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Lexical Availability in L2/L3 EFL Learners: An Exploration of Cognates and Prototypes in the Prompt "The Countryside"

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Abstract
Emerging evidence highlights the cognitive and linguistic advantages of multilingualism, particularly in terms of accessing and organizing vocabulary across languages. While heritage (L3) and non-heritage (L2) speakers often show similar lexical output, qualitative differences, such as in lexical organization and cognate use, suggest greater variation influenced by multilingual experience. Prototype research has further illuminated how multilinguals retrieve central or typical lexical items, offering insight into how conceptual categories are structured across languages. Building on this perspective, the present preliminary study introduces the radial category '*Countryside'* to examine how multilingual learners engage with cognitively flexible category structures beyond classical definitions. The objectives are twofold: (i) to determine whether there are quantitative differences between the groups regarding the number of words produced, and (ii) to explore qualitative differences between the groups, analysing in particular the type/token ratios and the presence of cognates and prototypes in the words retrieved by heritage and non-heritage English as a foreign language (EFL) learners. Results point to a distinct quantitative advantage for L2 learners in relation to their language proficiency, productive vocabulary, and performance in the lexical availability prompt 'Countryside'. By comparison, qualitative findings indicate that lexical performance varies by prompt type and reveal evidence of word prototypicality in the participants' responses. This study emphasizes the importance of using diverse lexical prompts to foster vocabulary development in both heritage and non-heritage learners. Teachers should also consider learners' multilingual experiences by emphasizing cognate recognition and prototypical vocabulary to improve lexical access and organization across language backgrounds.

Keywords
L2/L3 EFL learners, lexical availability, cognates, prototypes, vocabulary learning

Introduction

Recent research has indicated that bilingual learners may have an advantage when learning an additional language (Berthele & Udry, 2022). However, as Lorenz et al. (2020) highlight, considerable controversy remains given the influence of a wide range of factors. To address this question, recent studies have explored the English lexical availability (LA) of L2 and L3 speakers in Spain, either focusing on what Agustín Llach (2023) refers to as educational bilingual learners (EFL learners learning another language as an L2 in the school context, e.g., learners with L2 Basque and L3 English in Spain) and environmental bilingual leaners (heritage EFL learners, e.g., Arabic-speaking EFL learners in Spain). Some results reveal that while learners show quantitative similarities, greater qualitative differences are sometimes observed in lexical organization or cognate use (see, e.g., Agustín Llach, 2023, on environmental bilingual learners and Fernández-Fontecha, Jiménez-Catalán & Ryan, 2024, on educational bilingual learners). However, other studies suggest that there is no such difference in cognate use (Agustín Llach, 2019). Some authors have proposed that the lack of quantitative differences or variation in results may be attributed to the type of stimulus, whether taxonomic (e.g., 'Food & Drink') or open (e.g., 'Love'). In this sense, research on word prototypicality also contributes to determining the types of words retrieved through the prompt and to revealing whether there are similarities or differences in the central member (prototype) provided by L2 and L3 EFL learners (Mora, 2024a). To this end, the present preliminary study explores a third type of category, namely the radial category, 'Countryside' (i.e., a category which, according to Lakoff (1987), takes place as a cluster model in which concepts are based on a central sub-category with extensions underpinned by a diversity of procedures such as metonymy and metaphor. The method involves quantitative and qualitative analyses using computational tools, such as WordSmith Tools and Lexpro, to examine learners' word production and the most available words. The study is divided into four sections. The first section reviews the relationship between L3 heritage learners and vocabulary learning, LA, and studies on LA with heritage learners. The second section describes the sample and method. The third section presents the results and discussion of the main findings, and the paper concludes with implications for future research on the exploration of cognates and prototypes in the LA output of L2/L3 EFL learners.

Literature Review

Heritage learners and vocabulary

Heritage learners are learners who speak not only the official language of the country in which they live, but also another language that their family speaks at home. It has been suggested that these students may have an advantage in learning other languages (Kroll, Bogulski & McClain, 2012), as they may draw on their prior language skills to acquire gains when learning a foreign language. However, as Lorenz et al. (2020) point out, there remains certain controversy, as any advantages are highly dependent on different factors such as the type of bilingual, the type of language skill under analysis, cognitive skills, language background, age, language status and influence, the context, socioeconomic status, and literacy.

