Affix Cognateness and Productivity in the Development of Morphological Awareness in L2 Spanish: The Case of *Dis-* and *Des-*

La cognicidad y la productividad de los afijos en el desarrollo de la conciencia morfológica en el español como L2: El caso de *dis-* y *des-*

AARON YAMADA
CREIGHTON UNIVERSITY

CLAUDIA SÁNCHEZ-GUTIÉRREZ
UNIVERSITY OF CALIFORNIA, DAVIS

This study examined the role of affix cognateness and productivity in the development of Morphological Awareness (MA) among English-native L2 Spanish learners enrolled in four successive language courses (N = 121). We focused on a pair of Spanish prefixes that present an interesting distribution of cognateness and productivity: the negative Spanish prefixes *des-* and *dis-*. While *dis-* is graphically identical in Spanish and English, *des-* is not, but it is more productive than *dis-* in Spanish. Through an exploratory corpus analysis and a lexicality judgment task, we demonstrate that L2 Spanish learners gradually increase their acceptance and creative use of the more productive prefix *des-*. These results indicate that morpheme productivity progressively commands greater influence than morpheme cognateness on L2 MA, thus demonstrating that learners' morphological strategies shift from dependence on the L1 to adoption of L2 patterns, as they progress in their university Spanish course enrollments.

Keywords: *L2 Spanish; morphological awareness; prefixation; affix cognateness; affix productivity*

Este estudio examina el rol de la cognicidad y la productividad de los afijos en el desarrollo de la conciencia morfológica de 121 aprendices universitarios de español como L2 cuya lengua materna es el inglés. En particular, examinamos dos prefijos en español que presentan una distribución única en términos de cognicidad y productividad: los prefijos negativos dis- y des-. Aunque dis- en español es gráficamente igual al prefijo dis- en inglés, des- sólo existe en español, donde es más productivo que dis-. A través de un estudio de corpus preliminar y una tarea de lexicalidad, demostramos que estos aprendices de español como L2 aumentan su aceptación, y sus usos creativos, del prefijo más productivo des- a la vez que aumenta su competencia lingüística general. Estos resultados indican que, progresivamente, la productividad del morfema asume más influencia que su cognicidad en el desarrollo de la conciencia morfológica en la L2. Así, las estrategias morfológicas de los aprendices pasan de una dependencia de la lengua materna a la adopción de patrones propios de la L2, a medida que avanzan en las clases de español como L2 en la universidad.

Palabras clave: *el español como L2; la conciencia morfológica; la prefijación; la cognicidad de afijos; la productividad de afijos*

1. INTRODUCTION

Various studies show that Morphological Awareness (MA), defined as speakers' sensitivity to the morphemic structure of words (Carlisle, 1995), is beneficial to second language (L2) learners in that it positively contributes to L2 vocabulary acquisition and reading comprehension (Morin, 2003; Jeon, 2011; Tabatabaei & Yakhabi, 2011; Kieffer & Lesaux, 2012; Zhang & Koda, 2012; Zhang, 2016; Ke & Koda, 2017). For example, in L2 English, Schmitt and Meara (1997) find that learners' knowledge of inflectional and derivational suffixes correlates with vocabulary size. Additionally, several studies have proven that learners whose L1 presents productive derivational patterns transfer at least part of their morphological processing and MA skills to the L2. Diependaele, Duñabeitia, Morris and Keuleers (2011) find that the processing of suffixed words functions similarly in L1 and L2, in that both native speakers and bilinguals make use of morphological cues during lexical processing. This notion is supported by Casalis, Commissaire and Duncan (2015), who demonstrate that native French-speaking L2 learners of English, of both lower and higher proficiencies, show evidence of morphemic processing in word recognition in a lexical decision task. Similar findings emerge from Marcos Miguel (2012), who shows how fourth-semester L1 English-speaking university students of L2 Spanish transfer their lexical processing skills from L1 English to L2 Spanish in a lexical decision task that included suffixed words. Finally, Ramírez, Chen, Geva and Luo (2011) find that L1 Spanish-speaking L2 learners of English performed similarly to native speakers of English on a derivational awareness test, whereas L1 Chinese-speaking learners of L2 Spanish did not perform as well as either group. Thus, L1-L2 typological similarities in terms of word formation rules seem to positively impact word processing and MA in the L2.

2. THE DEVELOPMENT OF MA IN THE L2

Interestingly, cross-linguistic transfer seems not only to play a role in automatic word processing and guided MA tasks but also in productive word creation by L2 learners, although not all lexical innovations seem to be driven by mere L1 transfer. Indeed, Whitley (2004) finds that advanced L1 English-speaking learners of L2 Spanish use derivational morphology creatively in a corpus of Spanish writing samples. Whitley differentiates lexical creations that are driven by L1 transfer (i.e. the whole word was taken from English and the affix was simply adapted graphically to Spanish spelling conventions), such as *serioso* for *serious*, which should be *serio* in Spanish but was added a suffix *-oso* that is equivalent to the English *-ous*, and neologisms that could only be explained by learners' internalization of L2 word-formation rules. An example of the latter would be *descasado* for *unmarried*, where the learner used the highly productive negative prefix *des-* in order to create a new word that is not currently part of the English nor the Spanish lexicon (i.e. *dismarried* is not an English word, but the idea of *negative suffix + married* exists in the form of *unmarried*). These examples point to an L1 influence not only in terms of general morphological skills but also of L1-L2 graphical similarities of specific affixes (i.e. affix cognateness). This idea is supported by Sánchez-Gutiérrez (2013), who found that L2 Spanish learners' accuracy in receptive and productive MA tasks was highly influenced by cognateness, especially at low levels of proficiency. Learners in the study were enrolled in first, second, and third year language courses at a small university in the Midwest and completed five different

