

Exploring L2 and L3 EFL Learners' Prototypical Patterns in the Lexical Availability of "Daily Activities"

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This study aims to analyze prototypical patterns in the lexical availability of 100 L2 and L3 high school English Foreign Language (EFL) learners in response to the semantic category of "Daily Activities". A semantic fluency task and a lexical computational program were used to measure the participants' lexical availability (LA) in relation to "Daily Activities" and to appraise the availability index in the learners' vocabulary production to uncover hints of prototypical word patterns. The main objectives were (i) to determine the similarities and differences in the word production of L2 and L3 learners, (ii) to ascertain whether there is prototypicality in the word responses of L2 and L3 learners, (iii) to identify whether the prototypes within this semantic category correspond to a higher production of verbs than nouns, and (iv) to examine the types of word associations surrounding the prototype using tenets of graph theory. Results showed that vocabulary production was higher among L3 participants than L2 participants. Despite the differences in linguistic profiles, evidence of prototypicality was found in the participants' responses. Additionally, verbs outperformed nouns, as expected in response to "Daily Activities". Findings regarding the types of word associations surrounding the prototype revealed how L2 and L3 learners organize their mental lexicons in response to the selected prompt. Research on prototypical patterns in vocabulary production sheds light on how similarly L2 and L3 learners categorize in response to the nontraditional semantic category of "Daily Activities".

Keywords: semantic prototypes, mental lexicon, lexical availability, L2 and L3 EFL learners, "Daily Activities"

Introduction

The present study delves into the structure and lexical organization of L2 (non-heritage) and L3 (heritage) mental lexicons through prototypical word associations in response to the semantic category of "Daily Activities".

A significant amount of research has examined the cognitive and linguistic differences between bilingual and monolingual individuals (see Bialystok, Craik, & Luk, 2012; Bialystok & Luk, 2012). Nevertheless, the empirical support primarily focuses on bi- or multilingual contexts where two or more languages are intertwined in daily communicative interactions (e.g., Barnes & García, 2013; Mady, 2014; Sanz, 2000). There has been limited research on the structure and organization of the mental lexicon, as well as strategies for lexical access, selection, retrieval, and production in two types of linguistic profiles. The former includes monolinguals learning

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a first foreign language in a classroom situation—in this case, this would be their L2; and the latter consists of subjects who have acquired two languages (L1 and L2) in the natural context of a bilingual community where two languages concur, and who are also learning a first foreign language in a classroom setting—in this case, this language would be their L3. The identification of advantages or disadvantages in vocabulary learning of these learners' profiles can be achieved through evidence from lexical access, selection, retrieval, and production, given that it is no longer the exception but the norm in many schools worldwide.

Previous research on vocabulary production with L2 and L3 EFL learners through semantic fluency tasks (Agustín Llach, 2017; Jiménez Catalán & Fernández Fontecha, 2019; Fernández Fontecha, Jiménez Catalán, & Ryan, 2021) has focused only on the number of words retrieved and lexical organization and production strategies. This study explores not only the number of words produced by L2 and L3 EFL learners but also how these types of learners organize their mental lexicons through semantic prototypes (the best exemplar in a category). Additionally, analyses of other types of linguistic categories (verbs) evoked in this center of interest, along with the examination of the types of associations (experiential, syntagmatic, and paradigmatic), generated through semantic networks surrounding the prototype, will be included. These analyses will allow us to unveil differences in lexical organization and prototypical word retrieval by L2 and L3 EFL learners in response to "Daily Activities" using a semantic fluency task.

Background

Semantic Prototypes in the Categorization Process

The definition of a semantic prototype arises from the Aristotelian classical categorization theory based on necessary and sufficient conditions. This conception has changed considerably due to the prototype being the best, central, and most representative exemplar recognized by the human being in a category in which the remaining members keep a degree of similarity (Rosch, 1975). For instance, *apple* is the central case in the category of *fruit* because it is the most prototypical unit, the fastest-categorized element, and the substantial point of reference. On the contrary, lesser members of the category, like *olives*, are less prototypical due to the degrees of similarity and centrality. Therefore, the members of a category are arranged in order of *goodness*, in which similar things to the prototype are classified into very typical or good members and dissimilar things as less typical or less good members (Murphy, 2002). Likewise, other researchers added substantial aspects to this field, such as Dubois (1982; 1983), whose analysis of 22 natural categories in French revealed that the prototype is the best exemplar when it is the most frequently used and cited item by 75% of the individuals instead of solely being the central case of the category. In addition, Cordier (1980) considered that the prototype emphasizes an *interindividual agreement*, which makes the member in a category a more or less representative case in the human being's perception. The prototype has been viewed from the standard and the extended perspectives. Both versions accounted for different research scopes, including superordinate (abstract information), basic (accessible information), and subordinate (further specific information) levels of categorization (Rosch, Mervis, Wayne, Johnson, & Boyes-Braem, 1976; Kleiber, 1995), membership gradience (Lakoff, 1987), family resemblance (Wittgenstein, 1953), prototypical and shared knowledge (Langacker, 1987), linguistic appropriateness (Wierzbicka, 1985), and typicality (Murphy, 2002). The standard and the extended vantage points agreed that the central and prototypical cases are rapidly recognized, early learned, and frequently used, as remarked by Rosch (1975). Thus, the central members or *prototypes* are not only the first used to cover the category as a whole, but they are also helpful in memory and learning, and they are the foundation on which human beings simplify certain situations.

