How psycholinguistics can inform contact linguistics:
Converging evidence against a decreolization view of Palenquero*

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This study employs a psycholinguistic task, known as the cued-language switching task, to examine whether the Afro-Iberian creole *Palenquero* is undergoing partial decreolization. To that end, we recruited (*in situ*) ten early acquirers and eight late acquirers of Palenquero (all native speakers of Spanish). Pictures of concrete objects were presented to participants in three sets (a Spanish set, a Palenquero set, and a mixed set) using PowerPoint. They viewed each picture and were asked to name the object in question immediately after hearing a beep.

Response latencies revealed switch costs for both groups of participants when naming objects in Spanish and in Palenquero, indicating that, for these speakers, cognitively Spanish and Palenquero are as separate language systems. Since the presence of switch costs is not to be expected if Palenquero were heavily encroached by Spanish, the results add to the existing body of evidence that argues against Palenquero as a (partially) decreolized speech variety.

Keywords: bilingualism, decreolization, field work, language production, language switching, Palenquero, Palenquero Spanish, psycholinguistics

1. Introduction

The main goal of the work presented here is to employ a psycholinguistic paradigm known as the *Cued-Language Switching Task* as a tool to test whether Palenquero (an Afro-Iberian creole spoken in the village of San Basilio de Palenque,Colombia) is undergoing partial decreolization. Creolists generally agree that extensive exposure of a creole to a superordinate language — Spanish, in the case of Palenquero— can result in the gradual approximation of the creole to its historical lexifier language (e.g., Holm 2000: 10, Winford 1993: 7-13, 1997: 17-23) or to a lexically different target language (e.g., Mühlhäusler 1997: 211-212). This process is known as decreolization.

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There is debate, however, as to what constitutes evidence for decreolization. Minimally, it would require differentiating decreolization from ordinary processes of language change, a task that entails demonstration that a creole feature is being lost (Siegel 2010). The clearest proof might come from reliable data documenting the stages of the history of a creole or from texts containing historical and contemporary data, which can be used to carry out detailed analyses that allow for empirical verification in favor of decreolization (Winford 1993: 378). In many instances, however, this type of evidence is not available. A case in point is found in San Basilio de Palenque, where a creole known by its speakers as *Lengua ri Palengue* (lit. 'the language of Palenque') has been in contact with the socially dominant Spanish for an estimated 300 years (Lipski 2013: 8).

Lexically, Spanish and Palenquero are cognate languages (Cásseres Estrada 2005; Lipski 2013; Schwegler 2011), with the vast majority of Palenquero's everyday words derived from Spanish rather than from African languages (e.g., *kasa* PALENQUERO */casa* SPANISH *'house'*; *ombe* PALENQUERO */hombre* SPANISH *'man'*; *kala* PALENQUERO */cara* SPANISH 'face'; *kusa* PALENQUERO */cosa* SPANISH 'thing'). Schwegler (2000) estimates that over 99% of Palenquero lexical items come from Spanish, with only a handful of everyday-words surviving from the African lexical repertoire (for an updated analysis of Palenque's African lexicon, see Schwegler 2012). Despite this, Palenquero and Spanish are generally not mutually intelligible (Schwegler 2000, Lipski 2013) largely due to morphosyntactic differences and phonetic divergences between the two languages (Schwegler 2011). Syntactically, they share some major features: Both languages are SVO, have head-first subordinate clauses, prepositional phrases and post-nominal adjective placement (Lipski 2014). However, morphosyntactic differences place Palenquero and Spanish under different language categories (Cásseres Estrada 2005, Simarra Reyes & Triviño-Doval 2008, Friedemann & Patiño Roselli 1983, Megenney 1986, Schwegler 1996). To illustrate, unlike Spanish, noun phrases in Palenquero lack gender and number marking (e.g., *muhé bieho* PALENQUERO / *mujer vieja* SPANISH/old woman); the prefix *ma* (derived from the Kikongo class prefix *ma*) serves to express plural number and definiteness (e.g., *ma ese kusa* PALENQUERO / PL this thing); and tense, mood and aspect are signaled by pre-verbal particles: *ta* (imperfective/ progressive; *suto ta kumé*/ 'we are eating'), *tan* (future; *suto tan kumé/* 'we will eat'), *a* (past/ imperfective; *suto a kumé/* 'we ate') and *asé* (habitual; *suto asé kumé*/ 'we usually eat'). In addition, Palenquero verbs are not inflected for person or number (*yo ta kumé* 'I am eating'; *suto ta kumé* 'we are eating') (Lipski 2013, Schwegler 2011).

Scholars who have studied Palenquero have noted the appearance of Spanish elements in otherwise Palenquero discourse (e.g., Friedemann & Patiño Roselli 1983, Schwegler 1996, Schwegler & Morton 2003), including conjugated verbs and preverbal clitics (Lipski 2013). Reasons for this have been attributed to language attrition, code-switching, interference from Spanish, and critical for purposes of the present paper, decreolization. The strongest supporter for a decreolization view of Palenquero is Megenney (1986), who affirms that Palenquero has undergone decreolization in the direction of Spanish:

> *En realidad, esta "lengua" de Palenque se podría describir como una lengua post-criolla de un microcosmos que rápidamente está cambiando a causa de las influencias lingüísticas y culturales del resto del país.* (Megenney 1986: 86)

> [In fact, this "language" of Palenque could be described as a post-creole language in a microcosms that is rapidly changing due to the linguistic and cultural influences from the rest of the country.] (Translated by P. Dussias)

Given the paucity of historical texts that can be used to characterize the Palenquero language prior to the 20th century, testing for a decreolization view of Palenquero necessarily requires triangulation from various data sources. Schwegler (1996) approaches this challenge by using linguistic information available from the past 100 years (going back to c. the 1890s) to examine areas of grammar (e.g., subject pronouns; the article system; word order of object pronouns) in which interference from Spanish could be expected to result in restructuring. After a meticulous and careful analysis, he concludes that "Palenquero is one of those rare creole languages which during the last 100 years appear[s] to have escaped decreolization or restructuring" (2001: 410). More recently, Lipski takes a psycholinguistic approach to investigating whether Palenqueros effectively "keep their two languages apart" (2013:10). Psycholinguistic tasks are useful to answer this question because the speed and accuracy with which bilingual speakers perform linguistic operations can provide a window into how a bilingual's two languages interact, and offer a sensitive measure of relative language strength (cp. Gollan & Ferreira 2009, Ju & Luce 2004, Kroll & Stewart 1994, Sánchez-Casas & García-Albea 2005; Schwartz, Kroll & Diaz 2007, Shook & Marian 2012). Using data from a language identification task administered with naturalistic and artificially created speech samples, as well as data from a speech-shadowing task, Lipski converges on the conclusion that Spanish-like incursions in Palenquero speech do not meet the criteria of decreolization.

