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**RELATIONSHIP BETWEEN RECEPTIVE AND PRODUCTIVE
KNOWLEDGE OF WORD FAMILIES: THE CASE OF LEARNERS OF
ENGLISH**

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INTRODUCTION

Mastering a foreign language is hard work. To be successful in learning and teaching a foreign language and to prepare the most appropriate methodology for second language learners, it is essential to understand how people acquire linguistic knowledge and how they apply it in practice. Second language acquisition as a field of scientific inquiry is quite new, it has been systematically researched only since the 1970s (Language teaching, 2008).

Learning of foreign language is highly related to learning and increasing vocabulary. There is scientific evidence of a high correlation between vocabulary size and language proficiency, i.e., ability to use language (Schmitt, 2010). Although students, teachers, material writers, and researchers agree that learning vocabulary is an essential element when learning and using a second language, the best means of achieving good vocabulary knowledge is still unclear (Schmitt, 2008). The lack of and the need for such information resulted from an increase in vocabulary research in the last few decades and it became one of the most extensively researched areas in second language learning, teaching, processing, and assessment (Nation, 2013). Despite a large amount of research done, there is a real necessity for further investigation in the field. No less important is to replicate previous studies in L2 learning and teaching in order to confirm their outcomes and validate results as it is a requirement of scientific inquiry (Language teaching, 2008)

For a long time, word lists were used to guide learner's lexical acquisition, prepare course material, and design vocabulary tests. This has led to a discussion among researchers what are the principles of the optimal word list (Stoeskel et al., 2018). The key question is to find the best ways of grouping words on such a list, that is, the researchers have to find out how many related words learners would know if they know a headword. The answer to this question is very important as the choice of the lexical unit has a great impact on the vocabulary learning process and influences the research results.

Well known word lists, such as General Service List (West, 1953), Academic Word List (Coxhead, 2000), or instruments such as the Vocabulary Level Test (Schmitt, Schmitt, & Clapham, 2001) and the Vocabulary Size Test (Nation & Beglar, 2007) utilize word families as grouping units, which include headwords together with many of their inflections, regular derivations, and irregular but frequent derived forms. However, researchers have begun to question whether the word family is really an appropriate lexical unit in vocabulary studies and this question became currently the

subject of active scientific debate internationally (e. g., Ward and Chuenjundaeng, 2009; Kremmel, 2016; Brown et. al, 2020).

To answer the question about the appropriateness of word family as a lexical unit and to find an argument for the discussion researchers carry out new researches and analyse different aspects of vocabulary knowledge, look for proves in previous studies, compare the word family with other lexical units in order to find its advantages and disadvantages, etc. Although researchers agree that the word family is the largest and the most complex lexical unit it is still very little explored and none of the studies has so far investigated the relations within members of the word family. This study attempts to fill this gap and to extend the information available on the word family and provide a more complete picture of this lexical unit by conducting empirical research with Lithuanian learners of English.

The **subject** of the present study is the receptive and productive vocabulary knowledge of members of selected word families. The study **aims** to investigate the relationship between receptive and productive knowledge of members of a word family of native Lithuanian speakers who learn English as a foreign language. To achieve the aim, the following **objectives** were set:

1. to review the literature on the word family as well as receptive and productive knowledge,
2. to identify learners' productive knowledge of members of a word family,
3. to determine learners' receptive knowledge of members of a word family,
4. to establish the relationship between receptive and productive knowledge of word family members.

The quantitative approach to the empirical research was adopted. Descriptive and inferential statistics were used to analyse the data collected. The part of the research dedicated to the testing of receptive knowledge partially replicates Schmitt and Zimmerman's (2002) study.

The paper has the following structure. It consists of three chapters. The first chapter of the paper deals with the literature review on this particular topic, explains the main concepts and terms used, discusses the factors influencing the vocabulary learning process, presents the prevailing views on two types of word knowledge, and talks about a word family as a lexical unit in vocabulary studies. The second chapter describes the methodology used, which explains who were the participants of the survey, how the data was collected and analysed. The third chapter presents the results of the empirical survey conducted. Finally, conclusions are drawn from the results of the analysis. The research also provides references, data sources, and summaries in English and Lithuanian.

I. RECEPTIVE AND PRODUCTIVE KNOWLEDGE OF A WORD AND WORD FAMILY IN VOCABULARY STUDIES

1.1. Factors influencing vocabulary learning

Everyone agrees that if you want to speak a foreign language you have to start from learning the words of that language, but what does it mean to learn a word? Many people consider that the word is learned if they know the written/ spoken form and the meaning of a word. In reality, learning the word is a much more complex process than it seems. It just starts from recognizing the form and the meaning of the word but later word knowledge encompasses many other aspects such as grammatical patterns, collocations, appropriate register, etc. that have to be learned in order to use the word in speech or writing correctly. In the initial learning stage information about an individual word is learned. The next step is to find out how to integrate this knowledge of a single word into an entire sophisticated and often confusing language system.

It takes some effort to learn a word. Different words demand different learning efforts. Word learning depends on a variety of factors that can increase or decrease the effort required. These factors can be classified as linguistic factors and socio-contextual factors (González-Fernandez, 2018). Linguistic factors in vocabulary acquisition are based on learners' different language backgrounds. The main principle is that the more a word coincides with patterns and knowledge that learners are already familiar with the less effort is needed (Nation, 1990). These patterns and this knowledge can come from the native language or the prior knowledge of the other learned foreign language. For example, if the word has the same sound as in the learners' first language, follows the usual spelling pattern, has a common origin, uses similar grammatical structures and collocations for such learners it will be easy to learn new foreign language words compared to those learners whose first language is not related to the second language. (Schmitt, 2010; González-Fernandez, 2018).

The socio-contextual factors involve features such as the learner's age, motivation, the way of teaching language, or the circumstances that determined the learning of the word. These socio-contextual factors are less regular and normally more difficult to handle than linguistic ones (González-Fernandez, 2018). All in all, learning words, building up vocabulary, and mastering language is a long and laborious process. The fact that people usually speak only one or very few foreign languages just confirms the complexity of the matter.

1.2. Perceptive and productive knowledge

This section provides an overview of the theory on receptive and productive knowledge. It explains the distinction between two types of knowledge, outlines different views on word knowledge components, and presents tests used in vocabulary research.