MA tasks. In all tasks, items that were identical cognates or had an orthographic distance of less than two letters between the L1 and the L2 (e.g. *regional, accesible, heroísmo*) presented a high degree of accuracy even among first-year students, words that included at least a cognate root and/or a cognate suffix (e.g. *trabajador [worker], futbolista [football player])* presented significantly better results by the second year, and words that included no cognate morphemes (e.g. *tristeza [sadness], grandeza [greatness]*) showed improved results only by the third year, or not at all. Similar conclusions have been drawn by other authors investigating MA. In Mochizuki and Aizawa's (2000) study of L1 Japanese-speaking learners of L2 English, participants had to choose the equivalent meaning (in Japanese) for English prefixes used to create pseudowords. The existence of English prefixed loan words in Japanese, such as *risaikuru [recycle]*, seemed to facilitate learners' correct identification of corresponding English prefixes, suggesting that L1 transfer could play a part in the acquisition order of affixes in L2 English.

While L1 transfer and affix cognateness seem to influence L2 MA, they cannot be the only factors to be considered in better understanding how and at what pace L2 learners develop their morphological skills. Otherwise, no English-speaking learner of L2 Spanish would ever create newly invented words, such as **descasado*, where no morpheme is an identical English-Spanish cognate. This is not the case, as corpus studies document the existence of such innovations in L2 learners' production (Whitley, 2004). It is thus necessary to investigate what factors may be underlying L2 lexical innovations and L2 MA at different stages of learners' linguistic development. In the literature on morphological processing and MA, different characteristics of morphemes seem to influence how fast they are recognized and processed. Concretely, it has been shown that morpheme frequency, family size and productivity play a central role in how morphologically complex words are read and processed (Baayen, Wurm & Aycock, 2007; Kuperman, Bertram & Baayen, 2010; Amenta & Crepaldi, 2012). Derived words that contain more frequent roots and/or affixes are read and processed faster than complex words with low frequency morphemes. The same is true of words that are made up of highly productive morphemes or morphemes that are part of a broad morphological family. In a recent study in English, Sánchez-Gutiérrez, Mailhot, Deacon and Wilson (2018) ran a series of hierarchical regression models in which they introduced all these variables as predictors of reaction times in a lexical decision task completed by native speakers. They found that measures of affix productivity, frequency and family size actually shared a significant part of the variance and that their individual effects arose when only one of them was included in the model. This indicates that, even though they represent different conceptual constructs, their actual effect on word processing cannot be disentangled due to their high collinearity. For this reason, in this paper we will focus on affix productivity and we will not further discuss frequency nor family size, given their close proximity to productivity in terms of individual explanatory power. In this study, affixes with a high productivity are those that are repeatedly found in neologisms, as opposed to low-productivity affixes, which are not used as frequently in lexical innovations (Baayen & Renouf, 1996).

As was mentioned earlier, most studies on L2 morphological awareness or processing have focused on L1 transfer, but still little is known about the effect of productivity in the development of morphological skills by L2 learners. One exception is Lowie (2005), which measured reaction times in lexical decision tasks to study the acquisition of the productive morpheme *-ness* and the relatively less productive morpheme *-en* in English. Their results indicated that learners of L2 English acquire the *-ness* morpheme early in acquisition, while advanced learners of English and native speakers of English treated both *-en* and *-ness* to be

similarly productive affixes, even though they are not exactly as productive in objective terms. This study establishes that even early on in L2 acquisition, learners show a certain sensitivity to the patterns of morphemic productivity. Given the limited amount of evidence and the fact that no study has been carried out in any other L2 than English, the present study aims to offer insights into the effect of morphological productivity in the development of morphological awareness in L2 Spanish.