As mentioned above, in the work presented here, we employ a psycholinguistic task known as the *Cued-Language Switching Task* (Meuter & Allport 1999) to further test whether Palenquero is undergoing partial decreolization. Cues (e.g., colored backgrounds) prompt bilingual speakers to name targets (typically pictures or digits presented on a computer screen) in one language or the other. Participants see two types of trials: switch trials —where the language of response differs from the language spoken on the previous trial— and stay trials —where the language of response matches the language spoken on the preceding trial. Across many studies (e.g., Costa & Santesteban 2004, Costa et al. 2006, Gollan & Ferreira 2009, Beauvillain & Grainger 1987), comparisons of response times (RTs) and error rates across trial types have demonstrated a reliable switch cost: switch trials produce longer RTs and higher error rates than stay trials. These switch costs have been interpreted as a reflex of the difficulty that participants have in inhibiting a previously used language when a switch is required (Green 1998). For our purpose, the task is potentially useful because evidence for inhibition would suggest separate language systems, a finding that would be congenial with the view that, contrary to earlier expectations, Palenquero is not moving in the direction of its original lexifier language.

Before delving into the experiment, we will expand on the notion of inhibitory control in bilingual speakers, briefly explaining the role of inhibition in bilingual speech production (Section 1.1). We will then explain why the presence of switch costs provides evidence for separate language systems (Section 1.2). This discussion will serve as a segue to the experiment reported here.

1.1. *Bilingual Inhibitory Control*

One finding that remains uncontroversial after almost two decades of psycholinguistic research with bilinguals is that the two languages of a bilingual speaker are active, even when the intention is to speak only one language. When bilinguals read, when they listen, or when they prepare to speak in one of their two languages, the language not in use is also active (Kroll, Bobb & Wodniecka 2006; for an extensive review, see Dijkstra 2005). The parallel activation of the bilingual's two languages is not restricted to languages that share structural and functional features, and has been observed irrespective of whether the language in use is the bilingual's stronger or weaker tongue. More surprisingly, the second language (L2) also becomes activated during first language (L1) processing, particularly for bilinguals who have reached very high proficiency in both of their languages. Cross-language activity has been reported in bilinguals who speak typologically different languages such as Japanese and English (Hoshino & Kroll 2008) as well as in bi-modal bilinguals, who use one sign language and one oral language (Emmorey et al. 2008, Morford et al. 2011). The parallel activity of a bilingual's two languages creates cross-language interactions that influence performance at every level of language, including phonology (e.g., Blumenfeld & Marian 2007, Jared & Kroll 2001, Ju & Luce 2004, Marian & Spivey 2003, Spivey & Marian 1999), orthography (e.g., Dijkstra & Van Heuven 1998, van Heuven, Dijkstra & Grainger 1998), syntax (e.g., Hartsuiker, Pickering & Veltkamp 2004), and meaning (e.g., Sunderman & Kroll 2006).

A remarkable feature about bilinguals is that, despite contemporaneous activation of their two linguistic systems, they do not generally experience difficulty controlling their choice of language at any given moment. In fact, errors of language selection during production are quite rare. At the same time, bilinguals can purposefully utilize the parallel activation of their two languages to seamlessly switch back and forth between languages (e.g., Myers-Scotton, 2002). These two observations —that bilinguals can avoid errors of language selection during unilingual production and that they exploit parallel activation to code-switch— suggest that bilinguals possess an exquisite mechanism of linguistic control. The primary mechanism of linguistic control is hypothesized (Meuter & Allport 1999) to be *inhibition*, or suppression, of the unintended language. That is, to successfully speak in the intended language, parallel activation of the other language must be kept in check.

1.2. "*Switch costs" as evidence for separate linguistic systems*

One mechanism that has been proposed to allow linguistic control in bilinguals is *inhibition*. As irrelevant items (e.g., translation equivalents or form-related words such as homographs) in the unintended language become activated, they must be suppressed or inhibited to avoid interference (Green 1998). The method most often used to study inhibition during bilingual language production is the Cued Language-Switching Paradigm. In this task, participants are told that they will name pictures in their first or their second language. Pictures appear on a computer screen one by one against a color background that cues the language of the response (e.g., a brown background to name pictures in English, and a blue background to name pictures in Spanish). Two types of trials are presented: (1) non-switch (or stay) trials —in which participants name the picture in the same language as the preceding trial— and (2) switch trials, in which they name the picture in the language opposite to that of the previous trial. Switch costs are measured by subtracting naming latencies (RTs) on non-switch trials from switch trials.

From an inhibitory standpoint, when a bilingual names a word in Language A, Language B becomes activated in parallel, and so words in Language B must be suppressed or inhibited to successfully speak Language A. If naming continues in Language A (a non-switch trial), Language B would again become activated to some extent and would need to be suppressed. When bilinguals are asked to switch from Language A to Language B (a switch trial), they must overcome the inhibition that was just applied to Language B on the previous trial. Overcoming this inhibition requires cognitive effort, resulting in a *switch cost*. A prediction derived from the inhibitory account is that naming should be more costly when going from the weaker language (typically the L2) into the stronger language (typically the L1) than the other way around. In other words, switch costs should be asymmetric. Why would this be the case? To successfully name pictures in the weaker language, bilinguals must inhibit the stronger language to avoid interference. When a shift is then required to enable naming in the stronger language, the suppression from the previous trial must be overcome. Doing so requires effort, and this effort translates into a behavioral switch cost.