Regarding the type of language skill, in particular, vocabulary is one area in which bilingual learners are thought to experience benefits. This is because, having two prior lexicons, bilingual learners' awareness is greater than that of monolingual learners (Klein, 1995). They may consequently be better equipped to make cross-linguistic comparisons; for example, they may be more prepared to capitalize on the presence of cognates (i.e., words that are formally and semantically similar in two languages) to facilitate the acquisition of foreign language vocabulary (Otwinowska, 2016). This advantage had also been referred to as the cognate facilitation effect, which indicates that bilinguals find it easier to recognise cognate than non-cognate words (Costa, Caramazza & Sebastian-Gallés, 2000; Muñoz, 2020). However, while

previous research in this area has studied learners' performance in their first language, there is a distinct lack of research on the lexical production of EFL learners.

Lexical availability

Lexical Availability refers to the words that an individual has readily available to them when presented with a specific topic. For example, in the case of a topic such as 'Body Parts', it is likely that the first words that come to mind will be *head*, *mouth*, *finger*, or *hand* (Ferreira, Garrido Moscoso & Guerra Rivera, 2019). The first LA studies were conducted in France, in a context where language teachers primarily prioritized the most frequently used words (López Morales, 2014). This was because they were deemed the most useful and commonly used words. However, it soon became clear that there were many words that are not frequent but are important and are used daily. For example, a word such as *trousers* is unlikely to appear near the top of a list of a language's most frequent words, but it is nonetheless an essential word in everyday language (Payne, 2016). From this arose Michéa's (1953) distinction between frequency and availability, which led to the first LA studies in the 1960s and 1970s (e.g., Dimitrijévic, 1969, in Scotland; Gougenheim et al., 1964, in France; López Morales, 1973, in Puerto Rico; and Mackey, 1971, in Canada).

In terms of analysing LA, both quantitative and qualitative approaches may be adopted. Quantitative analysis involves comparing the number of words produced by different groups of learners or comparing the number with other measures (e.g., their language proficiency, their level of creativity, etc.). Studies also often compare the number of responses across different prompts, generally drawing on the 16 categories proposed by Gougenheim et al. (1964) in the first Lexical Availability Tasks (LATs). In particular, some recent research has highlighted the potential difference in learner responses depending on the nature of the prompt at hand, and whether it is, for example, natural and inclusive (categories with a narrow membership gradience, i.e., X=Y), radial and inclusive (inclusive categories, encompassing all variants radiating from the prototype within a single conceptual framework), and radial and relational (categories with a widened membership gradience in which the elements of the category are related among themselves, i.e. X is part of Y) (e.g., Mora, 2024a); taxonomic (categories with specific ranks within a hierarchical classification system), emotional or experiential (organized around core feelings or direct human experience) (e.g., Agustín Llach & Geoghegan, 2025).

Qualitatively speaking, a large variety of approaches have also been adopted in the study of LA, such as analysing lexical diversity by means of type/token ratios, exploring the use of cognates in learners' responses, and identifying the use of prototypes. Firstly, the learners' type/token ratio is the ratio between the number of words produced and the number of different words. This is an extremely efficient means of evaluating the learner's lexical diversity (Richards, 1987), which is "the relative amount of repetitiveness or the relative variety in vocabulary" (Carroll, 1938, p. 379). It is thus a very convenient means of determining the variety in the learners' responses. Another approach is to carry out a cognate analysis to determine whether there is a cognate facilitation effect. This may be of relevance in LA research with heritage learners, as discussed below, given the research which indicates that these learners may rely to a greater extent on the use of cognates in their responses. Finally, in the field of LA, the prototype theory has explored lexical production as a means to identify the central member of a category (Rosch, 1975; Kleiber, 1995). Therefore, this technique provides evidence of the representation of the most available words retrieved by L2 and L3 EFL learners and also determines the sort of words provided across semantic categories.