1.2.1. The difficulty defining receptive and productive knowledge

Lexical knowledge is a complex construct that involves mastering various types of skills. Traditionally, linguists distinguish between receptive and productive knowledge (e. g., Laufer & Goldstein, 2004; Webb, 2008; Nation, 2013). Receptive knowledge refers to learner's ability to understand a word when he/she hears or sees it, whereas productive knowledge indicates the learner's ability to produce a word and use it in his/ her speech or writing. Receptive knowledge carries the idea that the learner receives input from others through listening or reading and in the case of productive knowledge the learner himself produces language forms by speaking and writing to convey a message to others (Nation, 2001, p.24). Often scholars refer to receptive and productive knowledge as passive and active and use the terms interchangeably. Both terms will be used in this research as well. Such distinction between receptive and productive knowledge has been widely used to describe the multifacetedness of vocabulary knowledge (Nation, 2013), to conduct empirical studies (Melka, 1982; Schmitt & Zimmerman, 2002), to design tests for measuring the lexical knowledge (Laufer & Goldstein, 2004; Schmitt et al., 2001; Laufer & Nation, 1995) and other purposes.

While the general principles of dividing knowledge into receptive and productive seem clear, in reality, things are not that simple. Scholars themselves admit that there is no precise definition of the two types of lexical knowledge (Schmitt, 2010; Melka, 1982; Nation, 2002; Pignot-Shahov, 2012); therefore, different researchers characterize and explain these two notions differently.

For example, Webb (2008) perceives receptive knowledge of the word as the learner's ability to recognize the form of the L2 lexical unit and to provide its meaning and synonyms in L1, whereas he defines productive knowledge as the learner's ability to recall the L2 word form when the meaning of the L1 word is known. From Laufer and Goldstein's (2004) point of view, receptive knowledge means the ability to recall and supply the L1 word form to demonstrate an understanding of the meaning of the L2 word, and productive knowledge means the ability to recall the form of the L2 word once the meaning is known. Besides, in another study Laufer (1998) examined productive knowledge in detail and distinguished two types of productive knowledge:

controlled and free. The first type refers to the forced use of the word following the instructions of the task/ teacher but not the learner’s initiative. Free productive knowledge, on the contrary, refers to the voluntary use of the lexical item at one’s free will.

Besides definitions, researchers have different attitudes towards the specific skills that should be assigned to each of these two types of knowledge. For example, Nation (2001) prepared a very detailed classification of word knowledge that is shown in Table 1 (p. 27). The most general level of word knowledge includes knowledge of form, knowledge of meaning, and knowledge of use. Then he subdivides each of these categories into three subcategories. All subcategories together reflect all aspects of the word knowledge and explain how receptive and productive knowledge in each step relate. According to Schmitt (2010), “this is the best specification of the range of ‘word knowledge’ aspects to date” (p. 33).

Table 1. *What is involved in knowing a word*

Form	Spoken	R	What does the word sound like?
		P	How is the word pronounced?
	Written	R	What does the word look like?
		P	How is the word written and spelled?
	Word parts	R	What parts are recognizable in this word?
		P	What word parts are needed to express this meaning?
Meaning	Form and meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
	Concept and referents	R	What is included in the concept?
		P	What items can the concept refer to?
	Associations	R	What other words does this make us think of?
		P	What other words could we use instead of this one?
Use	Grammatical functions	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	Collocations	R	What words or types of words occur with this one?
		P	What words or types of words must we use with this one?
	Constraints on use (register, frequency ...)	R	Where, when, and how often would we expect to meet this word?
		P	Where, when, and how often can we use this word?

Note. In column 3, R = receptive knowledge, P = productive knowledge; from Nation (2001, p. 27).

According to the classification provided, receptive knowledge implies the recognition of written and spoken forms of the word, knowledge of morphological structures, grammatical relationships with other words and collocations; knowledge of the meaning of concept and associations with other words, as well as the frequency of occurrence of the word and its appropriate use according to context (register, style). Productive knowledge, on the other hand, denotes the ability to pronounce and write the word correctly, to construct the word using the right word parts, use it in a grammatically correct way in appropriate contexts, to produce synonyms and antonyms, to use collocations well, and to use it to suit the degree of formality of the situation (Nation, 2001).

By contrast, Laufer and Goldstein (2004) do not include as much information about each lexical unit into the knowledge structure. In their view, passive knowledge of the word is limited to the ability to recognize its form and retrieve its meanings, while active knowledge involves the ability to retrieve the written or spoken form of the word based on the meaning. Furthermore, Laufer and Nation (2001) suggest that another additional component such as fluency, or automaticity, to active and passive vocabulary knowledge, should be added because these two types of knowledge do not cover all aspects of vocabulary knowledge. Fluency shows the speed with which “a learner can access the various kinds of knowledge” (p. 9) which has a great impact on vocabulary learning.

To summarize, there is a lack of consensus on the definition of receptive and productive vocabulary knowledge, therefore the researchers, who carry out analysis in this field to avoid misunderstanding and confusion should clearly and precisely explain the terms they use.

1.2.2. The relationship between receptive and productive knowledge

According to Pignot-Shahov (2012), one of the most controversial issues associated with the receptive and productive aspects of vocabulary which divided researchers is the clarification of their relationship. Just as researchers do not find a consensus on the concepts of receptive and productive knowledge, so they do not agree “whether this distinction is dichotomous or whether it constitutes a continuum” (Laufer & Goldstein, 2004, p. 405).

Melka (1982) perceives receptive and productive knowledge as a continuum. According to her theory, receptive knowledge gradually moves to productive mastery as the learner learns more about the lexical item. She states that at some points the two modes of word knowledge overlap and interact, therefore they cannot be considered as two separate systems but rather as one. There is though no clear threshold at which receptive knowledge becomes productive.

Laufer and Goldstein (2004) are other linguists supporting the theory that two types of lexical knowledge constitute a continuum but they have a slightly different approach to the issue. The authors propose a hierarchy of four interrelated levels of knowledge which they refer to as “degrees of “strength” of knowledge” (p. 408). Based on the relationships between supplying the form for a given meaning versus supplying the meaning for a given form, and being able to recall versus only being able to recognize (whether form or meaning) authors divided vocabulary knowledge into the following categories:

Table 2. *Degrees of vocabulary knowledge*

	Recall	Recognition
Active (retrieval of form)	Supply the L2 word	Select the L2 word
Passive (retrieval of meaning)	Supply the L1 word	Select the L1 word

Note. From Laufer and Goldstein (2004, p. 407)

They found evidence that the most difficult degree of knowledge of meaning for learners is active recall and the least difficult knowledge is passive recognition:

passive recognition < active recognition < passive recall < active recall.