That it should be harder to name a picture in the stronger language when the trial is immediately preceded by naming in the weaker language is initially counterintuitive. Typically, one would expect naming in the stronger language to be faster and less effortful compared to the weaker language. However, if one assumes that greater co-activation requires greater suppression and that less co-activation requires less suppression, the reason for the asymmetry becomes clear. While executing naming in the weaker language, the more dominant language is strongly co-activated. This strong co-activation requires great suppression. On subsequently switching into the stronger language, the active suppression of the stronger language needs to be overcome, causing a large response delay (i.e., a large switch cost). Conversely, when executing naming in the stronger language, the weaker language is only weakly co-activated. Because the amount of parallel-co-activation is small, less active suppression is required. On subsequently switching into the weaker language, then, there is less suppression to overcome, resulting in smaller switch costs.

The first piece of evidence for an inhibitory control mechanism during language switching came from Meuter & Allport (1999). They asked bilingual speakers to name numerals that switched unpredictably between their stronger and weaker language. Two findings were reported. First, switch trials were harder compared to non-switched trials. This was expected on the assumption that switching elicits response conflict between naming in the current language and naming in the new language, and response conflicts typically manifest themselves as longer latencies. Second, and consistent with the notion that the more dominant language must be more strongly inhibited for naming than the weaker language, switch costs were asymmetric (an effect known as the *reserve dominance effect*), with greater switching costs into the stronger language from the weaker language than into the weaker language from the stronger language. Asymmetric switch costs have been reported in a large number of subsequent studies (Costa & Santesteban 2004, Costa et al. 2006, Gollan & Ferreira 2009, Beauvillain & Grainger 1987, Gullifer et al. 2013, Jackson et al. 2004, Macnamara et al. 1968, Thomas & Allport 2000, Verhoef et al. 2009, Von Studnitz & Green 2002). These costs are present during language production (Costa & Santesteban 2004, Costa et al. 2006, Gollan & Ferreira 2009, Gullifer et al. 2013, Macnamara et al. 1968, Meuter & Allport 1999) as well as in language comprehension

(Gullifer et al. 2013 Jackson et al. 2004, Thomas & Allport 2000, Van der Meij et al. 2011, Von Studnitz & Green 2002). While most studies on language switching are behavioral (Costa & Santesteban 2004, Costa et al. 2006, Gollan & Ferreira 2009, Beauvillain & Grainger 1987, Gullifer et al. 2013, MacNamara et al. 1968, Meuter & Allport 1999, Thomas & Allport 2000, Verhoef et al. 2009, Von Studnitz & Green 2002), switching effects are also present in electrophysiological records of event-related potentials (Chauncey et al. 2008, Chauncey 2011, Jackson et al. 2004, Moreno et al. 2002, Van der Meij et al. 2011) and neurophysiological records of functional Magnetic Resonance Imaging (Guo et al. 2011).

Although asymmetric switch costs are quite robust in the literature, they have typically been observed with unbalanced bilinguals (e.g., Costa & Santesteban 2004, Meuter & Allport 1999). Balanced bilinguals, on the other hand, show symmetric switch costs; that is, the same cost is observed when switching from the weaker to the stronger language as from the stronger to the weaker language (Costa & Santesteban 2004; Costa, Santesteban & Ivanova 2006). This finding is expected when there is a small relative difference in proficiency between the two languages of a bilingual speaker because the amount of inhibition that needs to be overcome on a switch trial should be the same for both languages (Verhoef, Roelofs & Chwilla 2009). Additionally, a reverse dominance effect (i.e., overall longer naming latencies in the stronger language) has also been reported with symmetric switch costs (Costa & Santesteban 2004, Costa, Santesteban & Ivanova 2006, Gollan & Ferreira 2009 for balanced bilinguals only; Christoffels, Firk & Schiller 2007).

In sum, the available findings on switch costs lead to the observation that where there is a large difference in proficiency, as in the case of unbalanced bilingualism, the switch cost asymmetry emerges in the direction predicted by inhibitory control accounts: switch costs are larger for a switch into the more dominant language (e.g., Costa et al. 2006, Meuter & Allport 1999). Even when switch costs are symmetric between L1 and L2, there are still switch costs present, and these simple costs have been taken as evidence for an inhibitory mechanism.

1.3. Switch costs and decreolization

Bilinguals have the option to flexibly choose whichever language they wish to express their intended thoughts. This means that they can speak in one of their two languages and even codeswitch between them (e.g., begin a sentence in one language and end it in the other language). This right is exercised freely by the speech community in San Basilio de Palenque, where speakers use only Spanish, only Palenquero, and also codeswitch between the two (Schwegler 2011). Over the past decade, efforts to revitalize the creole have been strong. In 2005 Palenque was declared Masterpiece of the Oral and Intangible Heritage of Humanity by UNESCO; the result has been a renewed sense of pride attached to knowledge of and proficiency in the creole (Lipski 2013); traditional speakers of Palenquero are now highly respected because of their verbal eloquence in the creole and language classes in Palenquero are now available from pre-school through high school so that the younger generations learn to speak the language. The Colombian government has invested in Palenque's infrastructure, which has dramatically increased the attention that Palenque receives from local and non-local tourism.

Findings from the cognitive psychology literature suggest when bilinguals exercise the option of using either of their two languages for communication, they incur a switch cost: participants take longer to respond when switching from one language to the other than when using the same language from trial to trial. The presence of switch costs implies that speakers need time to reconfigure the goals from naming in one language to naming in the other language (Gollan & Ferreira 2009). For cognitive psychologists, switch costs reveal a role for inhibitory control in bilingual language production; critical for the goal of the work presented here, the presence of switch costs implies a mandatory separation by language in the bilingual mind. Contextualized from this angle, results showing that Palenquero speakers exhibit switch costs when naming objects in Spanish and in Palenquero would provide empirical support for a non-decreolization view of the creole; otherwise switch costs may not be expected. We test this hypothesis in the experiment described below.

