was stronger with subject-biased (NP1) verbs than with object-biased (NP2) verbs, however, the difference was not strong enough to reach significance. Moreover, in our self-paced listening task, when analyzing the pronoun segment, we found significant delays when a null pronoun retrieved its antecedent from an object instead of a subject. This effect could be attributed to PAH, but it could also be attributed to a first mention preference, or to the effect of implicit causality.

5.2.3 Interim summary null pronouns

To sum up, for null pronouns we can conclude that in Mexican Spanish, speakers showed a tendency to visually prefer the first-mention antecedent, nevertheless, as it was stated before, eye-tracking does not give answers about pronominal resolution. Relative to actual pronoun resolution during language processing, null subjects are prone to be disambiguated using implicit causality information and they are sensitive to reference incongruences.

In the literature review of this thesis, we discussed the theories proposed to explain how implicit causality and pronominal form, separately, interact with pronoun resolution in Spanish. Table 5.1 shows a summary of the results found for null pronouns. In Experiment 1, null pronouns showed a tendency to be visually linked to the first mentioned antecedent and this effect was greater with NP1 verbs than with NP2 verbs, however, the effect was not strong enough to be significantly different. In Experiment 2, we found that non-ambiguous

null pronouns were sensitive to implicit causality in real time language processing. Relative to the effects of form, in Experiment 1 and Experiment 2 we showed that, as proposed by Carminati (2002), null pronouns in Spanish tend to retrieve their antecedent from the subject of the previous sentence.

Table 5.1: Summary of significant effects of implicit causality and Position of Antecedent Hypothesis in null pronoun conditions

	Type of pronoun	Effect of IC bias	Followed PAH
Experiment 1: Visual world eye-tracking	Ambiguous null	Yes: with NP1 verbs	Yes
Experiment 2: Self-paced listening task	Non-ambiguous null	Yes	Yes

5.3 Resolution of overt subjects in Spanish

5.3.1 Effect of implicit causality in overt subjects

Moving on to the resolution of overt pronominal subjects, the results of the eye-tracking experiment showed an inverted implicit causality effect. We found that participants' looks pointed to the second-mentioned entity with NP1 verbs, and to the first-mentioned entity with NP2 verbs. One possible explanation for this unpredicted pattern is that speakers were relying on *implicit consequentiality*, the semantic counterpart of implicit causality. Implicit consequentiality, unlike implicit causality, focuses its attention on the *consequences* or effects of an action. Stewart, Pickering and Sandford (1998) showed that this bias affects pronoun interpretation in English, in both production and online reading tasks. They argued that implicit consequentiality has an effect only when additional cues that could potentially disambiguate a pronoun are lacking. In other words, when gender or number information is present, speakers would not need to use implicit consequentiality. It has been shown that

there is a close relationship between implicit causality and implicit consequentiality (Crinean & Garnham, 2004). In this sense, in a sentence like '*John frightened Bill…'* where the verb has a NP1 implicit causality bias, the implicit consequentiality bias would be NP2. Although implicit consequentiality is partially consistent with our results because our items in the eye-tracking experiment were ambiguous, Koornneef and Sanders (2012) showed that in Dutch, connectors have an influence on the use of this kind of semantic information. They showed that in sentences with the connector '*because'* implicit causality bias held, while in sentences linked with '*but'* and '*and*' implicit consequentiality was preferred. The sentences in our experiment were linked with the connector '*because*', hence, to this point implicit consequentiality cannot fully explain our interaction between verb bias and overt pronouns in the eye-tracking experiment.

A more plausible explanation for our results might be related with how sensitive overt pronouns are to less salient antecedents. Ariel (1990) claims that the more prominent an expression is, that is, the more content it carries the better it is at retrieving its reference from a less salient antecedent. Following this idea, in our experimental items semantic salience is given by the implicit causality bias, hence, for NP1 verbs, the least salient antecedent is the second-mentioned character and with NP2 it is the first-mentioned. In our results, we showed that the participants interpreted the overt pronoun referring to the least semantically salient antecedent (see Järvikivi et al., 2017 for more evidence about the role of semantic salience in anaphor resolution). It is worth pointing out that our participants were presented with null and overt conditions in the same task, so it is possible that they divided the labor of the two pronominal forms in terms of semantic salience, resulting in overt pronouns retrieving less salient antecedents.

In the self-paced listening task, we did not find significant effects of implicit causality for non-ambiguous overt pronouns. This is to say that regardless of the verb bias, our participants did not show any processing penalties. This could be partially explained by the

number disambiguation in these experimental items. In these items, one of the participants in the main sentence was matching in number with the subordinate subject, hence there was only one felicitous antecedent available for the pronoun. This disambiguation probably caused that our participants did not find inconsistencies in the subordinate clauses. In that sense, overt pronouns might be more likely than null pronouns to prompt shallow processing, which might have resulted in no immediate processing difficulty on the pronoun. This hypothesis does not assume that number marking masks or overrides implicit causality information. In fact, another possibility is that anaphoric forms are affected by different factors in different degrees. Kaiser and Trueswell (2008) showed that Finnish personal pronouns were differently sensitive to salience: whereas personal pronouns were sensitive to subjecthood, grammatical role information, Finnish demonstrative pronouns were sensitive to both grammatical role and sentence position (second mention). In the same way, overt pronouns in our experiment could be more sensitive to a larger variety of cues than null pronouns.

5.3.2 Effect of pronominal form in overt subjects

As far as the effect of form is concerned, our results do not support PAH as it was originally proposed by Carminati (2002), (i.e., the hypothesis that in null subject languages, overt pronouns are preferably assigned to objects).

The gazes in our eye-tracking experiment showed that overt pronouns were equally likely to be linked to first- and second-mentioned entities. In this sense, ambiguous overt pronouns seem to be flexible when retrieving a visual antecedent from a subject or an object. Our results are not consistent with Chamorro (2018) who found that ambiguous overt pronouns preferred very consistently an object antecedent.

In line with our eye-tracking experiment, our self-paced listening task did not show significant effects of pronominal form with non-ambiguous overt pronouns. Specifically,

when the overt pronoun was referring to the subject, our participants did not show any processing penalties. The results of this task also conflict with Chamorro's et al. (2016) findings for non-ambiguous overt pronouns. However, an explanation for these differences could be that our experimental items used causal clauses instead of temporal clauses.

5.3.3 Interim summary overt subjects

To sum up the results of our two experiments, overt pronouns in the eye-tracking experiment showed a strong effect of implicit causality but not in the predicted direction. This might be due to the fact that overt pronouns prefer the least semantically salient antecedent of a sentence and in our experimental items the least prominent character for NP1 verbs is the second-mentioned while for NP2 verbs is the first-mentioned. Therefore, we could argue that, in the eye-tracking experiment, overt pronouns showed to be more sensitive to discourse context than null pronouns, because with null pronouns participants were consistent in their preferences to the first-mentioned character regardless of the verb bias. In the self-paced listening task, overt pronouns did not show significant effects of implicit causality or pronominal form, which suggests that the disambiguation features of the pronoun, i.e., number mismatch, could have played a very important role in the processing of these subjects.

With respect to the theories proposed to affect pronoun resolution in Spanish, Table 5.2 shows the summary of our findings for overt pronoun conditions. First, in Experiment 1 we found an effect of implicit causality but in the opposite direction to what the verb bias predicted. In Experiment 2, we did not find effects of implicit causality. Relative to Carminati's PAH (2002), which suggests that overt pronouns prefer to retrieve their antecedent from object antecedents, our results did not support this hypothesis. Furthermore, we found that overt pronouns were relatively flexible, and they showed sensitivity to different factors in different degrees.

Table 5.2: Summary of significant effects of implicit causality and Position of Antecedent Hypothesis in overt pronoun conditions

	Type of pronoun	Effect of IC bias	Followed PAH
Experiment 1: Visual world eye-tracking	Ambiguous overt	Yes: albeit the effect was in the opposite direction	No
Experiment 2: Self-paced listening task	Non-ambiguous overt	No	No

5.4 Relationship between verb bias and pronominal form

Relative to a possible interaction between verb bias and pronominal form, the predictions were as follows: since the theory claims that null pronouns retrieve their antecedent from the subject of the previous sentence, their processing might be faster with NP1 verbs, which also retrieve the antecedent from the subject, than with NP2 verbs which retrieve it from the object. This means, when both verb bias and pronominal form show the same preferences, we would expect faster reaction times. In the same fashion, we would expect faster reaction times with overt pronouns and NP2 verbs, since both prefer object antecedents, than with overt pronouns and NP1 verbs.

In our form-congruency analyses of the self-paced listening task, we did not find significant effects of verb bias in the null and overt pronoun conditions. More precisely, in contexts with null pronouns retrieving their antecedent from the subject, we did not find a significant effect of verb bias. However, in the eye-tracking experiment we did a preference of NP1 verbs with null pronouns, although not significant. It might be the case that in the form congruency analysis, as subjecthood is a very strong cue that affects null pronouns, its influence is stronger than the effect of verb bias. In the case of overt pronouns retrieving an

antecedent from the object there was no significant difference whether the sentence was using a NP1 verb or a NP2 verb.

5.5 Methodological implications and challenges

As it was stated in Chapter 2, the motivation for the use of two different methodologies was to consider the results as complementary. Visual world eye-tracking experiments give information about preferences, which can be (partly) attentional, and not necessarily reflect language processes or cognitive load directly (e.g., Magnuson, 2019, for an overview). For the latter purpose, online comprehension tasks that tap into processing load such as self-paced listening are more felicitous.

We can take as an example the behavior of our null pronouns in the two experiments reported in this thesis. First, in the eye-tracking experiment, phonetically empty pronouns did not show strong effects and they did not show evidence for implicit causality influence. Cooper (1974) described visual world eye-tracking as a technique that correlates visual selection of adequate targets with concurrently heard words. This is to say, the assumption behind visual world eye-tracking is that language processing preferences time-lock eye-gazes on visual stimuli to explicit spoken expressions. This is also what has been done in the majority of experiments using this paradigm. However, when we used ambiguous null pronouns, there was no explicit linguistic expression that could be linked to a visual stimulus. Furthermore, the only available cue was agreement marking, nonetheless, as the sentences were ambiguous, verbal inflection was not helpful to resolve the anaphora. Therefore, it is possible that visual-via-linguistic attention to the characters on the screen works differently with null pronouns than with explicit referring expressions such as overt pronouns and names. This hypothesis is also supported by the fact that in the self-paced listening task, where people need to resolve the anaphora, we found that null pronouns were sensitive to implicit causality congruency (see Bott & Solstad, 2014; Pyykkönen & Järvikivi,

2010). Moreover, this implicit causality effect on null pronouns is similar to what has been shown for languages where default subject pronouns are overt and agreement is forced by other linguistic cues, such as gender marking (e.g., Stewart et al., 2000). Given this, it might be the case that for the purpose of studying null pronouns, visual world eye-tracking is not the most sensitive methodology and use of online or offline comprehension tasks is more helpful to account for null pronoun resolution.

The present study found some challenges throughout its process. First, in the eye-tracking experiment we did not use distractors in the visual stimuli. An extra image in the screen might have been helpful in the discrimination of participants' eye-gazes. Additionally, as we used profession names in our experimental items, we sought to use pictures that explicitly depicted these professions. To this end, some of the pictures showed the character posing with objects related to their profession, e.g., the picture of the *singer* showed a male character with a microphone. These visual details might have also drawn the attention of our participants and added noise in the data. Second, in the self-paced listening task, unlike the eye-tracking experiment, we used number mismatch in the experimental items. Therefore, the experimental stimuli in both experiments were not fully comparable because other linguistic cues were playing a role in the comprehension experiments. This is essential to consider since in one experiment the sentences were ambiguous while in the other, they were not. Still, our findings demonstrate the importance of investigating language processing with different methodological approaches. When doing so, it is important to consider the kind of output that the tasks provide even if the investigations seek to answer the same research questions.

Finally, it is worth pointing out that in both experiments between experimental items and fillers, participants were given many different conditions. In addition to implicit causality and pronominal form, some conditions in the fillers such as gender mismatch, the

use of proper names and the use of different connectors might have also created different expectations in the participants throughout the experiments.

