The Interplay between Semantic Fluency and Learner Creativity in L2 Acquisition

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A R T I C L E   I N F O

A B S T R A C T

Creativity in L2 acquisition is an issue which has received considerable attention in domains related to the study of individual learner differences, lexical item memorisation and retrieval, bilingualism, teaching strategies. Despite that the interdependence of L2 creativity and verbal production of young English language learners has not received considerable attention so far. The aim of the current study is to examine the relationship between creativity and L2 word production fluency of a group of 52 10-11-year old Bulgarian primary school speakers of English. The performed descriptive statistical analysis of the data gathered revealed a strong interdependence between creativity (in its three dimensions – fluency, flexibility and originality) and the target language verbal production of the study subjects.

1.   INTRODUCTION

After the establishment of psycholinguistics as a scientific field in the 1950s, the body of research that tackles the issue of how children learn a second language (L2) has grown rapidly. Recent studies focused on examining the nature of L2 grammars of primary school students who learn English in the foreign language classroom have provided consistent

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evidence about the effect of the Universal Grammar to the acquisition of various linguistic domains, the cognitive factors influencing L2 learning, the interference of first language (L1), age, and the critical period on the overall mastery of the language. A focal point in the literature which provides insights on the processes of L2 acquisition is linguistic creativity. Given the fact that creativity is a multidimensional phenomenon which is intrinsically linked to curiosity, originality, flexibility and innovation, it is a construct that can be approached from a number of perspectives – psychological, cognitive and social. In psychology and psycholinguistics it is examined in relation to other variables which have an impact on the learning of a target language such as critical thinking (DeWaelsche 2015, Liang & Fung 2021), metacognition (Zhang 2010) and open-mindedness (DeWaele & Wei 2012), while cognitive linguistics and neuroscience highlight the positive role of creativity on L2 vocabulary development (Krönert, Marijanovic and Camps 2019, Fernández-Fontecha 2021, Suzuki *et al.* 2022).

Recently, a growing number of empirical works investigate the link between creative thinking and L2 vocabulary memorisation and retrieval through semantic fluency tasks (Benedek *et al.* 2020, Skalicky *et al.* 2017, Johnson *et al.* 2022). It has been found that the individuals demonstrating higher levels of creativity produce more association responses within a set time limit (Benedek & Neubauer 2013). Furthermore, their association responses are more uncommon and are based on semantic connections that are more distant. In addition, the semantic networks of the most creative L2 speakers are more flexible which allows them to produce a larger range of associations (Kenett *et al*. 2014, Gruszka and Necka 2002). Most of this research, however, has provided initial information about the interdependence of linguistic creativity and L2 vocabulary production of adult foreign language learners. Little data are available about the connection between creativity and the L2 semantic fluency (i.e. the ability of L2 speakers to generate words from a specific semantic category) of young learners of English. This study, therefore, aims to fill in this void by investigating the relationship between creativity and L2 word production fluency of a group of 10-11-year old Bulgarian primary school speakers of English. The gathered data will provide fresh evidence and new perspectives on the effect of creativity on the L2 vocabulary fluency of young English language learners and will suggest innovative ways to improve the pedagogical repertoire and practices of L2 vocabulary teaching and learning.

2. CREATIVITY AND L2 SEMANTIC FLUENCY AS STUDY VARIABLES

Creativity is a construct that has been given many different interpretations by researchers from various fields. Generally, it is often associated with curiosity, innovation and experimentation, as well as human traits such as imagination, giftedness, willingness to take risks and flexibility since it involves original thinking and problem-solving skills. According to Sternberg and Lubart (1999) it is "the ability to produce work that is both novel (i.e. original, unexpected) and appropriate (i.e. useful concerning task constraints)" (Sternberg and Lubart 1999: 3). In line with this Runco and Jaeger (2012) suggest that it entails originality and effectiveness, while Kahl and Hansen (2015) state that creativity is a process, an act of discovery that encompasses mental, emotional and cognitive elements. Such a view is also reflected by Walia (2019), Stefanova (2016) and Ionescu and Geantă (2018) who put forward

the claim that creativity is a dynamic concept which often leads to the generation of an outcome – a tangible product or a mental construct that is completely new.