Semantic Prototypes in Lexical Availability

According to Taylor (1989) and Aitchison (2003), semantic prototypes play a significant role in the categorization of the mental lexicon in any language. Thus, research on the words associated with semantic categories is essential for understanding how bilingual and monolingual EFL learners categorize vocabulary (Pavlenko, 2009), given that learners categorize the world differently when learning a new language (Athanasopoulos, Dering, Wiggett, Kuipers, & Thierry, 2010). Linguistic research suggests that the semantic fluency task is one of the methods used to study L1, L2, and L3 lexical production and organization processes. In this respect, semantic prototypes in EFL contexts have been analyzed using the semantic fluency task, also known as the lexical availability task (LAT). This task consists of a data collection instrument conducted through paper-and-pencil or computer-based online questionnaires. This task is presented to the informants with cue words, also known as *stimuli*, *cue words*, *semantic categories*, *prompts*, or *centers of interest*. Subsequently, participants are required to write down all words that come to their minds in response to the stimulus provided in a two-minute slot. The presentation of each category is provided on a different page with numbered lines, and participants can only move on to the following semantic category after the two minutes are up. Studies on LA have used 16 traditional semantic categories (*Parts of the Human Body*, *Clothes*, *Parts of the House*, *House Furniture*, *Food and Drink*, *Objects on the Table for the Meal*, *The Kitchen and Its Utensils*, *School Furniture and Materials*, *Heating and Lighting*, *The City*, *The Countryside*, *Means of Transport*, *Farm and Garden Work*, *Animals*, *Games and Entertainment*, and *Jobs and Professions*) in the LAT interchangeably based on the ones proposed by Gougenheim, Michéa, Rivenc, and Sauvageot (1964). The use of a LAT has proved to cast light on data collected from learners differing in L1, target language, age, and learning contexts (Hernández Muñoz, 2006; Samper Hernández & Jiménez Catalán, 2014), as well as to shed light on how reliable the LAT is when researching L1, L2, and L3 available lexicon (Canga Alonso, 2017; Agustín Llach, 2017; 2019; Jiménez Catalán & Fernández Fontecha, 2019; Fernández Fontecha et al., 2021). Since the analysis of vocabulary production through a LAT includes data related to the lexical availability index (the value given to highly available words, which are more likely to appear first in the list of responses), it facilitates the investigation of semantic prototypes in EFL learners' lexical availability output in response to a semantic category. Research on prototypes in lexical availability has included analyses concerning lexical availability in English and Spanish as FL (Šifrar, 2014a), the universality of prototypes in L1 and L2 Spanish (Šifrar, 2016), prototypical associations in English and Spanish as FL (Mora & Jiménez Catalán, 2019), age and course level differences (Mora, 2022; Mora, 2024a). Šifrar's (2014a) research showed a high degree of similarity in the significant number of shared words in most of the semantic categories despite the English and Spanish performance level differences among the groups of informants. Similarly, Šifrar (2016) revealed that the semantic prototypes generated by L1 and L2 Spanish learners were the most available responses from both groups and showed a tendency to confirm the universality of prototypes based on human experience regardless of the cultures and different first languages. Mora & Jiménez Catalán (2019) focused on finding evidence of word prototypicality in a global framework in the word responses generated by informants from two countries in two foreign languages. Findings on the convergences and divergences featured in prototypes, both in English and Spanish, indicated that despite the difference in language and culture, there was a similarity of prototypical associations and lexical production between the two groups of informants. Results also showed that production differences between the learners' word responses are due to variables, such as textbook vocabulary input, the methodological approach, and the intensive/extensive instructional program.

Regarding age and course level differences, Mora (2022; 2024a) identified and analyzed the similarities and differences in the number of prototypical words produced by children and adolescent EFL informants. Findings revealed that children retrieved fewer words than adolescents in the lexical availability task. However, results also showed evidence of prototypical word responses primarily associated with the basic level of categorization, which might be related to a similar mental categorization of children and adolescent EFL learners in response to the semantic categories selected for each research. Mora (2024a) also analyzed the EFL learners' word responses via tenets of the graph theory in order to identify the type of word associations generated from the prototype provided in response to each selected semantic category. Results of this research indicated that most of the prototypical word responses were related to *experiential* associations (words related to experience, culture, emotions, word knowledge), *syntagmatic* associations (sequential or collocational relationships to the prompt word and, as such, are usually (but not always) from a different word class than is the prompt word), and *paradigmatic* associations (words from the same word class as the prompt word, and, as such, could presumably perform the same grammatical function within a given sentence). In this sense, in this study, word associations obtained through graph networks allowed us to determine how the mental lexicon stores information in lexical units, where lexical units are nodes and the different links between the units are connections (Aitchison, 1987; Vitevitch, 2020). Other studies on graph networks have suggested that analyses in this field determine how foreign language learners categorize and organize the words in the mind through the use of a lexical availability task (Ferreira & Echeverría, 2010; Sánchez-Saus, 2022; Agustín Llach, 2023a; 2023b).

Research on the representation of word prototypicality in L2 and L3 EFL learners' lexical availability output has been relatively scarce. To our knowledge, this is the first attempt to explore semantic prototypes in vocabulary production through a lexical availability task with multilingual learners.

“Daily Activities” in Lexical Availability

The literature on lexical availability has primarily considered 16 traditional semantic categories or centers of interest in analyzing word production, including mainly nouns (Dimitrijević, 1969). Nevertheless, since the 1960s when studies were carried out on the available lexicon in French as a foreign language (Gougenheim et al., 1964), new studies have shown that the semantic category of “Daily Activities” needs to be addressed, given that it is one of the essential topics in learning a foreign language (Tomé Cornejo, 2015; Šifrar, 2021). According to McCarthy (1999), this center of interest is framed within the denomination of *Core Vocabulary*, which constitutes the basic communication components when learning a language. In this study, including this semantic category as essential vocabulary involves the importance of describing and generating word responses related to daily actions (e.g., *wake up*, *eat*, *sleep*, *study*). Besides, unlike previous studies on lexical availability, where most words refer to concrete and abstract nouns, this semantic category also encompasses the production of new linguistic categories, such as verbs. Apart from verbs, other combined words might be generated, such as collocations (*set off the alarm*, *get dressed*), multiword verbs, including phrasal verbs and prepositional verbs (*get up*, *listen to*), phrasal prepositional verbs (*hang out with*, *meet up with*), and unconventional constructions (*have a date with your girlfriend/boyfriend*, *help my mother in the house*). These word combinations provide the learner with a more significant way to learn vocabulary instead of isolated word components (Lewis, 1993). Furthermore, this array of word responses and prototypical associations allows us to explore how L2 and L3 EFL learners categorize and organize their mental lexicons in response to “Daily Activities” through a LAT.

The choice of this semantic category in this study arises from the research conducted by Tomé Cornejo (2015). Based on Tomé Cornejo's (2015) analysis of the 16 traditional centers of interest and the implementation of additional semantic categories used in previous lexical availability studies, the researcher described how "Daily Activities" has been included in the analysis of foreign language learners' lexical production (Table 1).

Table 1

Applications and Variations of the Semantic Category "Daily Activities"

Acciones Cotidianas/Daily activities	
Les activités courantes/Current activities	Mackey (1971)
Acciones que normalmente se realizan todos los días/ Actions normally performed every day	Azurmendi Ayerbe (1983) Šifrar (2014b)
Acciones/Actions	Ayora Esteban (2006)
Acciones y actividades habituales/Regular activities and actions	Sánchez Saus-Laserna (2011)

Source: Tomé Cornejo (2015, p. 220).