5.6 Conclusion

In the present study we combined two factors that to our knowledge had not been tested together before in Spanish: implicit causality and pronominal form. Using a visual world eye-tracking experiment and a self-paced listening task, we evidenced that different forms of pronominal subject are sensitive to different factors in different extents.

Relative to the effects of implicit causality, our eye-tracking experiment found that with ambiguous null pronouns participants' gazes were not affected by implicit causality bias in a consistent manner, rather the looks pointed more consistently to the first-mentioned antecedent. In the case of ambiguous overt pronouns, we found opposite effects of what implicit causality predicted, suggesting that overt pronouns may have preferred less salient antecedents, considering that in our experiments the salience contrast was given by implicit causality. In self-paced listening task, our results showed that non-ambiguous null pronouns are sensitive to implicit causality congruency. In contrast, with non-ambiguous overt pronouns participants did not show any effects of implicit causality congruency.

Relative to the effects of pronominal form, we found that ambiguous null pronouns were consistently linked to first-mentioned antecedents. Ambiguous overt pronouns, however, were equally likely to be linked with the subject or the object of the previous sentence. We further found that non-ambiguous null pronouns were processed faster when referring to a subject than an object. Non-ambiguous overt pronouns, contrarily, did not show any effects of form congruency, which suggests that they were equally likely to be assigned to subject and object antecedents without processing penalties.

Further studies considering implicit causality and null/overt pronouns in Spanish would need to be performed with special attention to the factors that can potentially affect

the use of overt pronouns in pro-drop languages. For instance, it would be useful to test ambiguous overt pronouns, i.e., pronouns without number disambiguation, in interaction with implicit causality in a self-paced listening task. For now, our results suggest that the processing of null and overt pronouns in Spanish is affected, in different ways, by a larger set of factors than often assumed.

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Appendix A: Language background test

Language Background Test

Name of the participant/Participant Code:
Gender:
Spoken languages:
Date of Interview:

1a. When is your date of birth?
1b. Place of birth:
1c. Parental place of birth:

2. How many years of education do you have?

Education	Completed?	Years of School	Country	Language of the school
Primary	YES NO			
Middle School	YES NO			
High School	YES NO			
College	YES NO			
University-Degree	YES NO			
University-Masters	YES NO			
University-PhD	YES NO			

3a. Do you wear glasses or contacts?

3b. Do you have any vision illness that has not been treated?

3c. Do you have hearing loss?

3d. Do you wear hearing aid?

3e. If yes, in which ear?

4a. Are you bilingual?

4b. If yes, in which languages?
4c. First language:
4d. Languages you speak besides Spanish:
4e: Language:
4f: Competence level:

1 **Not fluent** No understanding or speaking ability	**2** **Limited fluency** Some understanding and can say short, simple sentences	**3** **Somewhat fluent** Good understanding and can express myself on many topics	**4** **Fluent** Very comfortable expressing myself in English in most situations	**5** **Native-like fluency**
	e.g. can answer the phone in English, can say basic greetings	e.g. can order food in a restaurant, can give and ask for directions		

4h. Language:
4i. Competence level:

1 **Not fluent** No understanding or speaking ability	**2** **Limited fluency** Some understanding and can say short, simple sentences	**3** **Somewhat fluent** Good understanding and can express myself on many topics	**4** **Fluent** Very comfortable expressing myself in English in most situations	**5** **Native-like fluency**
	e.g. can answer the phone in English, can say basic greetings	e.g. can order food in a restaurant, can give and ask for directions		

5a. How well do you read in Spanish?

1 **Cannot read in Spanish**	2 **Limited reading ability in Spanish**	3 **Somewhat proficient reading ability in Spanish**	4 **Proficient reading ability in Spanish**	5 **Native-like reading ability in Spanish**

5b. How well do you speak Spanish?

1 **Not fluent in Spanish** No understanding or speaking ability	2 **Limited fluency in Spanish** Some understanding and can say short, simple sentences	3 **Somewhat fluent in Spanish** Good understanding and can express myself on many topics	4 **Fluent in Spanish** Very comfortable expressing myself in English in most situations	5 **Native-like fluency in Spanish**
	e.g. can answer the phone in English, can say basic greetings	e.g. can order food in a restaurant, can give and ask for directions		

5c. How well do you write in Spanish?

1 **Cannot write in Spanish**	2 **Limited writing ability in Spanish**	3 **Somewhat proficient writing ability in Spanish**	4 **Proficient writing ability in Spanish**	5 **Native-like writing ability in Spanish**

5d. How well do you comprehend Spanish?

1 **Cannot comprehend in Spanish**	2 **Limited comprehension ability in Spanish**	3 **Somewhat proficient comprehension ability in Spanish**	4 **Proficient comprehension ability in Spanish**	5 **Native-like comprehension ability in Spanish**

6a. Have you ever lived in other Spanish speaking country?

6b. If yes, for how long? (years, months)

7a. Do you have a husband/wife/roommate?

YES NO

7b. If YES, how many years of education does your husband/wife have?

Education	Completed?	Years of School	Country	Language of the school
Primary	YES NO			
Middle School	YES NO			
High School	YES NO			
College	YES NO			
University-Degree	YES NO			
University-Masters	YES NO			
University-PhD	YES NO			

7c. If YES, how well does your husband/wife/roommate speak Spanish?

1 **Not fluent in Spanish** No understanding or speaking ability	2 **Limited fluency in Spanish** Some understanding and can say short, simple sentences	3 **Somewhat fluent in Spanish** Good understanding and can express myself on many topics	4 **Fluent in Spanish** Very comfortable expressing myself in English in most situations	5 **Native-like fluency in Spanish**
	e.g. can answer the phone in English, can say basic greetings	e.g. can order food in a restaurant, can give and ask for directions		

7d. If YES, in what language(s) do you speak to your husband/wife/roommate in your home?

1	2	3	4	5

Other (almost) always, Spanish (almost) never	**Other usually, Spanish seldom**	**Other 50% Spanish 50%**	**Other seldom, Spanish usually**	**Other (almost) never, Spanish (almost) always**

7e. What language(s) do you speak to your siblings in your home?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

7f. What language(s) do you speak to your child in your home?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

7g. Do you work outside home? /Are you a student?

YES NO

7h. If YES, in what language(s) do you speak in your work place/school?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

8a. Do you have friends or acquaintances with whom you interact after work (by phone or in person)?

YES NO

If YES, think about the 2 friends/acquaintances with whom you interact most while answering the following.

8b. In what language(s) do you speak to friend (1)?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

8c. In what language(s) does friend (1) speak to you?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

8d. In what language(s) do you speak to friend (2)?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

8e. In what language(s) does friend (2) speak to you?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

9. In what language(s) do you usually read for your studies/job?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

10. In what language(s) do you usually read for pleasure? (fiction, stories, books in general)

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

11. In what language(s) do you usually read the news? (print or online)

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

12. In what language(s) do you usually watch tv, documentaries or movies? (in any kind of device)

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

13. In what language(s) do you usually make calls? (cell phone, house phone, other)

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

14. In what language(s) do you usually write emails?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

15. In what language(s) do you usually text?

1 Other (almost) always, Spanish (almost) never	**2 Other usually, Spanish seldom**	**3 Other 50% Spanish 50%**	**4 Other seldom, Spanish usually**	**5 Other (almost) never, Spanish (almost) always**

Appendix B: Political ideology questionnaire

Political Ideology Questionnaire

Are you for or against the following?

1. Prayer in schools

For 1 2 3 4 5 6 Against

2. Pro-choice (abortion)

For 1 2 3 4 5 6 Against

3. Cuts to welfare programs

For 1 2 3 4 5 6 Against

4. National healthcare

For 1 2 3 4 5 6 Against

5. Sex education in elementary schools

For 1 2 3 4 5 6 Against

6. Gun control

For 1 2 3 4 5 6 Against

7. Stronger labour unions

For 1 2 3 4 5 6 Against

8. Contraception

For 1 2 3 4 5 6 Against

9. Food stamp programs

For 1 2 3 4 5 6 Against

10. Same sex marriage

For 1 2 3 4 5 6 Against

11. Aid/care for the homeless

For 1 2 3 4 5 6 Against

12. Minimum wages

For 1 2 3 4 5 6 Against

13. Political correctness

For 1 2 3 4 5 6 Against

14. Racial quotas in the workplace

For 1 2 3 4 5 6 Against

15. Capital punishment

For 1 2 3 4 5 6 Against

How much do you agree or disagree with the following statements?

16. It is better to keep things the way they are

Strongly disagree 1 2 3 4 5 Strongly agree

17. People are essentially selfish; they need to be controlled

Strongly disagree 1 2 3 4 5 Strongly agree

18. Individuals have free will; they are responsible for their own lives and problems

Strongly disagree 1 2 3 4 5 Strongly agree

19. The traditional family must be preserved at all costs

Strongly disagree 1 2 3 4 5 Strongly agree

20. Government regulations are needed to control monopolies

Strongly disagree 1 2 3 4 5 Strongly agree

21. A free market economy is the best way to ensure prosperity and fulfilment of individual needs

Strongly disagree 1 2 3 4 5 Strongly agree

22. Sometimes revolutions are necessary

Strongly disagree 1 2 3 4 5 Strongly agree

23. This country would be better if most government programs were eliminated

Strongly disagree 1 2 3 4 5 Strongly agree

24. People are basically good but can be corrupted

Strongly disagree 1 2 3 4 5 Strongly agree

25. The free market economic system is basically exploitative and inherently unfair to working people

Strongly disagree 1 2 3 4 5 Strongly agree

26. Helping the poor encourages laziness

Strongly disagree 1 2 3 4 5 Strongly agree

27. If the rich continue to get richer and the poor to get poorer, I would support a violent revolution to correct the inequality

Strongly disagree 1 2 3 4 5 Strongly disagree

Appendix C: Verb selection

Stimulus-Experiencer Verbs	
aburrir	to bore
agotar	to fatigue
alterar	to alter
asombrar	to amaze
complacer	to please
conmover	to move
desilusionar	to disappoint
distraer	to distract
enfurecer	to anger
fascinar	to fascinate
herir	to hurt
impresionar	to impress
invitar	to invite
ofender	to offend
olvidar	to forget
preocupar	to worry

Experimenter-Stimulus Verbs	
admirar	to admire
adorar	to adore
agradecer	to thank
amenazar	to threaten
atesorar	to treasure
confiar	to trust
considerar	to consider
deplorar	to deplore
detestar	to detest
enamorar	to fall in love
envidiar	to envy
molestar	to bother
preferir	to prefer
temer	to fear
tolerar	to tolerate
valorar	to value

Experimenter-Stimulus Verbs		
Exp-Stim	aguantar	to withstand
Exp-Stim	comprender	to comprehend
Exp-Stim	imaginar	to imagine
Exp-Stim	soñar	to dream
Exp-Stim	soportar	to stand
Stim-Exp	afectar	to affect
Stim-Exp	alegrar	to cheer up

Stim-Exp	asustar	to scare
Stim-Exp	desesperar	to frustrate
Stim-Exp	desmentir	to deny
Stim-Exp	enseñar	to teach
Stim-Exp	entretener	to entertain
Stim-Exp	formar	to prepare
Stim-Exp	inspirar	to inspire
Stim-Exp	satisfacer	to satisfy
Stim-Exp	sorprender	to surprise

Appendix D: List of experimental items and fillers of Experiment 1

NP1 verbs:

1a. La maestra aburrió a la alumna en la clase porque durante una hora leyó el libro de texto
1b. La maestra aburrió a la alumna en la clase porque durante una hora ella leyó el libro de texto
1c. La alumna aburrió a la maestra en la clase porque durante una hora leyó el libro de texto
1d. La alumna aburrió a la maestra en la clase porque durante una hora ella leyó el libro de texto
2a. El plomero alegró al carpintero en la obra porque en el fin de semana limpió la entrada para los camiones
2b. El plomero alegró al carpintero en la obra porque en el fin de semana él limpió la entrada para los camiones
2c. El carpintero alegró al plomero en la obra porque en el fin de semana limpió la entrada para los camiones
2d. El carpintero alegró al plomero en la obra porque en el fin de semana él limpió la entrada para los camiones
3a. El bombero alteró al policía en la escena del crimen porque durante dos horas cerró el acceso a los autos grandes
3b. El bombero alteró al policía en la escena del crimen porque durante dos horas él cerró el acceso a los autos grandes
3c. El policía alteró al bombero en la escena del crimen porque durante dos horas cerró el acceso a los autos grandes
3d. El policía alteró al bombero en la escena del crimen porque durante dos horas él cerró el acceso a los autos grandes
4a. La nadadora asombró a la gimnasta porque durante el verano asistió a todas las actividades
4b. La nadadora asombró a la gimnasta porque durante el verano ella asistió a todas las actividades
4c. La gimnasta asombró a la nadadora porque durante el verano asistió a todas las actividades
4d. La gimnasta asombró a la nadadora porque durante el verano ella asistió a todas las actividades
5a. El chef complació al policía en el restaurante porque en la noche de apertura permitió la entrada a más invitados
5b. El chef complació al policía en el restaurante porque en la noche de apertura él permitió la entrada a más invitados
5c. El policía complació al chef en el restaurante porque en la noche de apertura permitió la entrada a más invitados
5d. El policía complació al chef en el restaurante porque en la noche de apertura él permitió la entrada a más invitados
6a. El abogado conmovió al técnico en el aniversario de la empresa porque durante su discurso recordó su trayectoria
6b. El abogado conmovió al técnico en el aniversario de la empresa porque durante su discurso él recordó su trayectoria
6c. El técnico conmovió al abogado en el aniversario de la empresa porque durante su discurso recordó su trayectoria

6d. El técnico conmovió al abogado en el aniversario de la empresa porque durante su discurso él recordó su trayectoria
7a. La corredora desilusionó a la patinadora en el torneo porque antes de empezar el viaje renunció sin avisar
7b. La corredora desilusionó a la patinadora en el torneo porque antes de empezar el viaje ella renunció sin avisar
7c. La patinadora desilusionó a la corredora en el torneo porque antes de empezar el viaje renunció sin avisar
7d. La patinadora desilusionó a la corredora en el torneo porque antes de empezar el viaje ella renunció sin avisar
8a. El nadador distrajo al boxeador en la entrevista porque durante la plática recordó viejas anécdotas
8b. El nadador distrajo al boxeador en la entrevista porque durante la plática él recordó viejas anécdotas
8c. El boxeador distrajo al nadador en la presentación porque durante la plática recordó viejas anécdotas
8d. El boxeador distrajo al nadador en la presentación porque durante la plática él recordó viejas anécdotas
9a. El mesero enfureció al barista en el restaurante porque durante el entrenamiento rompió varios platos
9b. El mesero enfureció al barista en el restaurante porque durante el entrenamiento él rompió varios platos
9c. El barista enfureció al mesero en el restaurante porque durante el entrenamiento rompió varios platos
9d. El barista enfureció al mesero en el restaurante porque durante el entrenamiento él rompió varios platos
10a. El cantante fascinó al pianista en el recital porque en la segunda canción alcanzó notas que no habían ensayado
10b. El cantante fascinó al pianista en el recital porque en la segunda canción él alcanzó notas que no habían ensayado
10c. El pianista fascinó al cantante en el recital porque en la segunda canción alcanzó notas que no habían ensayado
10d. El pianista fascinó al cantante en el recital porque en la segunda canción él alcanzó notas que no habían ensayado
11a. La estudiante hirió a la chef en la clase porque en la cocina descuidó los utensilios peligrosos
11b. La estudiante hirió a la chef en la clase porque en la cocina ella descuidó los utensilios peligrosos
11c. La chef hirió a la estudiante en la clase porque en la cocina descuidó los utensilios peligrosos
11d. La chef hirió a la estudiante en la clase porque en la cocina ella descuidó los utensilios peligrosos
12a. El cirujano impresionó al director del hospital en la junta porque hasta ayer en la noche desconocía los nuevos procedimientos
12b. El cirujano impresionó al director del hospital en la junta porque hasta ayer en la noche él desconocía los nuevos procedimientos
12c. El director del hospital impresionó al cirujano en la junta porque hasta ayer en la noche desconocía los nuevos procedimientos
12d. El director del hospital impresionó al cirujano en la junta porque hasta ayer en la noche él desconocía los nuevos procedimientos
13a. La abogada invitó a la policía al congreso porque en la cena habló de sus nuevos proyectos

13b. La abogada invitó a la policía al congreso porque en la cena ella habló de sus nuevos proyectos
13c. La policía invitó a la abogada al congreso porque en la cena habló de sus nuevos proyectos
13d. La policía invitó a la abogada al congreso porque en la cena ella habló de sus nuevos proyectos
14a. La vendedora ofendió a la clienta en el salón de belleza porque el día de su cita no llegó a tiempo
14b. La vendedora ofendió a la clienta en el salón de belleza porque el día de su cita ella no llegó a tiempo
14c. La clienta ofendió a la vendedora en el salón de belleza porque el día de su cita no llegó a tiempo
14d. La clienta ofendió a la vendedora en el salón de belleza porque el día de su cita ella no llegó a tiempo
15a. El poeta olvidó al periodista en la lista de invitados porque los últimos días había estado muy ausente
15b. El poeta olvidó al periodista en la lista de invitados porque los últimos días él había estado muy ausente
15c. El periodista olvidó al poeta en la lista de invitados porque los últimos días había estado muy ausente
15d. El periodista olvidó al poeta en la lista de invitados porque los últimos días él había estado muy ausente
16a. La gimnasta preocupó a la bailarina en la competencia porque el día más importante llegó tarde al encuentro
16b. La gimnasta preocupó a la bailarina en la competencia porque el día más importante ella llegó tarde al encuentro
16c. La bailarina preocupó a la gimnasta en la competencia porque el día más importante llegó tarde al encuentro
16d. La bailarina preocupó a la gimnasta en la competencia porque el día más importante ella llegó tarde al encuentro

NP2 verbs:

17a. La investigadora admiró a la astronauta en el instituto porque en el despegue ella resolvió el problema
17b. La investigadora admiró a la astronauta en el instituto porque en el despegue resolvió el problema
17c. La astronauta admiró a la investigadora en el instituto porque en el despegue ella resolvió el problema
17d. La astronauta admiró a la investigadora en el instituto porque en el despegue resolvió el problema
18a. La golfista adoró a la tenista en el evento porque durante las demostraciones ella participó muchas veces
18b. La golfista adoró a la tenista en el laboratorio porque en las demostraciones participó muchas veces
18c. La tenista adoró a la golfista en el laboratorio porque en las demostraciones ella participó muchas veces
18d. La tenista adoró a la golfista en el laboratorio porque en las demostraciones participó muchas veces
19a. El enfermero agradeció al doctor en la cena porque para el próximo semestre él aceptó el cambio de turno
19b. El enfermero agradeció al doctor en la cena porque para el próximo semestre aceptó el cambio de turno

19c. El doctor agradeció al enfermero en la cena porque para el próximo semestre él aceptó el cambio de turno
19d. El doctor agradeció al enfermero en la cena porque para el próximo semestre aceptó el cambio de turno
20a. La periodista amenazó a la chef en el restaurante porque en la inauguración ella negaba que pudiera tener acceso al evento
20b. La periodista amenazó a la chef en el restaurante porque en la inauguración negaba que pudiera tener acceso al evento
20c. La chef amenazó a la periodista en el restaurante porque en la inauguración ella negaba que pudiera tener acceso al evento
20d. La chef amenazó a la periodista en el restaurante porque en la inauguración negaba que pudiera tener acceso al evento
21a. El doctor atesoró al policía en el curso porque durante las clases él compartió experiencias invaluables
21b. El doctor atesoró al policía en el curso porque durante las clases compartió experiencias invaluables
21c. El policía atesoró al doctor en el curso porque durante las clases él compartió experiencias invaluables
21d. El policía atesoró al doctor en el curso porque durante las clases compartió experiencias invaluables
22a. El veterinario confió en el anestesista en la cirugía porque anteriormente él había trabajado con otros colegas
22b. El veterinario confió en el anestesista en la cirugía porque anteriormente había trabajado con otros colegas
22c. El anestesista confió en el veterinario en la cirugía porque anteriormente él había trabajado con otros colegas
22d. El anestesista confió en el veterinario en la cirugía porque anteriormente había trabajado con otros colegas
23a. La atleta consideró a la gimnasta en la lista de participantes porque durante varias semanas ella ayudó en la organización del evento
23b. La atleta consideró a la gimnasta en la lista de participantes porque durante varias semanas ayudó en la organización del evento
23c. La gimnasta consideró a la atleta en la lista de participantes porque durante varias semanas ella ayudó en la organización del evento
23d. La gimnasta consideró a la atleta en la lista de participantes porque durante varias semanas ayudó en la organización del evento
24a. El patinador deploró al gimnasta en el torneo porque durante las presentaciones él robó ideas de su competencia
24b. El patinador deploró al gimnasta en el torneo porque durante las presentaciones robó ideas de su competencia
24c. El gimnasta deploró al patinador en el torneo porque durante las presentaciones él robó ideas de su competencia
24d. El gimnasta deploró al patinador en el torneo porque durante las presentaciones robó ideas de su competencia
25a. El gimnasta detestó al árbitro durante la competencia porque en cada rutina él incumplía el reglamento
25b. El gimnasta detestó al árbitro durante la competencia porque en cada rutina incumplía el reglamento
25c. El árbitro detestó al gimnasta durante la competencia porque en cada rutina él incumplía el reglamento
25d. El árbitro detestó al gimnasta durante la competencia porque en cada rutina incumplía el reglamento

26a. La bailarina enamoró a la maquillista en el rodaje porque en el ensayo ella escuchó todas las recomendaciones
26b. La bailarina enamoró a la maquillista en el rodaje porque en el ensayo escuchó todas las recomendaciones
26c. La maquillista enamoró a la bailarina en el rodaje porque en el ensayo ella escuchó todas las recomendaciones
26d. La maquillista enamoró a la bailarina en el rodaje porque en el ensayo escuchó todas las recomendaciones
27a. La reportera envidió a la fotógrafa ayer en la noche porque en el evento ella tuvo mejor acceso
27b. La reportera envidió a la fotógrafa ayer en la noche porque en el evento tuvo mejor acceso
27c. La fotógrafa envidió a la reportera ayer en la noche porque en el evento ella tuvo mejor acceso
27d. La fotógrafa envidió a la reportera ayer en la noche porque en el evento tuvo mejor acceso
28a. El futbolista molestó al comentarista durante el partido porque frente a las cámaras él reconoció que no apreciaba su trabajo
28b. El futbolista molestó al comentarista durante el partido porque frente a las cámaras reconoció que no apreciaba su trabajo
28c. El comentarista molestó al futbolista durante el partido porque frente a las cámaras él reconoció que no apreciaba su trabajo
28d. El comentarista molestó al futbolista durante el partido porque frente a las cámaras reconoció que no apreciaba su trabajo
29a. El ingeniero prefirió al maestro para la demostración porque la próxima semana él haría el nuevo inventario
29b. El ingeniero prefirió al maestro para la demostración porque la próxima semana haría el nuevo inventario
29c. El maestro prefirió al ingeniero para la demostración porque la próxima semana él haría el nuevo inventario
29d. El maestro prefirió al ingeniero para la demostración porque la próxima semana haría el nuevo inventario
30a. La empresaria temió a la corredora en la reunión porque ayer junto a los directivos ella amenazó con clausurar la empresa
30b. La empresaria temió a la corredora en la reunión porque ayer junto a los directivos amenazó con clausurar la empresa
30c. La corredora temió a la empresaria en la reunión porque ayer junto a los directivos ella amenazó con clausurar la empresa
30d. La corredora temió a la empresaria en la reunión porque ayer junto a los directivos amenazó con clausurar la empresa
31a. La paracaidista toleró a la fotógrafa en la prueba porque mañana en la tarde ella tenía que escribir el reporte final
31b. La paracaidista toleró a la fotógrafa en la prueba porque mañana en la tarde tenía que escribir el reporte final
31c. La fotógrafa toleró a la paracaidista en la prueba porque mañana en la tarde ella tenía que escribir el reporte final
31d. La fotógrafa toleró a la paracaidista en la prueba porque mañana en la tarde tenía que escribir el reporte final
32a. La violinista valoró a la cantante en el recital porque durante el intermedio ella salvó el evento
32b. La violinista valoró a la cantante en el recital porque durante el intermedio salvó el evento

