32nd International Conference of the Spanish Association of Applied Linguistics (AESLA):
Language Industries and Social Change

The effect of opacity and productivity of Spanish suffixes on derived words

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Abstract

Studies have shown the impact of morphological knowledge on grammatical awareness and reading achievement (Carlisle, 1995; Marinellie and Kneile, 2012). There are factors, such as low productivity and opacity, which make derived words difficult to understand. Those and the deep structure of opaque derived words need further investigation (Gayatri, 2013; Serrano-Dolader, 2006).

The goal of this study is to develop a scale of opacity along a continuum based on the number of changes to the lemma when the suffix is applied. Each of these changes was measured over a corpus of 550 derived words with productive Spanish suffixes (DRAE, 2001). 130 native Spanish high-school students and a small group of advanced non-native college students of Spanish were tested on the scale.

Results reveal the usefulness of the scale to assess processing and reading difficulties in Spanish. Validation results indicate that all participants react in a similar way when facing basic morphological decisions.

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Keywords: Spanish linguistics, derivational morphology, opacity, productivity, first language acquisition, second language acquisition.

1. Introduction

In Spanish, many new words are formed by adding a suffix to a root word, e.g. decid-ir > decis-ión. When students encounter this type of words during reading, they understand some better than others. Two aspects related to the phenomenon of morphological complexity are opacity and productivity.

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Productivity has to do with the ease with which suffixes attach to simple words. More productive suffixes are more frequent on word formation patterns. Productivity depends on multiple, inter-relational and variable factors (Booij, 2005; Zacarías Ponce de León, 2010). In the case of Spanish, productive suffixes have their meaning described in a dictionary such as the Diccionario de la Real Academia Española (Dictionary of the Royal Academy, DRAE).

Opacity is the opposite of transparency. It affects a derived word that has undergone a phonological or orthographic change during derivation. For example, from the base word cielo, we can obtain a transparent derived word such as ciel-ito and opaque derived word such as cel-este. While opacity has been proven to affect negatively the speed and accuracy with which students identify the base word or lemma of a given derived word (Windsor, 2000; Carlisle, 1987, 1988; inter alia), knowledge of derived words is related to morphological awareness, which has been proven to have a positive impact on children’s reading skills (Bowers, 2006; Carlisle, 2000; Carlisle & Fleming 2003; Carlisle & Stone, 2005; Marinellie & Kneile, 2012; Windsor, 2000). When derived words are created, certain lexical relations are established that help reduce the costs on processing time in word recognition (Lázaro López-Villaseñor, 2008; Moreno, 2000). Consequently, derivational rules and suffixes can be stored, increasing the efficiency with which speakers understand and produce words (Mackay, 1978).

The goal of this study is to develop a scale of opacity based on the number of changes applied to the lemma during suffixation. With this scale, we intend to prove that opacity is not an absolute term, but a relative value within a continuum (Bowers, 2006). Having an opacity scale will be a useful tool to assess word processing and reading difficulties, and to develop appropriate intervention instruments for students to overcome those difficulties.

2. Research questions

The following research questions guided the present study:

1. Which are the main morphological changes within derivation?
2. Are the changes discovered consistent throughout the Spanish lexicon?
3. Will opacity and productivity interfere with students’ understanding of derived words?
4. Is morphological awareness proportional to the time students spend learning morphology in the classroom?

3. Methodology

3.1. Materials

A corpus of 550 derived words from a compilation of productive suffixes (DRAE 2001) was analyzed, and a list of morphological and semantic changes was created. The values ranged along a continuum of opacity: the greater the number of changes from the lemma to the derived word, the more opaque the derived word would be. A preliminary scale of opacity was developed (see Fig. 1). For the final scale of opacity, in order to measure the difficulty added by the suffix, we took into consideration the frequency of the changes and the students’ performance when dealing with derived words.
There were a total of 60 derived words with highly productive suffixes. The resulting words were mainly nouns and adjectives. They were chosen according to the type of change produced in the lemma: some transparent (aceitera) and some opaque (vendaval).