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Research addressing the LA of heritage learners

As noted in Section 2.1, previous research on heritage learners has focused mainly on their mother tongue, neglecting the foreign language learning of EFL learners. However, some recent studies have attempted to fill this gap. Agustín Llach (2023), for example, explored the lexical profiles of heritage and non-heritage learners with a LAT and showed that while learners produced a similar number of words, the heritage learners had higher levels of lexical organisation. Similar results were found in Fernández-Fontecha, Jiménez-Catalán & Ryan (2024) with educational bilinguals, where Spanish/Basque EFL learners (L3) and Spanish EFL learners (L2) retrieved a similar number of words; however, more word classes, cognates, and idiosyncratic responses were observed in the responses of the L3 learners. Recent findings by Geoghegan (2025a) also suggest that the specific prompt at hand may be of central importance, as differences between the learners may be highly dependent on the category. Analysing the learners' responses in a taxonomic category 'Food & Drink' and an ad hoc prompt, 'Love', the results showed clear differences: non-heritage learners outperformed heritage learners in the former, but no differences were observed in the latter. Finally, regarding research on prototypes, Mora and Šifrar Kalán (2025) observed that when comparing heritage and non-heritage learners, the former surpassed the latter in terms of vocabulary production in response to the relational semantic category 'Daily Activities'. Additionally, although there were differences in the learners' linguistic profiles, there was evidence of word prototypicality in the responses retrieved.

These results largely indicate that although L2 and L3 learners produce a similar number of words, there may be some interesting qualitative differences. Additionally, some variations depend on the prompt, warranting further exploration.

To this effect, the study at hand seeks to address the following two research questions:

RQ1: What are the quantitative differences between L2 and L3 learners in terms of their language level, productive vocabulary, and the number of words produced in response to 'Countryside'?

RQ2: What are the qualitative differences between L2 and L3 learners in terms of the type/token ratios, cognates, and prototypes in the words retrieved in response to 'Countryside'?

Method

Research design

The present study was carried out as part of a national project exploring productive vocabulary in English as an L2 and L3 in secondary education. It included learners from schools in La Rioja and Extremadura who were defined as either L2 non-heritage learners or L3 heritage learners who spoke languages such as Arabic or Romanian in the home context. Data were collected across two sessions with the aim of exploring learners' language level, lexical availability, and productive vocabulary. Background data was also collected by means of a biodata and language background questionnaire.

Participants

This study focuses on a subgroup of 122 learners who participated in the project. Selection criteria for the heritage learners included having Arabic as an L1 and completing the LAT, while the non-heritage learners were selected at random. This resulted in a total of 61 L3 Spanish/Arabic learners and 61 L2 Spanish learners with a B1 level of English according to the CEFR (2001).

 ISSN 3078-5677

Materials

To measure language level, participants completed the OPT (Version 2, UCLES, 2002). The test consisted of two parts: Part 1 (Questions 1-40), which included questions on topics like notices, word choice, and short passages, and Part 2 (Questions 41-60), which addressed vocabulary in longer passages.

To address productive vocabulary, the learners completed Laufer & Nation's (1999) PVLT. This test, which took a total of 10 minutes, assessed the learners' general vocabulary up to the 2K level. Test-takers are required to complete a missing word in 30 different sentence contexts within ten minutes. To guide them and prevent the use of unintended words that may fit the context, the initial letters of the target words are provided. For instance, they might be asked to complete the sentence "He was riding a bic___" with the word "bicycle" (Laufer & Nation, 1999).

Finally, the present study explores the learners' responses in a LAT to a radial prompt, namely, 'Countryside'. The criteria for the selection of this prompt stems from the fact that radial categories use a cluster model in which concepts are based on the activation of multiple cognitive domains (Lakoff, 1987), and also, because this sort of category provides alternative theories to describe categories that are not adjusted to classical definitions by means of necessary and sufficient conditions with delimited boundaries but with unrelated central and prototypical members. Although LATs typically adopt a pencil-and-paper approach, a novelty of the project at hand is that data were collected via a specifically designed online application (HerPro App). The procedure used for the LAT, however, was the same as typical approaches: participants were given two minutes to type as many responses as came to mind. Responses were saved automatically at the end of the two-minute period.