Mackey (1971), in his comparison between the available lexicon in France and the Canadian Acadie, pointed to cultural differences since semantic categories cannot be considered universal among speakers. Therefore, Mackey proposed six new centers of interest in addition to the existing 16 traditional ones, including "Les Activités Courantes"/ "Daily Activities". In the Basque Country, Azurmendi Ayerbe (1983), following the ideas contributed by Mackey (1971) in Canada, carried out a study on lexical availability, including "Daily Activities" as a new category at the level of bilingualism. Similarly, Šifrar's (2014b) study comprised "Daily Activities" among 11 traditional semantic categories to compare the lexical availability of Slovene students of Spanish FL with the lexical availability of native Spanish students and detect lexical differences and similarities between foreign and native Spanish speakers. In keeping with Mackey (1971), both researchers suggest that additional centers of interest should be considered to measure the lexical availability output of FL Spanish learners, given that new linguistic units, such as verbs, might be observed alternatively to nouns. Adding new conceptual areas allows researchers to obtain lexical elements belonging to new linguistic categories, as Ayora Esteban (2006) suggested in her study on lexical availability with Spanish foreign language learners. According to Sánchez-Saus (2011), exploring the semantic category of "Daily Activities" arises from the need to analyze sociocultural variables and the extraction of verbs to obtain a broad linguistic variation through FL learners' available lexicon.

The latest research on the semantic category of "Daily Activities" was conducted by Šifrar (2021), whose study aimed to examine the quantitative and qualitative Slovene students' LA based on her previous work in 2014b and that carried out by Sánchez-Saus (2011). Results showed that either in Šifrar's (2021) study or Sánchez-Saus' (2011), in response to this semantic category, verbs were the most generated because of the nature of the category itself (activities). Findings in Šifrar's (2021) study also indicated that there was evidence of word prototypicality and that the lexical availability was similar regardless of the learners' L1, cultures, and Spanish FL levels. Since "Daily Activities" has not been worked on in English as a foreign language, we set out to investigate the L2 and L3 EFL learners' lexical availability output in response to this semantic category. The research questions of the present study were as follows:

RQ1: Are there any similarities or differences in the word responses provided by L2 and L3 EFL learners in response to "Daily Activities"?

RQ2: Are there qualitative similarities concerning the prototypical patterns retrieved by L2 and L3 EFL learners in response to “Daily Activities”?

RQ3: Do the prototypical word associations within the semantic category of “Daily Activities” correspond to a higher production of verbs than nouns?

RQ4: Are there differences and similarities in the type of word associations surrounding the prototype in response to “Daily Activities” via tenets of the graph theory?

Methodology

Participants

The sample included 100 informants at the 4th course level of ESO (Compulsory Secondary Education) within the Spanish Educational System. Two groups were distributed into 50 L2 and 50 L3 heritage EFL learners. We selected each group out of a large pool of students belonging to different schools in two Autonomous Communities of Spain (La Rioja and Extremadura) based on their linguistic profiles: L2 (non-heritage) and L3 (heritage) learners. The learners were aged between 15 and 17. Table 2 shows further information concerning the number of participants and its corresponding L1. Some specificities should be considered: Colombian and Spanish EFL learners were included in the L2 group. Moroccan and Algerians were included in the Arabic L1 group of L3 learners. Pulaar corresponded to the L1 language used by a Senegalese informant in the sample. Although there was no application for a level proficiency test in English, the student's English level of B1 corresponds to that of the Common European Framework of Reference for Languages (CEFR) (Council of Europe, 2001) and the one established by the current education law and decrees in the Autonomous Communities which develop the curricula of formal education.

Table 2

Sample of Informants

No. of informants	Linguistic profile	Mother tongue (L1)	
100 L2/L3 EFL learners 4th ESO (15-17 years old)	50: L2 learners 50: L3 learners	Spanish (50)	Pulaar (1)
		Arabic (28)	Polish (1)
		Romanian (7)	Italian (1)
		Urdu (4)	Uzbek (1)
		Georgian (3)	Hindi (1)
		Russian (1)	Ukrainian (1)
		Galician (1)	

Data Collection, Procedures, and Analysis

For this research, the informants were required to fill in a questionnaire that included relevant information regarding their personal data, such as age, family origin, and spoken languages. Moreover, learners were also asked to provide information about their experience with languages concerning their mother tongue (L1), their L2 exposure in and out of school, and, if applicable, their L3. Additionally, details on their involvement in language programs, language level ranges, and extra learning activities with the foreign language were requested. The questionnaire, written in Spanish, allowed the students to follow the instructions and answer the questions accurately.

Subsequently, we used a lexical availability task, which included 13 traditional and non-traditional semantic categories (“Animals”, “Town”, “Countryside”, “Food and Drink”, “Love”, “Daily Activities”, “Physical Activities”, “Festivities and Celebrations”, “Fruits and Vegetables”, “El Campo”, “Amor”, “Fruits and Vegetables”, “Fiestas y Celebraciones”) used in L1 and L2 Spanish and English lexical availability studies. For this study, we selected

“Daily Activities” for the reasons previously mentioned in our literature review. The informants were asked to write down as many words or expressions as came to their minds for each prompt. Twenty-six minutes were allotted to complete the task, 2 minutes per semantic category. Learners were not allowed to move to the following page until the two-minute period was over. The data were gathered through a computer-based task completed in special sessions devoted to data collection. The data were run by the members of the National Research Project (HERPRO) from the University of La Rioja (HERLEX) and the University of Extremadura (HERCOG).

After completing the LAT application, we edited, encoded, and lemmatized the word responses (Table 3). In this process, we considered the criteria used and proposed in L2 English by Jiménez Catalán et al. (2014), Mora & Jiménez Catalán (2019), and Mora (2022; 2024a).

Table 3

Word Response Editing, Encoding, and Lemmatization Criteria in a LAT

Word response editing, encoding, and lemmatization criteria

1. Students' answers were edited and included in an Excel spreadsheet.
2. Spanish words were discarded as well as words which do not appear as lexical entries in dictionaries. We took three dictionaries as guidance: *Cambridge Online Dictionary*, *Word Reference Dictionary*, and *Oxford Dictionary*.
3. Lexical units with a lexicalized meaning such as *arm-wrestling* were considered as lexical units, which were counted only as one, not as the sum of the parts.
4. Abbreviations were kept: (e.g., *BMX*)
5. Spelling mistakes were corrected.
6. Repeated words in the same prompt were deleted, that is, counted once solely.
7. Verbs were changed to bare infinitive.
8. Prepositions were deleted unless they were part of a phrasal verb or their meaning changed the noun they preceded (e.g., *hang out with*).

Note. The list of criteria provided has been revised and followed by the members of GLAUR (Grupo de Lingüística Aplicada de la Universidad de La Rioja).