However, Meara (1996) perceives the relationship between the two types of lexical knowledge in a different way. He affirms that the distinction between receptive and productive vocabulary is clear and not gradual and turns from receptive to productive knowledge is based on the number and quality of the connections and network among lexical items.

Researchers have carried out several studies to understand and quantify the relationship between productive and receptive knowledge; nonetheless, the answer is still vague as the results of various research that measured the extent to which receptive vocabulary is known productively vary from 16% to 92%. Such a wide disagreement between results is affected by a small number of studies conducted, inconsistency in methodology and concepts used (Schmitt, 2010, p. 80).

In conclusion, although researchers agree about the principal classification of knowledge to receptive and productive, they hold opposing views on how they relate to each other whether as a continuum or as two separate poles. The relationship between receptive and productive knowledge is still a little-explored area that requires more research as the current results of the studies are very inconsistent.

1.2.3. Measuring depth and breadth of vocabulary knowledge

To better understand how learners gain lexical knowledge and to assess each type of knowledge researchers use vocabulary tests. What vocabulary test to use depends on the test designer's definition of vocabulary knowledge, the type of knowledge (productive/ receptive) he/ she wants to measure, and the aim of the research. Two aspects of vocabulary knowledge are usually distinguished: depth and breadth. Vocabulary breadth is defined as "the number of words for which the person knows at least some of the significant aspects of meaning" and vocabulary depth as "the quality or depth of understanding" (Anderson & Freebody, 1981, p. 93). So, size tests measure the number of words a person knows and depth tests indicate how well those words are known.

Measuring the depth of vocabulary is a more complex task than measuring size. What kind of test to use for measuring the depth depends on the researcher's approach to vocabulary knowledge, i.e., whether he or she takes a developmental approach or a components' approach. The components approach means dividing the word knowledge construct into smaller units and quantifying the learner's mastery of "some of the type of word knowledge one can have about lexical item" (Schmitt, 2010, p. 238). The tests applied are typically productive and include a variety of productive tasks such as translating, producing free speech, or writing. The principal representative of this approach is Paul Nation whose classification of the components, or dimensions, is presented in Table 1.

The developmental approach is based on the incremental nature of vocabulary learning and considers vocabulary learning as a continuum (Schmitt, 2010). One way to track changes in vocabulary development is to use vocabulary knowledge developmental scales. However, it is very difficult to prepare a workable scale because there is still very little information about the progress of vocabulary knowledge. It is obvious that the scale should have the beginning point 'no knowledge' and the ending point 'full mastery of the item' but the problem is to organize stages in between to identify receptive but not productive knowledge. There are several developmental scales but the best known and most widely used is the Vocabulary Knowledge Scale (Paribakht & Welche, 1997). It was "designed to track the initial stages in word learning that are amenable to accurate self-report or demonstration through the use of a five-category Elicitation Scale that provides information for scoring using a five-level Scoring Scale" (p. 218). The examinee has to answer *how well* they know the tested item. The limitation of this scale is that it does not estimate lexical knowledge or give precise characteristics of the process of learning words. Another example

of developmental scales is Schmitt and Zimmerman scale that has four stages. Using this scale examinee has to self-evaluate and answer what they *are able to achieve* with a language.

Size tests have a more precise definition and clear object than depth tests therefore they are more frequently applied in vocabulary studies. Usually, size tests are based on the linking form and meaning of a word, i.e., the participant is asked to map L2 form to its L1 meaning and/or L1 meaning to the correct L2 form. The advantage of size tests is that they can test a large number of lexical units while depth tests deal with a limited number of items. The size tests generally measure the size of the receptive and productive vocabulary. A number of studies showed that receptive knowledge is more developed than productive (e. g., Melka, 1982; Laufer, 1998; Webb, 2008), and it is widely agreed that the word frequency plays a key factor in receptive and productive vocabulary knowledge (Pignot-Shahov, 2012).

While designing tests researchers have to decide what lexical item to use as a counting unit because “different ways of counting lexical items will lead to vastly different results” (Schmitt, 2010, p. 188). The most commonly used units of counting vocabulary are tokens, types, lemmas, and word families. Tokens identify the number of running words in a written or spoken text. Types are the number of different words in a text. A lemma is a group of words consisting “of a headword and its inflected and reduced (n’t) forms” (Nation, 2001, p. 7). And a word family is the largest and the most complex lexical unit, which will be discussed in the next chapter.

1.3. Word family as a lexical unit in vocabulary studies

This section deals with the issues related to the word family. It provides a definition of the word family and explains the idea of this lexical unit, describes the members of a word family, and present three studies in which word family was used as a counting unit. Schmitt and Zimmerman’s (2002) study analyzed was partially replicated in our research.

1.3.1. The idea and the use of a word family

A word family is defined as a group of related words consisting of “a headword (sometimes referred to as a base word), its inflected forms and a small number of reasonably regular derivations made from certain uses of certain affixes” (Daulton, 2008, p.111). For example, the words *work* (headword), *works*, *worker*, *working*, *workshop*, *rework* are the members of the same word family. The word family was introduced by Bauer and Nation (1993) in 1993 and is widely accepted by other researchers. The idea of the word family is that if a learner knows the base form or derived

form, he/ she can easily recognize other members of the family. Learners having morphological knowledge of affixation can understand the meaning of a family member without having to memorize each form separately (Bauer & Nation, 1993, p. 253). It is assumed that such readers can carry out minimal morphological analysis to recognize the meaning of regular inflected forms and derivations. For instance, if a learner knows the word *govern* and is acquainted with the prefix *mis-*, then *misgovern* requires minimal if any additional learning (Goulden et al, 1990, p. 343).

According to Bauer and Nation, the grouping of words into word families should be based on productivity, frequency, regularity, and predictability (1993, p. 254). They have attempted to organize reasonably regular predictable patterns of word building into seven stages which shows that increasing proficiency leads to the growth of word family members. The learners with a more developed knowledge of affixation add more words to word families because they can recognize less frequent or even irregular members. For example, at the beginning knowing the word *mend* can involve knowing such forms, meanings, and uses of the word as *mends*, *mended*, or *mending*, and at an advanced stage of learning knowing the same word *mend* may be extended adding the words *mender*, *mendable* und *unmendable* (Nation, 2001, p. 47).