Data analysis

Prior to analysis, the data were prepared. The OPT and PVLT were corrected, and the LAT was lemmatised, adopting the following procedure set forth by Jiménez Catalán and Agustín Llach (2017):

1. Correct any spelling errors
2. Delete Spanish words in the English data
3. Count any words that are repeated in the same prompt only once
4. Lemmatise lexical phrases as well as compound words as one lexical unit and count them as one word (e.g., orange-juice)
5. Delete proper nouns
6. Change plural words into the singular form, except in cases where the word is always plural (e.g., potatoes to potato)

Following preparation, quantitative differences between the groups were assessed using SPSS (Version 26). Independent-samples t-tests were run to compare the two groups on OPT, PVLT, and the number of tokens retrieved in the LA prompt 'Countryside'.

For the prototype analysis, the computational program *Lexpro* (Hernández Muñoz et al., 2023) was employed, as it provides several measures, including the lexical availability index (LAI), a key factor in identifying the most central members of a category. This measure allows the present study to determine whether the prototype (i.e., the most available word) evoked by L2 and L3 EFL learners coincides with or diverges from the top ten most available words in response to 'Countryside'.

 ISSN 3078-5677

Results and Discussion

Quantitative differences between heritage and non-heritage learners

Firstly, the results indicated that the L2 non-heritage learners outperformed the L3 heritage learners in terms of language level, productive vocabulary, and the prompt 'Countryside', with a statistically significant difference observed across all three measures (Table 1).

Table 1
Quantitative Differences between Heritage and Non-Heritage Learners

	M		**SD**		***T***	***df***	***p***
	L2	L3	L2	L3			
OPT	26.77	21.25	8.178	9.164	3.482	118	<.001
PVLT	2.87	1.72	2.10	1.907	3.178	120	.002
'Countryside'	7.43	5.72	4.06	3.98	2.345	120	.021

These results differ from previous LA research by Agustín Llach (2023) and Fernández-Fontecha et al. (2024) on L2 and L3 learners, which found no difference in the number of words produced due to the fact that participants had similar levels of language proficiency. However, they are unsurprising when the difference in language level is considered, as it has been found that learners at a higher level tend to produce more words (van Ginkel & van der Linden, 1996). This is consistent with the fact that Fernández-Fontecha et al. (2024) found no difference in terms of language level between the two groups; thus, it is likely that when one group outperforms the other in language proficiency, there will also be an advantage in terms of productive vocabulary and LA. On the other hand, if we compare the results with other prompts by the same participants, we observe that L2 learners outperform L3 learners in the taxonomic prompt 'Food & Drink' but that there is no statistically significant difference in the ad hoc prompt 'Love' (Geoghegan, 2025a). Thus, it appears that although L2 learners have a higher language level and outperform L3 learners in terms of productive vocabulary, the results of the LAT are dependent on the prompt at hand, with differences observed in the taxonomic (Geoghegan, 2025a) and radial (this study) prompts, but not in the ad hoc prompt (Geoghegan, 2025a).

Qualitative differences between heritage and non-heritage learners

Concerning the qualitative differences, the results of each group were analysed in terms of type/token ratio, cognate use, and prototypes.

Firstly, regarding the type/token ratio, although L2 learners retrieved more tokens in both languages, L3 learners produced a slightly higher number of types, although the difference was very small. Accordingly, L3 learners had a higher type/token ratio than L2 learners, suggesting greater lexical diversity in the responses retrieved by these learners (Table 2).

Table 2
Type/token Ratio in the Prompt 'Countryside'

	L2	**L3**
Tokens	453	349
Types	135	138
Type/token ratio	29.80	39.54

Again, when comparing these results with those from other prompts in previous research, there are clear differences depending on the specific prompt. As in the case of 'Countryside' here, the L3 learners had a higher type/token ratio in the prompt 'Love'; however, in the case of the

prompt ‘Food & Drink’, it was the L2 learners who had a higher type/token ratio (Geoghegan, 2025a).