32c. La cantante valoró a la violinista en el recital porque durante el intermedio ella salvó el evento
32d. La cantante valoró a la violinista en el recital porque durante el intermedio salvó el evento

Neutral verbs:
33a. El comentarista afectó al árbitro en el partido porque durante el calentamiento insultó a sus compañeros
33b. El comentarista afectó al árbitro en el partido porque durante el calentamiento él insultó a sus compañeros
33c. El árbitro afectó al comentarista en el partido porque durante el calentamiento insultó a sus compañeros
33d. El árbitro afectó al comentarista en el partido porque durante el calentamiento él insultó a sus compañeros
34a. La bailarina alegró a la peluquera en el salón de belleza porque antes de la función llegó a tiempo a la cita
34b. La bailarina alegró a la peluquera en el salón de belleza porque antes de la función ella llegó a tiempo a la cita
34c. La peluquera alegró a la bailarina en el salón de belleza porque antes de la función llegó a tiempo a la cita
34d. La peluquera alegró a la bailarina en el salón de belleza porque antes de la función ella llegó a tiempo a la cita
35a. El periodista asustó al fotógrafo en la ofina porque ayer en la noche entregó la última versión del reportaje
35b. El periodista asustó al fotógrafo en la ofina porque ayer en la noche él entregó la última versión del reportaje
35c. El fotógrafo asustó al periodista en la oficina porque ayer en la noche entregó la última versión del reportaje
35d. El fotógrafo asustó al periodista en la oficina porque ayer en la noche él entregó la última versión del reportaje
36a. La corredora desesperó a la enfermera en el hospital porque durante la comida habló sobre política
36b. La corredora desesperó a la enfermera en el hospital porque durante la comida ella habló sobre política
36c. La enfermera desesperó a la corredora en el hospital porque durante la comida habló sobre política
36d. La enfermera desesperó a la corredora en el hospital porque durante la comida habló sobre política
37a. El plomero desmintió al gerente de la constructora porque en la obra encontró varias inconsistencias
37b. El plomero desmintió al gerente de la constructora porque en la obra él encontró varias inconsistencias
37c. El gerente desmintió al plomero de la constructora porque en la obra encontró varias inconsistencias
37d. El gerente desmintió al plomero de la constructora porque en la obra encontró varias inconsistencias
38a. La mesera enseñó a la cocinera en el nuevo restaurante porque la semana pasada fue a un entrenamiento especial
38b. La mesera enseñó a la cocinera en el nuevo restaurante porque la semana pasada ella fue a un entrenamiento especial
38c. La cocinera enseñó a la mesera en el nuevo restaurante porque la semana pasada fue a un entrenamiento especial

38d. La cocinera enseñó a la mesera en el nuevo restaurante porque la semana pasada ella fue a un entrenamiento especial
39a. El futbolista entretuvo al boxeador en la fiesta porque antes de ese día había expresado su admiración
39b. El futbolista entretuvo al boxeador en la fiesta porque antes de ese día él había expresado su admiración
39c. El boxeador entretuvo al futbolista en la fiesta porque antes de ese día había expresado su admiración
39d. El boxeador entretuvo al futbolista en la fiesta porque antes de ese día él había expresado su admiración
40a. La doctora formó a la enfermera en las oficinas del hospital porque dentro de unos meses heredaría su plaza
40b. La doctora formó a la enfermera en las oficinas del hospital porque dentro de unos meses ella heredaría su plaza
40c. La enfermera formó a la doctora en las oficinas del hospital porque dentro de unos meses heredaría su plaza
40d. La enfermera formó a la doctora en las oficinas del hospital porque dentro de unos meses ella heredaría su plaza
41a. El profesor inspiró al bibliotecario en la junta de la escuela porque junto a otros maestros propuso un plan de lectura
41b. El profesor inspiró al bibliotecario en la junta de la escuela porque junto a otros maestros él propuso un plan de lectura
41c. El bibliotecario inspiró al profesor en la junta de la escuela porque junto a otros maestros propuso un plan de lectura
41d. El bibliotecario inspiró al profesor en la junta de la escuela porque junto a otros maestros él propuso un plan de lectura
42a. La florista satisfizo a la cantante en la boda porque en la planificación adjuntó nuevos detalles al escenario
42b. La florista satisfizo a la cantante en la boda porque en la planificación ella adjuntó nuevos detalles al escenario
42c. La cantante satisfizo a la florista en la boda porque en la planificación adjuntó nuevos detalles al escenario
42d. La cantante satisfizo a la florista en la boda porque en la planificación ella adjuntó nuevos detalles al escenario
43a. El dentista sorprendió al doctor en el congreso porque hace algunos años conoció a su padre
43b. El dentista sorprendió al doctor en el congreso porque hace algunos años él conoció a su padre
43c. El doctor sorprendió al dentista en el congreso porque hace algunos años conoció a su padre
43d. El doctor sorprendió al dentista en el congreso porque hace algunos años él conoció a su padre
44a. La mesera aguantó a la empresaria en el café porque mañana por fin tendría su día de descanso
44b. La mesera aguantó a la empresaria en el café porque mañana por fin ella tendría su día de descanso
44c. La empresaria aguantó a la mesera en el café porque mañana por fin tendría su día de descanso
44d. La empresaria aguantó a la mesera en el café porque mañana por fin ella tendría su día de descanso
45a. El bombero comprendió al enfermero en el hospital porque después de su turno decidió irse a casa

45b. El bombero comprendió al enfermero en el hospital porque después de su turno él decidió irse a casa
45c. El enfermero comprendió al bombero en el hospital porque después de su turno decidió irse a casa
45d. El enfermero comprendió al bombero en el hospital porque después de su turno él decidió irse a casa
46a. La policía imaginó a la recepcionista en la reunión matutina porque mañana por la mañana llevaría las pruebas del caso
46b. La policía imaginó a la recepcionista en la reunión matutina porque mañana por la mañana ella llevaría las pruebas del caso
46c. La recepcionista imaginó a la policía en la reunión matutina porque mañana por la mañana llevaría las pruebas del caso
46d. La recepcionista imaginó a la policía en la reunión matutina porque mañana por la mañana ella llevaría las pruebas del caso
47a. El karateka soñó al boxeador el fin de semana porque en el próximo entrenamiento practicaría su técnica
47b. El karateka soñó al boxeador el fin de semana porque en el próximo entrenamiento él practicaría su técnica
47c. El boxeador soñó al karateka el fin de semana porque en el próximo entrenamiento practicaría su técnica
47d. El boxeador soñó al karateka el fin de semana porque en el próximo entrenamiento él practicaría su técnica
48a. La dentista soportó a la enfermera en el consultorio porque en la última junta prometió que le ayudaría con los pacientes
48b. La dentista soportó a la enfermera en el consultorio porque en la última junta ella prometió que le ayudaría con los pacientes
48c. La enfermera soportó a la dentista en el consultorio porque en la última junta prometió que le ayudaría con los pacientes
48d. La enfermera soportó a la dentista en el consultorio porque en la última junta ella prometió que le ayudaría con los pacientes .

Fillers

Adriana buscó a Juan en la fiesta porque ella había prometido que iría
María trajo a Juan a la universidad porque ella descompuso su carro ayer
Alfonso calló a Aurora en la junta porque él tenía ideas nuevas
Manuel dejó a Sofía en la plaza porque Manuel olvidó que debía recogerla
Gabriela escuchó a Daniel en la noche porque Gabriela llegó a las tres de la mañana
Nadia esperó a Gustavo en la cafetería porque Nadia le dijo que tenía que contarle algo
José prometió a Martha que llegaría temprano mientras él compraba los últimos adornos
Arturo eligió a Luisa para el puesto de gerente mientras él leía su curriculum
Silvia leyó a Ricardo en el homenaje porque ella había cumplido 30 años de trayectoria
Martha culpó a José por el choque mientras Martha contaba la historia
Ricardo recibió a Liliana en su casa mientras Ricardo cocinaba la cena
Juan empujó a María en el entrenamiento mientras Juan buscaba la pelota
Aurora recordó a Alfonso en la junta cuando ella expuso los proyectos del año pasado
Sofía cantó a Julián en la fiesta cuando ella supo que era su cumpleaños
Daniel salvó a Gabriela en el mar cuando él vio que la marea era más intensa
Gustavo sintió a Magda en la sala cuando Gustavo se levantó en la noche para abrir la ventana
Raquel siguió a Emilio en la carretera cuando Raquel pasó la primera caseta
Patricia visitó a Arturo en el hospital cuando Patricia tuvo tiempo libre
Fernando conoció a Julia en la preparatoria antes de que él se graduara

Víctor apoyó a Carmen con sus taras en la escuela antes de que él estuviera más ocupado
Ana explicó a Tomás todas las dudas que tenía antes de que ella mandara el reporte
Mariana llamó a Brandon ayer en la noche antes de que Mariana dejara a su sobrino en su casa
Fernando describió a Violeta a los reporteros antes de que Violeta llegara a la fiesta
Virgilio perdonó a María por todas sus mentiras antes de que Virgilio se mudara
Alejandra extrañó a Víctor en la boda porque él no pudo salir de su trabajo
Jimena necesitó a Alberto para ingresar a la computadora porque él tenía la contraseña
Jair atacó a Frida en el juicio porque ella lo había acusado de robar varios productos
Alejandro dijo a Daniela sobre un nuevo restaurante porque Daniela quería celebrar su cumpleaños
Natalia escondió a Héctor en el carro porque Héctor tenía los regalos sorpresa
Cinthya escribió a Renato por correo electrónico porque Renato tenía que firmar el contrato
Alberto creyó a Paloma todo lo que dijo mientras ella contaba historias sobre sus experiencias
Renato miró a Ana en la exposición mientras ella hablaba de política
Sofía citó a Miguel en la plaza mientras él tenía su hora de comida
Tania tocó a Jorge en el hombro en la fiesta mientras Jorge hablaba con alguien más
Adán entendió a Ana en sus preocupaciones mientras Ana pensaba que no tenía amigos
Mauricio aconsejó a Laura para su entrevista mientras Laura preparaba las respuestas
Diana destruyó a Hugo en la partida de poker cuando él se distrajo
Dafne cuidó a Gerardo en su casa cuando él se rompió un brazo jugando futbol
Emmanuel habló a Sofía por teléfono cuando ella estaba bañándose
Santiago usó a Diana como su defensora cuando Diana aceptó haber visto lo sucedido
Viridiana ganó a Emmanuel en la carrera cuando Emmanuel perdió energía
Andrea encontró a Iván en la calle cuando Iván salía de su edificio
Nicolás dañó a Fernanda en su relación antes de que ella se diera cuenta de que la engañaba
Alfredo calmó a Ilse en la cena antes de que ella hiciera la discusión personal
Fabiola ayudó a Ricardo a decidir la decoración de su casa antes de que él contratara a un diseñador
Miriam preguntó a Miguel sobre las nuevas vacantes antes de que Miguel las anunciara a todos
Edgar mintió a Jimena sobre las nuevas reglas del juego antes de que Jimena las descubriera
Uriel disculpó a Lidia por la tardanza antes de que Lidia explicara la razón

Appendix E: Complete summary of the generalized additive model for verb bias and pronoun form

Parametric coefficients	Estimate	Std. Error	*t*-value	*p*-value
(Intercept)	0.0044	0.0702	0.0625	0.9502
null_NP2	0.0708	0.0918	0.7712	0.4406
overt_NP1	-0.1889	0.1082	-1.7462	0.0808
overt_NP2	0.0229	0.0961	0.2388	0.8113

