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The Interaction of Functional Predictors and the Mechanical Predictor Perseveration in a Variationist Analysis of Caribbean Spanish Heritage Speaker Subject Pronoun Expression

Ana de Prada Pérez[ID]

Department of Spanish and Latin American Studies, Maynooth University, W23 F2K8 Maynooth, Ireland; ana.depradaperez@mu.ie

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Abstract: Subject pronoun expression (SPE) in Spanish has been widely studied across monolingual and bilingual varieties, showing a consistent effect of functional predictors. In recent papers, the role of the mechanical predictor priming, or perseveration, has been the source of debate. Additionally, little is known about the interaction of perseveration and significant functional predictors (e.g., grammatical person). In this paper, we expand on previous research by examining first-person singular (1sg) and third-person singular (3sg) data from sociolinguistic interviews with Spanish–English bilinguals from Florida to explore the possible difference in priming in deictic vs. referential subjects. The results from a mixed-effects variable rule analysis only offered clear evidence of priming in 1sg. We hypothesize that this result could be due to either surprisal (1sg overt pronominal subjects are rarer in the corpus that 3sg overt pronominal subjects) or to 3sg involving reference-tracking and perseveration only being evident in contexts where the subject form does not signal for pragmatic content.

Keywords: subject pronoun expression; perseveration; priming

1. Introduction

In addition to social predictors, previous research on Spanish subject pronoun expression (SPE) has identified mostly functional predictors and one mechanical predictor, namely perseveration or priming, regulating subject form alternation between overt and null pronominal subjects in Spanish, as in *(Ella) baila en su oficina* "She dances in her office" (e.g., Carvalho et al. 2015; Otheguy and Zentella 2012; Orozco 2016, 2018; Travis and Cacoullos 2018). Priming has been widely explored in the psycholinguistic literature and, more recently, in corpus linguistics. A priming effect is reported where the use of a structure, when more than one structure is available, increases the probability of that same structure being used in a subsequent utterance. In SPE, some authors have explored priming by including the form of the subject of the previous verb form (with different approaches to what previous verb form should be considered) as a predictor. Several previous studies using variable rule analyses report that pronouns lead to pronouns and null subjects lead to null subjects (Abreu 2012; Cameron 1994; Cameron and Flores-Ferrán 2004; Flores-Ferrán 2002; Travis 2007; Travis and Cacoullos 2012). Otheguy (2015), however, presents crosstabulated data from eight interviews from Otheguy and Zentella (2012) NYC corpus and concludes that there is no priming effect. The current paper contributes to this debate by examining priming in several analyses, crosstabulated data and mixed-effects models, a random forest analysis, and a conditional inference tree.

Some of the antecedent research has also examined the interaction of priming with some functional predictors (distance from previous mention and co-referentiality). The results seem to indicate that priming is stronger in coreferential contexts. Thus, the interaction of functional and mechanical

predictors seems to be a productive avenue for a better understanding of the role of priming in SPE. This paper expands on previous literature by examining the interaction of perseveration, switch reference, and grammatical person.

Grammatical person is a functional predictor that has a large effect in SPE. Studies that include all grammatical persons (cf. Otheguy and Zentella 2012; Orozco 2018, among others) consistently explore grammatical person as a predictor. However, little explanation for the differences across persons in found in the literature. Travis and Cacoullos (2018) addressed this gap in the literature by examining differences in first person singular (1sg) and third person singular (3sg) subjects with respect to accessibility of reference, an expanded co-referentiality or switch reference predictor, where they included distance from previous mention in non-coreferential tokens and clause-linking, or the syntactic and prosodic relationship between the target subject and the preceding sentence, in coreferential tokens. They reported accessibility-impacted 1sg earlier or at a shorter distance than 3sg subjects. The present study aims to expand on Travis and Cacoullos (2018) research on the comparison of 1sg and 3sg subjects by examining the interaction of grammatical person and a mechanical predictor: perseverance or priming.

This paper can contribute to the previous literature in two ways. On the one hand, it can expand our understanding of the size of the effect of priming and how it interacts with a functional predictor that has been reported to have a very large effect. The nature of 1sg pronouns is deictic but that of 3sg is referential; therefore, the relevance of overt pronominal subjects for reference-tracking is different for 1sg than for 3sg subjects, which can have an effect on priming. Moreover, the interaction between person and priming can additionally clarify some of the conflicting previous results regarding priming, since previous studies differ in the grammatical persons included in their data (e.g., Travis and Cacoullos 2012, only included 1sg data in their analysis while Otheguy 2015, included data from all grammatical persons).

On the other hand, this paper also contributes to the literature on differences in SPE according to grammatical person. Previous research has examined the interaction of person with coreference (accessibility of reference) and has reported differences in the distance at which 1sg and 3sg get affected. In particular, Travis and Cacoullos (2018) reported that participants used more overt pronominal subjects at shorter distances with 1sg than with 3sg subjects. This result allowed them to explain why participants used more overt pronominal subjects in 1sg. In our data, participants used more overt subjects with 3sg subjects. In this paper, we explore if priming can explain the difference between 1sg and 3sg subjects in our data. In addition to accessibility differences between grammatical persons, in this paper, we show that person differences are additionally explained by differences in priming effects between 1sg and 3sg.

The paper is organized as follows. In the next section, we offer a summary of the previous research leading to this project. Section 3 presents the research questions and hypotheses and describes the participants, methods, and results. In Section 4, we discuss the results in light of the research questions and hypotheses. Lastly, in Section 5, we offer some conclusions and directions for future research.

2. Priming in SPE in Spanish

In the past few decades, work in psycholinguistics, more specifically on production, has examined structural priming as a cognitive process of utterance planning, where the repetition of a structure has been observed, even when the lexical items involved are different (Bock 1986). More specifically, structural priming refers to the "fact that speakers tend to re-use structures they have recently comprehended or produced themselves" (Gries and Koostra 2017, p. 235). For example, pioneering work by Bock (1986) examined the production of the active versus the passive voice as well as prepositional versus double object constructions in English.

(1)　　Transitive priming sentences

　　　　a.　　Active: One of the fans punched a referee.

      b.   Passive: The referee was punched by one of the fans.

(2)   Dative priming sentences

      a.   Prepositional: A rock star sold some cocaine to an undercover agent.

      b.   Double object: A rock star sold an undercover agent some cocaine.

Bock (1986, p. 361)

She reported that the use of one of the forms increased the likelihood of subsequent uses of the same structural choice, even in the absence of lexical or semantic relation with the previous sentence. An interest in priming is also present in corpus linguistics, where results on a priming effect are also well attested in the literature. Research on priming within corpus linguistics also examines the effect of other predictors, such as the distance between the prime and its target, the notion of surprisal, and the similarities between the prime and its target (same lemma, same form, etc.) (cf. Gries and Koostra 2017, for a review). Crucial to our paper is the notion of surprisal (Jaeger and Snider 2008; Rosemeyer and Schwenter 2019) or the fact that a structure primes more if it is less frequent or expected.

