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# Sentence processing in Andean and Peninsular Spanish: word order and animacy

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## Abstract

We report pioneering experimental evidence for sentence processing in Andean Spanish. Studies report that preverbal objects are more frequent in the Andean variety (A. Escobar, 1978; Lujan,Minaya and Sankoff, 1981; Muysken, 1984; Cerron-Palomino, 1990; A.M. Escobar, 1990, 2000; Klee, 1996; Zavala 1999; Muntendam, 2013). We compared the comprehension and reading times for SVO and OVS sentences by Andean and Peninsular Spanish speakers. SVO was fastest in both varieties, replicating previous studies on Peninsular Spanish (Basilico *et al.*, 1995; Casado *et al.*, 2005 and Del Rio *et al.*, 2012) and providing novel evidence that, despite the relatively higher frequency of preverbal objects, canonical word order in Andean Spanish is also SVO. We also considered the impact of object animacy in sentence processing: in both Andean and Peninsular varieties, object animacy results in a general slowdown and poorer comprehension, replicating previous findings. We provide the first online evidence involving Andean Spanish, and show that, despite their higher frequency, preverbal objects are processed with difficulty and SVO is canonical also in this variety.

*Keywords:* Andean Spanish, preverbal object, word order, animacy, sentence processing, reading times.

## 1. Introduction

Many languages allow variations of sentence word order, but each has a canonical order which is the most frequent and corresponds to the linearization of the simplest sentence structure generated by the grammar (Chomsky, 1981; Kaan, 1997; Lee & Kim, 2012). Most languages have either Subject-Verb-Object (SVO) or Subject-Object-Verb (SOV) as canonical (Dryer 2013). Spanish and English are examples of SVO languages, while Quechua and Japanese are SOV (Greenberg, 1963).

In Peninsular Spanish, canonical SVO sentences (1a) are the most frequent (Muysken, 1984; Ocampo, 1994; Klee, 1996; Muntendam, 2013), whereas OVS sentences (1b) are infrequent and both syntactically and semantically more complex (Laka1990; Zubizarreta, 2000).

(1) a. María compró pocas manzanas.
María bought few apples.
«Mary bought few apples»
b. Pocas manzanas compró María.
Few apples bought María
«Few apples is what Mary bought»

Experimental studies show that canonical sentences incur less processing costs; in Self-Paced Reading studies, shorter reading times have been reported for canonical word orders in languages like German (Weyerts, Penke, Münte, Heinze & Clahsen, 2002; Bahlmann, Münte, Rodriguez-Fornells & Rotte, 2007), Finnish (Kaiser & Trueswell, 2004), Japanese (Wolff, Schlesewsky, Hirotani & Bornkessel-Schlesewsky, 2008), Basque (Erdocia, Laka, Mestres-Misse & Rodriguez-Fornells, 2009), Russian (Sekerina, 2003; Levy, Feodorenko & Gibson,2013), and Hindi (Vasishth, 2002), among others.

Why are canonical sentences processed fast and easy? Three non-mutually exclusive theories explain it. According to the *Derivational Theory of Complexity* (Chomsky & Miller, 1963; Erdocia, Laka& Rodriguez-Fornells, 2012; Phillips, 2013) sentences with longer syntactic derivations involve more computational steps and this is why they incur greater processing demands; since object initial sentences in VO languages involve fronting of the object, this constituent must be held in memory until integrated with its base position (Wolff *et al*., 2008). The *Subject First* preference (Bever,1970; Bornkessel & Schlesewsky, 2009) also predicts that sentences that are not subject initial incur in greater processing costs because the comprehension system prefers to process Agent initial sequences. Finally, frequency based theories (Hale, 2001; Levy, 2008) show there is a correlation between frequency and processing ease, which in the case of sentence word order predicts an advantage for canonical word orders.

Accordingly, in Spanish, experimental studies reveal that SVO is the easiest word order to process: In an ERP experiment comparing SVO and OVS sentences, Casado, Fernández-Frías, Martin-Loeches & Muñoz (2005) found that SVO sentences were easiest to process. Similarly, Del Rio, Lopez-Higes & Martin-Aragoneses (2012), measuring reading times, found that object (OVS order) relative clauses required longer reading times than subject (SVO order) relative clauses, further indicating that canonical word order in Spanish is SVO.

Casado *et al*. (2005) measured the electrophysiological brain responses of Spanish speakers while reading SVO and OVS sentences with animate and inanimate objects. When comparing O-inanimate SVO and OVS conditions, the OVS condition elicited a negative component at sentence initial and final positions and a P600 component at verb position, signaling greater memory storage and reintegration cost for the displaced object. When comparing O-animate SVO and OVS conditions, a P600 component was observed at the second DP of sentence-final S as compared to O, also revealing that canonical word order in Spanish is SVO.

Andean Spanish is spoken in social and geographic contexts with a presence or influence of Quechua, Aymara or some other Andean language (Godenzzi, 1991). Studies of this variety report that preverbal objects are more frequent than in other varieties of Spanish (Muysken, 1984; Klee 1996; Muntendam, 2013), as summarized in the following table:

**Table 1**

Percentages of VO/OV in Non-Andean Spanish and Andean Spanish

| | **Non-Andean Spanish** | **Andean Spanish** | | |
|---|---|---|---|---|
| | **Ocampo (1994)** | **Muysken (1984)** | **Klee (1996)** | **Muntendam (2013)** |
| VO | 92.1% | 80% | 81.7% | 81.5% |
| OV | 7.9% | 20% | 18.3% | 18.5% |

*Sources:* For Ocampo (1994): Spanish monolinguals from Buenos Aires (Argentina); for Muysken (1984): Quechua-Spanish bilinguals from Ecuador; for Klee (1996): Quechua-Spanish bilinguals from Calca (Peru); and for Muntendam (2009): Quechua-Spanish bilinguals from Tarata (Bolivia) and Juncal (Ecuador). Adapted from Muntendam (2013).

Preverbal objects can express repetition, summary, agreement or explanation (Klee, 1996; Camacho, 1999; Sanchez, 2003). An example is provided in (3):

(3) A la chica he visto en misa.
DOM the girl have-I seen at mass.
«I have seen the girl at mass» (from A. Escobar, 1978)

The higher frequency of preverbal objects reported for Andean Spanish could indicate: (a) that speakers of this variety process sentences with preverbal objects with greater ease than speakers of Peninsular Spanish (were preverbal objects are rare), or (b) that canonical word order in Andean Spanish is not strictly SVO and is heavily modulated by the OV nature of indigenous contact languages. To the extent of our knowledge, experimental methodology has not been used to study Andean Spanish. Here, we aim to broaden our knowledge about sentence processing in Spanish across different varieties providing online processing measures. Specifically, we seek to test whether Andean and Peninsular Spanish differ in the cognitive cost involved in processing preverbal objects and whether object animacy modulates this cost. To this end, we compared reading times of SVO and OVS sentences with and without animate objects by means of a Self-Paced Reading task with two groups of monolingual speakers: Peninsular and Andean.

## 2. The experiment

We originally took the experimental design in Casado *et al*. (2005) about canonical word order in (Peninsular) Spanish as the base of our materials. We hypothesized that SVO will be processed faster and with less comprehension errors in comparison to OVS in the Peninsular Spanish group, thus replicating the results obtained by Casado *et al*. (2005). We also expect larger processing cost in sentences with animate objects as compared to sentences with inanimate objects because object animacy has been reported to make thematic role assignment more taxing cross-linguistically (Grewe, Bornkessel-Schlesewsky, Zysset, Wiese, von Cramon & Schlesewsky, 2007; Nieuwland, Martin, Carreiras, 2013). As for the Andean Spanish group, given the higher frequencies consistently reported for preverbal objects in this variety, we expect to find that object initial sentences incur in less processing costs than in Peninsular Spanish, or alternatively, if the greater frequency of object initial sentences reported for Andean Spanish is not significant enough to induce changes in sentence representation, we should find similar reaction times for both

groups of participants across conditions. Finally, since the O-animate condition carries a specific Differential Object Marking (DOM) '*a*', we particularly expect increasing processing cost for $O_{animate}VS$ sentences, since their marking signals them unambiguously as object initial from the start of the sentence.