2. Method

2.1. *Participants*

Twenty Spanish-Palenquero bilinguals participated in this experiment for payment. One participant failed to follow instructions, and, as a consequence, his data were excluded. Problems with the recording equipment led us to also exclude the data of a second participant. Of the eighteen bilinguals retained for the final analysis, ten were "early balanced bilinguals" (ages between 40 and 60), having learned Spanish and Palenquero in a home setting. We will refer to these participants as Spanish-Palenquero bilinguals. The remaining eight participants were Spanish-dominant speakers (ages 18-21) who had been studying Palenquero formally in school and who were judged by their teachers to be fluent in Palenquero. Among the Spanish-Palenquero bilinguals were language teachers of Palenquero, regarded by the community as having expert command of the creole.

2.2. *Materials*

Data were collected either at the participants' homes or at an office at the public school. Pictures were displayed on a laptop computer in three sets using a slideshow in Microsoft PowerPoint (version 14.3.9). The language of the response was cued by the background color of the slide on which each picture was presented. A red background cued a Spanish response, while blue was for Palenquero.

Participants first named pictures in a language-specific fashion in two single language set: a Spanish-only set and a Palenquero-only set. The order of each set was counterbalanced across participants. Within each of these first two sets, participants named 30 objects in the appropriate language. The order in which objects appeared was fixed. The third set was a mixed-language set in which participants named pictures in both Spanish and Palenquero. In this set, the language of response alternated, such that participants first named two pictures in one language (e.g., Spanish) and then two pictures in the other (e.g., Palenquero), and so on. Participants named 64 pictures in total in the third set. As in the first two sets, these pictures were presented in a fixed order. No picture was ever repeated among the three sets.

A picture database was compiled to create the experimental stimuli. For each picture to be named, a color photograph was selected from Google Images. To ensure that the pictures were familiar to the participants, the items to be named in Spanish were chosen from a list of high-frequency pictured objects taken from the International Picture Naming Project norms (http://crl.ucsd.edu/experiments/ipnp/). However, because there are no norms available for Palenquero, one of the experimenters took photographs of common objects and scenes in Palenque that were considered characteristic, common, and thus highly familiar to all members of the community. [1] All photographs used as stimuli appeared in isolation, and with solid backgrounds. Sample photographs from the mixed-language set are shown in Figure 1.

2.3. *Procedure*

Participants were asked to name pictures of concrete objects as quickly and accurately as possible. The presentation of each picture was synchronized to the presentation of a brief auditory stimulus (i.e., a tone) inserted at the beginning of each slide. After hearing the tone, participants were given as much time as necessary to respond. In instances where the participant could not name an object, they were instructed to respond with "I don't know". All responses were recorded using a microphone connected to a Marantz portable digital recorder for use in field work.

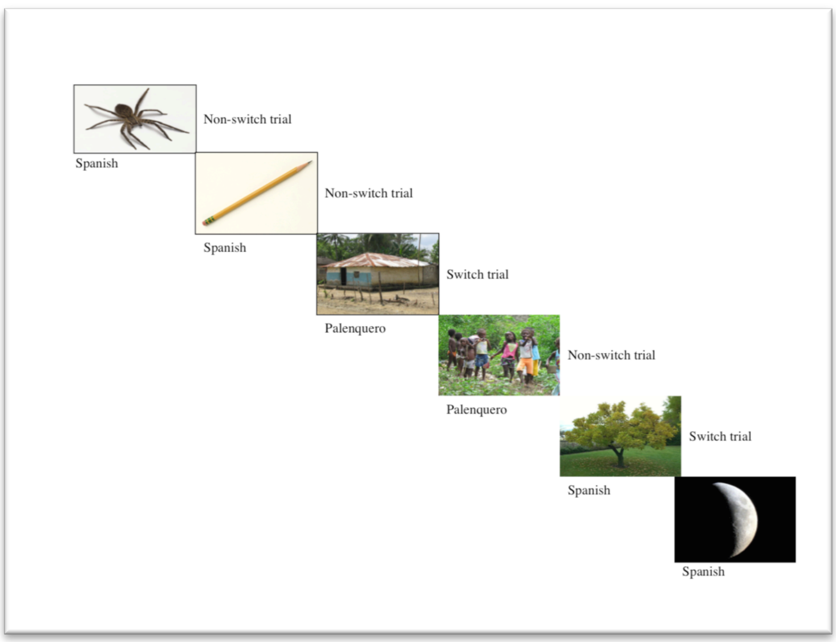

Figure 1. Sample presentation of the picture-naming task in the mixed-language block.

3. Results

Prior to analyzing the data, a speaker of Spanish with working knowledge of Palenquero transcribed the responses for accuracy. A highly proficient speaker of Palenquero independently verified the accuracy of the transcriptions. We regarded as errors (and thus excluded from the

[1] We thank John M. Lipski for providing this suggestion.

analysis) all trials in which (a) ambient environmental noise obscured the onset or offset of a response, (b) participants hesitated in their response, (c) participants revised their initial response, or (d) participants produced an incorrect response.

We analyzed the recordings in Praat (v. 5.3.30) by segmenting and labeling correct productions into trials from a continuous recording using TextGrids. The onset of each auditory stimulus within a trial was automatically marked by a Praat script that detected associated spectrographic power and pitch excursions. We manually checked the accuracy of this automatic measurement; no adjustments were necessary. We then manually marked the onset and offset of a participant's response within each trial, as close as possible to the onset and offset of spectrographic energy associated with the response. In rare cases of an unclear spectrographic reading (due to environmental noise), the waveform was used to mark response onset and offset. A second Praat script was used to automatically pull all data from the marked TextGrids and organize it for statistical analysis.