Many studies were conducted to measure the vocabulary size of native speakers and second language learners to assess how big a vocabulary is needed for second language learners to use English well. There are well over 54,000 word families in English. As a rule of thumb, educated native speaker of English knows about 20,000 word families (Nation & Waring, 1997, p. 6). Second language learners require receptive vocabulary knowledge of 8,000-9,000 word families to comprehend a variety of written English texts and knowledge of 6,000-7,000 word families for dealing with spoken text (Nation, 2006, p.79), but, in reality, after finishing school L2 learners in various countries know roughly 2,000-4,000 word families (Laufer, 2000, p.48). It is obvious that the gap between what is known and what is needed is large, therefore the process of vocabulary acquisition, development of receptive and productive skills is an object of great interest among scientists.

The concept of a word family is not only a linguistic term used in language research and teaching but it is a psychologically real unit justified by psycholinguistic evidence. Psycholinguistic research carried out with native speakers suggests that the human mind groups known members of the word family together therefore when we talk about knowing a word, in fact, we should be talking about

knowing a word family. However, most L2 learners will not have word families as inclusive as those of native speakers (Nation, 2006; Schmitt & Zimmermann, 2002).

Although most linguists admit that word families should be transparent and they agree on the general principles for assigning words into word families, at the same time they hold differing views on the criteria for word family inclusion therefore the average number of members in a word family varies. For example, according to Nagy and Anderson's (1984) research, using more flexible criteria an average word family has 7.64 types, and applying stricter rules, including only very transparent family members the figure decreases to 4.66 types. When Bauer and Nation (1993) analysed the first 5,000 words of English and excluded unproductive or less useful affixes, they produced 3,000 word families containing on average 1.67 types per family. Researchers or teachers have to decide what words to include into word family lists depending on their goals. In sum, despite the theoretical definition of a word family as a lexical unit being relatively clear, the practical assignment of words into word families is ambiguous and depends on criteria set by the researcher.

1.3.2. Members of a word family: inflections and derivations

Based on definition there are two groups of members in a word family: derivations and inflections. Inflections and derivations are built by attaching affixes – suffixes or prefixes – to a word stem. The stems of complex words may be free or bound forms. Free forms can stand alone as words with no affixes (e. g. *act, write*), while bound forms cannot stand without a prefix or suffix (e. g. *ject* as in *reject*). Headwords are the most morphologically basic form in word families (Dalton, 2008).

In word building, the inflected forms are the third person *-s, -ed, -ing*, plural *-s*, possessive *-s*, comparative *-er*, and superlative *-est* and sometimes the past participle is included. Inflection applies in more or less regular patterns to all members of a part of speech. Inflectional suffixes do not change a word class, they only carry out a linguistic function by indicating a number (*apple-apples* (noun), *run-runs* (the third person singular of a verb, present tense)), tense (*smile-smiled* (past tense of the verb)), or a comparison (*strong-stronger* (adjective)) (Nation, 2013; Sukying, 2020).

By contrast, the formation of derivatives is not always transparent, because the number of affixes is much greater, their usage and frequency are irregular, so the learners each time have to decide on the correct form of the word from scratch. Derivational affixes include prefixes and suffixes.

Prefixes may change merely the meaning of the base and leave a category unchanged (e.g., *write-rewrite*, *lucky-unlucky*) while by adding suffixes typically a member of a different word class is produced. For example, adding the suffix *-ion* to the verb *create* will designate it the noun *creation*, whereas the addition of the suffix *-ive* to the same verb will alter it to the adjective *creative* (Sukying, 2020; Daulton, 2008). Due to irregularities derivations are generally acquired after inflections (Schmitt & Zimmerman, 2002).

Inflected forms and derivations are crucial to vocabulary building and communication, as they are frequently encountered in English. By one estimate, about 21.9 % of words in written texts are inflected and 12.8 % are derived (Nation, 2001, p. 266). It is irrational to learn all the affixes. The best is to focus on learning the most useful affixes, which are especially productive in inflectional and derivational word building. The four most common prefixes in English are *un-*, *re-*, *in-* (meaning not), and *dis-* as they are used for creating 58 % of prefixed words. The top 10 suffixes are: *-s* and *-es*, *-ed*; *-ing*; *-ly*; *-er* and *-or* (agentive); *-ion*, *-tion*, *-ation*, and *-ition*; *-ible* and *-able*; *-al* and *-ial*; *-y*; and *-ness*, and they constitute 85% of suffixed words (Dalton, 2008, p. 113).

It is clear that understanding word parts, knowing the meaning and function of the affixes, and learning word building rules could be very beneficial for English language learners as it could greatly improve their receptive and productive skills. Firstly, affixational and morphological knowledge helps learners to access, interpret, and recall the meaning of complex words. This is especially true for academic text as academic language is typically more sophisticated, elaborated, includes a lot of words of Greek or Latin origin. Secondly, they can learn new words since they may be able to guess the meaning of the word by relating known information to other information which they do not know. Also, understanding how words are built and how they relate to one other may facilitate the efficiency of learning new words. Knowledge of affixes can decrease the effort required for learning morphologically complex words by breaking unknown words into known parts and relating words to word families (Sukying, 2020).

Thus, studies emphasize the importance of explicitly drawing learner's attention to word parts and word building principles, and the need to investigate further affixation process as word formation is one of "the most abstract and difficult aspect of morphology that students must learn" (Nagy et al., 1993, p. 156).

1.3.3. Word families for L2 vocabulary research and pedagogy

One of the most important issues in L2 vocabulary research and pedagogy is the choice of a lexical unit because it influences the results of research or teaching techniques in pedagogy. The appropriate lexical unit should align with learners' abilities. The assumptions about the learners' language skills determine the choice of a lexical unit. For example, the type is used for learners that cannot deal with variation in form, the lemma is used for learners that can recognize inflections as forms of a base word, and in the case of the word family, it is assumed that learners with knowledge of one family member are able to comprehend other family members. Due to the complexity of the word family, this lexical unit is not suitable for beginners and generally is advisable for teaching and testing advanced learners (Schmitt, 2010, Brown et al., 2020).

After renowned researchers Bauer and Nation (1993) published their article in which they presented the idea of the word family, the word family became a typical lexical unit used in L2 English vocabulary studies, especially related to reading and listening, during the last 20 years (Braun et al., 2020, p. 1). Other scientists also liked the comprehensive and logical scheme of learning affixes, word-family-based word lists and started developing new tests for assessing vocabulary knowledge, therefore most vocabulary tests used until now have been created with the word family as the counting unit. For example, the Vocabulary Level Test (Schmitt, Schmitt, & Clapham, 2001), the Vocabulary Size Test (Nation & Beglar, 2007), the Computer Adaptive Test of Size and Strength (Laufen & Goldstein, 2004), or later developed the Lexical Test for Advanced Learners of English (Lemhoefer & Broersma, 2012), etc. work with the family members as counting unit (Kremmel, 2016). Tests can be used to examine vocabulary size as well as to test specific components of the knowledge, as well as the relationship between vocabulary size and some word knowledge. It is up to the researcher to decide which test is best for particular research.