## 2.1. *Method*

### 2.1.1. Participants

32 monolingual speakers of Peninsular Spanish (mean age 21.75; 21 women) all of them undergraduate students at the University of the Basque Country (EHU/UPV) in Vitoria-Gasteiz (Spain) and 32 monolingual speakers of Andean Spanish (mean age 21.06; 22 women) all undergraduate students at the National University of San Agustin in Arequipa (Perú) participated in the experiment. All of them consented to participate and were given some money for their time and effort.

### 2.1.2. Materials

Stimuli consisted of 180 transitive sentences in SVO and OVS orders with animate and inanimate objects. There were 4 conditions:

(4) a. *Condition 1:SVO sentence with animate object* ($SVO_{(an)}$)
El inquilino alarmó al casero.
The tenant alarmed DOM.the landlord.
«The tenant alarmed the landlord».
b. *Condition 2: SVO sentence with inanimate object* ($SVO_{(in)}$)
El perro saltó la valla.
The dog jumped the fence.
«The dog jumped the fence».
c. *Condition 3:OVS sentence with animate object* ($O_{(an)}SV$)
Al casero alarmo el inquilino.
DOM.the landlord alarmed the tenant
«The tenant alarmed the landlord».
d. *Condition 4:OVS sentence with inanimate object* ($O_{(in)}SV$)
La valla saltó el perro.
The fence jumped the dog.
«The dog jumped the fence».

Conditions 3 and 4 were generated from conditions 1 and 2 respectively by reversing the order of Os and Ss. We created two lists in order to counterbalance the experimental material across participants and to prevent them from reading the same version of a sentence twice. Both lists contained 45 experimental sentences from each condition. We also included the same 50 filler sentences in both lists. All in all, each participant read 230 sentences.

Our experimental material was originally generated based on the materials used in Casado *et al*. (2005), but we had to introduce a few changes we discuss here: Their materials contained animate objects without the DOM marker *a*, yielding ungrammatical sentences in Spanish (for

instance, **el poeta desafió el novelista*) as discussed already by Demestre (2012). Accordingly, all our animate objects had the required DOM *a* marker (for instance, *al poeta desafió el novelista*). We substituted ditransitive and psychological verbs (like *obligar* «to force» or *disgustar* «dislike»), which involve experiencers and goals and hence more complex argument structures with simple transitive verbs involving agents and themes in their argument structure. A few lexical items used exclusively in Spain were substituted for words that are used also in Perú. For example, instead of *marido* «husband» (only Peninsular Spanish) we used *esposo* (both Peninsular and Peruvian Spanish)[1].In total we changed 46 items (30 nouns and 16 verbs).We also measured the length and the frequency of the lexical items in our experiment using *EsPal* (Duchon, Perea, Sebastián-Gallés, Martí & Carreiras, 2013). The verbs in the animate and inanimate conditions differ in length ($SVO_{(in)}$ = 6.61; $SVO_{(an)}$ = 7.68; $t(89) = -5.443$, $p < 0.001$) and frequency ($SVO_{(in)}$ = 19.91, $SVO_{(an)}$ = 6.10; $t(89) = 4.958$, $p < 0.001$). Inanimate objects were significantly shorter than animate objects ($SVO_{(in)}$ = 6.08, $SVO_{(an)}$ = 7.71; $t(89) = -6.962$ , $p < 0.001$). In inanimate conditions, subjects contained more letters than objects (S = 7, O = 6.1; $t(89) = 3.618$, $p < 0.001$), and in inanimate conditions, the opposite (S = 7.12, O = 7.71, $t(89) = -2.469$, $p = 0.015$).

In order to keep participants' attention and determine how they interpreted the sentences, we included a comprehension question after half of the experimental sentences[2]. The comprehension question was related to the previously read sentence and the answers of half of the questions of each condition was *correct* (see example 9 for *correct* answers). To answer the question, participants had to press the button corresponding to P and Q on the keyboard. We manipulated the word order of the comprehension questions in order to prevent any bias generated by the higher proportion of a given word order during the experiment. Thus, half of the comprehension questions of each experimental condition were SVO and the other half OVS. Participants received feedback on their answers. We recorded the accuracy and the reaction times of their responses. Half of the filler sentences were also followed by a comprehension question.

(5) a. *$SVO_{(in)}$ condition*
El chico perdió un juguete.
«The boy lost a toy».
b. *SVO question*
¿Es verdad que el chico perdió un lápiz?
*Is (it) true that the boy (S) lost a pencil (O)?*
«Is it true that the boy lost a pencil?»
c. *OVS question*
¿Es verdad que un lápiz perdió el chico?
*Is (it) true that a pencil (O) lost the boy (S)?*
«Is it true that a pencil lost the boy?»

### 2.1.3. Procedure

Experimental materials and comprehension task were presented to the participants through Self Paced Reading (Just, Carpenter & Woolley1982) using the *Linger* program (Rohde,

[1] All changes introduced in the materials are reported in the appendix.

[2] The 45 experimental items could not be divided by 2, thus we distributed the CT as follows: 22 questions were about inanimate object conditions (SVO and OVS) and 23 were about animate object conditions (SVO and OVS).

2001). We presented the sentences constituent by constituent by means of the Moving Window Technique (Just *et al.*, 1982). Participants read in a normal and comfortable pace. In order to move from one constituent to the next, participants pressed the space bar of the computer keyboard. The time they took to press the space bar was recorded by the program. Self-Paced Reading provides accurate reaction time measures of the participants' reading process, allowing us to infer the computations that happen in the participants' minds while they are processing each condition.

Before starting the experiment, participants performed a short training of 10 trial sentences with comprehension questions for half of them. For the Peninsular Spanish group, the experiment was conducted in the *Experimental Linguistics Laboratory* at the University of the Basque Country (EHU/UPV) in Vitoria-Gasteiz, Spain. For the Andean Spanish group, the experiment was conducted in Arequipa, Peru, at the Faculty of Economy of National University of San Agustin.

## 2.2. *Results*

### 2.2.1. Whole sentence reading times

For the Peninsular Spanish group, a two way repeated measures ANOVA was carried out to analyze whole sentence processing. The *Constituent Order* factor had a significant effect ($F$ (1,31) = 13.291, $P(HF)$ = 0.001), signaling that SVO sentences were read faster than OVS. Sentences with animate objects were read significantly slower than the sentences inanimate objects (*Animacy*, $F(1,31) = 33.875$, $P(\text{HF}) < 0.001$). Interaction between *Constituent Order* and *Animacy* factors did not reach significance ($F(1,31) = 3.051$ , $P(\text{HF}) = 0.091$). As it can be seen in Figure 1 and Table 2, the $\text{SVO}_{(in)}$ condition was read the fastest. The pairwise comparison of that condition with the rest of conditions is significant ($\text{SVO}_{(in)}$ vs. $\text{SVO}_{(an)}$: $t(31) = -5.192$, $p < 0.001$; $\text{SVO}_{(in)}$ vs. $\text{O}_{(in)}\text{VS}$: $t(31) = -2.804$, $p = 0.009$; $\text{SVO}_{(in)}$ vs. $\text{O}_{(an)}\text{VS}$: $t(31) = -5.829$, $p < 0.001$). The slowest condition, as expected, was $\text{O}_{(an)}\text{SV}$. The comparison between canonical $\text{SVO}_{(an)}$ vs. non canonical $\text{O}_{(an)}\text{VS}$ shows a canonical order advantage ($t(31) = -3.177$, $p = 0.03$). The comparison between $\text{O}_{(in)}\text{VS}$ and $\text{O}_{(an)}\text{VS}$($t(31) = -5.191$, $p < 0.001$) reveals a penalty for object animacy, as expected.