The data processing was conducted using the computer tool LEXPRO, which was developed and released by Universidad de Salamanca and Universidad Miguel Hernández de Elche. This tool allows for the automatic calculation of several measures such as tokens (the total number of words), types (the number of different words), mean values, cohesion index (the degree of coincidence in words retrieved by the informants in response to a semantic category), graphs measures (generated lexical networks and word associations). The LEXPRO program allowed calculations of different statistical measures (average degree, average path length, clustering coefficient, and modularity, bigrams (pairs of words that are associated most frequently), and availability index (the availability value based on the position of a word in the lists to measure the number of participants who placed the word at those positions and the lowest position in which the word has been put in any of the lists) using the formula by Juan López Cházvez and Carlos Strassburger Frías (2000). The following image displays the exact formula of the availability index:

$$D(P_j) = \sum_{i=1}^n e^{-c((i-1)/(n-1))} ((f_{ji}/I_1)$$

where:

n = max position reached by the word in the sample.

i = position of the word at the specific test explored.

j = target word index.

f_{ji} = absolute frequency of word j in position i .

I_1 = number of informants in the sample.

c = dispersion coefficient (2,3).

$D(P_j)$ = target word's j availability.

Furthermore, descriptive statistics were calculated via SPSS (V26.0) to analyze the p -value in comparing two independent samples (Mann-Whitney non-parametric test).

Results

Table 4 presents the overall data for descriptive measures of lexical production by L2 and L3 EFL learners in response to "Daily Activities".

Table 4

Overall Results of Lexical Availability in L2/L3 EFL Learners

	L2 EFL learners	L3 EFL learners
Tokens	479	455
Mean tokens	9.58	9.1
Types	171	161
Cohesion index	0.06	0.06

The information in Table 4 shows that L2 EFL learners produce slightly more tokens and types than L3 EFL learners. The cohesion index is identical between the L2 and L3 learners' responses (0.06), which suggests that the learners' specific semantic field is highly homogeneous and compact. In other words, both groups of informants showed uniformity of coincidence in their responses when considered within the group. This means that L2 and L3 learners have similar conceptualizations and ideas when categorizing in response to "Daily Activities".

Comparisons between the L2 and L3 EFL learners' "Daily Activities" lexical output (Figure 1) showed that in Mann Whitney non-parametric test, the data were not normally distributed since the p -value was less than $p < 0.005$ (0.001), with more words by L2 learners ($M = 53.05$, $SD = 4.02$) than L3 learners ($M = 47.95$, $SD = 4.66$).

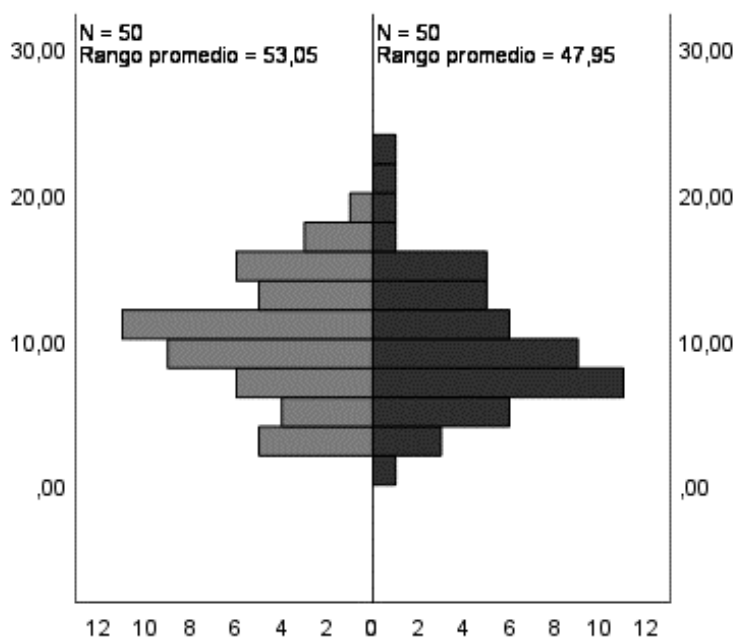


Figure 1. L2 and L3 EFL learners' "Daily Activities" lexical output.

Table 5

Top Twenty Most Prototypical Words Between L2/L3 EFL Learners (Daily Activities)

L2 EFL learners word responses	LAI	L3 EFL learners word responses	LAI
1. sleep	0.320048327	1. sleep	0.40875721
2. study	0.300353016	2. eat	0.394962664
3. eat	0.287222888	3. study	0.33719758
4. go to school	0.229819189	4. go to school	0.293092494
5. do homework	0.2062931	5. do homework	0.222124313
6. breakfast	0.143279587	6. run	0.194438276
7. walk	0.138901345	7. sport	0.164983274
8. wakeup	0.137809592	8. football	0.154499423
9. have breakfast	0.129801746	9. cook	0.151369284
10. sport	0.122058971	10. gym	0.108701994
11. read	0.103528564	11. play	0.107306178
12. dinner	0.099097195	12. drink	0.10472256
13. run	0.096162454	13. wakeup	0.09622643
14. football	0.087853581	14. do exercise	0.077274054
15. walk the dog	0.084306175	15. walk	0.076014301
16. have dinner	0.08425374	16. play video games	0.071979692
17. homework	0.080095717	17. do sport	0.071254768
18. listen to music	0.078792443	18. watch TV	0.067996771
19. play video games	0.072648678	19. learn	0.065259316
20. clean	0.072176505	20. play football	0.057851774

LAI: lexical availability index.

A comparison of the top twenty available words shows whether the two groups of L2 and L3 EFL learners produced similar or different associations in the semantic category of "Daily Activities" and whether we can observe any common semantic prototypes. The first twenty words are chosen because the most available words show collective results, while the least available words show individual results. Table 5 indicates that the most prototypical word response between the two groups of participants was *sleep*, followed by *eat* and *study*. However, each list provides the latter two responses in distinct order. Within the top twenty most prototypical words, nine lexical units were exclusive of each group of informants, whereas eleven lexical units were shared among the first responses provided by the L2 and L3 EFL learners. Most of these words were related to semantic fields, such as basic necessities (*sleep*, *eat*), leisure activities (*sport*, *run*, *walk*, *football*, *play video games*), school activities (*study*, *do homework*, *go to school*), and routines (*wake up*). The types of words found within the lists in Table 5 revealed that in the group of L2 learners, there were fifteen verbs and five nouns. In contrast, L3 learners' responses evoked 17 verbs and three nouns. Two of the nouns coincided with the informant's production of words (*sport*, *football*). The prototypical responses included collocations (*do homework*, *play video games*) and phrasal verbs (*wake up*). Exclusive words showed that apart from collocations (*have breakfast*, *have dinner*, *walk the dog*, *do exercise*, *do sport*, *watch TV*, *play football*), prepositional verbs were also evoked (*listen to music*, *go to school*). The basic level of categorization (the best and central members in a category) overtook the superordinate and the subordinate levels within the overall list of word types (257) and the L2 and L3 learners' top twenty most prototypical words. The lexical availability index showed that highly available words such as *sleep*, *eat*, *study* were also the most prototypical since they appeared first in the list of responses. However, the LAI in the L3 EFL learners' responses was higher in the first positions of the word list than that of the L2

participants, which probably points to more efficient communication among members of this group than those of the L2 group of informants.