Secondly, in terms of the cognate analysis, we investigated the number of Spanish/English cognates that appeared in the words retrieved by each group and by both groups together (Table 3). Thus, for example, heritage learners produced 79 words that were not produced by non-heritage learners, 26 of which were Spanish/English cognates (e.g., *bank, bar, explorer, familia*); non-heritage learners produced 76 words that were not produced by heritage learners, 18 of which were cognates (e.g., *bicycle, cereal, immigrant, pine*); and 59 words were produced by both groups, 17 of which were cognates (e.g., *fruit, insect, park, plant*). The results revealed that L3 learners produced a higher percentage of Spanish/English cognates in their unique words compared to the unique words of the L2 learners and the words produced by both groups. This suggests that these learners may rely more heavily on Spanish/English cognates when producing words in the English task. This may be due to the L2 status factor, a concept in L3 acquisition that suggests the L2 may be a more significant source of linguistic transfer than the L1 (Bardel & Falk, 2012). In other words, the L3 learners’ responses were influenced to a greater degree by their L2, Spanish, than the L2 learners’ responses were by their L1, Spanish.

Table 3
Spanish/English Cognates in the Prompt ‘Countryside’

L2	**L3**	**L2 + L3**
18/76	26/79	17/59
(23.7%)	(32.9%)	(28.9%)

These results are consistent with previous LA research by Fernández-Fontecha et al. (2024), which found that L3 learners produced more cognates than L2 learners, but differ from those by Agustín Llach (2019), who found no such difference between non-heritage and heritage EFL learners. In addition, the results again differ from the results found in other prompts within the same cohort of learners. While here in the case of ‘Countryside’, there are more cognates in the unique words of L3 learners, in ‘Food & Drink’, there were more in the shared words and in the unique words of L2 learners (Geoghegan, 2025b), and in ‘Love’, there were no differences (Geoghegan, 2025a). Therefore, there appears to be a considerable amount of variety across different lexical domains. Nonetheless, in terms of the prompt ‘Countryside’, the greater reliance on cognates does not seem to have made a difference, given the quantitative advantage for the L2 learners reported above. In Fernández-Fontecha et al. (2024), however, greater use of cognates was observed in L3 learners, even when the sample was homogeneous in terms of EFL proficiency. This is evidently an important factor to take into consideration, particularly given research by Blumenfeld et al. (2016), which indicates that as proficiency in the non-dominant language increases, bilinguals tend to produce more cognates. The relationship between language proficiency and cognate use in heritage and non-heritage learners thus warrants further investigation to determine its role.

Finally, findings on the representation of word prototypicality in the responses of L3/L2 learners to ‘Countryside’ indicate that the most available words with the highest LAI become the most prototypical words among participants. The lexical units were: *animal*, *tree*, and *flower*. However, the rank order differs in the first position (L3 = *animal*; L2 = *tree*), as shown in Table 4.

Table 4
Word Prototypicality by L3 and L2 Learners in Response to 'Countryside'

L2 Learners' Responses	LAI	L3 Learners' Responses	LAI
tree	0,33412	***animal***	0,320201
animal	0,329914	***tree***	0,247777
flower	0,286594	***flower***	0,154274
grass	0,206651	***farm***	0,137738
farm	0,204939	***mountain***	0,117769
river	0,168974	***plant***	0,088315
plant	0,148377	*tomato*	0,088106
mountain	0,12072	***grass***	0,081869
cow	0,106295	*vegetable*	0,072377
lake	0,09718	*horse*	0,066857

The top 10 most available words were selected for this qualitative analysis because they reflect collective results, while the least available words show individual results, as stated by Mora (2024a). These findings regarding the prototype in 'Countryside' do not align with the results presented by Šifrar (2014a), whose study with Slovenian learners identified the most prototypical words as *farm, green,* and *grass*. These results suggest that, for Slovenian learners from a country surrounded by green landscapes, word associations and prototypes are influenced by the specific geographical context. This also supports evidence of Aitchison's (1994) prototype theory, which suggests that the individual mental model is based on a combination of factors, including observation, experience, cultural influence, memory, and imagination; therefore, different cultures have various prototypes.

Results also showed that L3/L2 learners shared seven words among the top ten most available and prototypical lexical units, although in a different ranking order. This finding indicates that the universality of prototypes is present despite the cultural and linguistic differences between L3/L2 ELF learners, as observed by Mora and Šifrar Kalán (2025). In addition, the word-type responses retrieved by L2 and L3 EFL learners were represented by short noun words, which, as Kleiber (1995) put forward, are the easiest and fastest to recall, as well as the easiest to acquire when learning a language (Murphy, 2002).