Following this line of work, research on SPE has examined priming in the alternation of overt and null pronominal subjects. Comparing the use of null subjects preceded by overt pronominal subjects to those preceded by null subjects and the use of overt pronominal subjects after overt pronominal vs. after null subjects, the majority of previous studies conclude that "a pronominal Trigger favors a following pronominal Target and a null subject Trigger favors a following null subject Target" (Cameron 1994, p. 38). More specifically, Cameron and Flores-Ferrán (2004) build on Bock and Griffin (2000) idea that repetitions in speech can be intentional or unintentional and, thus, pragmatically unmotivated. They examined the effect that the form of the subject of the previous verb or the previous mention of that referent had on SPE. To explore that perseveration or priming can indeed have an effect, it is necessary to examine contexts in which pragmatic predictors are controlled. Cameron (1994), for instance, compared the effect of priming of an immediately-preceding subject when it was coreferential vs. when it was non-coreferential. His results showed that priming took effect in coreferential contexts only. This result is important as it establishes the interaction between a pragmatic predictor, co-referentiality or switch reference, and perseveration. From this result, it seems that priming operates only in contexts where the subject form does not signal for pragmatic content. In SPE, it has been established that null subjects are used in contexts of continuity of reference and overt subjects in switch reference. Thus, overt subjects have been characterized as signaling pragmatic content while nulls are seen as the unmarked form. Thus, Cameron (1994) results indicate that priming is only visible in unmarked contexts or those contexts where there is no need to use the subject form as a signal for pragmatic content. In this paper, we also examine co-referentiality, or switch reference, to examine the interaction of priming and another functional predictor and include an additional functional predictor that has been shown to have a large effect on subject pronoun expression in previous studies: grammatical person.

Previous research on priming in SPE can be difficult to summarize due to differences in the tokens included as well as their notion of priming. In particular, there are studies that included previous subjects with little conditioning while others were more restrictive in their selection of the prime. For example, Cameron (1994) examined the relation between the target form and their immediately preceding subject (the prime). Otheguy (2015) followed the same notion of prime as being in the immediately preceding clause, with the only condition that it had to be an animate referent. In contrast, Abreu (2012), Flores-Ferrán (2002), Shin (2014), and Travis (2007) included only those that have the same referent as primes. Importantly, Travis (2007) examined the effect of distance from previous mention as measured by intervening subjects between the prime and the target. Lastly, Travis and Cacoullos (2012) compared the effect of priming with the previous mentioned subject (similarly to Abreu 2012; Flores-Ferrán 2002; Shin 2014; Travis 2007) as well as the immediately preceding subject (in line with Cameron 1994 and Otheguy 2015). This methodological decision has important consequences for the results attested for perseveration of overt pronominal subjects, as argued below.

Additionally, previous studies differ in the predictors included in the analysis, other than priming, and the grammatical persons included in the analysis. With reference to the latter, while Cameron (1994) included only singular subject forms, Flores-Ferrán (2002) included singular and plural forms and examined these two grammatical numbers separately. Travis (2007), and Travis and Cacoullos (2012) only included 1sg subjects, while Shin (2014) only included 3sg subjects. Lastly, Abreu (2012) and Otheguy (2015) included all persons, without examining the interaction with perseveration or performing separate analyses according to person. Flores-Ferrán (2002), and Cameron and Flores-Ferrán (2004) concluded that priming exerts a similar effect in singular as in plural subjects. In the present project, we depart from examining a person effect separating singular and plural forms and instead compare 1sg and 3sg. Because the nature of 1st and 2nd persons is deictic while it is referential for 3rd, tracking reference is critical in 3rd person subjects. Similar to the interaction between co-referentiality and priming, it is possible that the priming effect is more evident in deictic persons since they can be considered given information (Chafe 1994). In this paper, thus, we examine the possible interaction between grammatical person and perseveration, expanding on previous literature by examining priming in 1sg and 3sg separately.

The predictors examined in the previous literature differed from study to study, as a response to the data and contexts included. While Cameron (1994) and Flores-Ferrán (2002) focused on priming, they separated their data differently to examine the interaction of priming and coreference in the former and the interaction of priming and grammatical number in the latter. Cameron (1994) separated his data according to switch reference and performed separate analysis for coreferential and non-coreferential subjects in addition to examining possible differences between SPE in San Juan, Puerto Rico, and Madrid, Spain. Flores-Ferrán (2002), on the other hand, separated her data according to grammatical number, i.e., singular (sg) vs. plural (pl) and ran separate analyses for sg than for pl subjects. Abreu (2012) and Shin (2014) examined different predictors regulating SPE. They, however, did not explore their interaction with priming. With respect to priming, Abreu (2012) included priming from English and from the interlocutor, expanding the predictors previously examined within priming. Travis (2007) examined the interaction of priming and several linguistic predictors (distance from previous mention, verb type and reference, and Tense, Aspect, and Mood (TAM) continuation) as well as the effect of genre (narrative vs. conversation). Travis and Cacoullos (2012) examined the two different types of priming (previous mention vs. previous subject) and the interaction of priming and turn position as well as priming and co-referentiality.

The results from these studies indicate perseveration effects that are modulated by a variety of predictors. Coreferential subjects exhibit a stronger priming effect than non-coreferential subjects in San Juan and in Madrid, where priming was not significant for non-coreferential subjects in Cameron (1994). The same trend was reported in Colombian Spanish in Travis and Cacoullos (2012), where, as was the case in Madrid, priming was not significant in non-coreferential contexts. Flores-Ferrán (2002) indicated strong preservation effects in her data from Puerto Ricans in New York City (NYC), which only included coreferential subjects, both in singular and plural subjects. Abreu (2012) also identified a priming effect both in monolingual and bilingual Puerto Rican speakers in Florida and Puerto Rico. Similarly, Shin (2014) also reported an effect of priming on 3sg subjects in NYC data (Otheguy and Zentella 2012). Travis (2007) also reported evidence of priming, although with differences in the interaction between priming and duration or distance between prime and target in Colombian vs. New Mexico (NM) data. In NM, priming was significant at longer distances. This difference was attributed to the differences in genre between the conversational nature of the data in the Colombia corpus and the narrative style of the NM data. In the former dataset, priming was observed only for null subjects, which was the same result reported in Otheguy (2015). Travis (2007) attributed this effect to the interaction with distance. In general, at longer distances between previous mention and target, speakers used more overt pronominal subjects, while they used more null subjects at shorter distances. Sometimes the interaction between priming and distance converged on the same result: at longer distances and with an overt pronominal previous mention, overt pronominal subjects are favored,

and at shorter distances and with a null previous mention, null subjects are favored. The NM data displayed significantly shorter distances between previous mention and target than the Colombian data. Therefore, she attributed the different results between the two datasets to differences in distance, not necessarily differences in priming.

Otheguy (2015), in contrast, interpreted the result that priming only occurs with null subjects as indicative of a lack of a priming effect. Instead of priming, he offered a functional explanation, whereby null subjects are the default and likely to precede both null and overt subjects, with overt subjects being used when required pragmatically, as in switch reference. This study calls for further research, given that it is the only study to approach the data differently and to reach a different conclusion: no priming effects present in SPE. The results from previous studies guided our analysis: we performed two different analyses on the same data to reflect the methodological differences attested in the preceding literature (crosstabulation vs. mixed-effects models).

Notwithstanding the differences in previous research, some common tendencies were reported across studies. The most consistent result was the perseveration of null subjects in contexts where both coreference and priming lead to more null subjects, that is contexts of subject continuity with a preceding null subject. As Travis (2007), and Travis and Cacoullos (2012) explained, this is a context where results were different for all three contexts considered in their study (which resulted from the combination of the predictors coreference and form of previous subject), where overt pronominal subjects were significantly more frequent. Thus, they concluded that the combination of these two predictors (priming and coreference) better explained the distribution. Otheguy (2015) differed in his analysis as well as his interpretation of his data from bilinguals in NYC. Instead of using a variable rule analysis (multivariate regression in Goldvarb), he presented crosstabulations of the frequency of overt pronominal pronominal subjects and null subjects in a context where the preceding subject was also overt pronominal or null. He further examined his data separately for contexts of coreference and contexts of switch reference. His results indicated that null and overt pronominal subjects tended to be preceded by null subjects, both in coreferential and non-coreferential contexts. Thus, he concluded that there was no priming and no interaction with co-referentiality.