As for the lexical availability index, Table 5 shows that within the top twenty shared prototypical words, the group of L3 learners had the highest lexical availability index compared to the group of L2 informants. Concerning the three most prototypical words, differences also emerged since the L3 learner's word responses obtained a higher occurrence rate (*sleep* (0.56%), *eat* (0.5%), and *study* (0.5%)) than the L2 learners' word retrieval (*sleep* (0.46%), *study* (0.44%), and *eat* (0.42%)).

Table 6 presents the comparison regarding the production of shared and non-shared word responses between both groups. Subsequently, Figure 2 illustrates how linguistic categories, such as nouns and verbs, were represented and distributed in the L2 and L3 EFL learners' lexical output in response to "Daily Activities".

Table 6

Comparison of the L2 and L3 Learners' Production of Words

Group of learners	No.	Tokens	Types	No. of exclusive words	No. of shared words
L2	50	479	171	96	75
L3	50	455	161	86	

Note. The sum of sets is 257.

The comparison between the L2 and L3 learners' groups of informants in response to the semantic category of "Daily Activities" showed that the overall sum of word types (257) was distributed into 75 shared word responses and 96 non-shared word responses by the L2 participants, and 86 non-shared word responses by the L3 learners. Although, to a lesser extent, shared responses differed per group, L2 learners obtained 56.14%, whereas L3 learners had 53.42%. Similarly, exclusive word percentages also varied; the L2 group obtained 43.86%, while the L3 group had 46.58%.

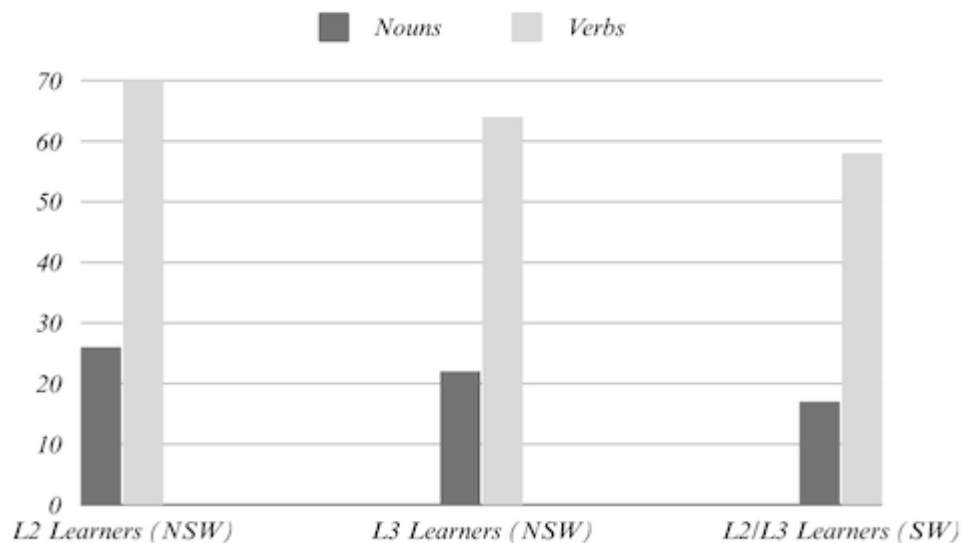


Figure 2. Distribution of L2/L3 EFL learners' shared and non-shared words regarding the production of nouns and verbs in response to "Daily Activities".

From the information in Figure 2, it can be observed that within 257-word types, 192 were verbs, and 65 were nouns. L2 and L3 learners' shared word (SW) responses were 75, of which 58 were verbs (43.5%), and 17

were nouns (12.75%). L2 learners' non-shared word (NSW) responses obtained a total of 96 words, distributed into 70 verbs (67.2%) and 26 nouns (24.96%), whereas L3 learners' non-shared lexical production corresponded to 86 words, encompassing 64 verbs (55.04%) and 22 nouns (18.92%). Accordingly, verbs had the highest percentage over nouns in this semantic category, either in shared or non-shared word responses.

The variation in verbal responses was represented by different linguistic categories, such as prepositional verbs (*listen to music, go for a walk, go to school/work*), phrasal verbs (e.g., *dress up, stand up, get up*), phrasal prepositional verbs (e.g., *meet up with, go out for, go out with*), collocations (*make the bed, do homework, do the dishes*), and unconventional constructions (e.g., *have a date with my boyfriend/girlfriend, play with the mobile, watch YouTube*).

For the "Daily Activities" category, overall network metric parameters were calculated (Table 7). In addition, results on the word associations within the top twenty most available words indicated how L2 and L3 learners' mental lexicons store information in lexical units through graph networks, where lexical units are nodes and the different links between the units are connections (Figures 3 and 4). Moreover, subgraphs of the semantic connections showed how learners organize their mental lexicons in response to "Daily Activities" surrounding the prototype (Figures 5 and 6).

Table 7

"Daily Activities" Graph Metrics

	L2 EFL learners	L3 EFL learners
Nodes	171	161
Edges	383	358
Degree	2.23	2.22
Density	0.012	0.013
Average degree	2.24	2.22
Average path length	3.77	3.34
Clustering coefficient	0.08	0.06
Modularity	0.47	0.42

Table 7 shows that although overall results were highly alike between the two groups of informants, L2 learners display a highly tight network, with a high degree, density, and clustering coefficient. Besides, average degree, path length, and modularity values were higher than the L3 learner's graph metrics.

Nevertheless, Figures 3 and 4 for this study depict how the top twenty most available L2 and L3 learners' word responses were associated with the graph's most central members (prototypes). The most prominent circles represented the most prototypical word responses (*sleep, eat, study*), followed by *go to school* and *do homework* within the slightest less prominent circles. Findings on the semantic network also showed how words were connected through bigrams. Despite the linguistic profile of each group of learners, one remarkable bigram was shared by L2 and L3 informants: *sleep-eat*, which, in response to the semantic category of "Daily Activities", as previously mentioned, refers to basic needs. This bigram was derived from the most available and prototypical word *sleep* (Table 5). However, Figure 4 displays that this bigram was more highly connected within the group of L3 learners. In addition, other peripheral strongly connected bigrams stood out: L2 learners (*dinner-breakfast, sleep-go to school*); L3 learners (*eat-do homework, eat-drink*) (Figures 3 and 4).