For example, **Schmitt and Zimmerman (2002)** investigated the syntactic knowledge of derivative affixes in the four major word classes (i.e., noun, verb, adjective, and adverb) across members of a word family and in relation to more global knowledge of the target words. The participants in this study were 36 native-speaking university students and 106 non-native learners of English from three groups: 50 advanced English as a second language (ESL) students in an intensive English (preuniversity) program at a U.S. university, 36 advanced ESL undergraduate and graduate students taking one ESL writing course at a U.S. university, and 20 graduate ESL students completing a master's degree in English language teaching (MA-ELT) at a university in the United Kingdom. To avoid the influence of morphology knowledge of Romance language 96 out of 106

participants were Asians. The study was conducted at universities in the UK and the U.S. 16 target words were selected from the Academic Word List (AWL; Coxhead, 2000). Firstly, to investigate learners' knowledge of derivatives in conjunction with their global knowledge the four-level development scale was used. The participants who had claimed to know the word well had to construct a sentence for that word. Secondly, to test derivational knowledge participants were asked to produce target words in the correct word forms in a prompted context. For each selected word four sentences representing four word classes were presented. Participants had to indicate if derived forms of the word did not exist.

The results of the study did not support a strong facilitative effect for knowledge of words within a word family. The findings indicated that it was relatively uncommon for subjects to know all four word forms or none of them. ESL students produced an average of 58.8% of the derived words; that is, learners could produce, on average, two of four possible derived words within a family. The participants failed to produce any derivatives for less than 6,6 % of the target words; however, full mastery of the word family was also observed in a small percentage of the case as the most advanced participants produced less than 43 of the possible derivatives for words. It means that even for words rated as well known, the word family was known only partially. Data showed greater productive knowledge of verb and noun forms while adjectives and adverbs forms appeared for participants more difficult to produce. The results may imply a need for more attention to the teaching of derivative technics.

Ward and Chuengjundaeng (2009) investigated whether knowledge of a word facilitates an understanding of other words within a word family. Participants of the study were two groups of students in a Thai university; one group consisted of first- and second-year undergraduate students from the Faculty of Engineering (G1), and the other included participants from the Faculty of Medicine (G2). It was assumed that students in G2 were more advanced as they had higher English scores on the entrance examination and the medical program was more selective than the engineering program. Both groups were given a simple L2-L1 translation test with a one-week interval between the two tests. The participants were required to write down the L1 meaning of the 32 target words from different word families. The first test comprised 16 headwords and 16 derived words, while the second test consisted of 16 derived words from the headwords in the first test and 16 headwords of the derived words in the first test. To illustrate, if in the first test, the students were required to translate *consume*, in the second week, they would be asked to translate *consumer*, and vice versa; if *assignment* was given in the first week, *assign* would be given in the second week.

For the test word families from the AWL (Coxhead, 2000) selected. Four supposedly easy and frequent suffixes such as *-tion*, *-er*, *-ity*, and *-ment* were chosen for investigation.

The data revealed that in group G1 just in less than 10 % of cases both headword and derived form was known, in 75-80 % of word pairs neither form was known because participants lacked basic vocabulary knowledge, and with their vocabulary knowledge they could write down the meaning of only one form in 4-17 % cases. The students from group G2 demonstrated better word-building knowledge: both forms were known in 14-35% cases, none of the forms in 35-57 % cases, one form in less than 20 % cases. Test results contradict the assumption that knowledge of headwords implies knowledge of other members of the family, at least with lower-level students from the non-Latina L1 background. The result also suggests that the use of word families as a counting tool leads to highly misleading conclusions, especially with less proficient learners, that learning roots can facilitate learning of the derived words but not vice versa, that the acquisition of stem + suffix occurs with certain particular suffixes before others (in this case the scores for *-er* and *-tion* affixes were higher compared to that of *-ity* and *-ment*), and that frequency of exposure is critical for acquisition of word part strategy.

The recent research conducted by **Sukyng (2020)** has proved the efficiency of Bauer and Nation's (1993) suggested system for teaching purposes. Sukyng investigated the effect of affix instructions on acquiring morphologically complex words. Two tasks to test receptive and productive affix knowledge were administered to 92 Thai university learners of English. All participants had learned English for at least 14 years and it was assumed, they all had a similar level of English language proficiency. Participants were split into two groups: the treatment group of sixty participants and the control group containing 32 participants. The treatment group was given explicit teaching of English affixes and word families based on Bauer and Nation's (1993) word family constructs, whereas the control group was not. To examine whether there was a difference between the treatment and the control groups in word knowledge participants had to take three tests: pre-test, post-test and delayed post-test. Instructions on suffixes were given after the pre-test before taking the post-test. A delayed post-test was given two weeks after explicit instructions. Participants had to complete two different tasks: receptive and productive affix knowledge test. The receptive affix knowledge (RAK) test comprised 18 sets in a multiple-choice format that used pseudowords and real affixes. Participants were asked to match the correct affix for a given pseudoword with a known meaning. For the productive affix knowledge (PAK) task, participants

were asked to write all acceptable affixes for the given word and to produce a correct word for each blank space in a given context.

The results of the research demonstrated a positive effect of affix instructions in English language classes as after explicit teaching of affixes the treatment group scored significantly higher in post-test and delayed post-test compared to pre-test in both RAK and PAK tasks whereas no significant difference was found between any time points for the control group participants' performance on the RAP and PAK tasks. The data also indicated that both groups of participants obtained better scores on the RAK than the PAK tasks and that some affixes were better known to participants than others. The findings also indicated that productive use of affixes is more difficult to acquire because participants were likely to recognize the form and meaning of the affix before they were able to use it in context. In sum, although the results indicated that the explicit teaching improved learners' language skills it did not prove that mastering one member of a family does not necessarily mean mastery over other members of the family. This finding provides support to previous studies that showed learners' knowledge of word families is incomplete ((Schmitt & Zimmerman, 2002; Ward & Chuenjundaeng, 2009).