The differences in interpretation are partly due to differences in comparisons. Otheguy (2015) compared the use of overt pronominal subjects in contexts where they were preceded by overt pronominal subjects (perseveration) vs. contexts where they were preceded by null subjects (interspersion). Similarly, he compared the use of null subjects in contexts of perseveration and interspersion. In other studies, the regression analysis compared the probability of using an overt pronominal vs. a null subject in contexts where the previous mention was an overt subject as well as in contexts where the previous mention was a null subject. In (3) and (4), we contrast the two approaches to perseveration, where *n* is used to represent a null subject and *p* is used to represent an overt pronominal subject.

(3)   Otheguy (2015) comparisons

      p . . . p (perseveration) vs. n . . . p (interspersion)
      n . . . n (perseveration) vs. p . . . n (interspersion)

Otheguy (2015) compared, on the one hand, pronominal perseveration (a pronoun followed by a pronoun) with null subject interspersion (a null subject followed by a pronominal subject) and, on the other, null subject perseveration (a null subject followed by a null subject) with pronominal interspersion (a pronominal subject followed by a null subject). In sum, he compared the two primes that might precede a specific target. This comparison is different from that in previous analyses, where the comparisons were in the two targets that might follow a specific prime, as represented in (4).

(4)   Comparisons in variable rule analyses (Abreu 2012; Cameron 1994; Cameron and Flores-Ferrán 2004; Flores-Ferrán 2002; Shin 2014; Travis and Cacoullos 2012; Travis 2007).

p . . . p (pronominal perseveration) vs. p . . . n (pronominal interspersion)

n . . . p (null subject interspersion) vs. n . . . n (null subject perseveration)

In (4), the authors compared pronominal perseveration, where a pronominal subject preceded another pronominal subject, with pronominal interspersion, where a null subject followed a pronominal subject, and on the other hand null subject interspersion, where a pronominal subject followed a null subject, with null subject perseveration, where a null subject followed a null subject.

The results are in fact rather similar, once the data offered in these papers is adapted to present similar comparisons. Table 1 offers data from previous studies adapted to follow Otheguy (2015) presentation of the data.

Table 1. Perseveration vs. interspersion in previous research.

		Second Subject Is Overt (PV)					Second Subject Is Null (V)				
		Perseveration		Interspersion		Total	Perseveration		Interspersion		Total
		%	N	%	N		%	N	%	N	
Cameron (1994)	San Juan	61	176	39	112	288	61	317	39	199	516
	Madrid	42	39	58	54	93	78	433	22	125	558
Abreu (2012)	Florida	72	256	28	101	357	68	260	32	121	381
Flores-Ferrán (2002)	NYC	67	3903	33	1954	5857	67	4530	33	2201	6731
Travis (2007)	NM	54	138	46	118	255	77	353	23	104	457
	Colombia	56	240	44	192	432	59	265	41	181	446
Travis and Cacoullos (2012)	Prev. mention	53	372	47	330	702	57	316	43	238	554
	Prev. subject	39	238	61	369	607	68	226	32	108	334
Otheguy (2015)	NYC	49	64	51	68	132	74	241	26	84	325

Table 1 shows that previous research is uniform in showing the use of null subjects following null subjects (null subject perseveration) (with a minimum of 57% null subjects preceded by null subjects, reported in Travis and Cacoullos 2012, and a maximum of 78% in Madrid, reported in Cameron 1994) while pronominal perseveration seems to vary more from study to study (42% in Madrid to 72% in Puerto Ricans in Florida). The median percent of perseveration of null subjects across these studies is 68%, while it is 54% in pronominal subjects. Crucially, no studies showed a percentage above 50% for null subject interspersion, whereas three studies attested a higher rate of overt pronominal subject interspersion than perseveration (Madrid in Cameron 1994; immediately preceding subject in Travis and Cacoullos 2012, and Otheguy 2015). These three cases are those where the prime was not the previous mention but the adjacent previous subject. In our data, only the adjacent previous subject was included but the data was separated by person into 1sg and 3sg. Appendices A and B summarize the data, showing the same trend as in previous research with an adjacent previous subject. In coreferential contexts with 1sg and in switch reference contexts with both persons, there was around 30% difference between interspersion and perseveration. In 3sg in coreferential contexts, though, the size of the effect was smaller, with a difference of a little over 10%. Therefore, it seems that the effect of the predictor perseveration is smaller in 3sg in coreferential contexts than in switch reference contexts and in 1sg subjects in either context. Importantly, the results offered in Table 1 for Cameron (1994) and Otheguy (2015) only included coreferential subjects, as the effect was not reported for non-coreferential subjects in some of the studies. If priming is only clear in cases of null subject perseveration, can we still consider priming takes place in SPE? Otheguy (2015) concluded that, in the case of an immediately preceding (coreferential) subject, a functional approach to SPE is sufficient in explaining the data. He argued that priming should be more evident in pronominal subjects as pronouns are both less frequent and more salient. According to the effects of surprisal on priming, their frequency and saliency should make them the main subject form for priming. What these data showed, in general, was that null subjects were more frequent and were the default form; thus, they tended to precede all types of subject forms.

Otheguy (2015) explained that overt pronominal subjects were used in cases where the discourse might require them, e.g., when there is an intervening human subject. Nonetheless, this analysis was highly influenced by the overall high rate of null subjects. In priming, however, the question may be better framed as to whether the probability of using a pronoun after having used a pronoun is higher, even if the likelihood of being preceded by null subjects than by overt subjects is higher. In other words, even if overt pronominal subjects tend to be preceded by null subjects, is it possible to report a priming effect where an overt pronominal subject leads to a higher use of pronominal subjects? This would be established by a comparison with contexts where a pronominal subject is preceded by a null subject. With this in mind, it is possible to interpret Otheguy (2015) results as merely indicating that null subjects are highly frequent while not necessarily offering the necessary comparison to reject a priming effect in SPE. Multivariate regressions, or mixed-effects variable rule analyses, can make the necessary comparisons. Thus, although the crosstabulations in Table 1 can offer insightful information, they are insufficient to answer the question of a possible priming effect in SPE.

In sum, previous research on priming in SPE has made some headway in our understanding of priming and how it may interact with functional predictors (e.g., co-referentiality and distance from previous mention). This paper aims to further explore interactions between priming and another functional predictor, grammatical person. If, as Otheguy (2015) argues, there is no priming in SPE, there would not be differences across grammatical persons, at least in contexts of same reference. If, however, there is priming but it interacts with functional predictors, it is possible that there is a difference in the effect of priming across persons. Thus, examining a possible interaction between priming and grammatical person can (i) shed some light on the differences between 1sg and 3sg that have been reported in SPE (Travis and Cacoullos 2018), (ii) test that differences in previous studies on priming in SPE cannot be attributed to differences in the grammatical persons included in their data, and (iii) elucidate interactions between priming and other functional predictors, as only the interaction with coreference has been explored. In order to examine the possible interaction between perseveration and grammatical person, we analyzed data from Spanish–English bilingual speakers in Florida.

3. Materials and Methods

The present study aims to examine the interaction of perseveration with other functional predictors, namely grammatical person and switch reference in Spanish.