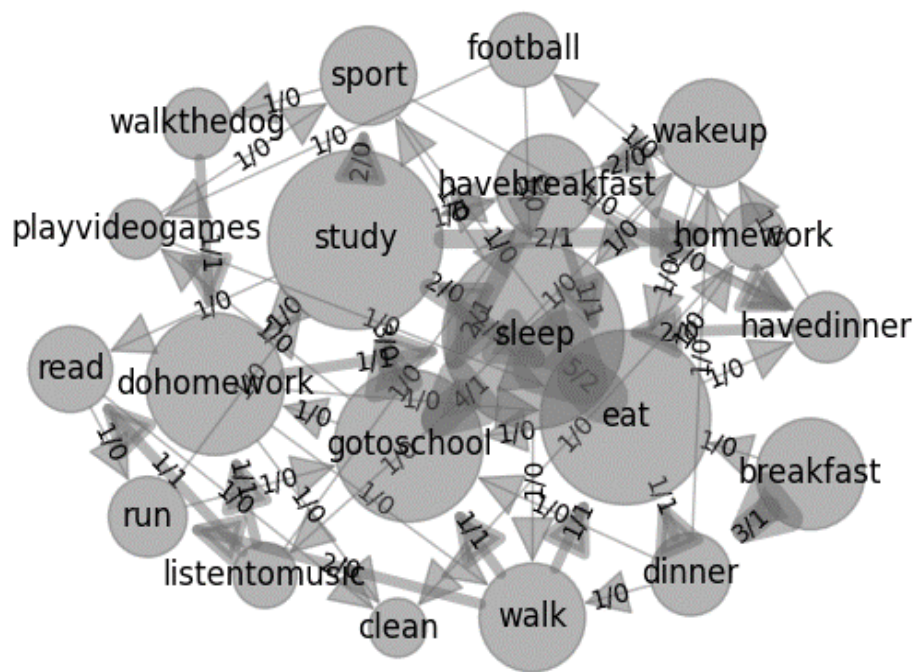


Figure 3. L2 learners' graph in response to "Daily Activities".

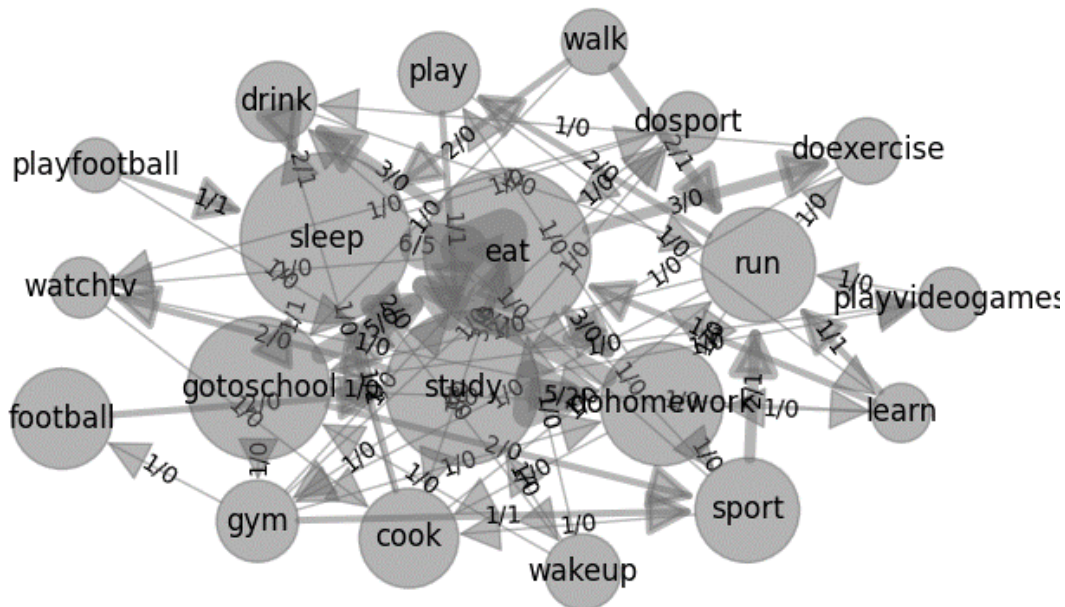


Figure 4. L3 learners' graph in response to "Daily Activities".

Figures 5 and 6 display that L2 and L3 learners' word responses surrounding the prototype *sleep* were identical. These ten words were: *eat*, *study*, *go to school*, *do homework*, *play football*, *wake up*, *walk*, *drink*, *do sport*, and *cook*. Also, bigrams originating from the prototype were alike for each group of participants (*sleep-eat*, *sleep-do homework*, *study-eat*, *study-do homework*, *do homework-study*, *eat-drink*, *eat-go to school*, *eat-do homework*). However, less densely connected bigrams were also identified (*sleep-wake up*, *eat-cook*, *walk-go to school*, *wake up-go to school*, *drink-cook*).

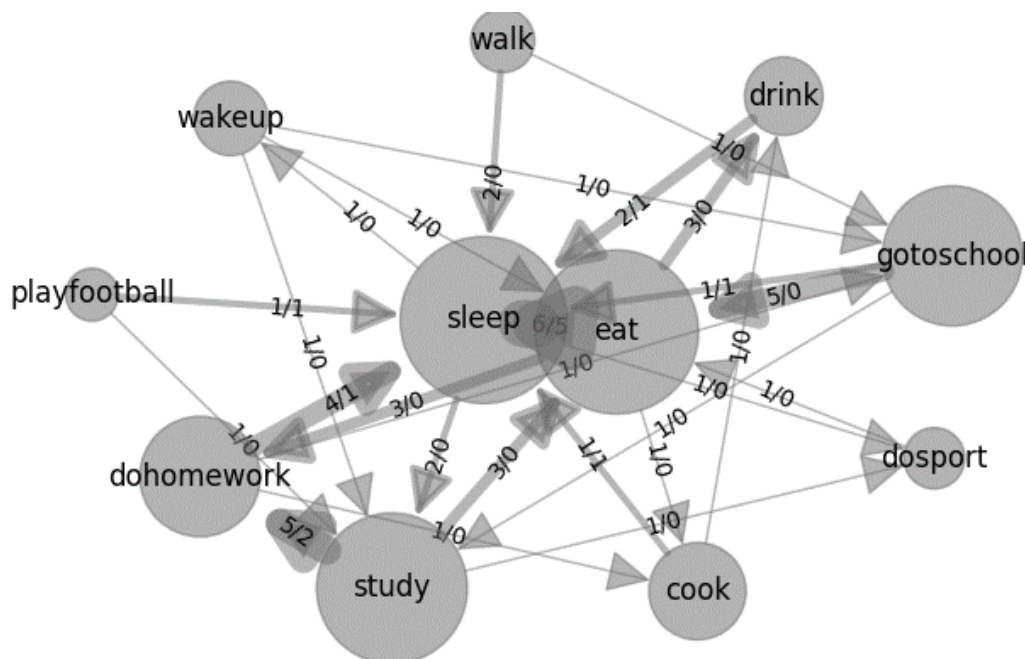


Figure 5. L2 learners’ subgraph of the prototype provided in response to “Daily Activities”.