3. THE PRESENT STUDY

Although there is abundant evidence supporting the existence of affix cognateness effects in L2 MA, it seems that more work is needed to thoroughly assess the influence of the role of affix productivity on L2 MA. In particular, more efforts are needed in order to better understand the contributions of intralingual morphemic variables such as affix productivity, in addition to the already well-established focus on cross-linguistic transfer as the main explanatory factor of L2 MA. The purpose of the present study is to contribute to this discussion by assessing the effects of both constructs, namely affix productivity and affix cognateness, on lexical innovations found in three different Spanish learner corpora and on lexicality judgments made by L2 Spanish learners about words and pseudowords that include either an identical Spanish-English affix or a productive affix. In order to investigate these effects in a controlled manner, this study focuses on a specific pair of Spanish negative prefixes, *dis-* and *des-*, which present a unique set of characteristics: while *dis-* is graphically identical in both English and Spanish, and is thus a perfect cognate prefix, *des-* is more productive in Spanish than *dis-*, but it is not graphically identical to any English prefix. This interesting distribution allows for an in-depth analysis of the effects of each variable (i.e. cognateness and productivity). Additionally, there are certain advantages to our focus on prefixes, as opposed to suffixes. Prefixes attach directly to the base without graphically modifying it, and they provide additional meaning without changing the part-of-speech of the resulting word. These characteristics limit the number of possible confounding variables that could intervene when working with suffixes, which can change the part-of-speech and require graphical modifications of the base in order to create new derived words in Spanish (e.g. *conducir [drive] -> conductor [driver]*).

3.1 *Spanish dis- and des-*

In Spanish, the prefix *dis-* originates from the Latin *dis-* and indicates negation, in that it forms words that denote the opposite of their bases, such as *discontinuo [discontinuous]* and *continuo [continuous]* or *disconformidad [disconformity]* and *conformidad [conformity]*. The *des-* prefix, in addition to negation, can also indicate reversal or undoing as in *desconectar*. *Des-* also originates from the Latin *dis-* and in several cases has displaced it, as in *discubrir > descubrir* and *dispertar > despertar* (Martín García, 2007). *Des-* is a relatively productive morpheme not only because it is capable of attaching to words of any grammatical class (García Platero, 1994) but also because, as Martín García (2007) points out, *des-* is currently an actively productive prefix that can form new words. *Dis-*, however, exists among lexicalized forms where it cannot be interpreted separately from a base word (for example, *disminuir*), and among *cultismos* such as *disculpa*, which are words that have not undergone the expected diachronic changes (in this

case, *dis-* > *des*). That is, as *des-* is actively more productive in Modern Spanish, and *dis-* is limited to *cultismos* and does not form neologisms, we will define *des-* as more productive than *dis-*.

Turning to the question of cross-linguistic cognateness, *dis-* and *des-* offer interesting contrasts. In English, the *dis-* prefix exists and can give a negative, privative, or reversative reading, as in *disagree*, *distrust*, or *disconnect* (Andreou, 2015). Importantly, there is not a one-to-one relationship between *dis-* words in English and *dis-* words in Spanish. This is to say that there are words like English *disfigured*, which translates to Spanish *desfigurado*, while on the other hand there are words like English *discontinuous*, which translates to Spanish *discontinuo*. This presents certain challenges for L1 English-speaking learners of L2 Spanish, who cannot always rely on the English data and must learn the correct prefixation for these Spanish words on a case-by-case basis. For the purposes of this study, the prefixes *dis-* and *des-* provide an interesting test case for the roles of cognateness and productivity in L2 MA. Although *dis-* is a graphically identical English-Spanish cognate, in Spanish it is less productive than *des-*, and thus allows for the teasing apart of cognateness and productivity.

In summary, the present study aims to be a first step in addressing the need for more in-depth analyses of the variables that underlie the development of MA in L2 Spanish. By focusing on two prefixes that differ in terms of their intralingual and cross-linguistic characteristics, we expect to shed some light on the unique contributions of prefix cognateness and prefix productivity in Spanish learners' process of acquiring morphological skills in their L2. Additionally, we consider L2 MA in its multidimensionality of productive and receptive skills (Sánchez-Gutiérrez & Hernández Muñoz, 2018). Indeed, we will look at productive lexical innovations in three available Spanish learner corpora and at the results of a more controlled test that requires learners to decide on the lexicality of real words (i.e. *desagradable* [disagreeable]) and pseudowords (i.e. **disagradable*) that include these prefixes. Concretely, the Research Questions that we pose here are the following:

RQ 1: How does prefix productivity and prefix cognateness influence lexical innovations by L2 Spanish learners at different levels of proficiency?

RQ 2: How does prefix productivity and prefix cognateness influence decisions about the lexicality of real words and pseudowords by L2 Spanish learners at different levels of proficiency?

4. STUDY 1: LEXICAL INNOVATIONS IN SPANISH LEARNER CORPORA

4.1 *The corpora*

For this study, we searched for lexical innovations that started with *des-* or *dis-* in three written Spanish learner corpora: *Corpus de aprendices de español* (CAES: Rojo & Palacios, 2016), *Corpus para el análisis de errores de aprendices de E/LE* (CORANE: Cestero Mancera & Penadés Martínez, 2009), and *Corpus Escrito del Español L2* (CEDEL2: Lozano, 2009). CAES contains 570,000 words produced in written texts by learners of all CEFR proficiency levels, except C2. CORANE contains 1,091 texts written by students of various native languages enrolled in Spanish language and culture courses at the Universidad de Alcalá. CEDEL2 is

composed of written compositions in L2 Spanish from over 2,000 L1 English-speaking participants at universities and high schools around the world, compiling a corpus of over 730,000 words. In each corpus, we restricted our search to data from learners of Spanish whose L1 was English.