Smooth terms	e*df*	Ref. *df*	*f*-value	*p*-value
Smooth: Time, null_NP1	2.0313	2.8708	3.112	0.0281 *
Smooth: Time, null_NP2	0.3481	0.569	0.0016	0.9762
Smooth: Time, overt_NP1	1.0007	1.0012	0.2449	0.6206
Smooth: Time, overt_NP2	1.734	2.1506	4.1007	0.016 *
Random effect: Time, Subject	163.91	350	19.7949	< 0.0001 ***
Random effect: Event	521.181	563	21.1877	< 0.0001 ***
Smooth:Time, Item1	1.284	1.499	0.795	0.3109
Smooth:Time, Item10	6.1293	7.5131	8.5436	< 0.0001***
Smooth:Time, Item11	2.4973	3.2013	2.3403	0.0619
Smooth:Time, Item12	1.0005	1.0009	1.2194	0.2694
Smooth:Time, Item13	5.413	6.8098	2.8981	0.0056***
Smooth:Time, Item14	1.0004	1.0008	0.4571	0.4991
Smooth:Time, Item15	3.8703	5.011	2.4995	0.0287*
Smooth:Time, Item16	4.5032	5.7888	4.739	0.0001***
Smooth:Time, Item17	4.6327	5.9449	7.5155	< 0.0001***
Smooth:Time, Item18	4.2352	5.4626	3.775	0.0016**
Smooth:Time, Item19	1.77	2.218	1.456	0.213
Smooth:Time, Item2	3.1708	4.101	5.606	0.0001***
Smooth:Time, Item20	1.001	1.0019	2.9224	0.0871
Smooth:Time, Item21	3.2921	4.2622	3.4917	0.0064 **
Smooth:Time, Item22	1.0006	1.0012	12.7652	0.0004 ***
Smooth:Time, Item23	3.1574	4.0855	1.1895	0.2937
Smooth:Time, Item24	4.0279	5.2122	5.2144	< 0.0001***
Smooth:Time, Item25	3.4623	4.4866	3.3947	0.0084**
Smooth:Time, Item26	2.6553	3.4124	4.2081	0.0047**
Smooth:Time, Item27	1.0003	1.0006	15.0333	0.0001***
Smooth:Time, Item28	4.2984	5.5412	1.8001	0.1034
Smooth:Time, Item29	2.9403	3.7946	10.6047	< 0.0001***
Smooth:Time, Item3	2.7519	3.546	6.5509	< 0.0001***
Smooth:Time, Item30	1.9885	2.5157	2.0477	0.1015

Smooth:Time, Item31	1.0003	1.0006	28.6325	< 0.0001***
Smooth:Time, Item32	3.8066	4.9287	2.3185	0.0408*
Smooth:Time, Item4	4.3007	5.5426	6.732	< 0.0001***
Smooth:Time, Item5	4.649	5.9576	3.1591	0.0044**
Smooth:Time, Item6	3.6793	4.7642	1.2723	0.2805
Smooth:Time, Item7	2.841	3.665	2.234	0.0719
Smooth:Time, Item8	1.0004	1.0007	5.7693	0.0163*
Smooth:Time, Item9	4.7261	6.0528	2.7344	0.0118*

Note: Significance codes = 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’

Appendix F: List of experimental items and fillers of Experiment 2

NP1 verbs

1A La maestra aburrió a las niñas ayer porque en la escuela habló de su boda y nada más.
1B La maestra aburrió a las niñas ayer porque en la escuela hablaron de una nueva muñeca.
1C Las niñas aburrieron a la maestra ayer porque en la escuela hablaron de una nueva muñeca.
1D Las niñas aburrieron a la maestra ayer porque en la escuela habló de su boda y nada más.
1E La maestra aburrió a las niñas ayer porque en la escuela ella habló de su boda y nada más.
1F La maestra aburrió a las niñas ayer porque en la escuela ellas hablaron de una nueva muñeca.
1G Las niñas aburrieron a la maestra ayer porque en la escuela ellas hablaron de una nueva muñeca.
1H Las niñas aburrieron a la maestra ayer porque en la escuela ella habló de su boda y nada más.
2A El entrenador agotó a los atletas el fin de semana porque en el entrenamiento pidió más ejercicios de resistenca.
2B El entrenador agotó a los atletas el fin de semana porque en el entrenamiento hicieron más series de ejercicios de resistencia
2C Los atletas agotaron al entrenador el fin de semana porque en el entrenamiento hicieron más series de ejercicios de resistencia.
2D Los atletas agotaron al entrenador el fin de semana porque en el entrenamiento pidió más ejercicios de resistencia
2E El entrenador agotó a los atletas el fin de semana porque en el entrenamiento él pidió más ejercicios de resistencia.
2F El entrenador agotó a los atletas el fin de semana porque en el entrenamiento ellos hicieron más series de ejercicios de resistencia
2G Los atletas agotaron al entrenador el fin de semana porque en el entrenamiento ellos hicieron más series de ejercicios de resistencia
2H Los atletas agotaron al entrenador el fin de semana porque en el entrenamiento él pidió más ejercicios de resistencia
3A La escritora alteró a las editoras la semana pasada porque en la junta no aceptó las correcciones de su borrador
3B La escritora alteró a las editoras la semana pasada porque en la junta comentaron que el artículo tenía muchos errores
3C Las editoras alteraron a la escritora la semana pasada porque en la junta comentaron que el artículo tenía muchos errores
3D Las editoras alteraron a la escritora la semana pasada porque en la junta no aceptó las correcciones de su borrador
3E La escritora alteró a las editoras la semana pasada porque en la junta ella no aceptó las correcciones de su borrador
3F La escritora alteró a las editoras la semana pasada porque en la junta ellas comentaron que el artículo tenía muchos errores
3G Las editoras alteraron a la escritora la semana pasada porque en la junta ellas comentaron que el artículo tenía muchos errores

3H Las editoras alteraron a la escritora la semana pasada porque en la junta ella no aceptó las correcciones de su borrador
4A El mago asombró a los niños el fin de semana porque en la fiesta hizo varios trucos con animales.
4B El mago asombró a los niños el fin de semana porque en la fiesta se emocionaron mucho con el espectáculo
4C Los niños asombraron al mago el fin de semana porque en la fiesta se emocionaron mucho con el espectáculo
4D Los niños asombraron al mago el fin de semana porque en la fiesta hizo varios trucos con animales
4E El mago asombró a los niños el fin de semana porque en la fiesta él hizo varios trucos con animales.
4F El mago asombró a los niños el fin de semana porque en la fiesta ellos se emocionaron mucho con el espectáculo
4G Los niños asombraron al mago el fin de semana porque en la fiesta ellos se emocionaron mucho con el espectáculo
4H Los niños asombraron al mago el fin de semana porque en la fiesta él hizo varios trucos con animales
5A La doctora complació a las enfermeras en el hospital porque en vacaciones modificó sus horarios nocturnos.
5B La doctora complació a las enfermeras en el hospital porque en vacaciones trabajaron horas extras con mejor paga.
5C Las enfermeras complacieron a la doctora en el hospital porque en vacaciones trabajaron horas extras con mejor paga
5D Las enfermeras complacieron a la doctora en el hospital porque en vacaciones modificó sus horarios nocturnos
5E La doctora complació a las enfermeras en el hospital porque en vacaciones ella modificó sus horarios nocturnos.
5F La doctora complació a las enfermeras en el hospital porque en vacaciones ellas trabajaron horas extras con mejor paga.
5G Las enfermeras complacieron a la doctora en el hospital porque en vacaciones ellas trabajaron horas extras con mejor paga.
5H Las enfermeras complacieron a la doctora en el hospital porque en vacaciones ella modificó sus horarios nocturnos
6A El fotógrafo conmovió a los estudiantes en el curso porque el último día dio un discurso emotivo para ellos
6B El fotógrafo conmovió a los estudiantes en el curso porque el último día compraron un pastel para él
6C Los estudiantes conmovieron al fotógrafo en el curso porque el último día compraron un pastel para él
6D Los estudiantes conmovieron al fotógrafo en el curso porque el último día dio un discurso emotivo para ellos
6E El fotógrafo conmovió a los estudiantes en el curso porque el último día él dio un discurso emotivo para ellos
6F El fotógrafo conmovió a los estudiantes en el curso porque el último día ellos compraron un pastel para él
6G Los estudiantes conmovieron al fotógrafo en el curso porque el último día ellos compraron un pastel para él
6H Los estudiantes conmovieron al fotógrafo en el curso porque el último día él dio un discurso emotivopara ellos
7A La patinadora desilusionó a las juezas en la competencia porque en el último ejercicio perdió el equilibrio al terminar

7B La patinadora desilusionó a las juezas en la competencia porque en el último ejercicio ignoraron su destreza para brincar
7C Las juezas desilusionaron a la patinadora en la competencia porque en el último ejercicio ignoraron su destreza para brincar
7D Las juezas desilusionaron a la patinadora en la competencia porque en el último ejercicio perdió el equilibrio al terminar
7E La patinadora desilusionó a las juezas en la competencia porque en el último ejercicio ella perdió el equilibrio al terminar
7F La patinadora desilusionó a las juezas en la competencia porque en el último ejercicio ellas ignoraron su destreza para brincar
7G Las juezas desilusionaron a la patinadora en la competencia porque en el último ejercicio ellas ignoraron su destreza para brincar
7H Las juezas desilusionaron a la patinadora en la competencia porque en el último ejercicio ella perdió el equilibrio al terminar
8A El árbitro distrajo a los jugadores en el partido porque durante el primer tiempo miró su celular dos veces
8B El árbitro distrajo a los jugadores en el partido porque durante el primer tiempo salieron del campo varias veces
8C Los jugadores distrajeron al árbitro en el partido porque durante el primer tiempo salieron del campo varias veces
8D Los jugadores distrajeron al árbitro en el partido porque durante el primer tiempo miró su celular dos veces
8E El árbitro distrajo a los jugadores en el partido porque durante el primer tiempo él miró su celular dos veces
8F El árbitro distrajo a los jugadores en el partido porque durante el primer tiempo ellos salieron del campo varias veces
8G Los jugadores distrajeron al árbitro en el partido porque durante el primer tiempo ellos salieron del campo varias veces
8H Los jugadores distrajeron al árbitro en el partido porque durante el primer tiempo él miró su celular dos veces
9A La senadora enfureció a las periodistas en la conferencia de prensa porque se negó a dar cualquier declaración
9B La senadora enfureció a las periodistas en la conferencia de prensa porque interrumpieron su informe anual con abucheos
9C Las periodistas enfurecieron a la senadora en la conferencia de prensa porque interrumpieron su informe anual con abucheos
9D Las periodistas enfurecieron a la senadora en la conferencia de prensa porque se negó a dar cualquier declaración
9E La senadora enfureció a las periodistas en la conferencia de prensa porque ella se negó a dar cualquier declaración
9F La senadora enfureció a las periodistas en la conferencia de prensa porque ellas interrumpieron su informe anual con abucheos
9G Las periodistas enfurecieron a la senadora en la conferencia de prensa porque ellas interrumpieron su informe anual con abucheos
9H Las periodistas enfurecieron a la senadora en la conferencia de prensa porque ella se negó a dar cualquier declaración
10A El pianista fascinó a los violinistas en el concierto porque durante su participación emocionó a toda la audiencia presente
10B El pianista fascinó a los violinistas en el concierto porque durante su participación tocaron muy coordinados la sinfonía
10C Los violinistas fascinaron al pianista en el concierto porque durante su participación tocaron muy coordinados la sinfonía