We calculated response latencies, the dependent measure in the statistical analyses, by measuring the time between the onset of the auditory stimulus at the beginning of each naming trial (i.e., the tone) to the onset of a participant's response for that trial. The onset of each auditory stimulus was automatically marked by a Praat script that detected associated spectrographic power and pitch excursions. The accuracy of this automatic marking was checked manually; no adjustments were necessary. The onset and offset of a participant's response for each trial were also marked manually, as close as possible to the onset and offset of spectrographic energy associated with the response. In rare cases of an unclear spectrographic reading (due to environmental noise), the waveform was used to mark response onset and offset.

Trials in which participants hesitated in their response (or revised their initial response) were marked as errors and excluded from the analysis, as were trials in which ambient environmental noise obscured either the onset or offset of a response. Across all participants, a total of 8.5% of responses were marked as errors and were excluded. A second Praat script was used to automatically pull all data from the marked TextGrids and organize it for statistical analysis.

Two types of cost-related measures were calculated: (1) a switch cost and (2) a mixing cost. We did so because the literature on language control processes has linked each cost to a different type of cognitive process. Switch costs reflect transient control processes such as the recovery from trial-level language suppression, while mixing costs reflect most sustained aspects of language control such as the maintenance of multiple target languages (e.g., Braver, Reynolds & Donaldson 2003). Calculation of the switch cost involved examination of response latencies in the mixed-language sets. Switch costs were assessed by subtracting the response latencies of non-switch trials from the response latencies of switch trials in the mixed set. To illustrate both a switch and a non-switch trial, Figure 1 shows *lápiz* ('pencil' in Spanish) which corresponds to a non-switch trial because the previous word (*araña* 'spider') was also named in Spanish. *Posá* (Palenquero for 'house', derived from Am. Span. *posada* 'lodging') represents a switch trial because the word preceding it (*araña*) was named in Spanish. Calculation of the mixing cost involved examination of response latencies in the blocked and the mixed language sets. The mixing costs were calculated by comparing naming latencies of trials in the blocked language condition to non-switch trials in the mixed language set (for example, comparing naming latencies when participants named objects in the Palenquero-*only* set, and when they named objects in Palenquero in the *mixed*-language set).

3.1. *General Analysis of Variance (ANOVA) — Switching costs: Comparison of switch vs. non-switch trials in the mixed-language block*

We ran a 2 language (Spanish, Palenquero) x 2 switching (switch trials, non-switch trials) x 2 dominance (Spanish-Palenquero bilinguals, Spanish dominant speakers) repeated measures ANOVA to investigate the factors that influenced naming latency for bilingual speakers of Spanish and Palenquero. Language and switching were within-subjects factors while dominance was a between-subjects factor.

There were marginally significant main effects of language and switching such that naming latencies were shorter in Spanish than in Palenquero (Spanish: M = 1,375.53, SE = 67.72; Palenquero: M = 1,473.44, SE = 76.52; $F(1,16) = 3.393$, $p = .08$) and showed a switch cost in which naming latencies were shorter in non-switch compared to switch trials (non-switch: 1,397.71, SE = 74.01; switch: M = 1,451.26, SE = 63.41; $F(1,16) = 3.066$, $p = .09$). However, there was no main effect of dominance (Spanish-dominant: M = 1,438.38, SE = 100.16, Spanish-Palenquero bilinguals: M = 1,410.59, SE = 89.59; $F(1,16) = .043$, $p = .84$), indicating that the Spanish-Palenquero participants and the Spanish-dominant bilinguals all behaved similarly. The interactions between language and dominance, switching and dominance, and language and switching did not reach significance (all *ps* > .61), nor did the three-way interaction ($p = .88$).

3.2. *Mixing Costs: Comparison between blocked and mixed language conditions*

We ran a 2 language (Spanish, Palenquero) x 2 mixing (blocked trials; non-switch trials) x 2 dominance (Spanish-Palenquero bilinguals, Spanish dominant speakers) repeated measures ANOVA to investigate the factors that influenced naming latency for bilingual speakers of Spanish and Palenquero. Language and mixing were within-subject factors, and dominance was a between-subjects factor.

There were main effects of language and mixing such that naming latencies were shorter in Spanish than in Palenquero (Spanish: M = 1,167.20, SE = 58.84; Palenquero: M = 1,384.29, SE = 67.68; $F(1,16) = 20.187$, $p < .01$) and were shorter in blocked trials than in non-switch trials (non-switch: 1,397.71, SE = 74.01; blocked: M = 1,153.78, SE = 50.05; $F(1,16) = 26.890$, $p < .01$). There was no main effect of dominance (Spanish-dominant: M = 1,257.58, SE = 87.40, Spanish-Palenquero bilinguals: M = 1,293. 92, SE = 78.17; $F(1,16) = .096$, $p = .76$), again suggesting that the Spanish-Palenquero bilinguals and the Spanish-dominant speakers behaved similarly. The main effects of language and mixing were qualified by a significant interaction ($F(1,16) = 11.850$, $p < .01$). Follow-up analyses show a significant mixing cost for pictures named in Spanish $F(1, 17) = 35.284$, $p < .01$), but only a marginal effect for pictures named in Palenquero ($F(1, 17) = 3.609$, $p = .07$). In contrast, the interactions between language and dominance, and mixing and dominance did not reach significance (all *ps* > .31), nor did the three-way interaction ($F(1,16) = .605$, $p = .45$).

3.3. *Bootstrapping*

The sample of participants in the present experiment is drawn from a special population of bilingual speakers living in a somewhat remote village of Colombia. Our sample sizes are relatively small in comparison to experiments where the samples of participants are drawn from populations living in well-populated college towns. Small sample sizes result in a lack of statistical power and as such, effect sizes must be quite large to show that an effect is statistically significant. At the same time, errors in effect magnitude can arise with small sample sizes, resulting in the overestimation in the size of an effect. For example, participants who are outliers with respect to the populations may be sampled into a dataset, and these outliers can skew the results of data analysis, thereby causing a significant effect to appear when in reality there may be no true difference between the population means. Typically in psycholinguistic research this pitfall is avoided by removing participants who are outliers with respect to the sample. However, with a small sample size it becomes difficult to identify potential outliers and it is impractical to exclude them from data analysis. To overcome these issues inherent in analyzing data with small sample sizes, statistical *bootstrapping* is performed on the dataset.