The numerous perspectives towards the study of creativity propose a rich spectrum of models that outline its components. Guilford (1959) defines four essential components of creativity – fluency (linked to divergent thinking and the ability to generate a multitude of ideas), originality (the use of knowledge, products, objects and ideas in an innovative way), flexibility (the capacity to produce new patterns, to transform knowledge to reach a solution) and elaboration (the extent to which an individual details his creative ideas) (Fernandez-Fontecha 2021). Alternatively, Amabile (1996) proposes the Componential model of creativity that consists of three domains of multiple factors which are mutually dependent – the domain-relevant skills, the creativity-relevant skills and task motivations. For instance, the domain-relevant skills which include knowledge, technical skills, intelligence, expertise and talent are the foundation which allows individuals to act creatively. The creative-relevant skills (called "Creativity-relevant processes" in a later version of the model, see Amabile 2012) constitute the cognitive styles and the personal characteristics (i.e. risk-taking, independence, openness to new perspectives, etc.) of the individual that facilitate the synthesis, analysis and interpretation of available information with regard to the development of new and useful ideas. The last component – task motivation places an emphasis on the forces (internal and external) that initiate the undertaking of a task and its pursuit until its successful completion. Although the first model conceptualizes creativity as a correlate of divergent thinking, the second model places an emphasis on creative performance and creative products as an end result of an individual's skills to come up with new solutions to existing problems.

Another example of a model that describes creativity is the Four C Model (Kaufman & Beghetto 2009) which represents it as a continuum, a developmental sequence of levels of creativity skills that covers the whole life span. The gradation of creativity expands from the everyday creativity – the "little-c" creativity, which every individual has, to the genius type of creativity the "Big-C" creativity demonstrated by unconventional and ground-breaking artists, scientists, inventors. The model introduces also the "mini-c" creativity (related to learning and triggered by intrinsic motivation) and the "Pro-C" creativity (professional creativity involving expertise at the work place) since the authors acknowledge that a different level of creativity is used every time we attempt to solve a new task. They state that humans progress from the "mini-c" creativity demonstrated in early childhood to the "little-c" creativity in case supported and motivated to continue with the small acts of discoveries and refinement of knowledge and skills. While some individuals may never continue to develop their creative capacity due to lack of training or deliberate practice, some may proceed refining their creative thinking and move to the Pro-C or even the "Big-C" level. Such an outlook on creativity emphasizes its subjective nature and stresses the notion that it is an inherent characteristic of the creator and does not need to be shared with anyone else (Marzano 2022). Although, Kaufman & Beghetto's model suggests some linearity in the sequential evolution of creativity, it is not a purely linear model since it does not presuppose reaching a specific level before moving to the next.

The non-linearity of creativity is emphasized within the bulk of literature on the processes of convergent and divergent thinking and cognition (Lubart 2001, Sternberg,

Kaufman & Pretz 2013, Mekern, Sjoerds and Hommel 2019, Zhang, Sjoerds & Hommel 2020). Although divergent thinking involves flexibility since it leads to the generation of one of many possible solutions to a problem and convergent thinking relies on persistence when finding only one single solution to a problem, both types of thinking take part in the development of the connections between words in the L2 lexical network of foreign language learners and the principles governing the organization of this network. To date, the empirical studies addressing this link, have supported the assumption that divergent and convergent thinking (as components of creativity) facilitate the building of L2 semantic memory networks and the connectivity patterns within them (Borodkin *et al.* 2016, Stella and Kennet 2019). In fact, works along this line contribute to the underlying premises of the Associative Theory of Creativity (Mednik 1962) which postulates that creative thinking is the capacity to combine semantically remote concepts stored in the long-term memory into new clusters. Network science research has demonstrated that the semantic memory of people with higher creative potential is more flexible, i.e. it has faster and shorter connectivity links between remote concepts, compared to that of people with lower levels of creativity.