3.1. Research Question and Hypothesis

This paper focuses on the possible effect of priming on Spanish SPE and, particularly, a comparison of its effect in 1sg vs. 3sg subjects as well as in contexts of co-referentiality vs. switch reference. The guiding idea is that priming may not be as visible in contexts where the pronoun signals pragmatic content, following Cameron (1994) hypothesis for why priming is only evident in coreferential contexts. This paper tests this hypothesis on our data and further applies it to the predictor grammatical person. Previous research reports conflicting results with respect to perseveration: while variable rule analyses reported a priming effect, Otheguy (2015) crosstabulation analysis did not. In addition to a different analysis, Otheguy (2015) included different grammatical persons while Travis and Cacoullos (2012), and Travis (2007) only included 1sg subjects. There are significant differences between 1sg and 3sg subjects, as reflected in the large effect size of the predictor in previous research. Additionally, Otheguy (2015) functional approach argued that the aim of the overt pronominal subject was to facilitate reference tracking. Therefore, the effect might be different in 3sg, where reference tracking is of relevance, than in 1sg. If priming is restricted to contexts where the pronoun does not signal pragmatic content (Cameron 1994), the locus of priming would be 1sg. Similarly, Travis and Cacoullos (2018) identified differences in discourse structure between 1sg and 3sg that can have repercussions for the effect of priming. In a similar vein, this paper explores the interaction with switch reference, which also has a large effect size and has been found to interact with perseveration (Cameron 1994). Thus, the paper aims to answer the general question:

Is there evidence of perseveration with overt and null pronominal subjects in both 1sg and 3sg subjects?

The antecedent literature using crosstabulations (Otheguy 2015) reported no priming effect, a result likely due to the effect of the high overall frequency of null subjects. In contrast, the inferential statistical analyses used in the other papers examining priming and SPE consistently indicated that the rate of use of overt pronominal subjects is higher when the previous mention or previous subject was overt pronominal (Abreu 2012; Cameron 1994; Cameron and Flores-Ferrán 2004; Flores-Ferrán 2002; Travis and Cacoullos 2012; Travis 2007). We expect our results to be similar. In the crosstabulated data, we anticipate null subjects to be preceded by null subjects while overt pronominal subjects might be preceded by similar rates of null and overt pronominal subjects or slightly more null subjects. In the mixed-effects model, however, we anticipate a priming effect.

With respect to the interaction between perseveration and person, in particular, this paper aims to address the specific question:

Is the perseveration effect different in 1sg than in 3sg subjects?

With respect to the perseveration by person interaction, previous literature did not examine the interaction between person and priming (Flores-Ferrán 2002 explored grammatical number). It is possible that, in contexts where reference tracking is more evident, as in 3sg, priming has a smaller effect, similar to contexts of switch reference, where functional predictors may outrank mechanical predictors. In 1sg, like in coreferential contexts, the effect of priming would be more evident. Additionally, in previous research, there were differences between 1sg and 3sg subjects with respect to the effect of language contact or proficiency level in Spanish, such that those effects resulted in a higher use of overt pronominal subjects in 3sg than in 1sg. Since a correlation has been found between the frequency of a form and the size of its priming effect (surprisal effect), it is possible that overt pronominal subjects in 1sg evidence more priming since they are less frequently used than overt pronominal subjects in 3sg. As a result, we hypothesize that, in 1sg, priming effects will be stronger than in 3sg subjects.

With respect to the interaction between perseveration and switch reference, in particular, this paper aims to address the specific question:

Is the perseveration effect different in 1sg than in 3sg subjects?

With respect to the interaction between switch reference and perseveration, Cameron (1994) has reported a stronger perseveration effect in coreferential subjects than in switch reference contexts. Thus, we predict a stronger effect in coreferential subjects as well. As in the case of the interaction with person, this result could be explained by the notion of surprisal, overt subjects being more infrequent in coreferential than in switch reference contexts or by a functional approach where priming is more prevalent in contexts where there is no reference tracking.

3.2. Participants

In order to address this question, data from 21 participants participated in a sociolinguistic interview with the author[1]. They were all of Caribbean heritage, with Coastal Colombia, Cuba, Dominican Republic, Puerto Rico, and Venezuela as countries of origin. At the time of data collection, they were all college-age students taking advanced classes in Spanish in the bilingual track at a large public University in Florida. The specific details of each participant are presented in Table 2.

As can be seen from Table 2, all participants in the second generation, except for two, were born in the U.S. Participant 3, nonetheless, was born in Puerto Rico and migrated to the U.S. when she was 3. Participant 15 migrated when she was 4 months old. There were broad differences in proficiency across participants (range: 14–47/50), with a median proficiency of 30. Those participants who scored above 30 were classified as the higher proficiency group, and those below 30 were classified as the lower

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[1] This study was approved by the University of Florida Institutional Review Board 02. Protocol #2015-U-0153.

proficiency group. Additionally, there were four participants who were born abroad and migrated between the ages of 9 and 13 years old.

Table 2. Participant profiles.

Participant	AOA	Country of Origin	Proficiency (Median Split)	Gender
Participant 1	Born in the US	Puerto Rico	Lower	Female
Participant 2	Born in the US	Cuba	Higher	Female
Participant 3	3 years old	Puerto Rico	Higher	Female
Participant 4	Born in the US	Venezuela	Higher	Female
Participant 5	Born in the US	Cuba	Higher	Female
Participant 6	Born in the US	Cuba	Lower	Female
Participant 7	Born in the US	Dominican Republic	Lower	Female
Participant 8	Born in the US	Cuba	Lower	Female
Participant 9	Born in the US	Venezuela	Lower	Female
Participant 10	Born in the US	Cuba	Lower	Female
Participant 11	Born in the US	Puerto Rico	Lower	Female
Participant 12	Born in the US	Cuba	Higher	Female
Participant 13	Born in the US	Cuba	Higher	Female
Participant 14	Born in the US	Barranquilla, Colombia	Higher	Female
Participant 15	4 months old	Cuba	Higher	Female
Participant 16	Born in the US	Cuba	Lower	Male
Participant 17	Born in the US	Cuba	Higher	Male
Participant 18	11 years old	Cuba	Advanced	Male
Participant 19	13 years old	Cuba	Advanced	Female
Participant 20	11 years old	Puerto Rico	Advanced	Male
Participant 21	9 years old	Puerto Rico	Advanced	Female

It is important to point out that other variationist approaches to subject expression examine socially stratified communities. This group of speakers is different, in that they have moved to this college town from different communities (mostly from South Florida) and have formed a new and temporary group. It is common for college-age Spanish speakers in the US to form a new community while they are in college and that is the type of community under examination here. For this reason, this group may not qualify as a speech community (Gumperz 1972). Thus, this project is different from other studies in that there is no stratification by age and no examination of social predictors. It is similar, nonetheless, in approaching SPE as a variable phenomenon.

3.3. Materials

All participants completed a PowerPoint-guided sociolinguistic interview with the author, a language background questionnaire, and a proficiency test.

Sociolinguistic interview: Participants were audio-recorded while talking to the author in a quiet lab setting. A PowerPoint presentation with bulleted topics of conversation was used to make sure all the interviews addressed the same general topics. The questions aimed to elicit different tenses and 3sg as well as 1sg and included questions about their daily lives, their student lives, families, and friends. The laptop computer was facing the researcher while the participant and the researcher were facing each other.

Language background questionnaire: Participants were asked to provide information on their personal history, their language history, their reported language use, and their self-reported proficiency across skills (speaking, listening, writing, reading, pronunciation, grammar, and overall) in each language, using a 7-point (1 = minimal; 7 = nativelike) scale.

Spanish proficiency test: The Spanish proficiency test was taken from a multiple-choice grammar section and a cloze test, based on the Diploma de Español como Lengua Extranjera (DELE), and widely

used in the field of second language and heritage bilingualism (Montrul and Slabakova 2003). The test has a total of 50 questions.

The language background questionnaire and the proficiency test were presented on the online platform Qualtrics. Participants received the link to the Qualtrics survey after completing the sociolinguistic interview. Before the interview, they had signed a consent form and were advised that the interview would be recorded. They were asked to talk as if they were talking to a friend.