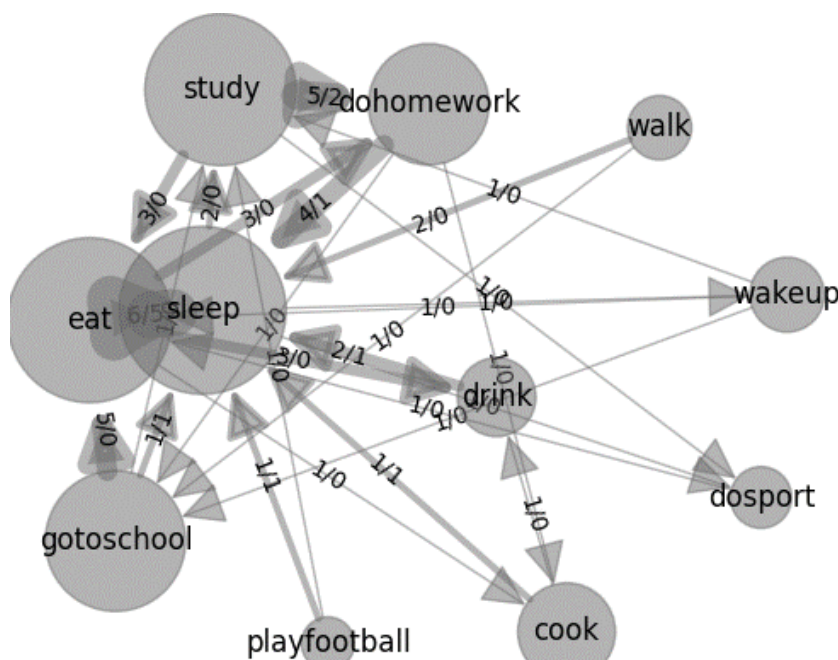


Figure 6. L3 learners’ subgraph of the prototype provided in response to “Daily Activities”.

Table 8 shows the most frequent bigrams in L2 and L3 learners' word responses and the type of associations they were related to.

The information in Table 8 indicates that most associations generated from the most frequent bigrams correspond to experiential co-occurrences. This means that L2 and L3 learners' extralinguistic and cultural experiences are somewhat similar, at least as "Daily Activities" is considered. Nevertheless, two bigrams depicted syntagmatic associations, which shows that L2 and L3 participants' organization of some of the "Daily Activities"

responses refers to sequential and collocational relationships. Only one paradigmatic association was included within the most prototypical L2 and L3 learners' word responses regarding lexical units from the same word class.

Table 8

Most Frequent Bigrams and Types of Associations in Response to "Daily Activities"

L2 and L3 learners' most frequent bigrams	Type of associations
Sleep-eat	Paradigmatic
Sleep-do homework	Experiential
Sleep-study	Experiential
Eat-drink	Syntagmatic
Eat-go to school	Experiential
Eat-do homework	Experiential
Study-eat	Experiential
Study-do homework	Syntagmatic

Discussion

We aimed to study the vocabulary performances of heritage students who were learners of English as an L3 compared to learners of English as an L2 at the same course level and from the same community. We wanted to explore how prototypical patterns are represented in the lexical availability output of these two groups of participants in response to a nonconventional semantic category of "Daily Activities".

The first research question aimed to determine whether there were convergences or divergences in the production of words provided by heritage informants, bilingual in their home language and in Spanish and non-heritage participants, who were learners of English as an L2. The results of the present study showed that despite the advantage of L3 learners' bilingualism, the L2 learners' lexical availability production was higher. In this respect, this present research corroborates the findings obtained by Agustín Llach (2017), who observed that monolingual Spanish learners retrieved a significantly higher number of words than bilingual Basque-Spanish learners in a lexical availability task. Similarly, our results aligned with Jiménez Catalán and Fernández Fontecha (2019), whose study focused on L2 and L3 secondary students' lexical availability and lexical frequency of words. The researchers found that the L2 group produced a more significant number of words than the L3 group. Correspondingly, our findings concurred with Fernández Fontecha et al.'s (2021) study with 12th graders, whose results indicated that L2 EFL learners outperformed L3 EFL learners' production of words in response to "Animals" in a semantic fluency task. However, Agustín Llach (2017), Jiménez Catalán and Fernández Fontecha (2019), and Fernández Fontecha et al. (2021) only included traditional categories in which "Daily Activities" was not considered.

Therefore, despite the coincidence of the results with these two previous studies, our findings did not show such significant differences. Moreover, it is of paramount importance to highlight that one interpretation of these results stems from the fact that the lower lexical availability of heritage L3 learners might be due to slow access to the activation of their L3 lexicon in time-controlled tasks, such as the LAT, in which learners were asked to write down as many words that came to their mind in association with a semantic category.

Research question 2 addresses the identification of similarities in the prototypical patterns provided by L2 and L3 learners in response to "Daily Activities". Our results revealed that despite the linguistic profile differences in the two groups of EFL learners, within the top twenty most available words, the prototypes were

almost identical. The most prototypical word response was *sleep*, followed by *eat* and *study*, although the latter two were provided in distinct order. Our findings suggested that in keeping with Šifrar (2016), a word fulfills similar functions given that it arises from the exact needs of the human condition, that is, from the same human biology and psychology, from the exact fundamental reflection of the environment and the same communicational needs. Our results are consistent with previous results obtained by Šifrar (2021), whose study with Slovenian learners of Spanish as L2 with B1 and B2 performance levels showed that the most available words in response to “Acciones Cotidianas”/“Daily activities” were related to basic living needs. However, the first position within the most prototypical words with the highest availability index was *eat (comer)* followed by *sleep (dormir)*.

Regarding the prototypical word-type responses retrieved by L2 and L3 EFL learners, we found they were related to short words, which, as Kleiber (1995) put forward, are the easiest and fastest to recall. Therefore, these short words in our findings are also considered basic words, which not only become the central members of a category but also prevail over other levels of categorization, such as the superordinate and subordinate levels (Rosch et al., 1976; Kleiber, 1995). Furthermore, as Murphy (2002) suggested, basic words are also the easiest to acquire when learning a language.