4.2 *The results*

A total of eight lexical innovations that included the wrong prefix (e.g. *discuento* instead of *descuento* [discount]) were found in CAES, and seven such innovations were found in CORANE. Due to the low number of occurrences in these corpora and the resulting impossibility of finding trends in their distribution across proficiency levels, a more detailed analysis is provided for CEDEL2, which contains 23 cases of these types of invented words. However, given the limited number of occurrences, we will only offer descriptive statistics for this exploratory corpus analysis. CEDEL2 organizes proficiency levels according to the Spanish placement test from the University of Wisconsin (1998). As this test gives scores on a continuous scale, we divided the proficiency levels of the participants in this corpus into four quartiles (i.e. learners in quartile 1 are those who had the lowest 25% of scores, etc.) and present the occurrences of errors according to quartile. Figure 1 presents the distribution of *dis-* errors (i.e. words that should contain a *des-* prefix, such as *descubrir [discover]* but were written with *dis-*: *discubrir*) and *des-* errors (i.e. words that should contain a *dis-* prefix, such as *discriminación [discrimination]*, but were written with *des-*: *descriminación*).
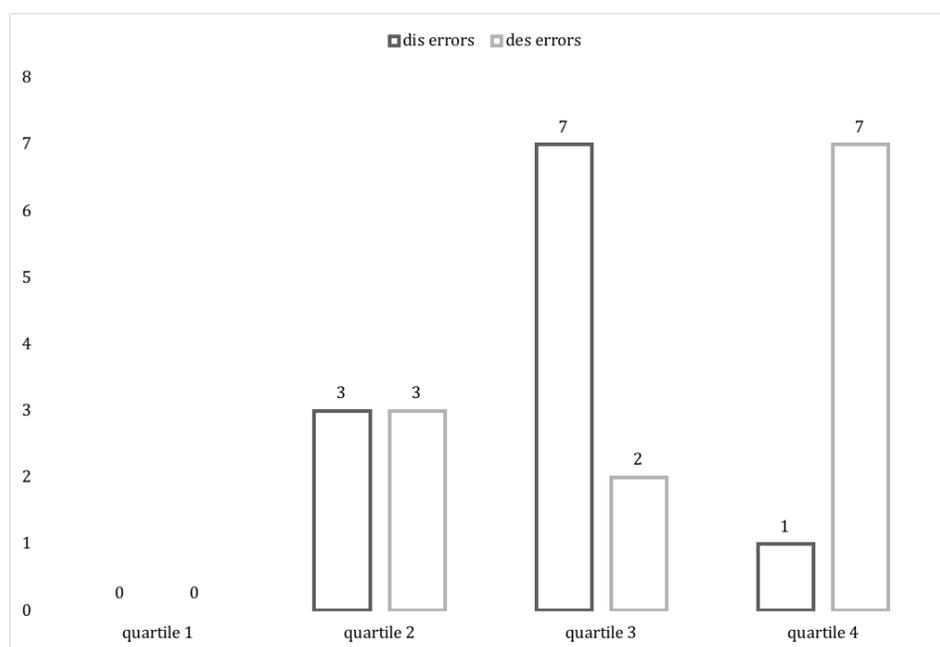

Figure 1: **Total number of dis- and des- errors per proficiency quartile**

As evidenced in Figure 1, there are no lexical innovations with either wrongly used *des-* or *dis-* until quartile 2, where there is an equal number of errors of both types. However, in quartile 3, errors tend to lean towards the *dis-* solution, meaning that learners preferred the *dis-* prefix

when creating a negative version of a Spanish word. This tendency is reversed in quartile 4, where more *des-* errors are found, as opposed to a single occurrence of a *dis-* error. In addition to these examples where learners use the wrong prefix for a word that actually does include either a *des-* or a *dis-*, there were also two cases of words that are genuinely new creations: **desprofesional* and **deseguridad*. In both cases, these forms are not the result of transfer, as neither **disprofessional* (in the sense of *unprofessional*) nor **dissecurity* (in the sense of *insecurity*) exist in English, and therefore can only be explained by the learner's awareness of the specific meaning of *des-* as a negative prefix. Interestingly, both cases were found in quartiles 3 and 4, but some misuses of *des-* are already found in quartiles 1 and 2, though these cannot be considered as evidence of actual MA in the learners. For example, across quartiles 1 and 2, there are four instances of **desporte*, which seems to be the result of considering that the word *deporte* 'sport' includes a prefix *des-*. This interpretation would indicate that the learners have graphically identified that *des-* can be applied to different words, but it would also reveal a misunderstanding of the meaning of the prefix itself, as there is no concept of negation in the word *deporte*.

In sum, the results of this exploratory corpus analysis seem to indicate a trend, in that learners move from a heavier reliance on the identical cognate prefix *dis-* towards a more Spanish-like preference for the more productive *des-* prefix. This shift takes place as learners gain proficiency in the L2. Additionally, the presence of non-morphological *des-* invented words, such as **desporte*, in beginners' texts point to an early recognition of the relevance of the string *des* in Spanish. However, this early recognition of the string only develops into an actual understanding of its meaning as learners become more proficient.