3.4. Coding

All the interviews were transcribed, and up to 300 tokens were extracted from each participant. Tokens included all 1sg and 3sg verb forms with an animate referent in variable contexts (cf. Otheguy and Zentella 2012). The tokens were coded for a number of predictors. Of interest to this paper were person (1sg. vs. 3sg), switch reference (same vs. different referent as previous clause), and the form of the previous subject. With respect to switch reference, it is important to note that, when there was a switch in speaker, the referent may have been the same, even if the person was different (e.g., a case where the interviewer asked a question in the second person about the interviewee and the interviewee responded in the 1sg was coded as the same referent). For each eligible token (1sg or 3sg animate referent), the previous subject was coded for its form as pronominal, lexical, null, or other. We did not limit previous subjects to be eligible based on functional predictors, such as coreference or eligibility (e.g., lexical subjects, unlike Abreu 2012; Flores-Ferrán 2002; Travis and Cacoullos 2012; Travis 2007) or animacy (in contrast with Otheguy 2015). Importantly, previous tokens could have been produced by the interviewer, which is of relevance, as an interlocutor pronominal prime for 3sg takes the same form as the target (*él/ella*), whereas for 1sg, it necessarily does not (a coreferential prime would be *tú*). Nonetheless, of the 4472 total tokens, only 332 were cases of an interlocutor prime (269 in 1sg and 65 in 3sg). Of these, only 190 in 1sg and 51 in 3sg were in a same reference context. Otheguy (2015) explained that the motivation for a wider inclusion was to examine perseveration due to priming as a mechanical motivation. We followed this reasoning in this paper. Data were coded into four categories:

- Lexical subjects: previous subjects which were a nominal phrase from as simple as a bare common noun or a proper noun to as complex as phrases with a determiner, complements, and adjuncts.
- Other subjects: previous subjects which were clausal or pronominal (other than subject pronouns).
- Pronominal subjects: previous subjects which had an overt pronoun in nominative case.
- Null subjects: previous verbs where the subject is null.

Examples of coding from our data is offered in (5).

(5) Coding for predictor perseveration or form of previous subject:

(a) Overt lexical subject

*Mi roommate el primer año de la universidad me llamó en enero pasado y me **dijo** que ella iba a estudiar también.*
"My roommate from my freshman year called me last January and told me that she was going to study as well."

(b) Overt pronominal subject

*Pero ella pinta. **Tiene** su estudio de arte.*
"But, she paints. She has an art studio."

(c) Null subject

*En realidad ∅ tendría 65 años. No **era** tan mayor.*
"She was actually around 65. She wasn't that old."

     (d)   Other

     *Otra persona que hablaba español porque ella **ha conocido** a otros padres pero todos son coreanos o americanos o de Tailandia* . . .
     "Another person who spoke Spanish because she has met other parents, but they were all Korean or American or from Thailand."

In example (5a), the target is *dijo* "(she) said". The preceding verb is *me llamó* "called me" which has the overt lexical subject *Mi roommate el primer año de la Universidad* "my roommate from my first year". Thus, the prime was coded as overt lexical subject. In (5b), the target is *tiene* "(she) has" and the prime is *ella* "she" in *ella pinta* "she paints". Therefore, it was coded as an overt pronominal subject. Similarly, (5c) and (5d) were coded as null subject and other since *era* "she was" is preceded by *tendría* "(she) was" and *ella ha conocido* "she has met" by *que hablaba español* "who spoke Spanish". One of the differences between the persons is in how frequently a coreferential previous subject may be lexical or other. In 1sg, these are quite rare and include previous subjects that are relative pronouns (6a); coordinated subjects (6b), which are only partially coreferential; switches between direct and indirect speech (6c); and preceded by a reverse psychological predicate (6d).

     (6)   Examples of coreferential 1sg subjects with a previous lexical or other subject:

     (a)   Porque no soy una persona, que al principio que era cómoda, y *que* siempre estaba ayudando a otras personas. **Traté de ser** mi solo al principio

     "Because I am not a person that, at the beginning I was comfortable, and I wasn't always helping other people. I tried to be on my own at first."

     (b)   *Soy* yo, mi hermana y mi hermano. Yo **soy** la del medio

     "It's me, my sister and my brother. I'm the middle child."

     (c)   Y mami *dice*: ay yo no **quiero hacer** eso

     "And mom says: I don't want to do that."

     (d)   Y eso me *gustó*. **Tenía que vivir** con estas personas.

In (6a), *traté de ser* "I tried to be" and *que siempre estaba* "who was always" refer to the speaker. As a relative pronoun *que* was coded as 'other' form of previous subject. Likewise, in (6b) and (6c), both verb forms refer to the speaker but, in (6b), the subject is coordinated in the first clause and, in (6c), there is a switch to direct speech. For switch reference, when the previous predicate was a reverse psychological predicate, the referent of the clitic was considered, as it is the semantic subject, even if it does not control agreement. Thus, in (6d), both subjects refer to the speaker.

For the crosstabulation analysis summarized in Section 2 (cf. Appendices A and B), the data were recoded for the form of the previous subject as perseveration or interspersion. When only tokens with overt pronominal subjects were examined, the predictor form of the previous subject was recoded into perseveration if the previous token was also overt, while all others were recoded as interspersion. Similarly, when examining null subjects, those preceded by null subjects were recoded as instances of perseveration whereas the other types of previous subjects were recoded as interspersion.

4. Results

Rates of overt pronominal subjects can shed some light on the role of perseveration. In particular, a surprisal effect may be found; priming exerts a stronger effect on forms that are less frequent. Therefore, in Table 3, we present the rates of overt pronominal subjects for each of the proficiency levels and for the two different persons.

Table 3. Rates of overt pronominal subjects in Spanish Heritage Speakers' oral productions.

		Spanish Proficiency			
		Advanced % (N)	Higher % (N)	Lower % (N)	Total N
Overall		20% (1300)	35.3% (1717)	40.2% (1323)	4340
Person	3sg	31.1% (296)	50.5% (499)	57.8% (282)	3263
	1sg	16.7% (1004)	29.1% (1218)	35.4% (1041)	1077
Switch reference	Same referent	12.7% (857)	28.9% (1099)	37.0% (875)	2831
	Different referent	34.1% (443)	46.8% (618)	46.4% (448)	1509
Perseveration	Perseveration	8.7% (813)	22.1% (976)	28.2% (767)	2556
	Interspersion	38.8% (487)	52.8% (741)	56.8% (556)	1784

Overall, the advanced proficiency heritage speakers (HSs) produced 20% overt pronominal subjects, the higher proficiency HSs produced 35.3% overt pronominal subjects, while the lower proficiency HSs produced 40.2% overt subjects. In 1sg, the three groups produced fewer overt pronominal subjects (16.7%, 29.1%, and 35.4%) than in 3sg (31.1%, 50.5%, and 57.8%). All proficiency groups used more overt pronominal subjects with a different referent (34.1%, 46.8%, and 46.4%) than with the same referent as the previous clause (12.7%, 28.9%, and 37%). Lastly, speakers used more overt pronominal subjects in contexts of interspersion (38.8%, 52.8%, and 56.8%) than in contexts of perseveration (8.7%, 22.1%, and 28.2%). For more detail on the distribution across conditions, Appendix C offers a table with rates of overt pronominal subjects across contexts. Comparing these results with those in the monolingual literature reveals interesting trends. Rates in monolingual Caribbean Spanish speakers range from 24% to 59.8% in 1sg. Thus, even the lower proficiency speakers produced fewer overt pronominal subjects than most of the monolingual speakers in previous research (with the exception of Ortiz López et al. 2017, at 24%, and Holmquist 2012, at 34%). Rates in monolingual Caribbean Spanish speakers range from 29% to 68.3% (48%, if we exclude Alfaraz, 2015) in 3sg. The rate for the advanced proficiency HSs is almost the lowest reported in the literature (except for Holmquist 2012). The rates for the higher and lower proficiency HSs, in contrast, is almost the highest (except for Alfaraz 2015), which indicates an effect of language contact intensity. While Spanish was in contact with English for all groups, the advanced group was dominant in Spanish and acquired it monolingually as children and the other two groups acquired both languages during their childhood and are dominant in English. This effect, however, is only present in 3sg subjects. With respect to the effect of person, while monolingual speakers use more overt pronominal subjects in 1sg than in 3sg, the opposite trend is attested here and in line with other previous research (e.g., studies examining the Otheguy and Zentella 2012 corpus). The results from the predictors switch reference and perseveration are in line with previous research using variable rule analyses.