10D Los violinistas fascinaron al pianista en el concierto porque durante su participación emocionó a toda la audiencia presente
10E El pianista fascinó a los violinistas en el concierto porque durante su participación él emocionó a toda la audiencia presente
10F El pianista fascinó a los violinistas en el concierto porque durante su participación ellos tocaron muy coordinados la sinfonía
10G Los violinistas fascinaron al pianista en el concierto porque durante su participación ellos tocaron muy coordinados la sinfonía
10H Los violinistas fascinaron al pianista en el concierto porque durante su participación él emocionó a toda la audiencia presente
11A La cantante hirió a las coristas en el recital porque en la segunda canción olvidó los cambios acordados por el equipo
11B La cantante hirió a las coristas en el recital porque en la segunda canción cambiaron la letra en el primer verso
11C Las coristas hirieron a la cantante en el recital porque en la segunda canción cambiaron la letra en el primer verso
11D Las coristas hirieron a la cantante en el recital porque en la segunda canción olvidó los cambios acordados por el equipo
11E La cantante hirió a las coristas en el recital porque en la segunda canción ella olvidó los cambios acordados por el equipo
11F La cantante hirió a las coristas en el recital porque en la segunda canción ellas cambiaron la letra en el primer verso
11G Las coristas hirieron a la cantante en el recital porque en la segunda canción ellas cambiaron la letra en el primer verso
11H Las coristas hirieron a la cantante en el recital porque en la segunda canción ella olvidó los cambios acordados por el equipo
12A El vendedor impresionó a los empresarios en la compañía porque durante la junta presentó un buen proyecto de publicidad
12B El vendedor impresionó a los empresarios en la compañía porque durante la junta redujeron el presupuesto para el proyecto
12C Los empresarios impresionaron al vendedor en la compañía porque durante la junta redujeron el presupuesto para el proyecto
12D Los empresarios impresionaron al vendedor en la compañía porque durante la junta presentó un buen proyecto de publicidad
12E El vendedor impresionó a los empresarios en la compañía porque durante la junta él presentó un buen proyecto de publicidad
12F El vendedor impresionó a los empresarios en la compañía porque durante la junta ellos redujeron el presupuesto para el proyecto
12G Los empresarios impresionaron al vendedor en la compañía porque durante la junta ellos redujeron el presupuesto para el proyecto
12H Los empresarios impresionaron al vendedor en la compañía porque durante la junta él presentó un buen proyecto de publicidad
13A La cocinera invitó a las meseras a la fiesta porque al final pensó que sería una buena idea para la compañía
13B La cocinera invitó a las meseras a la fiesta porque al final agradecieron su confianza para los empleos
13C Las meseras invitaron a la cocinera a la fiesta porque al final agradecieron su confianza para los empleos
13D Las meseras invitaron a la cocinera a la fiesta porque al final pensó que sería buena idea para la compañía
13E La cocinera invitó a las meseras a la fiesta porque al final ella pensó que sería una buena idea para la compañía

13F La cocinera invitó a las meseras a la fiesta porque al final ellas agradecieron su confianza para los empleos
13G Las meseras invitaron a la cocinera a la fiesta porque al final ellas agradecieron su confianza para los empleos
13H Las meseras invitaron a la cocinera a la fiesta porque al final ella pensó que sería buena idea para la compañía
14A El policía ofendió a los abogados ayer porque en el ministerio público dijo que hacían falta pruebas para el juicio
14B El policía ofendió a los abogados ayer porque en el ministerio público se burlaron de su trabajo como servidor público
14C Los abogados ofendieron al policía ayer porque en el ministerio público se burlaron de su trabajo como servidor público
14D Los abogados ofendieron al policía ayer porque en el ministerio público dijo que hacían falta pruebas para el juicio
14E El policía ofendió a los abogados ayer porque en el ministerio público él dijo que hacían falta pruebas para el juicio
14F El policía ofendió a los abogados ayer porque en el ministerio público ellos se burlaron de su trabajo como servidor público
14G Los abogados ofendieron al policía ayer porque en el ministerio público ellos se burlaron de su trabajo como servidor público
14H Los abogados ofendieron al policía ayer porque en el ministerio público él dijo que hacían falta pruebas para el juicio
15A La enfermera olvidó a las residentes en el hospital porque en la noche estuvo muy ocupada con sus pendientes
15B La enfermera olvidó a las residentes en el hospital porque en la noche trabajaron en un nuevo plan de rendimiento
15C Las residentes olvidaron a la enfermera en el hospital porque en la noche trabajaron en un nuevo plan de rendimiento
15D Las residentes olvidaron a la enfermera en el hospital porque en la noche estuvo muy ocupada con sus pendientes
15E La enfermera olvidó a las residentes en el hospital porque en la noche ella estuvo muy ocupada con sus pendientes
15F La enfermera olvidó a las residentes en el hospital porque en la noche ellas trabajaron en un nuevo plan de rendimiento
15G Las residentes olvidaron a la enfermera en el hospital porque en la noche ellas trabajaron en un nuevo plan de rendimiento
15H Las residentes olvidaron a la enfermera en el hospital porque en la noche ella estuvo muy ocupada con sus pendientes
16A El chofer preocupó a los clientes en el evento porque esa noche llegó tarde a recogerlos.
16B El chofer preocupó a los clientes en el evento porque esa noche estaban muy borrachos después de la fiesta
16C Los clientes preocuparon al chofer en el evento porque esa noche estaban muy borrachos después de la fiesta
16D Los clientes preocuparon al chofer en el evento porque esa noche llegó tarde a recogerlos
16E El chofer preocupó a los clientes en el evento porque esa noche él llegó tarde a recogerlos.
16F El chofer preocupó a los clientes en el evento porque esa noche ellos estaban muy borrachos después de la fiesta
16G Los clientes preocuparon al chofer en el evento porque esa noche ellos estaban muy borrachos después de la fiesta

16H Los clientes preocuparon al chofer en el evento porque esa noche él llegó tarde a recogerlos

NP2 verbs

17A El bombero admiró a los paramédicos ayer porque en el simulacro actuó como un gran líder

17B El bombero admiró a los paramédicos ayer porque en el simulacro reaccionaron a tiempo y con cautela

17C Los paramédicos admiraron al bombero ayer porque en el simulacro reaccionaron a tiempo y con cautela

17D Los paramédicos admiraron al bombero ayer porque en el simulacro actuó como un gran líder

17E El bombero admiró a los paramédicos ayer porque en el simulacro él actuó como un gran líder

17F El bombero admiró a los paramédicos ayer porque en el simulacro ellos reaccionaron a tiempo y con cautela

17G Los paramédicos admiraron al bombero ayer porque en el simulacro ellos reaccionaron a tiempo y con cautela

17H Los paramédicos admiraron al bombero ayer porque en el simulacro él actuó como un gran líder

18A La astronauta adoró a las becarias en el programa porque durante semanas compartió sus conocimientos y experiencias

18B La astronauta adoró a las becarias en el programa porque durante semanas trabajaron mucho en el proyecto de innovación

18C Las becarias adoraron a la astronauta en el programa porque durante semanas trabajaron mucho en el proyecto de innovación

18D Las becarias adoraron a la astronauta en el programa porque durante semanas compartió sus conocimientos y experiencias

18E La astronauta adoró a las becarias en el programa porque durante semanas ella compartió sus conocimientos y experiencias

18F La astronauta adoró a las becarias en el programa porque durante semanas ellas trabajaron mucho en el proyecto de innovación

18G Las becarias adoraron a la astronauta en el programa porque durante semanas ellas trabajaron mucho en el proyecto de innovación

18H Las becarias adoraron a la astronauta en el programa porque durante semanas ella compartió sus conocimientos y experiencias

19A El ejecutivo agradeció a los asesores financieros en el evento porque el mes pasado contrató a más contadores en la oficina

19B El publicista agradeció a los asesores financieros en el evento porque el mes pasado fortalecieron el valor de la empresa

19C Los asesores financieros agradecieron al ejecutivo en el evento porque el mes pasado fortalecieron el valor de la empresa

19D Los asesores financieros agradecieron al director en el evento porque el mes pasado contrató a más contadores en la oficina

19E El ejecutivo agradeció a los asesores financieros en el evento porque el mes pasado él contrató a más contadores en la oficina

19F El publicista agradeció a los asesores financieros en el evento porque el mes pasado ellos fortalecieron el valor de la empresa

19G Los asesores financieros agradecieron al ejecutivo en el evento porque el mes pasado ellos fortalecieron el valor de la empresa

19H Los asesores financieros agradecieron al director en el evento porque el mes pasado él contrató a más contadores en la oficina

20A La subdirectora amenazó a las profesoras en la escuela porque la semana pasada canceló varias clases de historia
20B La subdirectora amenazó a las profesoras en la escuela porque la semana pasada acordaron irse a paro indefinido
20C Las profesoras amanazaron a la subdirectora en la escuela porque la semana pasada acodaron irse a paro indefinido
20D Las profesoras amanazaron a la subdirectora en la escuela porque la semana pasada canceló varias clases de historia
20E La subdirectora amenazó a las profesoras en la escuela porque la semana pasada ella canceló varias clases de historia
20F La subdirectora amenazó a las profesoras en la escuela porque la semana pasada ellas acordaron irse a paro indefinido
20G Las profesoras amanazaron a la subdirectora en la escuela porque la semana pasada ellas acodaron irse a paro indefinido
20H Las profesoras amanazaron a la subdirectora en la escuela porque la semana pasada ella canceló varias clases de historia
21A El cantante atesoró a los productores en el estudio porque durante la grabación trabajó con todo el equipo del proyecto
21B El cantante atesoró a los productores en el estudio porque durante la grabación respetaron sus ideas para las canciones
21C Los productores atesoraron al cantante en el estudio porque durante la grabación respetaron sus ideas para las canciones
21D Los productores atesoraron al cantante en el estudio porque durante la grabación trabajó con todo el equipo del proyecto
21E El cantante atesoró a los productores en el estudio porque durante la grabación él trabajó con todo el equipo del proyecto
21F El cantante atesoró a los productores en el estudio porque durante la grabación ellos respetaron sus ideas para las canciones
21G Los productores atesoraron al cantante en el estudio porque durante la grabación ellos respetaron sus ideas para las canciones
21H Los productores atesoraron al cantante en el estudio porque durante la grabación él trabajó con todo el equipo del proyecto
22A La actriz confió en las maquillistas en el rodaje porque anteriormente sugirió atuendos muy innovadores
22B La actriz confió en las maquillistas en el rodaje porque anteriormente habían trabajado en una buena empresa
22C Las maquillistas confiaron en la actriz en el rodaje porque anteriormente habían trabajado en una buena empresa
22D Las maquillistas confiaron en la actriz en el rodaje porque anteriormente sugirió atuendos muy innovadores
22E La actriz confió en las maquillistas en el rodaje porque anteriormente ella sugirió atuendos muy innovadores
22F La actriz confió en las maquillistas en el rodaje porque anteriormente ellas habían trabajado en una buena empresa
22G Las maquillistas confiaron en la actriz en el rodaje porque anteriormente ellas habían trabajado en una buena empresa
22H Las maquillistas confiaron en la actriz en el rodaje porque anteriormente ella sugirió atuendos muy innovadores
23A El diseñador consideró a los arquitectos en la propuesta porque el año pasado ganó un premio muy importante
23B El diseñador consideró a los arquitectos en la propuesta porque el año pasado expresaron su interés en la decoración

23C Los arquitectos consideraron al diseñador en la propuesta porque el año pasado expresaron su interés en la decoración
23D Los arquitectos consideraron al diseñador en la propuesta porque el año pasado ganó un premio muy importante
23E El diseñador consideró a los arquitectos en la propuesta porque el año pasado él ganó un premio muy importante
23F El diseñador consideró a los arquitectos en la propuesta porque el año pasado ellos expresaron su interés en la decoración
23G Los arquitectos consideraron al diseñador en la propuesta porque el año pasado ellos expresaron su interés en la decoración
23H Los arquitectos consideraron al diseñador en la propuesta porque el año pasado él ganó un premio muy importante
24A La florista deploró a las decoradoras en la boda porque en las mesas puso muchas flores
24B La florista deploró a las decoradoras en la boda porque en las mesas quitaron los arreglos de flores
24C Las decoradoras deploraron a la florista en la boda porque en las mesas quitaron los arreglos de flores
24D Las decoradoras deploraron a la florista en la boda porque en las mesas puso muchas flores
24E La florista deploró a las decoradoras en la boda porque en las mesas ella puso muchas flores
24F La florista deploró a las decoradoras en la boda porque en las mesas ellas quitaron los arreglos de flores
24G Las decoradoras deploraron a la florista en la boda porque en las mesas ellas quitaron los arreglos de flores
24H Las decoradoras deploraron a la florista en la boda porque en las mesas ella puso muchas flores
25A El cocinero detestó a los organizadores en la fiesta porque durante el brindis cambió el menú
25B El cocinero detestó a los organizadores en la fiesta porque durante el brindis pusieron música
25C Los organizadores detestaron al cocinero en la fiesta porque durante el brindis pusieron música
25D Los organizadores detestaron al cocinero en la fiesta porque durante el brindis cambió el menú
25E El cocinero detestó a los organizadores en la fiesta porque durante el brindis él cambió el menú
25F El cocinero detestó a los organizadores en la fiesta porque durante el brindis ellos pusieron música
25G Los organizadores detestaron al cocinero en la fiesta porque durante el brindis ellos pusieron música
25H Los organizadores detestaron al cocinero en la fiesta porque durante el brindis él cambió el menú
26A La coreografa se enamoro de las alumnas en el curso porque al final recordaba sus anoos de ensenanza
26B La coreografa se enamoro de las alumnas en el curso porque al final demostraron que habian aprendido mucho
26C Las alumnas se enamoraron de la coreografa en el curso porque al final demostraron que habian aprendido mucho
26D Las alumnas se enamoraron de la coreografa en el curso porque al final recordaba sus anoos de ensenanza