5. STUDY 2: LEXICALITY JUDGMENT TASK

5.1 *Participants*

In this study, we collected data from 152 students enrolled in lower-division Spanish language courses at a large public university. These students were sampled from four different course levels: Second Quarter Spanish, Third Quarter Spanish, Fourth Quarter Spanish, and Fifth Quarter Spanish.

All participants completed a linguistic background questionnaire. On the basis of the linguistic background questionnaire, participants who were not L1 speakers of English, who spoke Spanish at home, or who had studied abroad in a Spanish-speaking country, were not included in the present dataset, leaving a total of 121 participants. This ensured that all participants (1) had similar levels of exposure to the Spanish language (i.e. mainly classroom input) and (2) were L1 speakers of English. Table 1 summarizes the ages and course levels of the participants included in this study.

Table 1: **Participants' mean ($\bar{x}$) age and standard deviation (s.d.) per course level**

Course	# of Participants	Age
2nd Quarter	33	$\bar{x} = 20.61$ s.d. = 2.07

3rd Quarter	28	x̄ = 21.17 s.d. = 2.34
4th Quarter	30	x̄ = 19.77 s.d. = 1.69
5th Quarter	30	x̄ = 20.17 s.d. = 1.94

5.2 *Materials*

5.2.1 *Linguistic background questionnaire*
All participants completed a questionnaire that asked them to report demographic information including their ages, the Spanish courses they were enrolled in, their native languages, and whether or not they had studied abroad in a Spanish-speaking country.

5.2.2 *Lextale*
In order to include a measure of vocabulary knowledge, all participants completed the Spanish version of the LEXTALE (Izura, Cuetos & Brysbaert, 2014), an untimed on-paper lexical decision task designed to measure vocabulary size. In the LEXTALE, students identify the words they think are real words among a list of sixty real words and pseudowords.

5.2.3 *Lexicality judgment task*
An untimed on-paper lexicality judgment task was designed to tests learners' ability to recognize an existent word from a list of five options, where only one word was a real prefixed word in Spanish and the rest were prefixed pseudowords. All five options contained the same lexical base. Importantly, each row included a version of the word with the prefix *des-* and one with the prefix *dis-*. A total of 20 target items were included, as well as 40 distractors. In 10 of the target trials, the correct answer was the *dis-* option, as in example (1), while in the other 10 the correct answer was the option with *des-*, as in example (2). The distractor items were designed similarly and manipulated both prefixes and suffixes; in (3) the base *moto-* is given five different suffixes among which the participant must choose the correct word in Spanish.

(1)	intorsión	antitorsión	**distorsión**	bitorsión	destorsión
(2)	**desconectar**	disconectar	inconectar	anticonectar	biconectar
(3)	**motorista**	motorísimo	motorano	motorote	motorario

All 20 target words were words that translate to prefixed *dis-* words in English, with the exception of *disléxico* and *disfuncional* (which translate to words prefixed with *dys-*, an allomorph of *dis-*, in English). These target words were chosen due to the limited number of words in Spanish prefixed with *dis-* that would also translate to words prefixed with *dis-* in English. As discussed previously, the pool of words prefixed with *dis-* in Spanish that remain prefixed with *dis-* in Modern Spanish is relatively narrow. The 40 distractor items were designed similarly; in each row of five words, there was only one real word. The order of rows and words was randomized across four different test versions and distributed randomly to participants. Table 2 presents the target words and their frequencies. Word frequencies (per million words) were drawn from EsPal (Duchon, Perea, Sebastián-Gallés, Martí & Carreiras, 2013).

114

Table 2: **Target item words and their frequencies**			
***dis-* words**	**Frequency**	***des-* words**	**Frequency**
distorsión	4.82	desconectar	0.76
discorde	0.12	desorganizado	0.45
discontinuidad	1.04	desfigurado	0.96
distraer	2.37	desgracia	41.4
disgustar	0.48	descontinuar	0.06
***dis-* words**	**Frequency**	***des-* words**	**Frequency**
disparidad	2.02	descubrir	30.98
disléxico	0.04	desproporcionado	1.61
disfuncional	0.28	desaparecer	19.86
dislocación	0.46	desarmar	1.69
disconformidad	1.65	descuento	3.12

An independent-samples *t-test* was conducted to compare the above frequencies and lengths (i.e., number of letters) of words in the *des-* group and in the *dis-* group. There was no significant difference in the average frequencies for *dis-* words (M=1.32, SD=1.47) and *des-* words (M=10.08, SD=15.15); t (9.17)=1.82, p=0.10, even though the words *desaparecer*, *descubrir* and *desgracia* are much more frequent than any of the *dis-* words. There was no significant difference in the average lengths for *dis-* words (M=10.5, SD=2.22) and *des-* words (M=10.9, SD=2.37), t (17.91)=0.38, p= 0.70.

5.3 *Procedure*

Participants completed the linguistic background questionnaire, the LEXTALE test, and the lexicality judgment task individually, on paper, and in a quiet office. The entire session lasted roughly 25 minutes.