A mixed-effects analysis, in particular a general analysis for linear models (Gallucci 2019) was performed using Jamovi (The Jamovi Project 2019), which is a graphical user interface for R (R Core Team 2018), with switch reference, person, form of previous subject, and proficiency as fixed effects and participant as a random effect. The results presented on Table 4 revealed no interactions in the general analysis, although interactions were found in the post hoc analyses. Main effects were found for the three linguistic fixed effects.

Overall, speakers used overt pronominal forms in 3sg more than in 1sg subjects, in contexts of switch reference more than in contexts of same reference, and when the previous subject had an overt form of any type than when it was null. These results indicate that the effect of person is similar to that reported in previous research with bilinguals. This result can be explained through a markedness account, where null subjects are more marked in 3sg (de Prada Pérez and Soler 2020), or a pragmatic account, where overt subjects signal more content in 3sg due to their referential nature than 1sg subjects. The switch reference and perseveration effects also are in line with previous research. The relevant

effect of these predictors was explored through a random forest (Figure 1), including the random predictor participant.

Table 4. Mixed effects model of the predictors contributing to the use of overt pronominal subjects.

|	**Estimate**	**Standard Error**	**z Value**	**p Value**
(Intercept)	−0.38414	0.228	−1.6819	0.093
Person (RL: 1sg)				
3sg	0.78077	0.147	5.3051	<0 .001
Switch reference (RL: different)				
Same	−0.87051	0.148	−5.8731	<0.001
Form of previous (RL: null)				
Lexical	0.38730	0.152	2.5517	0.011
Pronominal	0.65823	0.107	6.1644	<0.001
Other	0.48215	0.243	1.9850	0.047
Proficiency (RL: Advanced)				
Higher	0.67911	0.577	1.1771	0.239
Lower	1.00163	0.605	1.6548	0.098
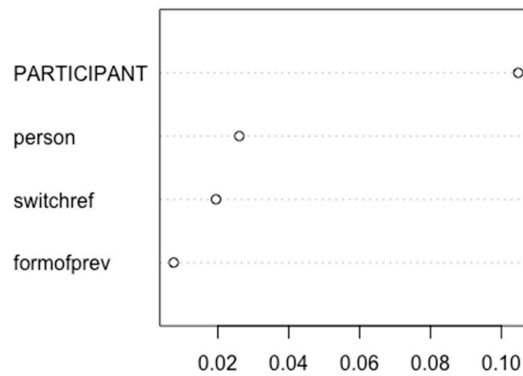
Figure 1. Random forest for fixed and random effects contributing to the use of overt pronominal subjects.

The conditional forest in Figure 1 indicates that, in addition to the large effect of the individual participant, the predictor with the largest effect is person, followed by switch reference, and lastly, form of previous subject. This ranking is also consistent with the previous literature (e.g., a monolingual group for all predictors and a bilingual group except for the effect of perseveration (Abreu 2012)).

Although no interactions were reported in the mixed effects model, Bonferroni post hoc analyses revealed interactions between the three linguistic fixed effects. The graphs below (Figure 2) further show this interaction.
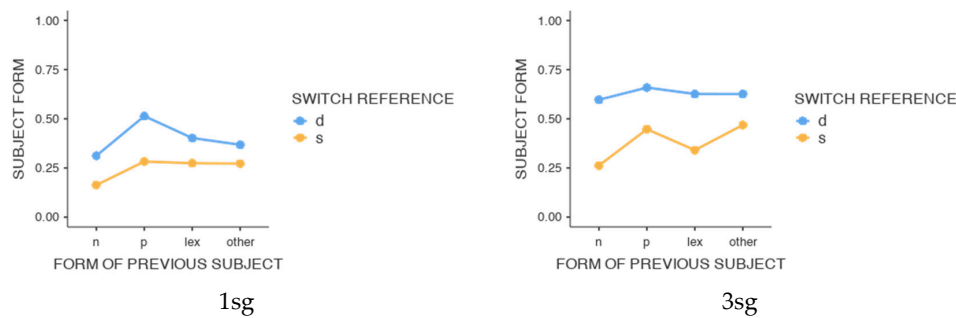

1sg   3sg

Figure 2. Interaction of switch reference and form of previous subject in the use of overt pronominal subjects in 1sg (**left**) and 3sg (**right**).

In particular, the use of more overt pronominal subjects than null subjects when the previous subject was pronominal was significant for 1sg subjects (both in contexts of same, $p < 0.001$, and different reference, $p = 0.003$) and with 3sg subjects in contexts of same referent ($p = 0.020$) but not in contexts of different reference ($p > 0.50$).

To further explore how these predictors interacted, a conditional inference tree analysis (Figure 3) was carried out using the ctree function on R. Conditional inference trees represent visually how natural splits occur in the data through binary branching trees and offer boxes at the bottom, including the total number of tokens and rate of subject form for each branch (see Tagliamonte and Baayen 2012).
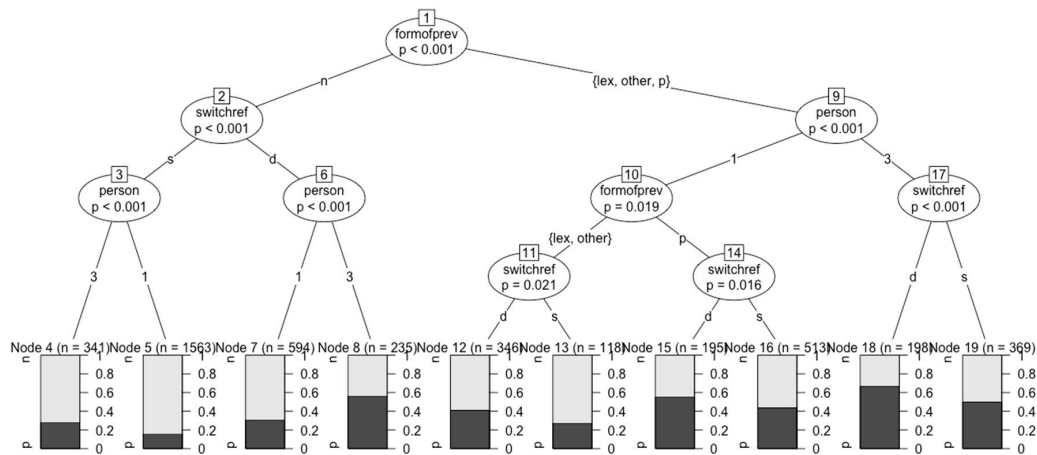

Figure 3. Conditional inference tree for the conditioning predictors in subject pronoun expression.