For the Andean Spanish group, we carried out two way repeated measures ANOVA to analyze whole sentence processing (see Table 2 and Fig. 1).The main result is that SVO sentences were read faster than OVS, as in the Peninsular group (*Constituent Order*, ($F(1,31) = 33.120$, $P(\text{HF}) < 0.001$). Comparing the inanimate conditions, we observed that SVO was read faster than OVS ($\text{SVO}_{(in)}$ vs. $\text{O}_{(in)}\text{VS}$: $t(31) = -3.149$, $p = 0.004$), and the same happened when we compared the two conditions with animate objects ($\text{SVO}_{(an)}$ vs. $\text{O}_{(an)}\text{VS}$: $t(31) = -5.142$, $p < 0.001$). *Animacy* also resulted significant ($F(1,31) = 62.819$, $P(\text{HF}) < 0.001$), signaling that sentences with animate objects were read slower than sentences with inanimate objects. The interaction between the two factors reached significance ($F(1,31) = 6.655$, $P(\text{HF}) = 0.015$). Pairwise comparisons for the factor *Animacy* also showed that animate conditions took longer than inanimate conditions ($\text{SVO}_{(in)}$ vs. $\text{SVO}_{(an)}$: $t(31) = -5.110$, $p < 0.001$; $\text{O}_{(in)}\text{VS}$ vs. $\text{O}_{(an)}\text{VS}$: $t(31) = -7.735$, $p < 0.001$;$\text{SVO}_{(in)}$ vs. $\text{O}_{(an)}$ VS: $t(31) = -8.317$, $p < 0.001$ ), as expected.

**Table 2**

Mean values of the reading times of the experimental sentences condition by condition. Reaction times are provided in milliseconds (ms) and standard errors in parenthesis

| | $O_{(an)}VS$ | $O_{(in)}VS$ | $SVO_{(an)}$ | $SVO_{(in)}$ |
|---|---|---|---|---|
| Peninsular Spanish | 2182 ms (±120) | 1964 ms (±94) | 2067 ms (±112) | 1909 ms (±94) |
| Andean Spanish | 2527 ms (±128) | 2168 ms (±102) | 2294 ms (±114) | 2070 ms (±89) |

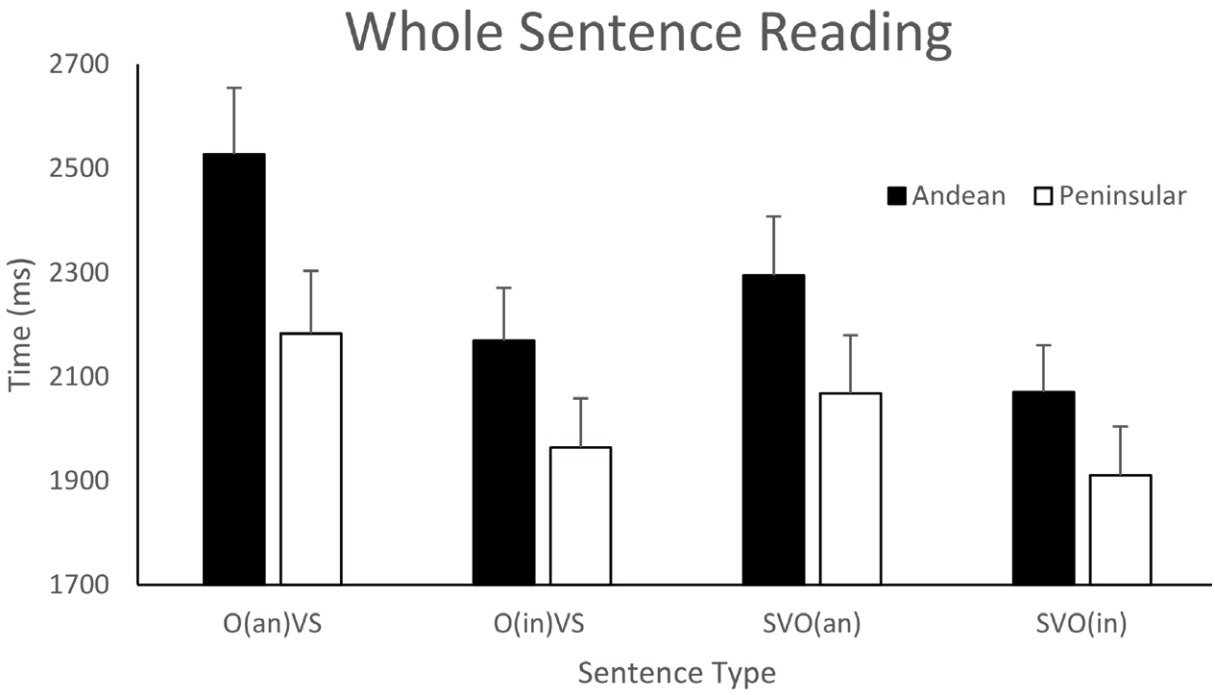


**FIGURE 1**

**Whole sentence reading times of Andean Spanish speakers (black bars) and Peninsular Spanish speakers (white bars)**

We also carried out a threeway ANOVA with the two groups, Andean Spanish vs. Peninsular Spanish as a between subject factor. The three way interaction between *Group*, *Constituent Order* and *Animacy* was not significant. We observed main effects for *Constituent Order* ($F(1,62) = 45.815$, $P(HF) < 0.001$) and for *Animacy* ($F(1,62) = 95.943$, $P(HF) < 0.001$), and the interaction between those two factors ($F(1,62) = 9.705$, $P(HF) = 0.003$) resulted significant, revealing that both groups of speakers processed the experimental conditions similarly. On the other hand, we observed two way significant interactions between *Animacy* and *Group* ($F(1,62) = 4.431$, $P(HF) = 0.039$) and *Constituent Order* and *Group* ($F(1,62) = 4.812$, $P(HF) = 0.032$). Importantly, the difference between animate and inanimate conditions was bigger for the Andean group than for the Peninsular group. In the same vein, the Andean group took longer to process O-initial conditions as compared to S initial conditions than did the Peninsular group.

### 2.2.2. Comprehension task

When comparing the error rates of the Peninsular group, we observed a main effect of *Animacy* ($F(1,31) = 23.881$, $P(\text{HF}) < 0.001$), revealing that sentences with animate objects generated more errors than those with inanimate objects (see table 3 and Fig. 2). The pairwise comparison showed that only animate-inanimate comparisons resulted significant ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = 3.341$, $p = 0.002$; $O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = 4.609$, $p < 0.001$; $SVO_{(in)}$ vs. $O_{(an)}VS$: $t(31) = –2.712$, $p = 0.011$; $SVO_{(an)}$ vs. $O_{(in)}VS$: $t(31) = 4.418$, $p < 0.001$). As for reaction times (see table 3 and Fig. 3), a similar scenario obtained, that is, a main effect of *Animacy* ($F(1,31) = 17.584$, $P(\text{HF}) < 0.001$). The pairwise comparisons also revealed that only animate-inanimate comparisons resulted significant ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = 2.535$, $p = 0.017$; $O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = –4.399$, $p < 0.001$; $SVO_{(in)}$ vs. $O_{(an)}VS$: $t(31) = –3.68$, $p = 0.004$; $SVO_{(an)}$ vs. $O_{(in)}VS$: $t(31) = 3.529$, $p = 0.001$).