### 3.2. Instruments

Three activities were distributed among participants in class. Activity 1 (Fig. 2) focused on the morphology of the derived words. Thirty-one derived words were presented to the students followed by four options: the lemma; a derived word from the same family; a distractor; and a pseudo-word. Pseudo-words followed the design used in Lázaro López-Villaseñor (2008): a known word with a phonetic change or a lemma with an added incompatible suffix. Students were asked to circle the lemma for each of the derived words.

<table>
<thead>
<tr>
<th>CHANGE</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress shift: When deriving a simple word, the accent moves from the lemma into the suffix.</td>
<td>pasar &gt; pasador</td>
</tr>
<tr>
<td>Syllabic regrouping</td>
<td>oceànico &gt; transoceànico</td>
</tr>
<tr>
<td>Deletion of an inflectional morpheme before adding the derivational suffix. Different epenthetic vowel.</td>
<td>comer &gt; comilón</td>
</tr>
<tr>
<td>No change within derivation.</td>
<td>leche &gt; lechería</td>
</tr>
<tr>
<td>Deletion of an inflectional morpheme before adding the derivational suffix. Same epenthetic vowel.</td>
<td>comer &gt; comedor</td>
</tr>
<tr>
<td>Two suffixes united in a single derived word.</td>
<td>vivo &gt; vivaracho</td>
</tr>
<tr>
<td>A meaningful change in the semantics of the lemma.</td>
<td>protestar &gt; protestante</td>
</tr>
<tr>
<td>Orthographic change.</td>
<td>mozo &gt; moedad</td>
</tr>
<tr>
<td>Use of an allomorph.</td>
<td>casa &gt; casina</td>
</tr>
<tr>
<td>Lemma vowel alteration: monophthongization, diphthongization or metaphorphy.</td>
<td>puerta &gt; portal</td>
</tr>
<tr>
<td>Addition of an infix.</td>
<td>café &gt; cafecito</td>
</tr>
<tr>
<td>Quality change in a lemma consonant: lenition or fortification.</td>
<td>moneda &gt; monetario</td>
</tr>
<tr>
<td>Substitution of the root of the word (suplenencia or suplencción in Spanish): back to its Latin form.</td>
<td>conciencia &gt; consciente</td>
</tr>
<tr>
<td>Shortening of the lemma during derivation.</td>
<td>Buenos Aires &gt; bonaerense</td>
</tr>
<tr>
<td>Parasynthesis.</td>
<td>vías ferreás &gt; ferroviario</td>
</tr>
</tbody>
</table>

Fig. 1: Preliminary Scale of Opacity.

Fig. 2: Extract Activity 1.
Activity 2 (Fig. 3) was divided into two parts, and focused on semantics. A lemma and a derived word were presented to the students simultaneously. Students were asked to define the main semantic difference between the two. After that, students had to select the two most relevant semas (pieces of meaning) for each word.

![Fig. 3: Extract Activity 2.](image)

The goal of Activity 3 was to determine whether participants could differentiate the syntactic role of derived words. A list of 15 sentences was presented with a blank space and a lemma between brackets at the end. Students were asked to select the derived word that would complete the meaning of the sentence. They could choose from: two derived words from the same family and different word category; a pseudo-word with the appropriate word category; and a distractor. All word categories were used in this activity.

![Fig. 4: Extract Activity 3.](image)

4. Participants

One hundred and thirty seven high-school-age students (13-17 years old) participated in the study. They were grouped by school year in 9th grade, 10th grade, and 11th grade, respectively. Students were recruited from two different high schools from a small town in the province of Sevilla, Spain. Some of them were in a bilingual program, and others in a non-college bound program. All of them were native speakers of Spanish. In addition, there were 29 college-age non-native speakers of Spanish (20-24 years old) from Ohio University. The purpose of having so many levels was to study morphological awareness across different contexts. The prediction was that students with a greater level of awareness would outperform students with a lesser level of awareness, whether bilingual or monolingual.