26E La coreografa se enamoro de las alumnas en el curso porque al final ella recordaba sus anoos de ensenanza
26F La coreografa se enamoro de las alumnas en el curso porque al final ellas demostraron que habian aprendido mucho
26G Las alumnas se enamoraron de la coreografa en el curso porque al final ellas demostraron que habian aprendido mucho
26H Las alumnas se enamoraron de la coreografa en el curso porque al final ella recordaba sus anoos de ensenanza
27A El escritor envidió a los pintores este semestre porque en la academia tenía muchos seguidores.
27B El escritor envidió a los pintores este semestre porque en la academia tenían un nuevo salón de clases.
27C Los pintores envidiaron al escritor este semestre porque en la academia tenían un nuevo salón de clases.
27D Los pintores envidiaron al escritor este semestre porque en la academia tenía muchos seguidores.
27E El escritor envidió a los pintores este semestre porque en la academia él tenía muchos seguidores.
27F El escritor envidió a los pintores este semestre porque en la academia ellos tenían un nuevo salón de clases.
27G Los pintores envidiaron al escritor este semestre porque en la academia ellos tenían un nuevo salón de clases.
27H Los pintores envidiaron al escritor este semestre porque en la academia él tenía muchos seguidores.
28A La reportera molestó a las fotógrafas en el museo porque en la exposición hizo preguntas impertinentes
28B La reportera molestó a las fotógrafas en el museo porque en la exposición estaban muy estresadas
28C Las fotógrafas molestaron a la reportera en el museo porque en la exposición estaban muy estresadas
28D Las fotógrafas molestaron a la reportera en el museo porque en la exposición hizo preguntas impertinentes
28E La reportera molestó a las fotógrafas en el museo porque en la exposición él hizo preguntas impertinentes
28F La reportera molestó a las fotógrafas en el museo porque en la exposición ellas estaban muy estresadas
28G Las fotógrafas molestaron a la reportera en el museo porque en la exposición ellas estaban muy estresadas
28H Las fotógrafas molestaron a la reportera en el museo porque en la exposición él hizo preguntas impertinentes
29A El gimnasta prefirió a los fisioterapeutas ayer porque en los entrenamientos estiró durante dos horas
29B El gimnasta prefirió a los fisioterapeutas ayer porque en los entrenamientos trataron sus lesiones
29C Los fisioterapeutas prefirieron al gimnasta ayer porque en los entrenamientos trataron sus lesiones
29D Los fisioterapeutas prefirieron al gimnasta ayer porque en los entrenamientos estiró durante dos horas
29E El gimnasta prefirió a los fisioterapeutas ayer porque en los entrenamientos él estiró durante dos horas
29F El gimnasta prefirió a los fisioterapeutas ayer porque en los entrenamientos ellos trataron sus lesiones

29G Los fisioterapeutas prefirieron al gimnasta ayer porque en los entrenamientos ellos trataron sus lesiones
29H Los fisioterapeutas prefirieron al gimnasta ayer porque en los entrenamientos él estiró durante dos horas
30A La contadora temió a las abogadas en la conferencia porque ayer confesó que había pruebas en su contra
30B La contadora temió a las abogadas en la conferencia porque ayer dijeron que habría una demanda
30C Las abogadas temieron a la contadora en la conferencia porque ayer dijeron que habría una demanda
30D Las abogadas temieron a la contadora en la conferencia porque ayer confesó que había pruebas en su contra
30E La contadora temió a las abogadas en la conferencia porque ayer ella confesó que había pruebas en su contra
30F La contadora temió a las abogadas en la conferencia porque ayer ellas dijeron que habría una demanda
30G Las abogadas temieron a la contadora en la conferencia porque ayer ellas dijeron que habría una demanda
30H Las abogadas temieron a la contadora en la conferencia porque ayer ella confesó que había pruebas en su contra
31A El escultor toleró a los carpinteros en la casa porque durante las remodelaciones escuchó buenas canciones
31B El escultor toleró a los carpinteros en la casa porque durante las remodelaciones trabajaron muy bien
31C Los carpinteros toleraron al escultor en la casa porque durante las remodelaciones trabajaron muy bien
31D Los carpinteros toleraron al escultor en la casa porque durante las remodelaciones escuchó buenas canciones
31E El escultor toleró a los carpinteros en la casa porque durante las remodelaciones él escuchó buenas canciones
31F El escultor toleró a los carpinteros en la casa porque durante las remodelaciones ellos trabajaron muy bien
31G Los carpinteros toleraron al escultor en la casa porque durante las remodelaciones ellos trabajaron muy bien
31H Los carpinteros toleraron al escultor en la casa porque durante las remodelaciones él escuchó buenas canciones
32A La mesera valoró a las clientas en el restaurante porque al final trajo un pastel
32B La mesera valoró a las clientas en el restaurante porque al final dejaron una buena propina
32C Las clientas valoraron a la mesera en el restaurante porque al final dejaron una buena propina
32D Las clientas valoraron a la mesera en el restaurante porque al final trajo un pastel
32E La mesera valoró a las clientas en el restaurante porque al final ella trajo un pastel
32F La mesera valoró a las clientas en el restaurante porque al final ellas dejaron una buena propina
32G Las clientas valoraron a la mesera en el restaurante porque al final ellas dejaron una buena propina
32H Las clientas valoraron a la mesera en el restaurante porque al final ella trajo un pastel

Neutral verbs

33A El ingeniero afectó a los albañiles en la construcción porque en la entrega dijo que aún faltaban detalles
33B El ingeniero afectó a los albañiles en la construcción porque en la entrega olvidaron las llaves de la camioneta
33C Los albañiles afectaron al ingeniero en la construcción porque en la entrega olvidaron las llaves de la camioneta
33D Los albañiles afectaron al ingeniero en la construcción porque en la entrega dijo que aún faltaban detalles
33E El ingeniero afectó a los albañiles en la construcción porque en la entrega él dijo que aún faltaban detalles
33F El ingeniero afectó a los albañiles en la construcción porque en la entrega ellos olvidaron las llaves de la camioneta
33G Los albañiles afectaron al ingeniero en la construcción porque en la entrega ellos olvidaron las llaves de la camioneta
33H Los albañiles afectaron al ingeniero en la construcción porque en la entrega él dijo que aún faltaban detalles
34A La futbolista alegró a las fanáticas en el partido porque en el medio tiempo dio muchos autógrafos
34B La futbolista alegró a las fanáticas en el partido porque en el medio tiempo cantaron una porra
34C Las fanáticas alegraron a la futbolista en el partido porque en el medio tiempo cantaron una porra
34D Las fanáticas alegraron a la futbolista en el partido porque en el medio tiempo dio muchos autógrafos
34E La futbolista alegró a las fanáticas en el partido porque en el medio tiempo ella dio muchos autógrafos
34F La futbolista alegró a las fanáticas en el partido porque en el medio tiempo ellas cantaron una porra
34G Las fanáticas alegraron a la futbolista en el partido porque en el medio tiempo ellas cantaron una porra
34H Las fanáticas alegraron a la futbolista en el partido porque en el medio tiempo ella dio muchos autógrafos
35A El maestro asustó a los guitarristas en el concierto porque antes de empezar creyó haber olvidado los instrumentos que les prestaron
35B El maestro asustó a los guitarristas en el concierto porque antes de empezar rompieron un micrófono
35C Los guitarristas asustaron al maestro en el concierto porque antes de empezar rompieron un micrófono
35D Los guitarristas asustaron al maestro en el concierto porque antes de empezar creyó haber olvidado los instrumentos que les prestaron
35E El maestro asustó a los guitarristas en el concierto porque antes de empezar él creyó haber olvidado los instrumentos que les prestaron
35F El maestro asustó a los guitarristas en el concierto porque antes de empezar ellos rompieron un micrófono
35G Los guitarristas asustaron al maestro en el concierto porque antes de empezar ellos rompieron un micrófono
35H Los guitarristas asustaron al maestro en el concierto porque antes de empezar él creyó haber olvidado los instrumentos que les prestaron
36A La atleta desesperó a las animadoras en la carrera porque en la salida tiró dos carteles
36B La atleta desesperó a las animadoras en la carrera porque en la salida estorbaron con su equipo

36C Las animadoras desesperaron a la atleta en la carrera porque en la salida estorbaron con su equipo
36D Las animadoras desesperaron a la atleta en la carrera porque en la salida tiró dos carteles
36E La atleta desesperó a las animadoras en la carrera porque en la salida ella tiró dos carteles
36F La atleta desesperó a las animadoras en la carrera porque en la salida ellas estorbaron con su equipo
36G Las animadoras desesperaron a la atleta en la carrera porque en la salida ellas estorbaron con su equipo
36H Las animadoras desesperaron a la atleta en la carrera porque en la salida ella tiró dos carteles
37A El plomero desmintió a los electricistas en la casa porque ayer vio que faltaban herramientas
37B El plomero desmintió a los electricistas en la casa porque ayer trajeron todo el material que faltaba
37C Los electricistas desmintieron al plomero en la casa porque ayer trajeron todo el material que faltaba
37D Los electricistas desmintieron al plomero en la casa porque ayer vio que faltaban herramientas
37E El plomero desmintió a los electricistas en la casa porque ayer él vio que faltaban herramientas
37F El plomero desmintió a los electricistas en la casa porque ayer ellos trajeron todo el material que faltaba
37G Los electricistas desmintieron al plomero en la casa porque ayer ellos trajeron todo el material que faltaba
37H Los electricistas desmintieron al plomero en la casa porque ayer él vio que faltaban herramientas
38A La maquillista enseñó a las peluqueras en el evento porque la semana pasada fue a un nuevo curso
38B La maquillista enseñó a las peluqueras en el evento porque la semana pasada aprendieron nuevas técnicas
38C Las peluqueras enseñaron a la maquillista en el evento porque la semana pasada aprendieron nuevas técnicas
38D Las peluqueras enseñaron a la maquillista en el evento porque la semana pasada fue a un nuevo concurso
38E La maquillista enseñó a las peluqueras en el evento porque la semana pasada ella fue a un nuevo curso
38F La maquillista enseñó a las peluqueras en el evento porque la semana pasada ellas aprendieron nuevas técnicas
38G Las peluqueras enseñaron a la maquillista en el evento porque la semana pasada ellas aprendieron nuevas técnicas
38H Las peluqueras enseñaron a la maquillista en el evento porque la semana pasada ella fue a un nuevo concurso
39A El jardinero entretuvo a las cocineras durante horas porque en la mañana hizo muchas bromas.
39B El jardinero entretuvo a las cocineras durante horas porque en la mañana estaban muy estresadas.
39C Las cocineras entretuvieron al jardinero durante horas porque en la mañana estaban muy estresadas.
39D Las cocineras entretuvieron al jardinero durante horas porque en la mañana hizo muchas bromas.