**Table 3**

Mean values of the comprehension task (percentage of errors and reaction times, RT) for Andean and Peninsular Spanish Speakers

| | $O_{(an)}VS$ | | $O_{(in)}VS$ | | $SVO_{(an)}$ | | $SVO_{(in)}$ | |
|---|---|---|---|---|---|---|---|---|
| | **Errors** | **RT** | **Errors** | **RT** | **Errors** | **RT** | **Errors** | **RT** |
| Peninsular Spanish | 7.9% (±1.2) | 2441 ms (±121) | 2.8% (±1) | 2216 ms (±113) | 9.4% (±1.3) | 2395 ms (±106) | 4.5% (±0.8) | 2236 ms (±113) |
| Andean Spanish | 7.2% (±1) | 2826 ms (±127) | 3.4% (±0.7) | 2567 ms (±98) | 9.7% (±1.1) | 2876 ms (±123) | 5.6% (±0.8) | 2684 ms (±103) |

Comparing the error rates of the Andean group, we observed a main effect of *Animacy* ($F(1,31) = 19.847$, $P(\text{HF}) < 0.001$) and another main effect of *Constituent order* ($F(1,31) = 8.097$, $P(\text{HF}) = 0.008$), but we did not observe any interaction between those factors (see table 3 and Fig. 2). The pairwise comparison showed that word order has an impact when objects were inanimate ($SVO_{(in)}$ vs. $O_{(in)}VS$: $t(31) = 2.184$, $p = 0.037$) but not when the objects were animate, due to the amount of errors observed in $SVO_{(in)}$. Indeed, the animate-inanimate comparison that involved $SVO_{(in)}$ and $O_{(an)}VS$ conditions resulted non significant, while the rest of animate-inanimate comparisons were significant ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = 3.205$, $p = 0.003$; $O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = 3.253$, $p = 0.003$; $SVO_{(an)}$ vs. $O_{(in)}VS$: $t(31) = 5.062$, $p < 0.001$).For reaction times, a main effect of *Animacy* ($F(1,31) = 11.318$, $P(\text{HF}) = 0.002$) was observed (see table 3 and Fig. 3). However, apart of the animate-inanimate comparisons ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = 2.019$, $p = 0.052$; $O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = 3.893$, $p < 0.001$; $SVO_{(in)}$ vs. $O_{(an)}VS$: $t(31) = –2.062$, $p = 0.048$; $SVO_{(an)}$ vs. $O_{(in)}VS$: $t(31) = 3.446$, $p = 0.002$), $SVO_{(in)}$ vs. $O_{(in)}VS$ comparison also resulted significant ($t(31) = 2.194$, $p = 0.036$).

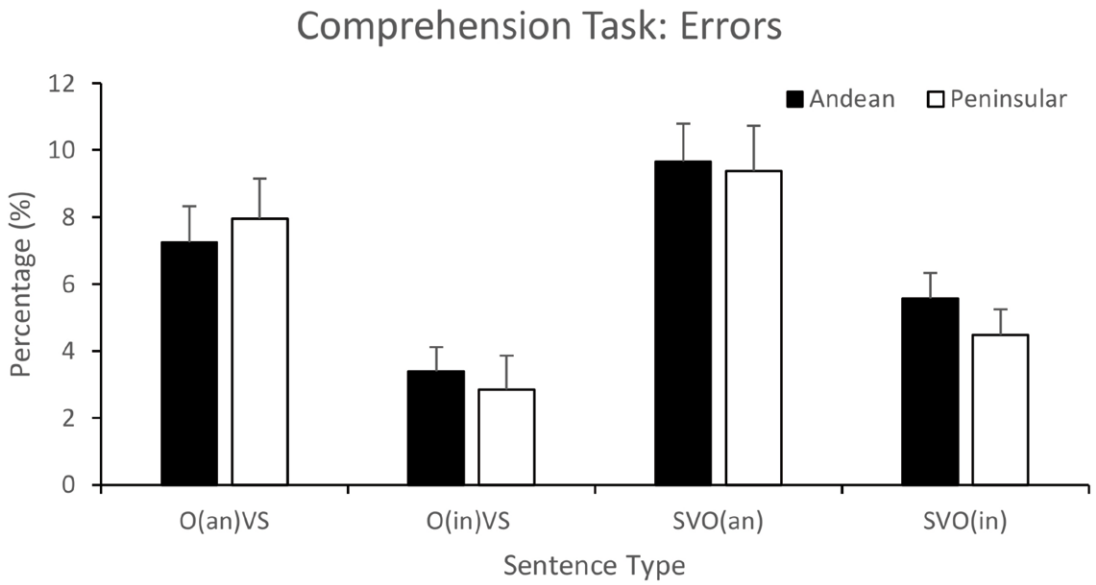


FIGURE 2

**Percentage of errors in the comprehension task of Andean Spanish speakers (black bars) and Peninsular Spanish speakers (white bars)**

Regarding the errors in the comprehension task, the group analysis revealed a main effect of *Constituent Order*($F(1,62) = 9.641$, $P(\text{HF}) = 0.003$) and another main effect of *Animacy* ($F(1,62) = 43.707$, $P(\text{HF}) < 0.001$). No interaction was observed. Finally, the group analysis of the reaction times generated a main effect of *Animacy* ($F(1,61) = 26.459$, $P(\text{FH}) < 0.001$) without any significant interaction. The lack of interactions with *Group* factor signals that Peninsular and Andean Spanish speakers performed similarly in the comprehension task.

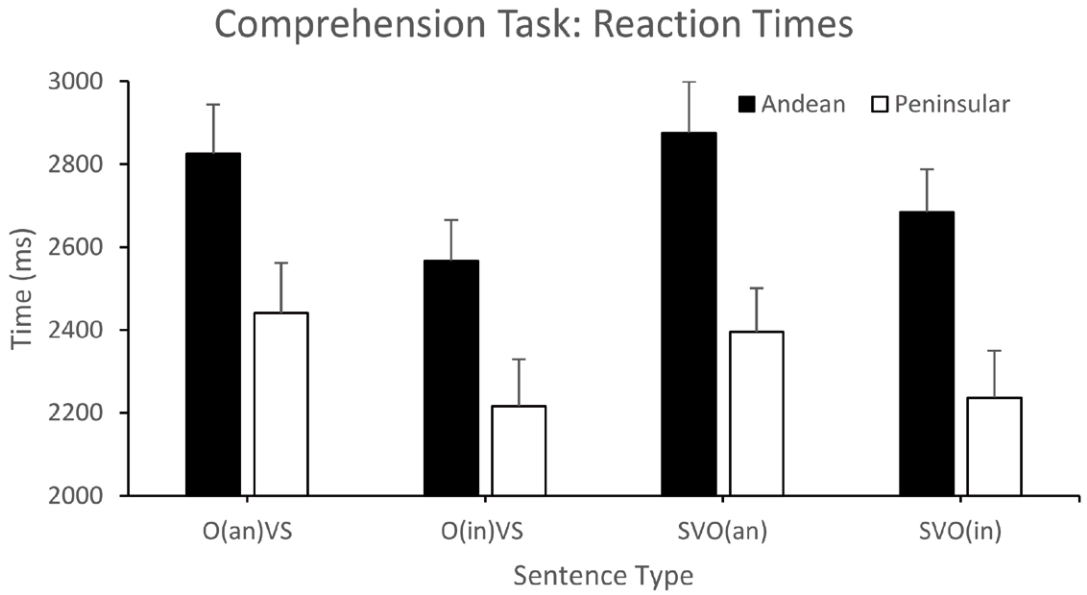


FIGURE 3

**Reaction times of the comprehension task of Andean Spanish speakers (black bars) and Peninsular Spanish speakers (white bars)**

### 2.2.3. Constituent by constituent analysis

Sentences were presented constituent by constituent in the experiment. Hence, we carried out pairwise comparisons of all experimental conditions at each sentence position (DP1, V, DP2) for both groups of participants.