5.4 *Results*

The results of the lexicality judgment task were analyzed using a general mixed-effects logistic regression (*glmer*) in *R* (Bates, Maechler, Bolker & Walker, 2015). For the 20 target items we conducted three separate regressions with the dependent variables set as the *des-*, the *dis-*, and the alternate decisions. The *des-* dependent variable was coded as whether or not a participant decided that the Spanish word that existed was the word prefixed with *des-*, which was a correct decision for Spanish words actually prefixed with *des-*, but incorrect for Spanish words actually prefixed with *dis-*. In the same fashion, the *dis-* dependent variable was coded as whether or not a participant chose the word prefixed with *dis-*, which was a correct decision for Spanish words actually prefixed with *dis-*. In essence, we selected these dependent variables in order to measure

participants' development of morphological awareness in the L2 versus their reliance on cognates in the L1. Lastly, the alternate decisions, which were always incorrect, were also coded as a dependent variable. In all analyses, the random effects were *subject* and *word*, and the independent variables were *course level* (2nd, 3rd, 4th, and 5th Quarter Spanish), *LEXTALE score*, *prefix* (whether the word was actually prefixed with *dis-* or *des-*) and *test version* (there were four test versions: A, B, C, and D). In Table 3, we present these analyses, wherein each cell contains the result of regressing the independent variable against each of the three dependent variables. The 2nd Quarter Spanish group and the Test Version A are the reference levels to which the other levels are compared, and thus do not appear in the following Table 3.

Table 3: **Regression analysis of target words**

Variables	Estimate	Std. Error	z value	p value
(Intercept)	*des-* : -0.389 *dis-* : -0.531 *alt* : -1.936	*des-* : 0.319 *dis-* : 0.326 *alt* : 0.328	*des-* : -1.221 *dis-* : -1.630 *alt* : -5.890	*des-* : 0.222 *dis-* : 0.103 *alt* : < 0.001
Lextale	*des-* : -0.002 *dis-* : 0.001 *alt* : -0.002	*des-* : 0.017 *dis-* : 0.016 *alt* : 0.016	*des-* : -0.146 *dis-* : 0.079 *alt* : -0.150	*des-* : 0.884 *dis-* : 0.936 *alt* : 0.880
Prefix: *Dis-*	*des-* : -0.388 *dis-* : 0.157 *alt* : 0.445	*des-* : 0.224 *dis-* : 0.274 *alt* : 0.308	*des-* : -1.732 *dis-* : 0.575 *alt* : 1.444	*des-* : 0.083 *dis-* : 0.565 *alt* : 0.148
Course: 3rd Quarter	*des-* : 0.452 *dis-* : -0.223 *alt* : -0.319	*des-* : 0.324 *dis-* : 0.305 *alt* : 0.283	*des-* : 1.395 *dis-* : -0.729 *alt* : -1.127	*des-* : 0.163 *dis-* : 0.465 *alt* : 0.259
Course: 4th Quarter	*des-* : 0.690 *dis-* : -0.161 *alt* : -0.928	*des-* : 0.338 *dis-* : 0.319 *alt* : 0.306	*des-* : 2.040 *dis-* : -0.505 *alt* : -3.029	***des-* : 0.041** *dis-* : 0.613 ***alt* : 0.002**
Course: 5th Quarter	*des-* : 1.227 *dis-* : -0.631 *alt* : -1.025	*des-* : 0.359 *dis-* : 0.340 *alt* : 0.327	*des-* : 3.412 *dis-* : -1.853 *alt* : -3.136	***des-* : < 0.001** *dis-* : 0.063 ***alt* : 0.001**
Task: Version B	*des-* : -0.339 *dis-* : 0.363 *alt* : -0.162	*des-* : 0.313 *dis-* : 0.297 *alt* : 0.291	*des-* : -1.084 *dis-* : 1.221 *alt* : -0.558	*des-* : 0.278 *dis-* : 0.222 *alt* : 0.577
Task: Version C	*des-* : < 0.001 *dis-* : 0.033 *alt* : -0.159	*des-* : 0.319 *dis-* : 0.304 *alt* : 0.293	*des-* : 0.002 *dis-* : 0.109 *alt* : -0.541	*des-* : 0.998 *dis-* : 0.912 *alt* : 0.588
Task: Version D	*des-* : -0.547 *dis-* : 0.448 *alt* : 0.294	*des-* : 0.321 *dis-* : 0.305 *alt* : 0.289	*des-* : -1.702 *dis-* : 1.467 *alt* : 1.017	*des-* : 0.088 *dis-* : 0.142 *alt* : 0.309

As shown in Table 3, there was a significant effect of the intermediate 4th Quarter and 5th Quarter course levels as predictors of increases in *des-* decisions and decreases in the alternate

decision among the 20 target words. As the actual prefix (*dis-* or *des-*) of the target word did not predict significant changes in the dependent variables, the significant increases in these *des-* decisions predicted by the 4th Quarter and 5th Quarter levels were observed in both correct contexts (for example, choosing the correct form *desconectar*) and incorrect contexts (for example, choosing the incorrect form **desconformidad*). Additionally, this analysis shows that neither the Lextale score nor the task version were significant predictors of changes in the dependent variables, and significant changes in the *dis-* dependent variable were not significantly predicted by any of the independent variables.