Bootstrapping is the process of re-sampling data from the original dataset with the aim of more accurately approximating sample estimates (e.g., the mean) and statistics (e.g., F statistic). This method is particularly useful to compute statistics when dealing with a small sample size because it tends to smooth out the potential influence of outliers that are not representative of the majority of the underlying population. New samples (of the same size as the sample in the original dataset) are drawn from the dataset (allowing for replacement) similar to the way in which an experimentalist samples from the population of interest. Statistical tests are then run on this new sample. This process of sampling from the original dataset is repeated thousands of times. Estimates of the statistic of interest (e.g., the mean F value) are then aggregated over all of these samples, and confidence intervals are placed around these estimates.

The dataset of 17 bilingual participants was bootstrapped 10,000 times; subsequently, a series of repeated Analysis of Variance (ANOVA) measures were to examine the effects of (1) language, switching and dominance as well as (2) language, mixing and dominance. If any effect was above the critical F value of 4.49 for 1 and 16 degrees of freedom, the effect was considered significant.

3.4. *Switching Costs: Comparison of switch vs. non-switch trials in the mixed-language set*

In the 2 language (Spanish, Palenquero) x 2 switching (switch trials, non-switch trials) x 2 dominance (Spanish-Palenquero bilinguals, Spanish dominant speakers) repeated measures ANOVA investigating switching costs, there were main effects of language ($F(1,16) = 4.91$, $p < 0.05$) and switching ($F(1,16) = 8.10$, $p < 0.05$). No other effects or interactions were significant (all $ps > 0.05$). These results largely parallel the results of the repeated measures analysis without bootstrapping. However with bootstrapping, the previously marginal effects of language and switching become significant at the alpha = 0.05 level.

These results suggest that naming in Palenquero was slower than naming in Spanish, and that naming latencies on switch trials were slower than naming latencies on non-switch trials. There was no evidence in the bootstrapping analysis that language interacted with switching, indicating that the switch costs were symmetrical in nature. Figure 2 and Figure 3 show the switching costs for the Spanish-dominant speakers and the Spanish-Palenquero bilinguals, respectively.

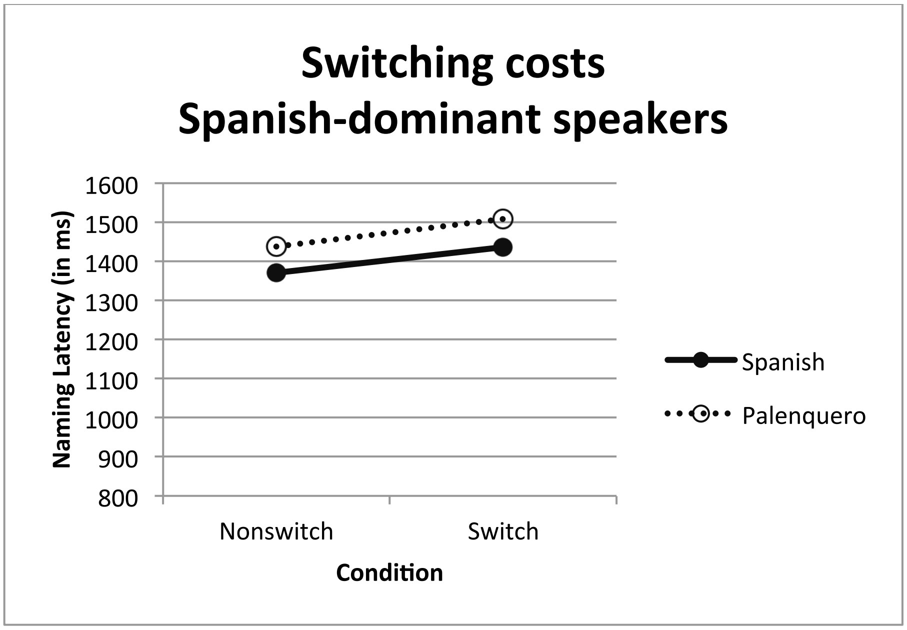

Figure 2. Switch costs. Spanish-dominant speakers

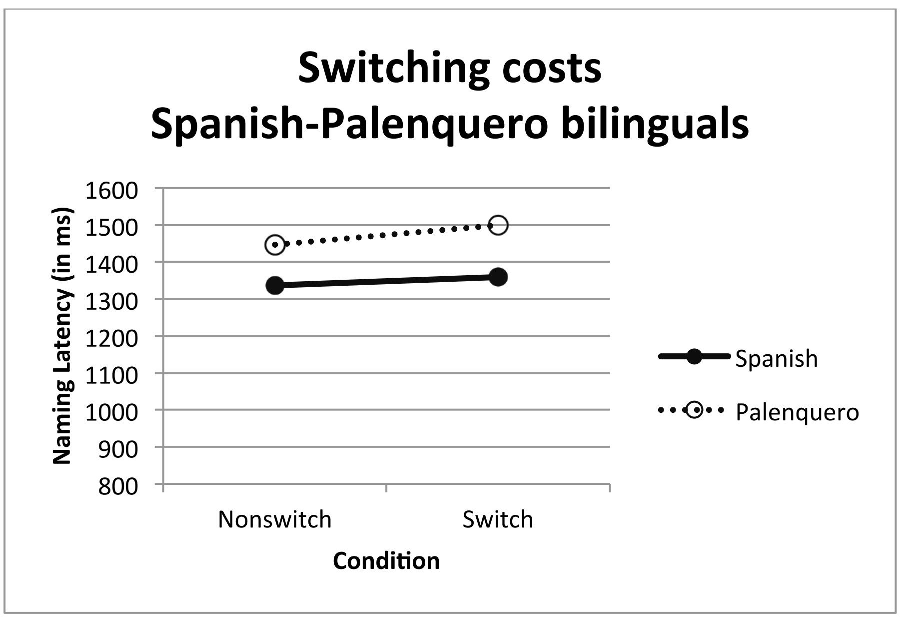

Figure 3. Switch costs. Spanish-Palenquero bilinguals

3.5. *Mixing Costs: Comparison between blocked and mixed language conditions*

In the 2 language (Spanish, Palenquero) x 2 mixing (blocked trials, non-switch trials,) x 2 dominance (Spanish-Palenquero bilinguals, Spanish dominant speakers) repeated measures