5. Results

Scoring was made at item level, by collapsing participants across each item. Scores were compared among groups, and the mean and standard deviation was extracted for each group. Means were compared using an ANOVA (Analysis of Variance) test, along with LSE and Bonferroni post-hoc tests.

The 11th graders had a significantly higher score in the three activities. Percentages per answer were collapsed across items and then compared by groups in order to obtain the preferred answers.

Analyzing the percentages, we found out that students tend to look for transparent forms. That explains why some students were choosing other lexically related derived words instead of the proper lemma. For instance, when...
given the word *juventud* (youth), some of them would choose *juvenil* (juvenile) instead of *joven* (young), as we can see in Fig. 5.

![Figure 5: Answer pattern for juvent-ud](image)

The change of the vowel in the lemma is the most conflicting one for all students, as we can see in Fig. 6 and Fig. 7.

![Figure 6: Answer pattern for cord-aje](image)

![Figure 7: Answer pattern for truequ-e](image)

The second most problematic change according to the results is the accumulation of two different suffixes in the same lemma and the use of an infix; an example of the first one in Fig. 8.
During word definition, participants from 9th and 10th grade tended to avoid non-familiar words. However, these participants and non-native students showed certain awareness of suffix meaning. Groups showed no difficulty relating grammar category with syntactic function.

6. Discussion

Opacity prevents students from relating words from the same lexical family. In general, opacity has a deeper effect on students with a weaker morphological awareness level. Within the continuum of our opacity scale, there were several changes that affected students’ performance negatively.

The most challenging words at all levels were two derived words whose root went back to Latin. Both had a low frequency suffix attached. Despite their level of opacity was completely different (paup-érri-mo [very poor] from pobre [poor], and celeb-érri-mo [very famous] from célebre [famous]), the scores were similar. That highlights the importance of productivity, and shows how both factors work in the continuum for (or against) understandability. However, these results do not account for the opacity of the root change itself.

Changes in the vowel of the lemma during derivation, the accumulation of two suffixes in a single lemma, and infixed derived words were also challenging across levels. We noticed that participants tended to include some parts of a suffix or the infix in the lemma. For example, with the pseudo-word *rosalúra (rosa+al+ura) some students picked rosal-ía over rosa showing their preference for more transparent lemmas.

Productivity, on the other hand, seems to be a positive factor in the understanding of derivation. Students were able to deduce that *torgúra was derived from *torgo, although both are pseudo-words in Spanish. In addition, participants defined the pseudo-word *palabrador [word maker] similarly. Although phonotactically plausible, that word-suffix combination does not occur in the language.

Productivity is also related to semantic specificity. That means that a very concrete meaning in a suffix has restrictions in use, and that results in low productivity rate. In the case of *palabra-dor, the meaning of the suffix was clearly opposed to the one of the lemma. In the case of the pseudo-word *limitatez, the suffix -ez is used to create abstract nouns in Spanish. Since the lemma was already an abstract noun (límite) [limit], participants did not find enough evidence to think these were different words. There is a semantic relation between productivity, phonotactic rules, and compatibility of suffixes that needs further investigation.

7. Conclusions

In the present study we found that 11th graders had a better understanding of derived words and a more efficient written expression than participants at lower levels and non-native students.

After analyzing our corpus and students’ performance, the opacity scale in Spanish stands as in Fig. 9. Changes range from more opaque to less opaque. Although not all of them have been proven in this study, further evidence is needed to determine their position within the scale yet.
Most changes in derivation are systematized, except for the addition of an infix, as indicated by the analysis of the corpus and students’ performance.

Opacity negatively affects decomposition of derived words -especially vowel root alternation, the agglutination of suffixes, and the insertion of an infix - whereas highly productive suffixes make derivatives more transparent.

In general, participants in this study have a good level of morphological awareness -native and non-native alike- and it increases with maturation and school preparation.

References