Among the methods used in psycholinguistics to analyse the organization of semantic memory in L2 acquisition are semantic fluency tasks in which participants have to recall as many words as possible from a given semantic category within a set period of time. Generally, the produced response sequence contains words which are semantically similar because when an L2 speaker is trying to retrieve vocabulary items from his/her semantic memory, the cognitive mechanisms involved in this process activate a cluster of words that fall within the same semantic category (Garcia-Castro 2022, Gorgan *et al.* 2009). Data from semantic fluency tasks can deepen not only our understanding of the mental organization and processing of target language vocabulary, but also the existing evidence concerning the link between L2 learners' creativity and L2 vocabulary production. Therefore, in our research we focus attention to the following three variables – *semantic fluency, verbal creativity* and *figural creativity*.

The research interest underlying the investigation of the first variable – *semantic fluency* covers the following aspects: the number of L2 words that each study subject retrieves, the grammatical classes of these words and the total number of vocabulary items produced. The data available will allow us to determine whether there is a relationship between L2 vocabulary knowledge, memorization and creativity in the priming of semantically related responses. The exploration of the other two variables will outline the creative profile of the study subjects measured by means of scores related to the verbal fluency, verbal flexibility and verbal originality of the study subjects in the completion of the verbal creativity test tasks, as well as on their figural originality.

3.   RESEARCH HYPOTHESIS AND QUESTIONS

The main hypothesis of the current study is that L2 learner creativity will have a positive impact on the target language semantic fluency of the research subjects.

The research study attempts to give answers to the following research questions (RQ):

RQ1: What creativity profiles do the participants of the study have based on their PIC-J test results?

RQ2: What similarities and differences are there between the L2 learners with higher levels and lower levels of creativity with regard to their semantic fluency?

4. METHODS

4.1. *Study participants*

The study sample comprised 52 L2 Bulgarian young learners of English as a foreign language from a compulsory state school. All study participants were in the 4th grade and had 4 English language classes per week during the school year. Their expose to English (spoken and written) covered a period of 4 years (starting the 2019/2020 school year) and was mainly in classroom settings. The study participants were taught by the same teacher over this 4-year period and used the same L2 coursebooks. Their mean age was 10.42 (SD = 1.145), while the gender ratio was 48.08 % (N = 25) male and 51.92 % (N = 27) female students.

The L2 level of proficiency of the study sample was not assessed since it did not exceed A1 CEFR level because they were all primary school pupils at the beginning stage of English language acquisition.

Participation in the study was voluntary. Written consent from the parents of the study subjects was collected one week before the start of the data collection procedure.

4.2. *The instruments*

4.2.1. *L2 semantic fluency tasks*

Four L2 semantic fluency tasks were designed for the purposes of the study. During the execution of a semantic fluency task the study subjects were asked to write down (on paper) as many words as possible that belonged to a specific semantic category (e.g. animals, fruits, vegetables, toys) in a period of 3 minutes. We deliberately chose these four semantic domains because during their L2 lessons over the 4 years at primary school the study sample had studied words belonging to each of them.

4.2.2. *The test of creative imagination*

The second instrument for data collection used in the current study was the Test of creative imagination (PIC-J test) (Artola *et al.* 2008) which belongs to the psychometric type of tests. Its main purpose was to assess the elements of divergent thinking comprising the creative profile of the study participants – flexibility, originality and fluency. The three games used in the current study were an adaptation of those provided in the original version of the PIC-J test.

In the first game the study subjects were shown a picture and were asked to make a written description of it. This task allowed the young L2 learners to use their imagination and curiosity

in speculating about what takes places in the situation presented in the picture. It measured their target language fluency and their flexibility.

The second game, which was adopted from the Alternative Uses Test of Guilford (1967), engaged the study respondents into thinking about different uses of an object (in our case a newspaper). The game assesses the ability of L2 speakers to search for and find possible new solutions to existing problems. Thus, it allows us to measure the study subjects' flexibility, fluency and originality by calculating the number of uses given for the object but with a specific focus on the rarity of category the response falls within.

In game three the study sample was asked to finish a set of 9 pictures and give a name to each of them[2]. This task assessed the capacity of the study participants to handle challenges and deal with unconventional ideas as they could complete the pictures in a multitude of ways depending on their imagination. As the previous game, this game measures the originality, flexibility and fluency of the study subjects.