6. DISCUSSION

This study confirms previous findings about the effects of L1 transfer and affix cognateness on L2 MA. In the corpus analysis, we find evidence of new lexical creations with *dis-* from quartile 2 to 4. Thus, a reliance on cognateness is clear both in word recognition and in the production of lexical innovations, echoing the findings of Mochizuki and Aizawa (2000) and Comesaña, Bertin, Oliveira, Soares, Hernández-Cabrera and Casalis, (2018). However, contrary to the consistent findings on affix cognateness, no study, to the best of our knowledge, had previously systematically studied the effect of affix productivity in the development of L2 MA. Our results thus offer a first insight into how and when affix productivity plays a role. In the lexicality judgment task, there was a significant increase in the average probability of making a *des-* decision by learners enrolled in the intermediate-level 4th and 5th Quarter Spanish courses. Notably, this increase in *des-* decisions is observed among the *dis-* test items, where the *dis-* word is an English cognate. In other words, these learners' rates of *des-* decisions see a significant increase even among words that are actually prefixed with *dis-* in Spanish and English. We argue that what motivates this movement towards *des-* is the relative productivity of *des-*, compared to *dis-*, in Spanish. At higher levels of course enrollment, learners seem to be more sensitive to L2 productivity patterns, and their preference for the more productive *des-* over the identical cognate *dis-* seems to reflect that sensitivity. Interestingly, this same pattern is observed in the number of lexical innovations with *des-* in the exploratory corpus investigation in Study 1: while at lower proficiency levels learners preferred innovations with *dis-*, higher proficiency learners formed more *des-* newly invented words. One could argue that these results are due to increased vocabulary knowledge on the part of the more advanced students. However, the increase in *des-* decisions is not only observed for real *des-* words, but also for words that are actually prefixed with *dis-*. Additionally, as the LEXTALE scores were not significant predictors of accurate lexicality judgment scores, we infer that this increase in *des-* decisions is not merely due to increases in vocabulary size, but rather to the development of more L2-based morphological skills.

7. CONCLUSION

The present study aimed to assess the influence of affix cognateness and productivity on L2 Spanish learners' development of MA, utilizing the Spanish prefixes *dis-* and *des-,* which present a complementary distribution of cognateness and productivity. While *dis-* is an identical English-

Spanish cognate prefix, *des-* is not a graphically identical, but it is more productive than *dis-* in Spanish. Our results show that at higher levels of L2 Spanish proficiency, learners increasingly favor the Spanish *des-* prefix, both when producing lexical innovations and when completing a lexicality judgment task. These findings provide valuable information about the emergence of L2 MA, as we demonstrate that learners' emergent MA becomes less dependent on L1 transfer and more sensitive to productivity patterns in the L2 as they enroll in progressively higher proficiency language courses.

This study aimed to exercise a certain degree of experimental control in the examination of MA development through the choice of two specific prefixes. However, this high degree of control does not necessarily reflect all the complexities of L2 MA as a whole. Therefore, future research should expand the scope of these findings to other pairs of derivational morphemes and across different L1-L2 pairs. For example, prefixes *in-* and *un-* in English are both negative prefixes, but only *in-* exists in Spanish, while *un-* is more productive than *in-* in English (Sánchez-Gutiérrez et al., 2018). It could thus be expected that Spanish beginner learners of L2 English favor the *in-* prefix and slowly discover, and possibly overuse, the more productive *un-* as they become more proficient. Finally, we must also point out that the data presented in this research study are limited to the public university context, and that further research would do well to examine whether our findings hold true among other groups of L2 Spanish learners of different ages and in different social contexts.

REFERENCES

Amenta, S. & Crepaldi, D. (2012). Morphological processing as we know it: An analytical review of morphological effects in visual word identification. *Frontiers in Psychology,* 3, 1-12.

Andreou, M. (2015). Lexical negation in lexical semantics: The prefixes *in-* and *dis-*. *Morphology*, 25, 391-410.

Baayen, R. H. & Renouf, A. (1996). Chronicling the times: Productive lexical innovations in an English newspaper. *Language,* 72, 69-96.

Baayen, R. H., Wurm, L. H. & Aycock, J. (2007). Lexical dynamics for low-frequency complex words. A regression study across tasks and modalities. *The Mental Lexicon,* 2, 419-463.

Bates, D., Maechler, M., Bolker, B. & Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software*, 67, 1-48.

Carlisle, J. F. (1995). Morphological awareness and early reading achievement. In L. B. Feldman (Ed.), *Morphological Aspects of Language Processing* (pp. 189-209). Hillsdale, NJ: Erlbaum.

Casalis, S., Commissaire, E. & Duncan, L. (2015). Sensitivity to morpheme units in English as L2 word recognition. *Writing Systems Research*, 7, 186-201.

Cestero Mancera, A. & Penadés Martínez, I. (2009). *Corpus de textos escritos para el análisis de errores de aprendices de E/LE (CORANE)*. Alcalá de Henares: Universidad de Alcalá.