Convergences in the first response (L3 = *animal*, and L2 = *tree*) also display how L3/L2 EFL learners organize their mental lexicons surrounding the prototype. For instance, L3 learners' responses show that *animal, tree,* and *flower* present the same number of interconnected nodes (*animal/tree* = 3 nodes; *animal/flower* = 3 nodes) (Figure 1), whereas L2 learners' responses indicate that *tree, animal,* and *flower* obtained a higher number of interconnected nodes (*tree/animal* = 10 nodes; *tree/flower* = 6 nodes), as seen in Figure 2. These results suggest that there were significant differences in the lexical-semantic connections provided by each group of participants. That is, non-heritage learners retrieved more words than heritage learners since the lower LA of L3 learners might lie in the slow access to the activation of their L3 lexicon within a time-limited task, in which learners were required to write down as many words related to a semantic category as they could within a time-limited task (Fernández Fontecha et al., 2021).

Figure 1
L2 Learners' Graph of the Prototype Tree

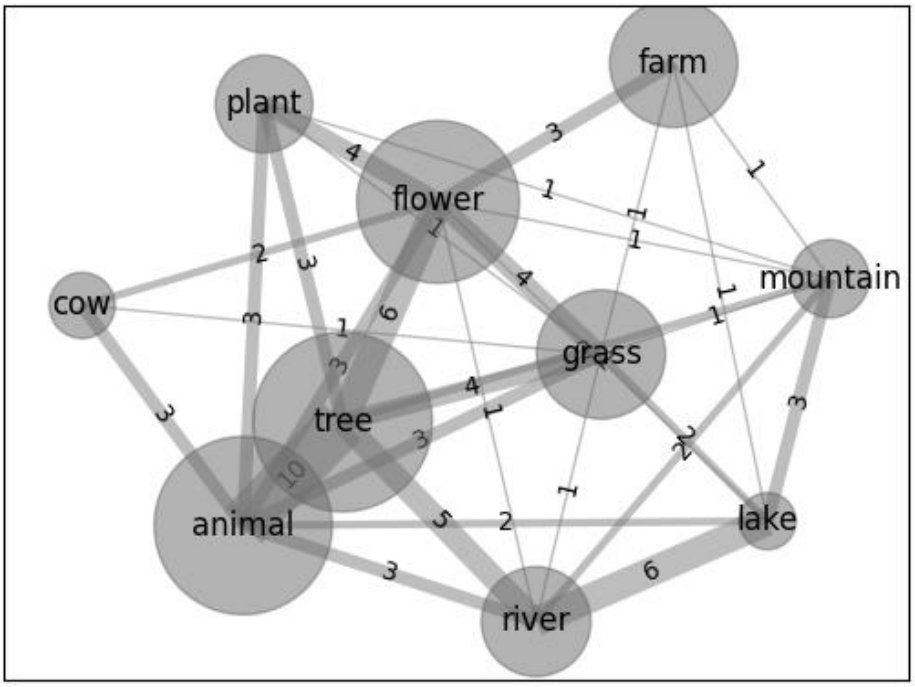
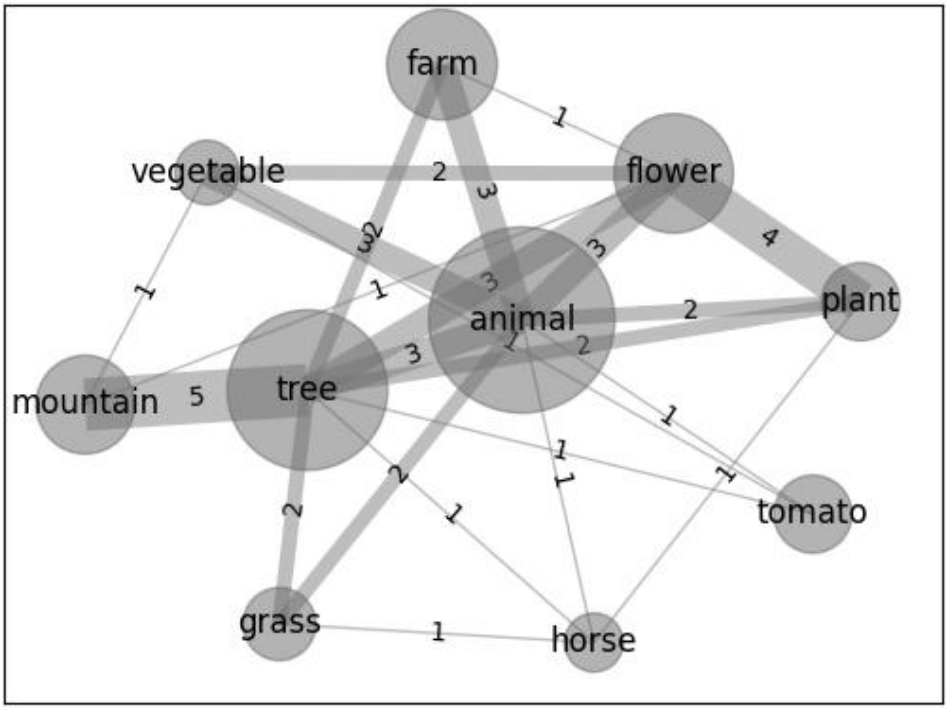