The conditional inference tree in Figure 3 indicated that the data were naturally split by whether the previous subject was null or overt (including lexical, pronominal, or other). When the previous subject was null, the data were further split by switch reference, where speakers used more overt pronominal subjects with a different referent from the previous clause than when it was the same referent. Both in the contexts of same reference and different reference, speakers used more overt pronominal subjects with 3sg than with 1sg subjects. When the previous subject was overt (lexical, pronominal, or other), the data were split by person, such that, for 3sg subjects, switch reference determined the use of overt pronominal subjects. In 1sg, in contrast, the form of the previous subject further split the data into lexical or other vs. pronominal subject form. In both of these contexts, speakers used more overt pronominal subjects with different than with same referents. Thus, even though the form of previous subject had a smaller effect overall, as shown in the random forest analysis above, it did divide the data, separating the contexts where the subject was preceded by a null subject than when it was preceded by an overt subject. Furthermore, when the preceding subject was overt, in 1sg, there was also a difference when the previous subject was pronominal than when it was lexical or other, with more overt subjects being used when the previous subject was pronominal. Pronominal priming, thus, was attested in 1sg in our data. In 3sg, however, there was no difference between being preceded by a pronoun or another type of overt subject.

5. Discussion

This paper aimed to address whether there was evidence of perseveration with null and overt pronominal subjects in both 1sg and 3sg subjects in the Spanish of Spanish HSs in the U.S. We hypothesized that our results would resemble those presented in Otheguy (2015) for the crosstabulation analysis, while evidence of a priming effect would be revealed in the mixed-effects analysis. We also hypothesized that there would be differences between 1sg and 3sg subjects.

The crosstabulation results largely resemble those in previous studies, where perseveration was evident with null subjects while interspersion, to a lesser degree, was attested with overt pronominal subjects. Overall, this analysis showed that null subjects were so frequent that they tended to precede

both null and overt pronominal subjects. Nonetheless, this analysis further revealed a difference between 1sg and 3sg, since in 3sg the perseveration effect for null subjects had a smaller effect but only in coreferential contexts. The results from this analysis were difficult to interpret. In the mixed-effect analysis, the form of the previous subject was included as a predictor instead, offering clearer results. Combining the different forms of previous subject into perseveration and interspersion was problematic, as the effect of a preceding null subject was very different from that of a lexical or other preceding subject. Including the form of previous subject in the mixed effect analysis revealed a clearer effect of priming, where being preceded by an overt subject, particularly a pronominal subject, lead to a higher use of a pronominal subject. This analysis further revealed that all three linguistic fixed effects (person, switch reference, and form of previous subject) were significant while proficiency was not. Additionally, through a random forest analysis, the ranking of the predictors as per their effect size was person, switch reference, and form of previous subject. Thus, the higher use of overt subjects in 3sg than 1sg subjects was the most significant effect, followed by the higher use of overt subjects in contexts of different reference, and lastly, the higher use of overt pronominal subjects in contexts where the previous subject is overt, particularly pronominal.

Comparing both analyses, the results appear to be contradictory. In the crosstabulation, we found evidence of perseveration for null subjects and interspersion for overt pronominal subjects. This result is consistent with the findings of Otheguy (2015) and Travis (2007) New Mexico data and those of the authors who examine the immediately preceding subject, as shown in Table 1 (Cameron 1994; Otheguy 2015, Travis and Cacoullos 2012). This result seemed to be at odds with the mixed-effect variable rule analysis in that the mixed-effect model indicated that the probability of using an overt pronominal subject was higher when the previous subject was also overt pronominal. The results from the two analyses, though, offered different viewpoints on the data. The crosstabulations allowed us to examine the rates in which a form was preceded by the same form, whereas the mixed-effects variable rule analysis indicated whether there was an increased probability of using an overt pronominal subject (vs. a null) with a specific previous subject form. The crosstabulation results indicated that null subjects were the most frequent form and they were likely to precede both null and overt pronominal subjects, although not so much with 3sg subjects. The mixed-effect models, however, showed that, in those cases where there was an overt pronominal subject, there was a higher probability of use of an overt pronominal form later on, at least for 1sg subjects. Our data is, thus, better explained by a combination of functional and mechanical predictors exerting an effect on the distribution of null and overt pronominal subjects (in line with Travis and Cacoullos 2012).

The effect of these predictors revealed some interactions, as per the post hoc tests, where the use of overt pronominal subjects was not significantly higher than the use of null subjects after a pronominal subject than after a null subject when the subject was in the 3sg form and in a context of different reference. To further understand the interaction and, thus, whether priming was different across conditions, a conditional inference tree analysis was performed. The analysis revealed that the data was split according to the form of previous subject into null and overt subjects and that there was only a split between pronominal and other types of overt subjects in 1sg subjects. Thus, all these results taken together reveal a priming effect for pronominal subjects, consistent with previous research using variable rule analyses and against Otheguy (2015) conclusion that a functional explanation suffices. This is the case for 1sg subjects and 3sg subjects in contexts of same reference. However, the effect of priming is rather small compared to other functional predictors and interacts in complex ways with the other predictors explored in this study. The absence of a priming effect for pronominal subjects in 3sg subjects (at least in different referent contexts) contrasts with the result in Shin (2014) for 3sg subjects in NYC, where she reported a strong effect of priming, with a range of 27 for the speakers raised in NYC. There are, nonetheless, several differences between both studies. Notably, Shin (2014) included both Caribbean and Non-Caribbean speakers, as the focus of the paper was on the effect of Tense, Aspect, and Mood (TAM) and the variety of Spanish was shown not to have an effect. If, as hypothesized before, the rate of use of overt pronominal subjects has an effect of the size of a priming effect (due to

surprisal), it is possible that the inclusion of Mainland speakers in the dataset had an effect, given that their overall rates of overt pronoun expression are different than those for Caribbean speakers.

The results presented here require an explanation as to why there is an interaction of priming, switch reference, and person in Spanish SPE. We find two possible hypotheses in the previous literature that can account for it. One explanation could be that priming is variable, with a smaller effect than functional predictors and, as a result, its effect is only evident in contexts where subject form does not signal pragmatic content (e.g., coreferential subjects in Cameron 1994). With respect to person, since 1sg is deictic and, relatedly, given information whereas 3sg involves reference tracking, it is possible that priming is only evident in 1sg, where the pragmatic context is rich enough. Thus, there may be more of a "yo-yo effect", in Travis (2007) terms, due to the fact that deictic subjects can be considered given information because they are present in the context and are not related to information flow (Chafe 1994; Travis 2007). Travis and Cacoullos (2018) examined differences between 1sg and 3sg subjects with respect to accessibility of the referent. They further specified the predictor switch reference, considering distance from previous mention for switch referent contexts and clause linking (based on syntactic and prosodic linking) for coreferential contexts. Thus, they can compare differences in 1sg and 3sg with respect to the distance at which they start to use more overt pronominal subjects, as both persons tend to favor overt pronominal subjects in switch reference but more fine-grained distinctions can be made when considering the distance from the previous mention within switch reference contexts. For 1sg subjects, overt pronominal subject rates increase at a shorter distance than 3sg subjects and the effect is larger. Further examination of the data reveals that 3sg subjects are used differently, in that they appear more in coreferential contexts; thus, they refer to them as "transient". Thus, a pragmatic explanation for the interaction of person and priming, where in contexts of interviews 3sg subjects have a different function, as a transient person, than 1sg subjects, which are the main topic of conversation, can explain our data. It is important to point out that, in Travis and Cacoullos (2018) data, they found the opposite trend with respect to the person where overt subjects were used more, i.e., more overt subjects in 1sg than in 3sg, a pattern reported in many monolingual varieties of Spanish (de Prada Pérez 2015; Ávila-Jiménez 1996; Cameron 1992; Holmquist 2012; Martínez Sanz 2011; Orozco 2015). The data from other bilingual communities in the U.S. also report higher rates of overt pronominal subjects in 3sg than in 1sg (e.g., Flores-Ferrán 2004; Lopez Villegas 2007; Otheguy and Zentella 2012) or a relatively higher increase in rates for 3sg than 1sg (Abreu 2012). Nonetheless, the same prediction with respect to the interaction between person and priming would be anticipated for their data as well.