As we can see, all the studies presented confirm that knowing one word in a word family does not necessarily mean knowing other members of the word family. These and several other studies have sparked debate in recent years among scholars about the appropriateness of the word family as a lexical unit for vocabulary tests in L2 research and pedagogy. For example, Kremmel (2016) thinks that using word families as the counting unit in vocabulary tests is not viable because L2 learners rely less on a morphological decomposition of words compared to native speakers, and members of the word family are not very strongly related in L2 learners' mental lexicon. Kremmel agrees that L2 learners have some knowledge about the relationship between family members but this level of knowledge is much lower than the word family-based vocabulary test would recognize, therefore the author suggests that lemmas "hold advantages over word families in lexical diversity measurement" (p. 978). Brown et al. (2020) in addition to Kremmel's insights note that word family-based vocabulary studies are likely significantly to underestimate the number of words necessary for reading comprehension of different tests. They also prefer lemma as a counting unit in vocabulary tests to the word family as most L2 learners can deal with lemmas and the vast majority of them lack the morphological knowledge to make the word family suitable unit because it takes a lot of time to develop this skill. For L2 pedagogy Brown et al. recommend concentrating

on smaller and easier manageable word family lists that give L2 learners a high level of coverage of texts rather than learning long lists of the members of the word family.

To sum up, the word family is the largest and the most complex lexical unit but is still frequently used in vocabulary research and pedagogy because popular teaching and testing instruments are developed using word family as a counting unit. Research shows that clear system and explicit learning of word building principles have a positive effect on vocabulary acquisition but some other studies suggest that the fundamental assumption of a word family is questionable what sparked the debate among researchers as to whether the word family is a generally appropriate lexical unit in vocabulary studies.

II. METHODOLOGY

This chapter of the paper extends the background for the study and deals with the main methodological issues used to conduct the empirical survey such as procedure, participants, target words, research instruments, data analysis, and scoring.

2.1. The background to the present research

The empirical survey was conducted due to the lack of information on a word family as a counting unit. The research is aimed to explore receptive and productive knowledge of the members of a word family and to provide more empirical data about this widely used lexical unit in linguistic studies as the relationships across members of a word family have not been scrutinized until now. For many decades researchers accepted Bauer's and Nation's (1993) theory of the word family as correct without actually questioning its empirical validity. The assumption that if an L2 learner knows at least one of the members of a word family well he/she can also understand other family members was generally accepted by researchers as prepared tests enabled them to test fewer lexical items and to make conclusions or develop theories about a larger amount of data. Recently researchers (e. g., Kremmel (2016), Bauer et al. (2020)) have started to express doubts in their publications about the suitability of the word family as a counting unit in linguistic research. However, their arguments do not appear to be sufficient to reject the word family as an inappropriate lexical unit for linguistic research as their affirmations are based on a small number of studies. In addition, the vast majority of the studies they rely on were carried out with English language learners of Asian descent. Moreover, studies mentioned in publications covered very narrow aspects of vocabulary knowledge as tests applied tested some specific receptive or productive skills, for example, acquisition of derivational affixes, recognition of affix form, meaning and grammatical function or translation of base words and their affixed forms. To reach any conclusions about a word family as a counting unit more research should be done and far more data should be analysed.

2.2. Procedure

To conduct the research participants were asked to complete three tasks. The first task was aimed to get a general overview of participants' knowledge of selected target words, i.e., if they knew the words and according to their self-assessment how well they knew the words. The second task was designed to measure participants' productive knowledge of the members of the word family of selected target words, and the third task was used to assess participants' receptive knowledge of

the members of the word family formed from selected target words. The developmental scale for the first task and the second task used to test participants' receptive knowledge were taken from Schmitt and Zimmerman's (2002) study and the third task was prepared by the author of this paper. The participants could not change the order of the tests and the answers given. The research design allowed to test all of the words receptively and productively and ensured that there was not a learning effect from one test to the other. Data were collected online. For online data collection, the software PsyToolkit was used (Stoet, 2010, 2017). It is a free-to-use online platform for demonstrating, programming, and running cognitive-psychological experiments and online surveys. There was no time limit set on task completion. The participants completed the tasks in an average of 45 minutes.

2.3. Participants

The participants in this study were 48 native speakers of Lithuanian. They were divided into two groups as follows:

- 30 undergraduate students of English as major from the faculty of Philology at Vilnius University (10 second-year, 10 third-year, and 10 fourth-year students). Later referred to as group G1.

Since English is compulsory in Lithuanian schools from the second grade, all participants in this group had studied English at school for at least eleven years plus 2-4 years at the university, depending on the year of study. In their first year of study at the university, they all had a compulsory two-semester course in English morphology, which included lessons on word classes, word building, the meanings of affixes, therefore it was considered this group to be more advanced in English.

- 18 other learners of English (9 second-, third- and fourth-year students of other study programs at the university and 9 graduates of other study programs). Later referred to as a group G2.

All participants learned English as a foreign language at school (7 (3 participants) or 11 years, depending on years of finishing school) and took an English course at the university as all university study programs include at least one semester of professional foreign language studies in their fields. The majority of graduates use English in their daily activities at work.

39 participants were females, and 9 were males. The age range of the students was 18-25 years old, and the age range of graduates was 26-49 years old. Participation in the research was voluntary and anonymous.

2.4. Target words

The target words and their word families, like the first two tasks in the research, were taken from Schmitt and Zimmerman's (2002) study because it was decided that it would be useful to at least partially replicate the study and be able to compare the results of the same test in different populations. Target words in their study were selected from the Academic Vocabulary List (AWL, Coxhead, 2000) because preference was given to words and word families that would be known and used by non-native speakers of English who are studying or intending to study in an English-medium university. These words were also relevant to the participants in this study because they were either students or had previously studied at a university and learned English. The list compiled consisted of 16 target words from the range of all 10 frequency-based sublists of the AWL (Coxhead, 2000) while balancing among the four word families as much as possible: *access*, *assume*, *authority*, *coherent*, *ethnic*, *ideology*, *inevitably*, *liberal*, *minimize*, *persist*, *philosophy*, *precise*, *release*, *select*, *survive*, and *traditional*. Based on frequency data from the *British National Corpus*, each target word was the most frequently occurring member of its word family. For example, *persist* occurred more frequently than *persistence*, *persistent* or *persistently*. The only exception on the list was *precise*, which appeared less frequently than its derivative form *precisely*. All word families (see Appendix B, Answers for TASK 2) according to the system created by Bauer and Nation (1993) were comparable to each other in terms of morphological difficulty across the four word classes.