For the Peninsular Spanish group, at sentence initial position (DP1),we observed that animate objects took longest, indicating they were hardest to process. They were slower than subjects and slower than inanimate objects ($O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = -4.167$, $p < 0.001$; $SVO_{(an)}$ vs. $O_{(an)}VS$: $t(31) = -3.337$, $p = 0.002$; $SVO_{(in)}$ vs. $O_{(an)}VS$: $t(31) = -4.519$, $p < 0.001$; see Fig.4 and Table 4). Recall that animate objects in Spanish carry a DOM marker *a* (*María vio [$_O$ a la niña]* «María saw the girl»), which rules out a temporary parsing of this initial DP as a subject. But inanimate objects are not morphologically marked (*María vio [$_O$ la luz]* «María saw the light»), and they can be temporarily interpreted as subjects at sentence initial position (e.g. *la luz cegó a María* «The light blided Mary»). Hence, the observed similar reading times are expected. Unexpectedly, the comparison of sentence initial inanimate objects with the subject in the $SVO_{(an)}$ condition was significant ($O_{(in)}VS$ vs.$SVO_{(an)}$: $t(31) = -2.683$, $p = 0.012$). We think this result is due to the fact that the inanimate objects in our materials were shorter than the subjects in the $SVO_{(an)}$ condition (see the discussion in the materials subsection above). Another unpredicted result was observed when comparing reading times of S in $SVO_{(in)}$ vs. $SVO_{(an)}$ conditions ($t(31) = -3.226$, $p = 0.003$), which differ in reading times though a revision of the items shows they did not differ in length or frequency.

At V (sentence second position), Peninsular Spanish speakers are slower in the O-animate condition than in the O-inanimate one ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = -4.008$, $p < 0.001$; $O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = -6.383$, $p < 0.001$; $O_{(in)}VS$ vs.$SVO_{(an)}$: $t(31) = -3.728$, $p = 0.001$). Further comparing reading times of V in the two O-animate conditions ($SVO_{(an)}$ vs. $O_{(an)}VS$), a statistically significant results was observed ($t(31) = -2.394$, $p = 0.023$), showing that sentence initial animate objects correlated with longest reading times at the verb.

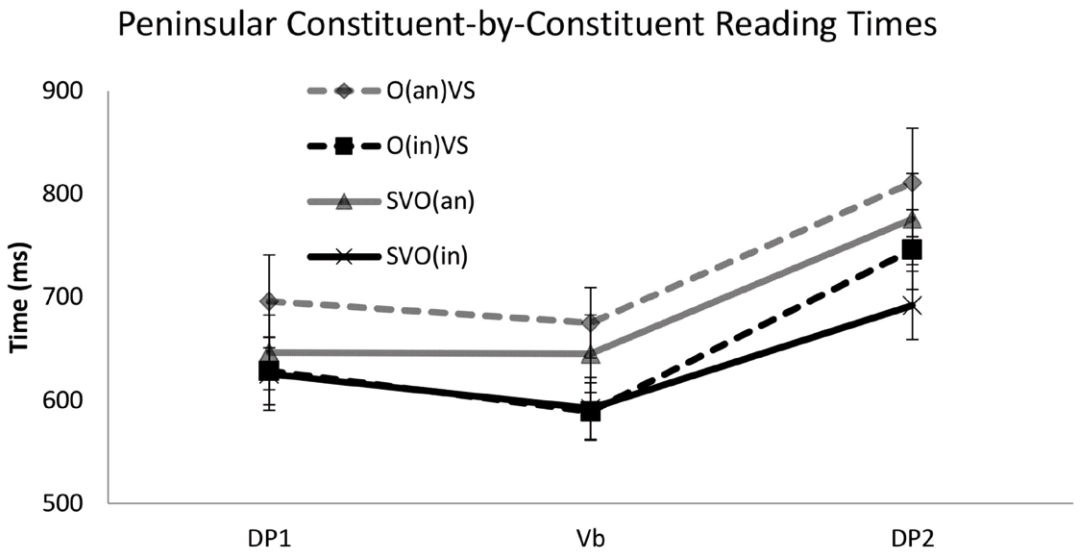


**Figure 4**

**Constituent-by-constituent reading times of the Peninsular Spanish speakers at each constituent position in every experimental condition. DP1 refers to the first Determiner Phrase of the sentences, the subject of SVO conditions and the object of OVS conditions. DP2 refers to the last Determiner Phrase of the sentences, the object of SVO conditions and the subject of OVS conditions**

At sentence final position (DP2), the largest processing cost was observed for the subject in the O-inanimate condition ($SVO_{(in)}$ vs.$O_{(in)}VS$: $t(31) = –4.143$, $p < 0.001$). Further, comparisons between O-animate and O-inanimate conditions resulted significant at DP2 position ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = –4.465$, $p < 0.001$; $O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = –2.609$, $p = 0.014$), with the exception of $O_{(in)}VS$ vs.$SVO_{(an)}$ comparison that was not significant, probably due to the increasing processing cost of the subject in final position in the O-inanimate condition (see Table 4 and Fig. 4).

**Table 4**

Constituent-by-Constituent mean reading times of the experimental conditions for both groups of participants (Peninsular and Andean). Time is provided in milliseconds, and standard errors in brackets. DP1 refers to the first Determiner Phrase of the sentences, the subject of SVO conditions and the object of OVS conditions. DP2 refers to the last Determiner Phrase of the sentences, the object of SVO conditions and the subject of OVS conditions

| | $O_{(an)}VS$ | | $O_{(in)}VS$ | | $SVO_{(an)}$ | | $SVO_{(in)}$ | |
|---|---|---|---|---|---|---|---|---|
| | **Penins.** | **Andean** | **Penins.** | **Andean** | **Penins.** | **Andean** | **Penins.** | **Andean** |
| DP1 | 696 (±45) | 808 (±43) | 628 (±32) | 698 (±33) | 646 (±36) | 712 (±34) | 625 (±35) | 683 (±30) |
| Verb | 675 (±34) | 785 (±42) | 589 (±27) | 654 (±28) | 645 (±37) | 717 (±34) | 592 (±30) | 636 (±28) |
| DP2 | 811 (±52) | 932 (±51) | 746 (±38) | 815 (±47) | 775 (±44) | 864 (±49) | 692 (±33) | 750 (±36) |

For the Andean Spanish group, comparisons at first constituent position (DP1) also revealed that the animate object was hardest to process ($O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = –5.365$, $p < 0.001$; $SVO_{(an)}$ vs. $O_{(an)}VS$: $t(31) = –5.250$, $p < 0.001$; $SVO_{(in)}$ vs. $O_{(an)}VS$: $t(31) = –6.303$, $p < 0.001$). As reported for the Peninsular group, we observed an unexpected difference when comparing sentence initial subjects ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = –2.3568$, $p = 0.025$).

At V (sentence second) position, O-animate conditions required longer reading times thanO-inanimate conditions ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = –6.083$, $p < 0.001$; $O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = –7.192$, $p < 0.001$; $O_{(in)}VS$ vs.$SVO_{(an)}$: $t(31) = –5.532$, $p < 0.001$).We also observed a carry over effect at verb position in the $O_{(an)}VS$ condition when we compared it with the $SVO_{(an)}$ condition ($t(31) = –4.948$, $p < 0.001$), similar to the effect observed in Peninsular Spanish speakers (see Table 4 and Fig. 5).

At sentence final position (DP2), Andean speakers, like Peninsular ones also read objects faster than subjects in the O-inanimate condition ($SVO_{(in)}$ vs. $O_{(in)}VS$: $t(31) = –3.335$, $p = 0.002$), an expected finding, signaling the extra processing effort required by sentence final subjects. Also in the O-animate condition, subjects took longer than objects ($SVO_{(an)}$ vs. $O_{(an)}VS$: $t(31) = –2.635$, $p = 0.013$). In general, sentence final constituents in O-animate condition were read slower than in O-inanimate condition ($SVO_{(in)}$ vs. $SVO_{(an)}$: $t(31) = –4.057$, $p < 0.001$; $O_{(in)}VS$ vs. $O_{(an)}VS$: $t(31) = –4.980$, $p < 0.001$). The only exception is the $O_{(in)}VS$ vs.$SVO_{(an)}$ comparison that was not significant, same as the Peninsular group (see Table 4 and Fig. 5).