4.3. *Data collection and analysis*

The collection of data took place in November 2022 during four regular classes of the study subjects. First we administered the semantic fluency tasks (12 minutes) and in the subsequent three lessons during the week we used the three games described above (10 minutes per game). In the four data collection sessions instructions were given to Bulgarian by the English language teacher of the study sample. The researcher, who was present in the L2 classroom during each session, was an observer and an assistant to the teacher in distributing and collecting the materials for the games.

The scoring of the semantic fluency tasks was done by counting the correct words produced in each of the four categories. Following the PIC-J test guide, the responses in the games were classified into different categories (e.g. emotions, actions, objects, plants, animals, places, people, toys, processes, events etc.). Scores were also obtained for each of the games in terms of flexibility (measured by the variety of responses and the categories to which these responses fit), originality (assessed in terms of the uniqueness of the produced responses on a scale from 0 – "not original at all to" to 3 – "very original") and fluency (measured through the number of given responses).

The global creativity of the study subjects was calculated as a sum of the verbal and figural creativity scores. SPSS software (version 29) was used to statistically process the results regarding the global creativity levels of the participants, as well as the adequacy and reliability of the data.

5. RESULTS

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[2] The original set of drawings is downloaded from https://onthesamepageelt.wordpress.com/2020/02/18/finish-the-picture/ (accessed 19 May 2023)

RQ1: What creativity profiles do the participants of the study have based on their PIC-J test results?

Based on their global creativity score the study participants were divided using a standard median split (Mdn = 86.00) into two groups – high creativity (HC) and low creativity (LC) group (Table 1).

Global creativity level groups	N	M	SD	Min	Max	Skewness	Kurtosis	Mdn
LC group	23	67.33	16.09	17.00	89.00	0.64	-0.38	67.00
HC group	29	121.94	22.74	91.00	204.00	1.75	1.93	110.00

Table 1.Descriptive statistics of the global creativity levels of the study subjects

The descriptive statistics of the global creativity levels of the two groups of study subjects shows that the Kurtosis ranges from -0.38 to 2.03 and the Skewness has a range from 0.64 to 1.75. The values of both measures fall within the acceptable ranges (-2 to +2 for Kurtosis and -7 to +7 for Skewness) (Hair *et al.* 2010), which is an indication of a normal uninvariate distribution.

The performed one-way ANOVA test revealed that there were statistically significant differences between the HC and LC groups regarding their global creativity, verbal creativity, verbal flexibility, verbal fluency and verbal originality with the exception of figural creativity (Table 2).

Variable	Global creativity group	N	M	SD	Min	Max	Skewness	Kurtosis	F (between groups)	p
Global creativity	LC group	23	58.32	16.21	18.00	91.00	-0.76	0.62	42.53	< 0.001
	HC group	29	119.48	27.17	95.00	201.00	1.70	3.28		
Verbal creativity	LC group	23	56.12	22.45	19.00	122.00	0.58	1.72	29.21	< 0.001
	HC group	29	108.31	27.65	69.00	193.00	1.64	2.33		
Verbal fluency	LC group	23	24.34	17.22	15.00	76.00	1.97	3.45	18.29	< 0.001
	HC group	29	53.78	12.15	47.00	110.00	1.66	3.79		
Verbal flexibility	LC group	23	17.26	3.68	10.00	30.00	-0.69	0.33	39.61	< 0.001
	HC group	29	26.47	3.98	35.00	48.00	-0.82	0.47		
Verbal originality	LC group	23	8.79	4.34	6.00	26.00	0.41	0.57	21.58	< 0.001
	HC group	29	23.55	18.47	15.00	73.00	1.83	1.89		
Figural creativity	LC group	23	6.29	3.78	5.00	7.00	0.28	0.31	5.63	> 0.05
	HC group	29	9.63	3.42	11.00	9.00	0.61	0.12		

Table 2.Descriptive statistics of the variables per creativity group

RQ2: What similarities and differences are there between the L2 learners with higher and lower levels of creativity with regard to their semantic fluency?

In order to give an answer to our second research question, we performed statistical descriptive analysis of each of the semantic fluency tasks. We calculated the number of words produced by the study participants in each category so that we could see which semantic category was most productive for the study sample (Table 3).