39E El jardinero entretuvo a las cocineras durante horas porque en la mañana él hizo muchas bromas.
39F El jardinero entretuvo a las cocineras durante horas porque en la mañana ellas estaban muy estresadas.
39G Las cocineras entretuvieron al jardinero durante horas porque en la mañana ellas estaban muy estresadas.
39H Las cocineras entretuvieron al jardinero durante horas porque en la mañana él hizo muchas bromas.
40A El nadador formó a los clavadistas en el gimnasio porque el año pasado compitió en el extranjero contra otros países
40B El nadador formó a los clavadistas en el gimnasio porque el año pasado quedaron en segundo lugar del campeonato
40C Los clavadistas formaron al nadador en el gimnasio porque el año pasado quedaron en segundo lugar del campeonato
40D Los clavadistas formaron al nadador en el gimnasio porque el año pasado compitió en el extranjero contra otros países
40E El nadador formó a los clavadistas en el gimnasio porque el año pasado él compitió en el extranjero contra otros países
40F El nadador formó a los clavadistas en el gimnasio porque el año pasado ellos quedaron en segundo lugar del campeonato
40G Los clavadistas formaron al nadador en el gimnasio porque el año pasado ellos quedaron en segundo lugar del campeonato
40H Los clavadistas formaron al nadador en el gimnasio porque el año pasado él compitió en el extranjero contra otros países
41A La gimnasta inspiró a las patinadoras en las olimpiadas porque durante una cena contó su historia
41B La gimnasta inspiró a las patinadoras en las olimpiadas porque durante una cena platicaron sus experiencias
41C Las patinadoras inspiraron a la gimnasta en las olimpiadas porque durante una cena platicaron sus experiencias
41D Las patinadoras inspiraron a la gimnasta en las olimpiadas porque durante una cena contó su historia
41E La gimnasta inspiró a las patinadoras en las olimpiadas porque durante una cena ella contó su historia
41F La gimnasta inspiró a las patinadoras en las olimpiadas porque durante una cena ellas platicaron sus experiencias
41G Las patinadoras inspiraron a la gimnasta en las olimpiadas porque durante una cena ellas platicaron sus experiencias
41H Las patinadoras inspiraron a la gimnasta en las olimpiadas porque durante una cena ella contó su historia
42A El bibliotecario satisfizo a los profesores en la escuela porque para las clases preparó una sección especial
42B El bibliotecario satisfizo a los profesores en la escuela porque para las clases arreglaron la lista de lecturas
42C Los profesores satisfacieron al bibliotecario en la escuela porque para las clases arreglaron la lista de lecturas
42D Los profesores satisfacieron al bibliotecario en la escuela porque para las clases preparó una sección especial
42E El bibliotecario satisfizo a los profesores en la escuela porque para las clases él preparó una sección especial
42F El bibliotecario satisfizo a los profesores en la escuela porque para las clases ellos arreglaron la lista de lecturas

42G Los profesores satisfacieron al bibliotecario en la escuela porque para las clases ellos arreglaron la lista de lecturas
42H Los profesores satisfacieron al bibliotecario en la escuela porque para las clases él preparó una sección especial
43A La veterinaria sorprendió a las enfermeras ayer porque en la emergencia actuó con mucha cautela
43B La veterinaria sorprendió a las enfermeras ayer porque en la emergencia participaron en la operación del gatito
43C Las enfermeras sorprendieron a la veterinaria ayer porque en la emergencia participaron en la operación del gatito
43D Las enfermeras sorprendieron a la veterinaria ayer porque en la emergencia actuó con mucha cautela
43E La veterinaria sorprendió a las enfermeras ayer porque en la emergencia ella actuó con mucha cautela
43F La veterinaria sorprendió a las enfermeras ayer porque en la emergencia ellas participaron en la operación del gatito
43G Las enfermeras sorprendieron a la veterinaria ayer porque en la emergencia ellas participaron en la operación del gatito
43H Las enfermeras sorprendieron a la veterinaria ayer porque en la emergencia ella actuó con mucha cautela
44A El chef aguantó a los críticos en el restaurante porque ayer leyó que su opinión era muy importante
44B El chef aguantó a los críticos en el restaurante porque ayer conocieron sus nuevas recetas
44C Los críticos aguantaron al chef en el restaurante porque ayer conocieron sus nuevas recetas
44D Los críticos aguantaron al chef en el restaurante porque ayer leyó que su opinión era muy importante
44E El chef aguantó a los críticos en el restaurante porque ayer él leyó que su opinión era muy importante
44F El chef aguantó a los críticos en el restaurante porque ayer ellos conocieron sus nuevas recetas
44G Los críticos aguantaron al chef en el restaurante porque ayer ellos conocieron sus nuevas recetas
44H Los críticos aguantaron al chef en el restaurante porque ayer él leyó que su opinión era muy importante
45A Las psicóloga comprendió a las alumnas en el congreso porque en su presentación aceptó que el trabajo había sido muy arduo
45B Las psicóloga comprendió a las alumnas en el congreso porque en su presentación admitieron que estaban cansadas
45C Las alumnas comprendieron a la psicóloga en el congreso porque en su presentación admitieron que estaban cansadas
45D Las alumnas comprendieron a la psicóloga en el congreso porque en su presentación aceptó que el trabajo había sido muy arduo
45E Las psicóloga comprendió a las alumnas en el congreso porque en su presentación ella aceptó que el trabajo había sido muy arduo
45F Las psicóloga comprendió a las alumnas en el congreso porque en su presentación ellas admitieron que estaban cansadas
45G Las alumnas comprendieron a la psicóloga en el congreso porque en su presentación ellas admitieron que estaban cansadas
45H Las alumnas comprendieron a la psicóloga en el congreso porque en su presentación ella aceptó que el trabajo había sido muy arduo

46A El pintor imaginó a los modelos en el estudio porque la semana pasada compró los muebles que usarían para el cuadro
46B El pintor imaginó a los modelos en el estudio porque la semana pasada visitaron su oficina para ponerse de acuerdo
46C Los modelos imaginaron al pintor en el estudio porque la semana pasada visitaron su oficina para ponerse de acuerdo
46D Los modelos imaginaron al pintor en el estudio porque la semana pasada compró los muebles que usarían para el cuadro
46E El pintor imaginó a los modelos en el estudio porque la semana pasada él compró los muebles que usarían para el cuadro
46F El pintor imaginó a los modelos en el estudio porque la semana pasada ellos visitaron su oficina para ponerse de acuerdo
46G Los modelos imaginaron al pintor en el estudio porque la semana pasada ellos visitaron su oficina para ponerse de acuerdo
46H Los modelos imaginaron al pintor en el estudio porque la semana pasada él compró los muebles que usarían para el cuadro
47A La cantante soñó a las coristas en el ensayo porque para el concierto pensó que con más luces se verían mejor
47B La cantante soñó a las coristas en el ensayo porque para el concierto olvidaron repasar las canciones nuevas
47C Las coristas soñaron a la cantante en el ensayo porque para el concierto olvidaron repasar las canciones nuevas
47D Las coristas soñaron a la cantante en el ensayo porque para el concierto pensó que con más luces se verían mejor
47E La cantante soñó a las coristas en el ensayo porque para el concierto ella pensó que con más luces se verían mejor
47F La cantante soñó a las coristas en el ensayo porque para el concierto ellas olvidaron repasar las canciones nuevas
47G Las coristas soñaron a la cantante en el ensayo porque para el concierto ellas olvidaron repasar las canciones nuevas
47H Las coristas soñaron a la cantante en el ensayo porque para el concierto ella pensó que con más luces se verían mejor
48A El abogado soportó a los policías en el juzgado porque la semana pasada propuso un nuevo horario para todos
48B El abogado soportó a los policías en el juzgado porque la semana pasada ayudaron a la captura de un delincuente
48C Los policías sopotaron al abogado en el juzgado porque la semana pasada ayudaron a la captura de un delincuente
48D Los policías sopotaron al abogado en el juzgado porque la semana pasada propuso un nuevo horario para todos
48E El abogado soportó a los policías en el juzgado porque la semana pasada él propuso un nuevo horario para todos
48F El abogado soportó a los policías en el juzgado porque la semana pasada ellos ayudaron a la captura de un delincuente
48G Los policías sopotaron al abogado en el juzgado porque la semana pasada ellos ayudaron a la captura de un delincuente
48H Los policías sopotaron al abogado en el juzgado porque la semana pasada él propuso un nuevo horario para todos

Fillers

Adriana buscó a Juan en la fiesta porque ella había prometido que iría
María trajo a Juan a la universidad porque ella descompuso su carro ayer

Alfonso calló a Aurora en la junta porque él tenía ideas nuevas
Manuel dejó a Sofía en la plaza porque Manuel olvidó que debía recogerla
Gabriela escuchó a Daniel en la noche porque Gabriela llegó a las tres de la mañana
Nadia esperó a Gustavo en la cafetería porque Nadia le dijo que tenía que contarle algo
José prometió a Martha que llegaría temprano mientras él compraba los últimos adornos
Arturo eligió a Luisa para el puesto de gerente mientras él leía su curriculum
Silvia leyó a Ricardo en el homenaje porque ella había cumplido 30 años de trayectoria
Martha culpó a José por el choque mientras Martha contaba la historia a la policía
Ricardo recibió a Liliana en su casa mientras Ricardo cocinaba la cena para ambos
Juan empujó a María en el entrenamiento mientras Juan buscaba la pelota en el campo
Aurora recordó a Alfonso en la junta cuando ella expuso los proyectos del año pasado
Sofía cantó a Julián en la fiesta cuando ella supo que era su cumpleaños
Daniel salvó a Gabriela en el mar cuando él vio que la marea era más intensa
Gustavo sintió a Magda en la sala cuando Gustavo se levantó en la noche para abrir la ventana
Raquel siguió a Emilio en la carretera cuando Raquel pasó la primera caseta
Patricia visitó a Arturo en el hospital cuando Patricia tuvo tiempo libre el martes
Fernando conoció a Julia en la preparatoria antes de que él se graduara y fuera a la universidad
Víctor apoyó a Carmen con sus tareas en la escuela antes de que él estuviera más ocupado
Ana explicó a Tomás todas las dudas que tenía antes de que ella mandara el reporte
Mariana llamó a Brandon ayer en la noche antes de que Mariana dejara a su sobrino en su casa
Fernando describió a Violeta a los reporteros antes de que Violeta llegara a la fiesta de inauguración
Virgilio perdonó a María por todas sus mentiras antes de que Virgilio se mudara a la ciudad
Alejandra extrañó a Víctor en la boda porque él no pudo salir de su trabajo
Jimena necesitó a Alberto para ingresar a la computadora porque él tenía la contraseña
Jair atacó a Frida en el juicio porque ella lo había acusado de robar varios productos
Alejandro dijo a Daniela sobre un nuevo restaurante porque Daniela quería celebrar su cumpleaños
Natalia escondió a Héctor en el carro porque Héctor tenía los regalos sorpresa
Cinthya escribió a Renato por correo electrónico porque Renato tenía que firmar el contrato
Alberto creyó a Paloma todo lo que dijo mientras ella contaba historias sobre sus experiencias
Renato miró a Ana en la exposición mientras ella hablaba de política muy animada
Sofía citó a Miguel en la plaza mientras él tenía su hora de comida
Tania tocó a Jorge en el hombro en la fiesta mientras Jorge hablaba con alguien más
Adán entendió a Ana en sus preocupaciones mientras Ana pensaba que no tenía amigos
Mauricio aconsejó a Laura para su entrevista mientras Laura preparaba las respuestas de la prueba
Diana destruyó a Hugo en la partida de poker cuando él se distrajo con el partido
Dafne cuidó a Gerardo en su casa cuando él se rompió un brazo jugando futbol
Emmanuel habló a Sofía por teléfono cuando ella estaba bañándose en su cuarto
Santiago usó a Diana como su defensora cuando Diana aceptó haber visto lo sucedido
Viridiana ganó a Emmanuel en la carrera cuando Emmanuel perdió energía al final
Andrea encontró a Iván en la calle cuando Iván salía de su edificio en la noche

Nicolás dañó a Fernanda en su relación antes de que ella se diera cuenta de que la engañaba
Alfredo calmó a Ilse en la cena antes de que ella hiciera la discusión personal
Fabiola ayudó a Ricardo a decidir la decoración de su casa antes de que él contratara a un diseñador
Miriam preguntó a Miguel sobre las nuevas vacantes antes de que Miguel las anunciara a todos
Edgar mintió a Jimena sobre las nuevas reglas del juego antes de que Jimena las descubriera
Uriel disculpó a Lidia por la tardanza antes de que Lidia explicara la razón