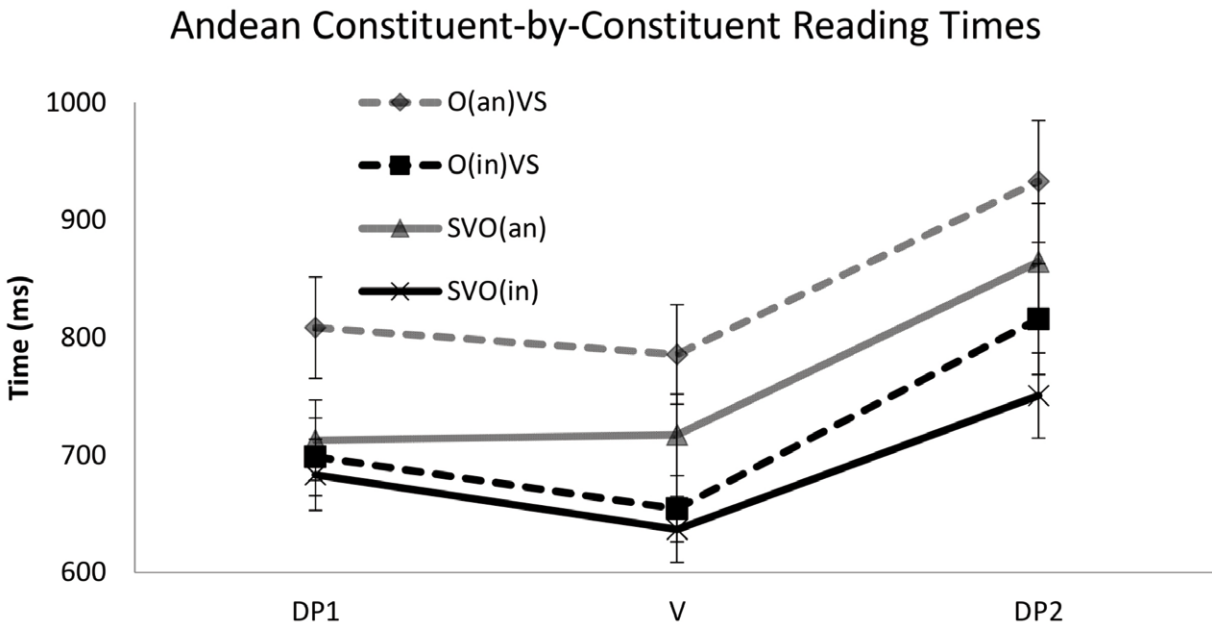


FIGURE 5

**Constituent-by-constituent reading times of the Andean Spanish speakers at each constituent position in every experimental condition. DP1 refers to the first Determiner Phrase of the sentences, the subject of SVO conditions and the object of OVS conditions. DP2 refers to the last Determiner Phrase of the sentences, the object of SVO conditions and the subject of OVS conditions**

In order to compare Peninsular and Andean Spanish in the constituent-by-constituent analysis, three way ANOVAs were carried out for all three constituent positions (DP1, Verb, DP2) with groups of participants as a between subject factor.

At DP1 position, results revealed main effects of *Constituent order* ($F(1,62) = 44.477$, $P(\text{HF}) < 0.001$) and *Animacy* ($F(1,62) = 54.823$, $P(\text{HF}) < 0.001$). Further, an interaction between *Constituent order* and *Group*($F(1,62) = 5.713$, $P(\text{HF}) = 0.020$) was observed, signaling that processing preverbal objects was harder for the Andean group than for the Peninsular group. The interaction of *Group* with *Animacy* and the three way interaction were not significant.

For the verb, at second position in the sentence, results revealed main effects of *Constituent order* ($F(1,62) = 21.972$, $P(\text{HF}) < 0.001$) and *Animacy* ($F(1,62) = 98.939$, $P(\text{HF}) < 0.001$). The interactions between *Group* and *Constituent order* ($F(1,62) = 6.034$, $P(\text{HF}) = 0.017$) and *Group* and *Animacy* ($F(1,62) = 4.246$, $P(\text{HF}) = 0.044$) were significant, signaling that the verbs of O-initial and O-animate conditions took longer to process for the Andean group than for the Spanish group. The triple interaction was not significant at verb position.

Finally, for DP2, at sentence final position, the ANOVA did not reveal any significant interaction. Only main effects of *Constituent order* ($F(1,62) = 26.096$, $P(\text{HF}) < 0.001$) and *Animacy* ($F(1,62) = 48.041$, $P(\text{HF}) < 0.001$) were observed.

## 3. Discussion

### 3.1. *Whole sentence processing*

Our results reveal that word order and object animacy have a significant impact on sentence processing speed and accuracy in both varieties of Spanish, Peninsular and Andean, as expected. Specifically, both in Peninsular as well as in Andean Spanish: (a) SVO sentences are processed faster and with less errors than their OVS counterparts, and (b) sentences with animate objects take longer to process than those with inanimate ones. We thus replicate the findings previously reported by Casado *et al*. (2005) and Del Rio *et al*. (2012) showing SVO to be the easiest sentence word order to processing Peninsular Spanish. Moreover, our results reveal this to be the case also in Andean Spanish, a variety for which no processing data were available before. This entails that, despite the higher frequency of preverbal objects reported as a characteristic feature of Andean Spanish (Escobar, 1978; Lujan, Minaya & Sankoff, 1981; Cerrón-Palomino, 1990; A.M. Escobar, 1990, 2000; Zavala 1999), this feature is not significant enough to alter the basic processing preferences: SVO is the canonical word order also in this Andean variety, as revealed by shorter reading times and errors, in comparison to OVS.

Both groups of Spanish speakers, Andean and Peninsular, respond similarly when processing sentence word order and object animacy manipulations. The Andean group revealed an interaction between *Constituent order* and *Animacy* that did not reach significance in the Peninsular group (though it almost did, see result section). The direct comparison between groups did not reveal any three way interaction (*Group* by *Consituent order* by *Animacy*) and main effects of *Consituent order* and *Animacy* were observed, signaling that both groups processed experimental conditions in the same fashion. The interactions between *Group* and *Animacy* factors and *Group* and *Constituent order* factors revealed that the processing cost of sentence initial animate Objects, as compared to the rest of the conditions, was greater for the Andean group. This is an interesting finding, because it indicates less tolerance to morphologically marked preverbal objects in the Andean variety than in the Peninsular one, despite reports of higher rates of preverbal objects in Andean Spanish (Muntendam, 2013).

### 3.2. *Comprehension task*

The comprehension task also sought to measure the comprehension cost of the various experimental conditions. Results reveal that word order and animacy modulate the correct comprehension of the sentences in both groups. Conditions with animate objects elicited more errors and required longer reading times than the conditions with inanimate objects. Regarding word order, object initial sentences elicited more errors and required longer reading times than subject initial counterparts. These results provide additional evidence that canonical word order in Spanish is SVO (Casado *et al*., 2005; Del Rio *et al*., 2012). The lack of differences between Andean and Peninsular speakers in the direct group comparison indicates that both groups deploy equivalent representation and processing of sentence word order and animacy traits. In particular, no evidence emerges for a preverbal object processing advantage in Andean Spanish.

### 3.3. *Reading times constituent by constituent*

The fastest constituents to process in both groups, as expected, were the sentence initial S and sentence initial O in the O-inanimate condition. Given that inanimate objects are not morphologically marked in Spanish, this result shows that a sentence initial inanimate object is initially processed as a subject, deploying the *Subject First strategy* (Bever, 1970).The slowest constituent to process, also for both groups, was the sentence initial animate object, as expected. Recall that animate objects in Spanish carry a *Differential Object Marker* (DOM), the preposition *a*; this marking rules out the possibility of temporarily interpreting the sentence initial object as a subject. Comparing reading times for subjects at sentence initial position ($SVO_{(in)}$ vs. $SVO_{(an)}$), we found longer reading times for condition $SVO_{(an)}$ in both groups of participants. This result is unexpected and we have no explanation for it; we ruled out to differences in frequency or length in the experimental material, for which we tested. Direct comparison between groups revealed that processing preverbal objects was harder for the Andean Spanish speakers than for the Peninsular ones, as suggested by the larger difference in reading times between OVS and SVO sentences for Andeans at DP1 position. As seen in the discussion on reading times for the whole sentence, here again we find that Andean speakers incur in greater costs than Peninsulars when processing OVS word orders.