ANOVA investigating mixing costs, there was a main effect of language ($F(1,16) = 25.59$, $p < 0.05$), a main effect of mixing ($F(1,16) = 32.18$, $p < 0.05$), and an interaction between language and mixing ($F(1,16) = 18.73$, $p < 0.05$). No other effects or interactions were significant ($ps > 0.05$). Follow-up analyses were performed for steps in the bootstrapping during which the interaction between language and mixing became significant. The follow-up analyses indicated that the mixing effect was significant only for Spanish ($F(1,16) = 40$, $p < 0.05$) but not for Palenquero ($F(1,16) = 4.34$, $p > 0.05$), suggesting that the mixing cost was driven by Spanish naming. These results parallel the findings in the repeated measures analysis without bootstrapping. Naming latencies were longer in Palenquero than in Spanish, and trials in the mixed-language block were named slower than trials in the blocked-language block but only for naming in Spanish. There was no evidence for a mixing cost for naming in Palenquero. Figure 4 and Figure 5 show the mixing costs for the Spanish-dominant speakers and the Spanish-Palenquero bilinguals, respectively.

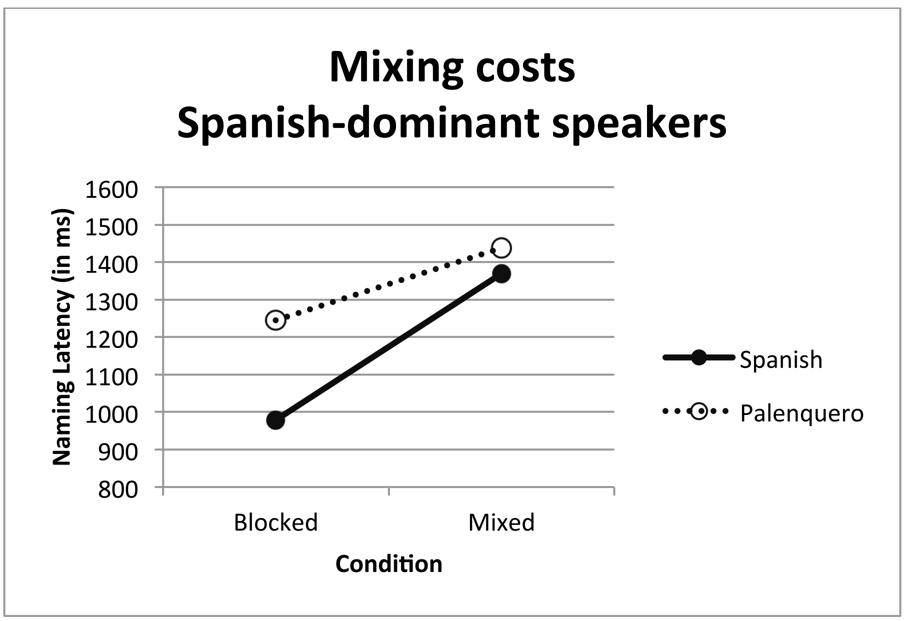

Figure 4. Mixing costs. Spanish-dominant speakers

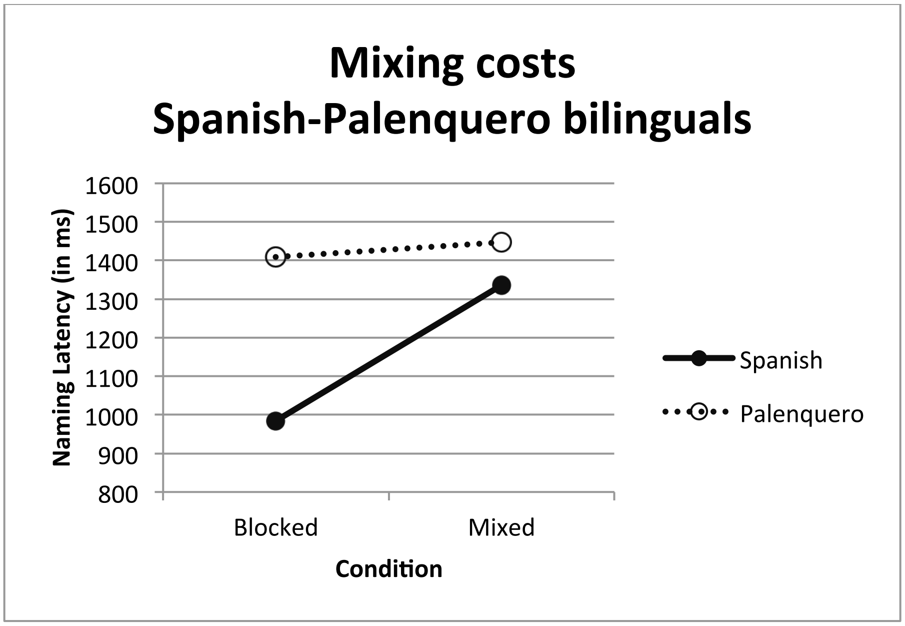

Figure 5. Mixing costs. Spanish-Palenquero bilinguals

4. Discussion

We have reported an experiment in which the performance of two groups of Spanish-Palenquero bilingual speakers was tested in a language-switching paradigm. The main goal was to determine whether these two populations of speakers would exhibit switch costs, a finding that would argue for language separation in the mind of these speakers. The same findings would also speak against the notion that Palenquero is approximating Spanish through a process of partial decreolization.