Comesaña M., Bertin, P., Oliveira, H., Soares, A. P., Hernández-Cabrera, J. A. & Casalis, S. (2018). The impact of cognateness of word bases and suffixes on morpho-orthographic processing: A masked priming study with intermediate and high-proficiency Portuguese-English bilinguals. *Plos One,* 13.

Diependaele, K., Duñabeitia, J. A., Morris, J. & Keuleers, E. (2011). Fast morphological effects in first and second language word recognition. *Journal of Memory and Language*, 64, 344-358.

Duchon, A., Perea, M., Sebastián-Gallés, N., Martí, A. & Carreiras, M. (2013). EsPal: One-stop shopping for Spanish word properties. *Behavior Research Methods, 45,* 1246-1258.

García Platero, J. M. (1994). El prefijo *des-* en el discurso periodístico. *Español Actual,* 61, 92-94.

Izura, C., Cuetos, F. & Brysbaert, M. (2014). Lextale-Esp: A test to rapidly and efficiently assess the Spanish vocabulary size. *Psicologica: International Journal of Methodology and Experimental Psychology*, 35, 49-66.

Jeon, E. H. (2011). Contribution of morphological awareness to second-language reading comprehension. *Modern Language Journal*, 95, 217-235.

Ke, S. & Koda, K. (2017). Is vocabulary knowledge sufficient for word-meaning inference? An investigation of the role of morphological awareness in adult L2 learners of Chinese. *Applied Linguistics*, 40, 456-477.

Kieffer, M. J. & Lesaux, N. K. (2012). Direct and indirect roles of morphological awareness in the English reading comprehension of native English, Spanish, Filipino, and Vietnamese speakers. *Language Learning*, 62, 1170-1204.

Kuperman, V., Bertram, R. & Baayen, H. (2010). Processing trade-offs in the reading of Dutch derived words. *Journal of Memory and Language, 62,* 83-97.

Lowie, W. (2005). Exploring a second language: The discovery of morphological productivity. *EuroSLA Yearbook*, 5, 251-268.

Lozano, C. (2009). CEDEL2: Corpus Escrito del Español como L2. In C.M. Bretones et al. (Eds.), *Applied Linguistics Now: Understanding Language and Mind/La Lingüística Aplicada Actual: Comprendiendo el Lenguaje y la Mente* (pp. 197-212). Almería: Universidad de Almería.

Marcos Miguel, N. (2012). Grapho-morphological awareness in Spanish L2 reading: How do learners use this metalinguistic skill? *Language Awareness*, 21, 197-213.

Martín García, J. (2007). Las palabras prefijadas con des-. *Boletín De La Real Academia Española*, 87, 295.

Mochizuki, M. & Aizawa, K. (2000). An affix acquisition order for EFL learners: An exploratory study. *System*, 28, 291-304.

Morin, R. (2003). Derivational morphological analysis as a strategy for vocabulary acquisition in Spanish. *Modern Language Journal*, 87, 200-221.

Ramírez, G., Chen, X., Geva, E. & Luo, Y. (2011). Morphological awareness and word reading in English language learners: Evidence from Spanish- and Chinese-speaking children. *Applied Psycholinguistics*, 32, 601-618.

Rojo, G. & Palacios, M. I. M. (2016). Learner Spanish on computer: The CAES 'Corpus de Aprendices de Español' project. In M. Alonso-Ramos (Ed.), *Spanish Learner Corpus Research: Current trends and future perspectives* (pp. 55-87). Amsterdam: John Benjamins Publishing Company.

Sánchez-Gutiérrez, C. (2013). Priming morfológico y conciencia morfológica. Una investigación con estudiantes norteamericanos de E/LE. PhD Dissertation, Universidad de Salamanca, Spain.

Sánchez-Gutiérrez, C., Mailhot, H., Deacon, S. H. & Wilson, M. A. (2018). MorphoLex: A derivational morphological database for 70,000 English words. *Behavior Research Methods,* 50, 1568-1580.

Sánchez-Gutiérrez, C. & Hernández Muñoz, N. (2018). Development of derivational morphological awareness in anglophone learners of Spanish: A relational knowledge study. *Foreign Language Annals*, 51, 369-388.

Schmitt, N. & Meara, P. (1997). Research vocabulary through a word knowledge framework. *Studies in Second Language Acquisition,* 20, 17-36.

Tabatabaei, O. & Yakhabi, M. (2011). The relationship between morphological awareness and vocabulary size of EFL learners. *English Language Teaching*, 4, 262.

University of Wisconsin. (1998). *The University of Wisconsin college-level placement test: Spanish (Grammar) [Form 96M]*. Madison WI: University of Wisconsin Press.

Whitley, S. (2004). Lexical errors and the acquisition of derivational morphology in Spanish. *Hispania*, 87, 163-172.

Zhang, D. (2016). Does morphology play an important role in L2 Chinese vocabulary acquisition? *Foreign Language Annals*, 49, 384-402.

Zhang, D. & Koda, K. (2012). Contribution of morphological awareness and lexical inferencing ability to L2 vocabulary knowledge and reading comprehension among advanced EFL learners: Testing direct and indirect effects. *Reading and Writing*, 25, 1195-1216.