Our results on prototypes within the field of lexical availability showed that in the L2 and L3 EFL learners' responses, the notion of typicality was present since, as suggested by Dubois (1982; 1983) and Murphy (2002), typicality pertains to the good examples provided by people when responding to a category and these good typical items are likely to serve as cognitive reference points. These assumptions confirm and further support the idea that typicality is one of the factors that provide the most available words, representing the highest word prototypicality within a LAT (Hernández Muñoz, 2006). For instance, the degree of availability of the prototypical words generated by both groups of learners in association with “Daily Activities” such as *sleep*, *eat*, and *study* showed that these highly available words were more likely to appear first in the lists of responses of the group data. Concerning the most atypical words, our results concurred with the evidence found in Šifrar's (2014a) study, given that the words ranking further away from the first positions of the lists might be the least prototypical lexical items. This may result from the fact that the least available words were the words that did not come first to the learners' memory; therefore, these words showed individual results rather than collective results.

In lexical availability studies, traditional semantic categories are all nouns, and most of these categories are superordinates or hypernyms, which seem to elicit nouns as responses (Dimitrijević, 1969). Results on research question 3 indicated that the prototypical word associations within the nontraditional semantic category of “Daily Activities” corresponded to a higher production of verbs than nouns. Thus, this current study significantly differs from previous results (Jiménez Catalán, Agustín Llach, Fernández Fontecha, & Canga Alonso, 2014; Šifrar, 2014a; Šifrar, 2016; Jiménez Catalán & Fernández-Fontecha, 2020; Mora, 2022; Mora, 2024a), given that their results pointed to the production of nouns in response to semantic categories, such as *Hobbies*, *Clothes*, *School*, *Professions*, *House*, *Animals*, *Town*, *Countryside*, *Parts of the Body*, *Food*, and *Drink*). Our results agree entirely with McCarthy's (1999) notion that “Daily Activities” is a substantial element of basic communication when learning a language. Similarly, exploring this semantic category in our study proved that, as ToméCornejo (2015) stated, the importance of “Daily Activities” inclusion cannot be overstated in foreign language learning. Findings in this current study also revealed that, unlike previous results on lexical availability research, where abstract and concrete nouns are vastly evoked, “Daily Activities” generates new combinations of verbal words in the learners' responses, such as collocations, multiword verbs, including phrasal verbs and prepositional verbs, phrasal

prepositional verbs, and unconventional constructions. Our findings are consistent with previous studies (Sánchez-Saus, 2011; Šifrar, 2021), whose results indicated that word retrieval by most Spanish FL students corresponds mainly to verbs and words derived from them.

In addition to this, the presence of an extralinguistic combination of verbal words provides the learner with a more significant way to learn vocabulary instead of isolated word components, in keeping with Lewis (1993).

In this regard, our results also concurred with those conducted by Šifrar (2014b) and Ayora Esteban (2006) who stated that new conceptual semantic categories allow researchers to obtain lexical elements belonging to new linguistic categories (verbs). Likewise, exploring the nontraditional prompt of "Daily Activities" arises from the need to analyze sociocultural variables and the extraction of verbs to obtain a broad linguistic variation through FL learners' available lexicon (Sánchez-Saus, 2011).

Furthermore, as proposed by Mackey (1971), the inclusion of "Daily Activities" in lexical availability studies might involve the analysis of cultural differences since semantic categories cannot be considered universal among speakers. Therefore, verbal word responses and prototypical associations results in our research, allowed us to explore how L2 and L3 EFL learners categorize and organize their mental lexicons in response to "Daily Activities" through a LAT.

Research question 4 aimed to unveil the differences and similarities in the type of word associations generated by L2 and L3 learners surrounding the prototype in response to "Daily Activities" through semantic networks. Our results showed that L2 learners produced more word types (nodes), and more links between the nodes (edges) than L3 learners. This finding concurs with previous research, which concluded that monolingual participants retrieved more words than bilingual informants since the lower lexical availability of heritage L3 learners might lie in the slow access in 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).

Findings in our research showed that there was a paradigmatic type of association based on the prototype (*sleep-eat*), which, in keeping with Agustín Llach (2023a), mainly indicates that the organization of lexicons is generally based on universal processes, as certain words are often learned or stored alongside other words in conceptual networks. Our results also found syntagmatic associations (*study-do homework, eat-drink*), which referred to meaning-based associative responses related to the semantic category in the general meaning and their tendency to co-occur in language (Fitzpatrick & Thwaites, 2020). However, as seen in our findings, most of the word associations based on the prototype referred to experiential connections (*sleep, do homework, sleep-study, eat, go to school, eat-do homework, and study-eat*). These results showed that "Daily Activities" gave rise to experiential knowledge since it might be a source of more associations regarding day-to-day life. These findings contradict previous results (Fitzpatrick & Thwaites, 2020; Agustín Llach, 2023a), given that their results revealed that paradigmatic associations are the most generated concerning vocabulary production through lexical availability. However, due care must be paid in relation to these statements since previous research was conducted within the traditional semantic categories used in LA.

Conclusions

This study set out to compare the lexical organization and production of English as a foreign language in two groups of L2 and L3 learners in response to "Daily Activities". The findings showed that although the

production of words was significantly similar, L2 learners retrieved a higher word retrieval than L3 learners due to memory and the psycholinguistic processes involved in lexical access. Prototypical word associations were shared by L2 and L3 learners within the top twenty most available words in a LAT. The first positions were related to basic needs (*sleep-eat*) since the vocabulary production was focused on the semantic category of “Daily Activities”. Most of the words retrieved were included in the basic level of categorization for being the shortest, fastest, and easiest to recall, specifically when responding to a time-controlled task, such as a LAT. Although the L2 learners obtained more production of words than L3 informants, the lexical availability index was higher in the group of heritage L3 learners due to the degree of availability, frequency, and order of appearance of a word in the list of responses within this group data. L2 and L3 learners' responses to the nontraditional semantic category of “Daily Activities” showed that verbs excelled over nouns, contrary to traditional semantic categories used in lexical availability studies. Extralinguistic verbal word forms were identified when exploring day-to-day life activities, such as collocations, multiword verbs, and unconventional constructions. Semantic networks indicated that L2 learners outperformed L3 learners regarding producing nodes and edges of word types. Concerning the type of prototypical word associations evoked by L2 and L3 EFL learners, they were most referred to as experiential connections followed by syntagmatic and paradigmatic associations, which means L2 and L3 learners associations are influenced by experience, culture, and word knowledge, least as far as “Daily Activities” is concerned. Further lexical availability studies in response to “Daily Activities” should be undertaken to broaden these findings based on prototypical word patterns, including larger samples of L2 and L3 informants and other nontraditional semantic categories. This study lays the groundwork for future research into how L2 and L3 learners organize their mental lexicons. It compares the participants' lexical availability output based on prototypical word associations, the types of semantic networks generated surrounding the prototype, and the production of novel word combinations, such as verbs rather than nouns.

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