Figure 2
L3 Learners' Graph of the Prototype Animal



Conclusion

The results of this study demonstrate a clear quantitative advantage for L2 learners in terms of language level, productive vocabulary, and their responses in the LA prompt 'Countryside'. However, when taking into account the qualitative analysis and findings from other prompts, we can observe some interesting differences between the groups. In 'Countryside', L3 learners

have a higher type/token ratio and produce more cognates, but L2 learners produce more words; in 'Food & Drink', L2 learners produce more words, more cognates, and also have a higher type/token ratio; and in 'Love', L3 learners have a higher type/token ratio, but very little difference is observed between the groups in terms of the number of words produced and the use of cognates. Thus, it appears that there may be an essential difference between these learners, depending on the prompt at hand; however, future research is necessary to determine whether these differences can be attributed to the specific type of prompt (i.e., taxonomic, radial, or ad hoc). In addition, findings also showed evidence of word prototypicality within the top ten most available words in the L3/L2 EFL learners' responses in the semantic category of 'Countryside'. Most of these short lexical units were similar across the two groups of participants despite their cultural and linguistic differences. Additionally, the prototype results showed that both groups of learners organize their mental lexicons differently, with L2 learners outperforming L3 informants in connecting words displayed in the prototype.

Although these results offer some new insights into an underexplored topic, several limitations must be acknowledged. Firstly, it should be noted that the quantitative advantages in vocabulary observed in this study are very likely attributable to the differences in language proficiency which were observed between these specific groups In other words, it is not necessarily the case that L2 learners outperform L3 learners in terms of productive vocabulary and LA due to their language background, but rather due to the fact that they differ in terms of language level. Future research would benefit from taking this issue into account and comparing groups with comparable EFL proficiency levels. Secondly, due to time constraints, the present analysis focuses solely on Spanish cognates; however, it is clearly necessary to explore the use of Arabic cognates as well, as this L1 may have an important effect on L3 learners. Furthermore, for the prompt 'Countryside', only the responses in English were considered, although the participants also completed this prompt in Spanish. Given the results of a similar exploration comparing the prompt 'Love' in both English and Spanish, this would be a very valuable addition to the study. Finally, thus far, the study has only addressed the issue at hand in one taxonomic prompt, one radial prompt, and one ad hoc prompt; to determine the effect of the type of prompt, it is evidently important to explore other prompts of these types to determine whether the differences observed are related to the type of prompt itself or to other factors. As for prototypes, further research would again be applicable to analyse the prompt 'Countryside' in Spanish ('El Campo') to determine whether the prototype resembles or differs across participants, despite linguistic and cultural differences.

Nevertheless, the current study contributes to the less explored area of LA in L2 and L3 EFL learners by analysing how radial category prompts, such as 'Countryside', affect word production, diversity, and organization. It emphasizes the quantitative advantage of L2 learners due to higher language proficiency, while also showing that L3 learners exhibit greater lexical diversity and use more cognates. The identification of shared and unique prototypical words offers further insight into how multilingual learners organise mental lexicons based on cultural and linguistic backgrounds. Ultimately, the results highlight the importance of customizing vocabulary instruction to prompt types and learners' linguistic histories, underscoring the pedagogical value of incorporating cognates and prototypes into vocabulary development.

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