Semantic category	M	SD	Min	Max	Skewness	Kurtosis	Mdn
Animals	18.93	6.14	6.00	22.00	0.27	0.23	18.00
Fruits	11.34	5.53	4.00	19.00	0.52	-0.49	11.00
Vegetables	17.09	5.12	5.00	20.00	0.48	-0.26	17.00
Toys	10.21	5.08	3.00	19.00	0.37	0.17	10.00

Table 3.Descriptive statistics of the study sample responses per semantic fluency task category

The data in Table 3 show that the most productive semantic category is "Animals" followed by "Vegetables" and "Fruits". The semantic category with the lowest number of responses is "Toys".

Although the semantic categories presuppose the retrieval of words which belong to the grammatical category of nouns, the study respondents generated words belonging to other grammatical categories – adjectives and verbs. In each semantic category we established the absolute and the relative frequency of the retrieved lexical items. The absolute frequency provides information about the number of word classes that are suggested by each member of the study sample in each category, while the relative frequency shows the ratio of the frequency of unique and shared lexical items in each category to the total number of words produced by each creativity group in a semantic category.

Semantic category	Global creativity group	Total types	Unique types		Shared types	
		N	N	%	N	%
Animals	LC group	60	31	51,67	29	48,33
	HC group	89	50	56,18		43,82
Fruits	LC group	39	17	43,59	22	56,41
	HC group	59	37	62,71		37,29
Vegetables	LC group	41	15	36,59	26	63,41
	HC group	67	41	61,19		38,81
Toys	LC group	31	12	38,71	19	61,29
	HC group	48	29	60,42		39,58

Table 4.Descriptive statistics for absolute and relative frequency of each category per creativity group

The analysis of the absolute and relative frequency indicates that the HC group produced more lexical items in total (M = 65.75 of the total types) than the LC group (M = 42.75 of the total types) in all semantic categories in the fluency tasks. The number of unique types of words written by the HC group members of the study sample in each category is almost two times higher than the number of unique types of words given by the LC group members.

Although the semantic categories presuppose the retrieval of words which belong to the grammatical category of nouns, the study respondents generated words belonging to other grammatical categories – adjectives and verbs. The absolute and relative frequency distribution of the word classes in the unique types of words in each semantic category reveals that nouns are the most frequent grammatical class followed by adjectives which takes second place in all semantic categories and verbs which ranks third but only in the categories "Animals" and "Toys" (Table 5).

Semantic category	Creativity group	Nouns		Adjectives		Verbs	
		N	%	N	%	N	%
Animals	LC group	24	16,11	4	2,68	3	2,01
	HC group	37	37,76	8	5,37	5	3,36
Fruits	LC group	11	11,22	6	6,12	0	0
	HC group	29	26,85	8	8,16	0	0
Vegetables	LC group	9	8,33	6	5,56	0	0
	HC group	31	28,70	10	9,26	0	0
Toys	LC group	9	11,39	3	3,80	4	5,06
	HC	14	17,72	9	11,39	6	7,59

Table 5.Descriptive statistics for absolute and relative frequency: word classes in unique types

Qualitative results in Table 5 indicate that the HC group triggered more lexical items in the word class of adjectives in all semantic categories than the LC group. For example, the adjectives generated in the category "Animals" refer to their description in terms of size (e.g. *big, small, enormous*), weight (e.g. *heavy, light*), physical features (e.g. *strong, beautiful, nice, fluffy, long*), feelings they evoke in humans (e.g. *cute, dangerous, lovely*). In the category "Vegetables" the shared vocabulary includes colours and words for shape and size (e.g. big, small, enormous, green, yellow, etc.). The new semantic fields that appear in the semantic category refer to taste (e.g. *sweet, hot, tasty*) and to healthy living (e.g. *healthy food, unhealthy food, junk food*). In the last semantic category – "Toys" the verbs given by the HC group denote different activities children do when they use different toys (e.g. *ride (a bike), hit (a ball), jump, score (a goal), throw*) or when accidents take place (e.g. *break (a window with a ball), break (a toy)*).