We compared the reading times for the verbs in the various conditions and found that, in both groups of participants, the verbs in the O-inanimate condition are processed faster than the verbs in the O-animate condition, an expected result. The verb in condition $O_{(an)}VS$ had the longest reading times in both groups of participants, plausibly due to the fact that subjects incur in greater cognitive costs when processing the differentially marked object, which already signals a non canonical sentence word order; we thus interpret it as a *spillover effect* (Just *et al.,* 1982) whereby the processing load of the animate object continues until the next element, in this case the verb. These comparisons must be taken carefully because the verbs in the O-inanimate condition are more frequent and shorter than verbs in the O-animate condition, which could also subtly contribute to faster reading times in the former. When comparing the reading times for verbs in conditions $SVO_{(in)}$ and $SVO_{(an)}$, we found that in $SVO_{(in)}$ condition the verb is processed faster by both groups of participants, which was not expected. We speculate that it results from a small difference in frequency and length of the verb in each condition (see the discussion in the materials subsection above). Direct comparison between groups at verb position revealed that the Andean group was more sensitive to word order variations and object animacy than the Peninsular group.

We measured and compared the reading times for DP2 at the end of the sentence. The S of $O_{(in)}VS$ condition was read significantly slower than the O of the $SVO_{(in)}$ condition in both groups of participants. The comparison of O and S of animate conditions ($SVO_{(an)}$ vs. $O_{(an)}VS$) at sentence final position (DP2) reached significance in the Andean group, but not in the Peninsular group. However, we did not observe any group effect for those O-animate conditions. The greater processing cost of S at sentence final position arises because this is not its canonical position and provides further evidence favoring that Spanish canonical word order is SVO (Casado *et al.*, 2005; del Rio *et al.,* 2012); although the asymmetries in length could overdraw the results.

All in all, constituent-by-constituent analysis revealed that Andean and Peninsular Spanish speakers are similarly affected by word order and animacy variations in the sentence, revealing that canonical word order is SVO in both varieties and animate objects increased the processing cost of sentences, also in both varieties. When differences between both groups of speakers were

observed, they signaled that OVS orders were harder to process for the Andean group. Thus previously reported higher frequencies for OV structures in Andean Spanish (Escobar, 1978; Lujan, Minaya & Sankoff, 1981; Cerrón-Palomino, 1990; A.M. Escobar, 1990, 2000; Zavala 1999) do not appear to sufficiently impact on the sentence processing strategies of Andean Spanish speakers, which remain similar to that of Peninsular speakers.

## 4. Conclusion

In the present study, we provide pioneering experimental evidence regarding sentence processing in Andean Spanish. Our findings reveal that both in Andean and Peninsular Spanish varieties: (a) sentence canonical word order is SVO, as revealed by the fast reading times and small amount of comprehension errors, and (b) object animacy slows down sentence processing regardless of its position in the sentence, but do it more when sentence initial. Interestingly, our results do not show signs of facilitation for processing animate object initial sentences in the Andean group, despite the higher frequency of preverbal objects reported as a characteristic feature of Andean Spanish (Muntendam, 2013).

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## References

Alameda, J.R. & Cuetos, F. (1995).*Diccionario de frecuencias de las unidades lingüisticas del castellano*. Oviedo, University of Oviedo.

Bahlmann, J.; Münte, T.; Rodriguez-Fornells, A. & Rotte, M. (2007).An fMRI study of canonical and noncanonical word order in German. *Human Brain Mapping* 28, 940-949.

Basilico, D.; Pinar, P. & Anton-Menendez, I. (1995).*Canonical word order and the processing of verbal traces in Spanish*. Poster presented on the Eighth Annual CUNY Conference on Human Sentence Processing, Tucson, Arizona.

Bever, T. (1970). The cognitive basis for linguistic structures. In: Hayes, R. (ed.).*Cognition and language development*. New York: Willey & Sons, 279-362.

Bornkessel, I.; Schlesewsky, M., & Friederici, A. (2002). Grammar overrides frequency: Evidence from online processing of flexible word order. *Cognition*, 85, B21-B30.

Bornkessel, I., & Schlesewsky, M. (2009). The role of prominence information in the real-time comprehension of transitive constructions: A cross linguistic approach. *Language and Linguistic Compass*, 3, 19-58.

Camacho, J. 1999. From SOV to SVO: the grammar of interlanguage word order. *Second Language Research,* 15(2), 115-132.

Casado, P. (2004). *Procesos implicados en la identificación del orden no canónico de oraciones transitivas: una aproximación electrofisiológica*. PhD dissertation. Madrid, Complutense University of Madrid.

Casado, P.; Fernández Frías, C.; Martin-Loeches, M. & Muñoz, F. (2005).Are semantic and syntactic cues inducing the same processes in the identification of word order? *Cognitive Brain Research*, 24, 526-543.

Cerrón-Palomino, R. (1990). Aspectos sociolingüísticos y pedagógicos de la motosidad en el Perú. In Cerron-Palomino, R. & Solis Fonseca, G. (eds.) *Temas de lingüistica amerindia*. Lima, CONCYTEC / GTZ, 153-180.

Cerrón-Palomino, R. (2003). *Castellano andino: aspectos sociolingüísticos, pedagógicos y gramaticales*. Lima, PUCP.

Chomsky, N. (1981). *Lectures on government and binding*: *The Pisa Lectures*. Holland: Foris Publications.

Chomsky, N. & Miller, G. (1963). Introduction to the formal analysis of natural languages. In Luce, R., Bush, R. and Galanter, E. (eds.) *Handbook of Mathematical Psychology*, vol. 2. New York: Wiley, 269-323.

Comrie, B. (1981). *Language universals and linguistic typology: syntax and morphology*. The University of Chicago Press, Chicago.

Contreras, H. (1978). *A theory of word order with special reference to Spanish*. Amsterdam, North Holland.

Del Rio, D.; Lopez-Higes, R. & Martin-Aragoneses, M. (2012).Canonical word order and interference-based integration costs during sentence comprehension: The case of Spanish subject – and object relative clauses. *The Quarterly Journal of Experimental Psychology*, 1-21.

Demestre, J. (2012). Deleting the object marker renders the sentenceungrammatical: comment on Casado, Martin-Loeches, Muñoz, and Fernandez-Frias (2005). *Languageand Cognitive Processes*, 27, 682-692.

Dryer, M.S. 2013.Order of Subject, Object and Verb. In: Dryer, Matthew S. & Haspelmath, Martin (eds.). The World Atlas of Language Structures Online. Leipzig: Max Planck Institute for Evolutionary Anthropology.<http://wals.info/chapter/81, accessed on 2017-07-03>.

Duchon, A.; Perea, M., Sebastián-Gallés, N.; Marti, A. & Carreiras, M. (2013). EsPal: One-stop Shopping for Spanish Word Properties. *Behavior Research Methods*, 45, 1246-1258. <http://www.bcbl.eu/databases/espal/>.

Erdocia, K.; Laka, I.; Mestres-Misse, A. & Rodriguez-Fornells, A. (2009).Syntactic complexity and ambiguity resolution in a free word order language: behavioral and electrophysiological evidences from Basque. *Brain and Language*, 109, 1-17.

Erdocia, K.; Laka, I. &Rodriguez-Fornells, A. (2012).Processing verb medial word order in a verb final language. In Lamers, M. & de Swart, P. (eds.), *Case, word order and prominence*. *Studies in theorethical psycholinguistics*. Springer, Nijmegen, 40, 217-237.

Erdocia, K. &Laka, I. (2018). Negative transfer effects on L2 word order processing. *Frontiers in Psychology*, 9, 337. <https://doi.org/10.3389/fpsyg.2018.00337>.

Escobar, A. (1978). *Variaciones sociolingüisticas del castellano en el Perú*. Lima, Instituto de Estudios Peruanos.