2.5. Research instruments

Task 1

Before giving the participants receptive and productive knowledge tasks, it was decided to assess participants' depth of lexical knowledge of the target words. The purpose of this task was to make sure that the target words selected matched the goal, i.e., they were well known to the participants. One way to measure the depth of knowledge is to use a developmental scale that is based on the incremental nature of mastery of a word. In this research, a scale developed by Schmitt and

Zimmerman (2002) was used. Using this scale participants had to self-evaluate four levels of word knowledge of each target word (see Appendix A, Task 1):

- A. *I don't know the word.*
- B. *I have seen the word before but am not sure of the meaning.*
- C. *I understand the word when I see it or hear it in a sentence, but I don't know how to use it in my own speaking or writing.*
- D. *I know this word and can use it in my own speaking and writing.*

However, in contrast to Schmitt and Zimmerman's (2002) study, due to the big number of assignments in all tests, participants were not asked to produce a sentence to illustrate the meaning of the words that they rated at Level D.

Task 2

To test participants' productive knowledge within a word family the Test of English Derivatives (TED; Schmitt & Zimmermann, 2002) was used. The test was constructed to demonstrate productive knowledge of the derivative forms of the four main parts of speech, namely noun, verb, adjective, and adverb. The test comprised 16 test items representing all selected word families. Each test item consisted of four similar, contextualized sentences for each prompt word, a total of 64 sentences. All sentences contained blanks for which participants had to write the appropriate form of derivative. What part of the speech needed to place was indicated in front of each sentence. The participants were instructed to write an X in the blank if they believed no derivative form existed and were informed that the derivative form might coincide with the prompt word. The format of the test, all the target words, and the prompt sentences are shown in Appendix A (Task 2), for example,

assume

- | | |
|------------------|--|
| <i>Noun</i> | <i>He made an _____ hat she likes meat.</i> |
| <i>Verb</i> | <i>He can _____ that she likes meat.</i> |
| <i>Adjective</i> | <i>He had an _____ idea that she likes meat.</i> |
| <i>Adverb</i> | <i>He decided _____ that she likes meat.</i> |

The sentences in the test were constructed to be similar semantically and to utilize the same vocabulary in the same set of sentences as much as possible. The vocabulary of the sentences was quite simple, mainly taken from the 2,000-word General Service List (West, 1953). Each of the 4

sentences in a test item was intended to check productive knowledge of derivatives of different parts of speech. For this purpose, the sentences were mostly designed to limit the possible answers to only one word class. However, for some of the word classes, more than one alternative was acceptable as an answer. For example, in the case of the target word *persist* both derivative forms of noun *persistence* and *persistency* were appropriate, or for the target word *traditional* the verb form *traditionalize* or *X* was accepted. The complete list of acceptable derivative forms is provided in Appendix B (Answers for Task 2).

Task 3

To investigate participants' receptive knowledge of the members of the word family a translation task was chosen. Such a task was appropriate because all participants were from the same L1 group. As in the previous test, the aim was to test receptive knowledge of four word classes (noun, verb, adjective, and adverb) in 16 selected word families. It was agreed to use the answer sheet of TED to select words for the translation task. Unfortunately, not all word families included derivatives of four word classes (e. g. no verbs forms exist for target words *inevitable* or *ideology*) and others had more than one option for some word classes (e. g. word family with a target word *liberal* contains four possible noun forms *liberality*, *liberalization*, *liberalness*, and *liberty*). It was decided not to replace the non-existent part of speech with other existing members of the same word family and in case of several possible options for the same part of speech, to pick the form based on frequency data of online BNC corpus (Davies, 2004). For instance, in the word family with the target word *philosophy*, there were two possible adjectives *philosophic* and *philosophical*. Since *philosophical* (1,275) occurred more frequently in the corpus than *philosophic* (63), *philosophical* was chosen for the translation task. The final list of the target items for the translation task consisted of 56 words. To maintain an equivalent test format as in the previous task, the selected words were presented to participants in contextualized sentences and they were asked to write a translation of the indicated word. The sentences for the translation task were taken from four online dictionaries: *Oxford Advanced Learner's Dictionary* (Oxford University Press, n.d.), *Cambridge Learner's Dictionary* (Cambridge University Press, n.d.), *Longman Dictionary of Contemporary English* (Longman, 2008), and *Collins English Dictionary* (Collins Dictionaries, 2007) (for the translation task see Appendix A, Task 3). For correct translations of words, an English-Lithuanian dictionary (Piesarskas, 2002) and free online English-Lithuanian dictionary *Alkonas* (Piesarskas, 2000) were consulted. As no cues for a translation form were given, the variety of answers provided was very wide, therefore, besides, the factual translations of the words were reviewed by two Lithuanian

native speakers having advanced knowledge of English, who extended the list of acceptable answers. Although the translations were accepted quite freely, i.e., not only dictionary translations but also their close synonyms were admitted, they had to be possible in the context of the sentence presented. The answer sheet for the translation test is shown in Appendix B (Answers for Task 3).

2.6. Scoring

The answers of the tests were checked against the list of acceptable derivatives and the answer sheet for the translation task. In TED the responses that demonstrated the knowledge of derivative form were marked as correct and given 1 point even if they were misspelled as long as the intended derivative form could be understood as we were more interested in knowledge of the derivatives than in complete mastery of their correct spelling. The same evaluation rules were applied to the translation test: responses that demonstrated knowledge of the meaning of translated words were marked as correct and given 1 point even if they were misspelled as long as the meaning was clear. In both tests, if the word class was incorrect 0 points were given.

2.7. Analysis

To analyse the data collected statistical methods were applied. For the data analysis both descriptive and inferential statistical methods were used.

Descriptive statistics illustrate the quantitative properties of the analysed data. The following statistics were calculated:

- **Frequency** is a rate at which something happens or is repeated. It is calculated as a count of variables meeting certain criteria.
- **Ratio** is a comparison of two numbers that indicates their size in comparison to each other. It is calculated by dividing the frequency by the total number of observations.
- **Mean (M)** shows the average value of the analysed variable. It is calculated as the sum of the analysed variable divided by the number of observations.
- **Standard deviation (SD)** shows how widely observations are spread about the sample mean. It is calculated as the sum of squared deviations of a variable from the sample mean divided by the number of observations minus one.
- **Correlation coefficient** shows the strength of the linear relationship between two variables. The correlation coefficient is calculated using the following formula (Freund,1999, p.474):

$$\hat{\rho} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}}$$

where x_i , and y_i is analyzed paired observations, \bar{x} and \bar{y} are sample means and n are the number of observations. The correlation coefficient varies between -1 and 1.