6. DISCUSSION

The study results concerning the first research question demonstrated that regarding global creativity the study subjects were divided into two main groups – the high creativity group (comprising 29 young L2 learners of English) and the low creativity group (comprising 23 L2 young learners of English). The statistical variance between the two groups was highest in verbal flexibility followed by verbal creativity and verbal originality. Verbal creativity is the variable in which the two groups have highest scores. The second variable for the HC group is verbal fluency, while the LC group obtained relatively similar results in verbal fluency and verbal flexibility. Verbal originality is the variable in which the difference between the two groups is the biggest. These results comply to an extend to the data available from other studies in which verbal fluency was the variable with the highest score and verbal flexibility and originality followed next (Fernandez-Fontecha 2021; Ferrándiz *et al.* 2017). A plausible explanation for our result could be found in the essence of the tasks used in determining the study sample global creativity and its variables (fluency, flexibility and originality) since the PIC-J test assess creativity through the use of verbal and figural content. In fact, our results correspond to the claims of other researchers who have established that students' performance on creativity assessment tests depends largely on the content (verbal or figural) of the tasks used in the test (Ferrándiz *et al.* 2017, Lemos, Abad, Almeida & Colom, 2013).

With regard to the first research question, it has to be noted that figural creativity is the variable in which no significant statistical differences between the two creativity groups were observed. This is consistent with the data available from Fernandez-Fontecha (2021) and Artola *et al.* (2011).

Regarding our second research question we established that the HC group subjects produced higher number of lexical items in each semantic category compared to the members of the LC group. Along with that the total number of unique types in the semantic categories "Animals", "Vegetables", "Fruits" and "Toys". The main reasons behind the overall larger retrieval of words in the first two categories could be the fact that they are the categories the study participants used in their L2 classes prior to the administration of the semantic fluency tasks and the PIC-J test. The category "Animals" was the most productive because some of the study respondents have pets or watch TV programmes related to animals. Strangely enough the category "Toys" was the least productive category. However, it was the semantic category in which in which the L2 young learners generated verbs related to different types of activities performed while playing. It is difficult to explain why the category "Toys" ranked lowest in terms of lexical item retrieval. However, the results prove what was already revealed in previous empirical studies – highly concrete words that denote objects are difficult to retrieve (Fernandez-Fontecha 2021) due to the limitations imposed by the semantic space these words have.

Aiming to discover the similarities and differences between the two groups of study respondents and their performance on the different semantic tasks with regard to their creativity, we examined the unique and shared types of responses given by each group. As expected, the HS group generated a higher number of unique types in all categories and both groups produced mainly lexical items belonging to the grammatical category of nouns, followed by adjectives (in all semantic categories) and verbs (only in the categories "Animals" and "Toys"). Another fact worth mentioning is that the member of the HC group gave the most unexpected responses (i.e. unique types) and reached deeper in the semantic space of each category. These results are a par with the data available for the link between divergent thinking and the deeper and flexible semantic networks of creative individuals (Kenett et al., 2014; Benedek & Neubauer, 2013).

7.   LIMITATIONS OF THE STUDY

The main limitation in performing the study is the limited command of the target language which the study participants have. Although there are research data which suggest that language proficiency has no impact on the L2 learner creativity (Albert 2006), further research is necessary to shed light on the relationship of these two variables.

8.   CONCLUSION

The results of the study indicate that there is considerable interplay between L2 learners' creativity and their verbal production in tasks that involve the retrieval of lexical items from a

specific category. This is particularly evident in cases when the semantic categories are less concrete or when the task allows individuals to change the focus and choose one of the many possible solutions. The results of the current study also imply that verbal originality and verbal flexibility are the two main indicators of creativity since the HC and LC groups manifested strong dissimilarities in these variables. Cognitive flexibility is thus an essential asset of L2 creativity as it is the directly related to the capacity of individuals to make connections between distant ideas. This also comes to suggest that creative L2 learners would use their creative abilities when copying with challenges arising in their L2 written production. It is necessary to continue the study of the link between L2 creativity and semantic fluency and expand it to refer to domains such as L2 creativity training programmes targeted at young foreign language learners.

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