Alternatively, a different explanation could be found in the psycholinguistic literature, where they have reported a surprisal effect: less frequent forms exhibit stronger priming. In 1sg and same referent contexts, overt pronominal subjects are less frequent than in 3sg and different referent contexts; thus, they are more subjective to priming. Thus, our results can be explained both by a surprisal effect, where the prediction would be for priming to be more restricted where the use of overt pronominal subjects is already rather high, as in the case of 3sg subjects in a context of switch reference in our data, or by a "pragmatic" effect, where priming is restricted to contexts where there is no other added pragmatic content, which would include contexts of different reference and 3sg. While for the surprisal effect the ranking of contexts for priming would be 1sg same referent > 3sg same referent > 1sg different referent > 3sg different referent, there is not an obvious ranking for a pragmatic effect with respect to these four contexts, an issue that we leave for further research.

To tease these two hypotheses apart, a study involving a variety where the rates of overt subjects are higher for 1sg than for 3sg (e.g., the data in Cacoullos and Travis 2018) would make different predictions. In particular, the prediction would be that priming would be more evident in 3sg than in 1sg subjects. In summary, if functional predictors have more weight than the mechanical predictor priming resulting in priming only being evident in contexts where the subject form is not signaling other pragmatic content (deictic persons, coreferential contexts, etc.), the same result observed here would be expected: 1sg subjects would exhibit more priming than 3sg. On the contrary, if the result is

better explained by a surprisal effect, the opposite trend would be expected; 3sg subjects would show a stronger priming effect.

6. Conclusions

This paper aimed to examine the interaction between priming, switch reference, and person in SPE. For that purpose, the speech produced during a sociolinguistic interview with a group of 21 Spanish–English bilinguals from Florida was coded and analyzed. The results revealed that, overall, null subjects are used more frequently than overt pronominal subjects, but more so in 1sg (16.7%, 29.1%, and 35.4% overt pronominal subjects in the advanced, higher, and lower proficiency groups, respectively) than in 3sg (31.1%, 50.5%, and 57.8% overt pronominal subjects in the advanced, higher, and lower proficiency groups, respectively). More importantly, it revealed that priming was a significant predictor in 1sg subjects but not in all contexts for 3sg subjects. We hypothesized that this was due either to the deictic nature of 1sg subjects, indicating no added pragmatic value to the subject form, or to a surprisal effect reported in previous psycholinguistic literature on priming, where less frequent forms are primed more. In the latter case, the fact that overt pronominal subjects are less frequent in 1sg may have resulted in a stronger priming effect. We suggested avenues for further research to test these hypotheses.

This paper contributes to the literature on the effect of priming and SPE by examining the interaction of functional predictors, namely person and switch reference, and the mechanical predictor perseveration. However, the results are limited in their generalizability due to the number of participants and the type of participants. Comparisons with other types of participants may also shed some light to the effect of priming on SPE. The group of speakers examined is not a long-established community but a transient community of speakers of Spanish heritage who participate in college life together but may have been part of the community for the duration of their degree. In this, we depart from other variationist studies but parallel studies on heritage speakers in other approaches. The interaction between person and perseveration found here additionally invites further research into the interaction of priming with other functional predictors of interest. The psycholinguistic literature indicates that the priming effect may occur in spite of functional predictors favoring the use of a different form. The previous literature on SPE seems to indicate the opposite: priming was only found in contexts of co-referentiality (Cameron 1994). There is a scarcity of research on the interaction between priming and other relevant predictors that affect SPE. These interactions can further specify the size of the effect of perseveration in comparison with other predictors as well as offer some insight on the apparent contradiction with the psycholinguistic studies where a priming effect seems to be reported for structures in contexts where they would be pragmatically not preferred. Another predictor that has received significant attention in the psycholinguistic literature is the effect of a lexical boost. To the best of our knowledge, no previous study has examined priming in contexts where the verb is the same as in the previous clause/mention. Future research can examine priming comparing cases where there is a lexical boost to those where there is not.

This paper also contributes to our understanding of differences in SPE between grammatical persons. While differences have been widely reported in terms of rates, little understanding exists as to how they are different. Travis and Cacoullos (2018) identified differences in the effect of the accessibility of referent in 1sg and 3sg. The current paper also identified differences in the effect of priming in 1sg and 3sg. Further examination of other predictors as well as the interaction between person, switch reference (or accessibility of reference), and priming can better identify the weight of these predictors in describing differences in rates of overt pronoun expression in SPE. These comparisons could additionally explain differences between communities that produce more overt pronominal subjects in 1sg than in 3sg and those communities that produce more overt pronominal subjects in 3sg than in 1sg.

Appendix A

Table A1. Crosstabulation analysis: perseveration and interspersion with null and overt pronominal subjects in contexts of co-referentiality.

| | Second Subject Is Overt (PV) | | | | | Second Subject Is Null (V) | | | | |
| | Perseveration | | Interspersion | | Total | Perseveration | | Interspersion | | Total |
Person	%	N	%	N		%	N	%	N	
1sg	14.61	224	43.27	286	510	85.39	1309	56.73	375	1684
3sg	33.33	122	46.22	159	281	66.67	244	53.78	185	429

Note: 1sg: $\chi^2 = 121.7$; $p < 0.001$; 3sg: $\chi^2 = 33.4$; $p < 0.001$.

Appendix B

Table A2. Perseveration and interspersion with null and overt pronominal subjects in contexts of switch reference.

| | Second Subject Is Overt (PV) | | | | | Second Subject Is Null (V) | | | | |
| | Perseveration | | Interspersion | | Total | Perseveration | | Interspersion | | Total |
Person	%	N	%	N		%	N	%	N	
1sg	20.77	108	52.68	324	432	79.23	412	47.32	291	703
3sg	45.74	86	73.06	179	265	54.26	102	26.94	66	168

Note: 1sg: $\chi^2 = 212.6$; $p < 0.001$; 3sg: $\chi^2 = 12.3$; $p < 0.001$.

Appendix C

Table A3. Distribution of overt pronominal subjects across conditions.

Person	Switch Ref	Form of Previous Subject	Spanish Proficiency			Total
			Advanced % (N) 20% (1300)	Higher % (N) 35.3% (1717)	Lower % (N) 40.2% (1323)	4340
1sg	SAME	Lexical	10% (3)	29.4% (5)	57.9% (11)	28.8% (19)
		Pronominal	19.8% (22)	35% (63)	61.6% (122)	42.3% (207)
		Null	9% (45)	19.1% (110)	19.8% (95)	16.1% (250)
		Other	7.4% (2)	42.9% (6)	50% (5)	25.5% (13)
	DIFF	Lexical	31.5% (23)	48.6% (36)	37.8% (28)	39.4% (87)
		Pronominal	61.3% (19)	51.7% (45)	54.4% (37)	54.3% (101)
		Null	22.2% (42)	32.6% (76)	35.5% (59)	30.1% (177)
		Other	27.9% (12)	37.8% (14)	46.2% (12)	35.8% (38)
3sg	SAME	Lexical	11.5% (3)	41.2% (21)	60.5% (23)	40.9% (47)
		Pronominal	41.5% (17)	61.8% (68)	52.7% (29)	55.3% (114)
		Null	12.8% (15)	28.1% (39)	52.2% (36)	27.7% (90)
		Other	40% (2)	50% (6)	50% (3)	47.8% (11)
	DIFF	Lexical	66.7% (10)	56.5% (13)	55.6% (5)	59.6% (28)
		Pronominal	61.9% (13)	69% (40)	71.8% (28)	68.6% (81)
		Null	44.9% (31)	61.1% (58)	58.7% (37)	55.5% (126)
		Other	50% (1)	63.6% (7)	66.7% (2)	62.5% (10)

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