Escobar, A.M. (1990). *Los bilingües y el castellano en el Perú*. Lima, Instituto de Estudios Peruanos.

Escobar, A.M. (2000). *Contacto social y lingüístico*. *El español en contacto con el quechua en el Perú*. Lima, PUCP.

Ferreira, F. (2003). The misinterpretation of noncanonical sentences. *Cognitive Psychology*, 47, 164-203.

Frisch, S. & Schlesewsky, M. (2001). The N400 indicates problems of thematic hierarchizing. *NeuroReport*, 12, 3391-3394.

Gibson, E. (1998). Linguistic complexity: locality of syntactic dependencies. *Cognition*, 68, 1-76.

Gibson, E., &Fedorenko, E. (2013). The need for quantitative methods in syntax and semantics research. *Language and Cognitive Processes*. 28(3): 229-240.

Godenzzi (1991).Discordancias gramaticales delcastellano andino en Puno (Peru). *Lexis*, 25 (1), 107-118.

Greenberg, J. (1963). Some universals of grammar with particular reference to the order of meaningful elements. In Greenberg, J. (ed.). *Universals of language*. Cambridge: MIT Press, 58-90.

Grewe, T., Bornkessel-Schlesewsky, I., Zysset, S., Wiese, R., von Cramon, D. Y., & Schlesewsky, M. (2007). The role of the posterior superior temporal sulcus in the processing of unmarked transitivity. *NeuroImage,* 35(1), 343-352.

Hale, J. (2001).A probabilistic early parser as a psycholinguistic model. In *Proceedings of NAACL*, volume 2, 159-166.

Just, M.A.; Carpenter, P.A., & Woolley, J.D. (1982). Paradigms and processes in reading comprehension. *Journal of Experimental Psychology*, vol. 111 (2), 228-238.

Kaan, E. (1997). *Processing subject-object ambiguities in Dutch*. PhD Dissertation. University of Groningen.

Kaiser, E. & Trueswell, J. (2004). The role of discourse context in the processing of a flexible word-order language. *Cognition*, 94, 113-147.

Klee, C. 1996. The Spanish of the Peruvian Andes: The Influence of Quechua on Spanish Language Structure. In Roca, A. and Jensen, J. (eds.) *Spanish in Contact, Issues in Bilingualism*, 73-92.

Laka, I. (1990). *Negation in syntax: On the nature of functional categories and projections*. PhD Dissertation, Massachusetts Institute of Technology.

Lambrecht, K (1994). *Information structure and sentence form: Topic, focus and the mental representation of discourse referents*. Cambridge Studies in Linguistics, 71. Cambridge, Cambridge University Press.

Lee, H. & Kim, N. (2012). Non-canonical word order and subject-object asymmetry in Korean case ellipsis. In Müller, S. (ed.). *Proceedings of the 19th International Conference on Head Driven Phrase Structure Grammar, Chungnam National University Daejeon*, 427-442.Stanford, CSLI Publications.

Lujan, M., Minaya, L. & Sankoff, D (1981). El principio de consistencia universal en el habla de niños bilingües peruanos. *Lexis*, 5 (2), 95-110.

Levy, R. (2008). Expectation-based syntactic comprehension. *Cognition*, 106, 1126-1177.

Levy, R., Feodorenko, E. & Gibson, E. (2013).The syntactic complexity of Russian relative clauses. *Journal of Memory and Language*, 69, 461-495.

Mak, W. (2001). *Processing of relative clauses: Effects of pragmatic, semantic and syntactic variables*. Doctoral dissertation.University of Nijmegen, Nijmegen.

Mak, W.; Schriefers, H.; & Vonk, W. (2002).The influence of animacy on relative clause processing. *Journal of Memory and Language*, 47, 50-68.

Mak, W.; Schriefers, H. & Vonk, W. (2006).Animacy in processing relative clauses: The hikers that rocks crush.*Journal of Memory and Language*, 54, 466-490.

Marantz, A. (2005). Generative linguistics within the cognitive neuroscience of language. *The Linguistic Review* 22, 429-445.

Matzke, M.; Heinke, M.; Nager, W.; Rüsler, J. & Münte, T. (2002). The costs of freedom: an ERP study of non canonical sentences. *Clinical Neurophsysiology*, 113, 844-852.

Muntendam, Antje (2009). Linguistic transfer in Andean Spanish: Syntax or Pragmatics? PhD Dissertation, University of Illinois at Urbana-Champaign.

Muntendam, Antje (2013). On the nature of cross-linguistic transfer: A case study of Andean Spanish. *Bilingualism, Language and Cognition*, 16, 111-131.

Muysken, P. 1984. The Spanish that Quechua speakers learn: L2 learning as norm governed behavior. In Andersen, R. (ed.), *Second languages: a crosslinguistic perspective*. Rowley, Mass., Newbury House, 101-119.

Nieuwland, M. S., Martin, A. E., Carreiras, M. (2013). Event-related brain potentials evidence for animacy processing asymmetries during sentence comprehension. *Brain and Language* 126, 151-158.

Phillip, M.; Bornkessel-Schlesewsky, I.; Bisang, W. &Schlesewsky, M. (2008). The role of animacy in real time comprehension of Mandarin Chinese: Evidence from auditory event-related brain potentials. *Brain and Language*, 105, 112-133.

Phillips, C. (2013). Parser-grammar relations: We don't hear everything twice. In Sanz, M., Laka, I. & Tanenhaus, M. (eds). *Language down the garden path: the cognitive and biological basis for linguistic structure*. Oxford, Oxford University Press, 294-315.

Prat-Sala, M. & Branigan, H. (2000).Discourse constraints on syntactic processing in Language production: A cross-linguistic study in English and Spanish. *Journal of Memory and Language*, 42, 168-182.

Rohde, D.L.T. (2001). *Linger* [Computer Software]. Cambridge, MA: MIT TedLab.

Sanchez, L. (2003). *Quechua-Spanish bilingualism: Interference and convergence in functional categories*. Amsterdam/Philadelphia: John Benjamins Publishing Company.

Schlesewsky, M.; Fanselow, G.; Kliegl, R. & Krems, J. (2000).The subject preference in the processing of locally ambiguous wh-questions in German. In Hemforth, B. & Konieczny, L. (eds.). *German Sentence Processing*, 65-93.

Sekerina, I. (2003). Scrambling and processing: Dependencies, complexity and constraints. In Karimi, S. (ed.). *Word order and scrambling*. Malden, WA, Blackwell Publishers, 1-18.

Sprouse, J. & Almeida, D. (2012). Assessing the reliability of textbook data in syntax: Adger's Core Syntax. *Journal of Linguistics*, 48, 609-652.

Valdez, L. (2002). *Clitics in the speech of monolingual Andean Spanish speakers*. PhD Dissertation, University of Pittsburgh.

Vasishth, S. (2002).*Working memory in sentence comprehension: Processing Hindi center embeddings*. Doctoral Dissertation, Ohio State University.

Weckerly, J., & Kutas, M. (1999). An electrophysiological analysis of animacy effects in the processing of object relative sentences. *Psychophysiology*, 36, 559-570.

Weyerts, H.; Penke, M.; Münte, T.; Heinze, H-J. & Clahsen, H. (2002). Word order in sentence processing: An experimental study of verb placement in German. *Journal of Psycholinguistic Research*, vol. 31, 211-268.

Wolff, S.; Schlesewsky, M; Hirotani, M. &Bornkessel-Schlesewsky, I. (2008). The neural mechanisms of word order processing revisited: electrophysiological evidence from Japanese. *Brain and Language*, 107, 133-157.

Zavala, V. (1999). Reconsideraciones en torno al español andino. *Lexis,* 24 (1), 25-85.

Zubizarreta, M.L. (2000). Las funciones informativas: tema y foco. In Bosque, I. & Demonte, V. (eds.). *Gramática descriptiva de la lengua española*, Madrid, Espasa Calpe, 4215-4244.