Bilingual participants were split into two groups, one characterized as Spanish-Palenquero bilinguals by virtue of acquiring the languages early in life, and a second group of Spanish-dominant Spanish-Palenquero speakers classified by virtue of learning Palenquero in a classroom setting. We compared patterns of performance in the two groups to ascertain whether differences in the form of acquisition and in the age of acquisition of the two languages affected switching performance to the same degree.

Participants were asked to name pictures presented in three sets: one set each of Spanish-only and Palenquero-only naming, and one set of mixed naming. In our slides, participants were cued via a color background as to which language to name. Switch costs (switch trials minus non-switch trials in the mixed block) and mixing costs (non-switch trials from the mixed block minus pure block naming trials) were analyzed. As discussed in the following section, the findings showed consistent symmetric switch costs and mixing costs for both bilingual groups.

4.1. *Switch effects when naming Spanish and Palenquero*

As explained in the Introduction, experiments in which the cued-language switching paradigm has been used to examine bilingual language production have resulted in two major findings: (1)

longer naming latencies on switch trials as compared to non-switch trials; and (2) asymmetric switch costs that display a reverse dominance effect. In other words, switching into a dominant language results in longer naming latencies than switching into a weaker language.

The fact that virtually identical switch costs were obtained for the older and younger bilinguals adds to the extant body of research (Lipski 2013, Schwegler 2000) that argues for a non-decreolization view of Palenquero. If significant decreolization had occurred as a result of the prolonged bilingualism and societal superstrate pressures from Spanish, one might expect the psycholinguistic status of the creole to approximate that of Spanish, effectively blurring the boundaries between the two languages; under this scenario, switch costs would not be expected. However, the results indicate the existence of significant switch costs when bilinguals are naming items in their two languages. In psycholinguistic terms, the two languages have clearly delineated boundaries that require switching from one system into the other when bilinguals are naming words in Spanish and in Palenquero. This finding adds weight to the assertion made in Schwegler that "[i]n Palenque, old and young bilinguals employ a virtually identical creole grammar, that is, there is no continuum, no "in-between" in terms of lects" (2011: 463).

4.2. *Explaining the presence of symmetrical switch costs*

One unexpected result is that symmetrical switch costs with no reverse dominance effect were also observed with the Spanish-dominant Palenquero speakers. As mentioned in the Introduction, many past studies have found asymmetric switch costs for speakers who are less proficient in one of their two languages. Contrary to this, our findings show that even though the Spanish-dominant participants were only moderately proficient in Palenquero, switch costs were not larger for the L1 than for the L2.

This surprising result raises the question of what may account for the symmetrical switch costs in these speakers. One potential hypothesis for why no reverse dominance effects are observed maybe that there is less of a need to globally inhibit the dominant language (Spanish). Lipski (2013) reports on a series of interesting experiments that show that the apparent use of Spanish-like features in Palenquero are still primarily perceived by the community at large as Palenquero speech. Because of rapid changes associated with linguistic revitalization (i.e. a "lost" generation of non-speakers of Palenquero or with minimal Palenquero fluency, coupled with intense revitalization in classroom settings for younger speakers), there may be a greater incentive within the community to accept a Spanish-dominant speaker's use of Palenquero, even if in the "traditional" sense their speech is not fully Palenquero-like. Thus, the symmetrical switch cost effects without a reverse dominance may overall reflect a cognitive system that is highly adaptive to the degree of contact between languages and the apparent use of both languages in that given contact setting. Such an interpretation is also highly compatible with recent hypotheses in the psycholinguistic literature on bilingual language control (e.g., Green & Abutalebi 2013).

4.3. *Concluding remark: How psycholinguistics can inform contact linguistics*

In concluding, we return to a question that underlies the work presented here: what might the possible links between linguistics and cognitive science be? Our goal in conducting the work reported here has been to suggest that historically documented processes of a certain type, i.e.

those relating to language change, grammaticalization, creolization and the like, form a unified theoretical bundle that provides insight into the cognitive processes at work in language organization and evolution. The findings presented here argue against the notion that historical phenomena are excluded from cognitive speculation. Instead, they argue for an extension of Labov's uniformitarian doctrine, which states "that the same mechanisms which operated to produce the large-scale changes of the past may be observed operating in the current changes taking place around us" (Labov 1972: 161). This principle is transferable to the current context in the following way: first, language as a system is no different today than it was millennia ago, easily as far back as diachronic speculation is likely to take us; and second, the human brain is structurally no different today from the brain of humans of up to ten thousand years ago. The cognitive-linguistic parallelism between the past and the present makes speculation possible, in this case about decreolization. It further allows us to make forward and backward inferences about both language change and its cognitive underpinnings.

One important finding presented here is that the rudimentary method employed to collect data in this study resulted in the replication of past findings on language switching in which sophisticated and precise measurements of mental chronometry have been employed: like much past work with bilinguals, the Spanish-Palenquero speakers in this study exhibited switch costs. Most research that has examined the mechanisms that allow bilinguals to select one of their two languages has been conducted in laboratory settings with literate populations or with college-educated participants. Only a small number of language pairs, out of more than 5000 languages spoken in the world, have been studied and most belong to the Indo-European family of languages. Psycholinguistic research seeks to understand the mental processes involved from the moment a pre-linguistic message is formulated and encoded into a linguistic form to its articulation in *all* bilingual speakers. A consequence is that the empirical base against which claims about bilingualism are formulated needs to be expanded to include other language pairings as well as bilingual populations with different characteristics (e.g., speakers of typologically different languages; bilinguals who are literate in only one of their two languages; bilinguals who sign a language and speak another language). This is important because psycholinguistic work is beginning to show that broadening the scope of data coverage has improved our understanding beyond what studies conducted on a small number of languages have offered (Jaeger & Norcliffe 2009). This paper is a first step in that proposed direction, and the findings presented here validate the use of our method to conduct psycholinguist studies outside the laboratory, thereby widening the field of inquiry to examine questions that have largely been understudied in psycholinguistic research.

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