Inferential statistical methods aim to project the results of the sample to the total population. The following statistics were calculated in the research:

- **t statistics** are used to compare the value of a variable in two populations based on the results of samples drawn from these populations. The statistics were calculated using the following formula (Freund, 1999, p.419):

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where n_1 and n_2 are the sample sizes from the two tested populations, \bar{x}_1 and \bar{x}_2 are the corresponding sample means and s_p is calculated as follows:

$$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

Here s_1^2 and s_2^2 are sample variances from the two tested populations. In the hypothesis testing the value of t statistics is compared against the critical values obtained from the tables and the null hypothesis is rejected if the value of calculates statistics exceeds the critical value.

- **Paired t statistics** are used to compare two paired variables in a population based on the results of samples drawn from this population. The statistics, for the paired t-test, was calculated using the following formula:

$$t = \frac{\bar{d}}{(s_d/n)}$$

Where \bar{d} is the mean difference between the paired variables, s_d is the sample standard deviation of the differences and n is a sample size. The hypothesis testing is performed by comparing t statistics against the critical values in the same way as for the standard t-test.

III. EMPIRICAL SURVEY ON RECEPTIVE AND PRODUCTIVE KNOWLEDGE

This chapter presents the results of the empirical survey. The chapter is divided into four sections. The first three sections introduce the quantitative data of the three tasks and present the results of the data analysis. In the fourth chapter, the relationship between receptive and productive knowledge is analysed and the formulated hypotheses are tested.

3.1. Knowledge of the main members of a word family

Self-assessment test using Schmitt-Zimmerman's (2002) scale revealed that participants in group G1 had only a slightly better depth of lexical knowledge of the target words compared to the participants of group G2. The trend of the distribution of responses between levels A, B, C, and D in both groups was similar as well (see Table 3).

Table 3. *Word knowledge according to Schmitt-Zimmerman scale*

Levels of word knowledge	A		B		C		D	
	G1	G2	G1	G2	G1	G2	G1	G2
Total no. of words	2	2	10	4	29	26	439	256
Structure, %	0.4%	0.7%	2.1%	1.4%	6.0%	9.0%	91.5%	88.9%

Note. G1 n=30; G2 n=18

Group G1 participants rated 91.5% of their knowledge of target words at level D (*I know this word and can use it in my own speaking and writing*) and 6.0% at level C (*I understand the word when I see it or hear it in a sentence, but I don't know how to use it in my own speaking or writing*). Meanwhile, participants in group G2 rated 88.9% of their knowledge of target words at level D and 9.0% at level C.

In sum, the results of the self-assessment task show that, as was expected, the participants had very good depth lexical knowledge of selected words measured on the Schmitt-Zimmerman developmental scale. The words selected met the requirements for the target words and they were suitable for further investigation in our population.

3.2. Productive knowledge of members of a word family

In response to the second research objective *to identify learners' productive knowledge of members of a word family* the number of derivatives produced and the knowledge of derivative classes were investigated.

3.2.1. Number of derivatives produced

For both groups of participants, the mean (*M*) number of derivatives produced was 51.6 words (standard deviation (*SD*)=8.2) out of a possible 64 (16 target words x 4 derivatives per word), or 80.7% (see Table 4). On average participants produced about 3.2 derivatives for a given word family. However, the results differ across groups. Participants of group G1, students of English, demonstrated better productive knowledge than English learners from group G2. Participants from group G1 produced 53.2 derivatives or about 8.4 percentage points more than participants from group G2 (49.1 words). Participants in group G1 produced 83.1% derivatives, while members of group G2 made only 76.7% of possible words.

Table 4. *Productive knowledge of derivative forms*

Group	Total no. of words	No. of words produced	Proportion of words produced, %	<i>M</i> (out of 64)	<i>SD</i>	<i>M</i> per family (out of 4)
G1	1920	1595	83.1%	53.2	8.5	3.3
G2	1152	884	76.7%	49.1	7.4	3.1
G1+G2	3072	2479	80.7%	51.6	8.2	3.2
<u>Schmitt and Zimmerman study</u>						
All students	6624	3895	58.8%	37.6	9.84	2.4

Note. G1, n=30; G2, n=18; total number of participants in Schmitt and Zimmerman's (2002) study, N=106

Compared to the data of Schmitt and Zimmerman's (2002) research, Lithuanians have better derivational knowledge than the participants of the previous survey, who produced only 37.6 (*SD*=9.84), or 58.8% of all potential derivatives. This means that on average, the participants were able to produce just two of the four possible derivatives for a given word family. One of the reasons why participants in the Schmitt and Zimmerman's study showed poorer results may be the origin of the participants, as 88% of the participants were Asian. The languages of Asian countries belong

to other language families (e. g. Thai, Japanese, or China language families) than English and they usually use a non-Latin script. Meanwhile, Lithuanian, like English, comes from the Indo-European language family and uses the Latin alphabet. In addition, affixes are widespread in the Lithuanian language, so derivatives are ordinary word structures to Lithuanians.

A more detailed analysis of derivative forms revealed that the participants failed to produce any derivatives for only 6 target words, which amounts to only 0.8% of all word families (G1, 1%; G2, 0.3%; see Table 5). And full knowledge of the word family (all four forms) was evident in half of the cases (50.5%). Students of English, group G1, produced all four derivative forms even for 56.7% of word families and three forms for another 25.0% of the cases. The distribution of word families in which 4, 3, or 2 derivative forms were formed in group G2 was more even, 40.3%, 31.3%, and 22.9%, respectively, of all cases.

Table 5. *Word for which participants produced zero, one, two, three, and four derivative forms*

Group	Total no. of items analysed (1 item = 4words)	Derivative forms produced									
		0		1		2		3		4	
		No.	%	No.	%	No.	%	No.	%	No.	%
G1	480	5	1.0%	19	4.0%	64	13.3%	120	25.0%	272	56.7%
G2	288	1	0.3%	15	5.2%	66	22.9%	90	31.3%	116	40.3%
G1+G2	768	6	0.8%	34	4.4%	130	16.9%	210	27.3%	388	50.5%
<i>Schmitt and Zimmerman study</i>											
All students	1656	91	5.5%	303	18.3%	471	28.4%	489	29.5%	302	18.2%

Note. G1, n=30; G2, n=18; Schmitt and Zimmerman (2002) N=106

In contrast to Lithuanian participants, Schmitt and Zimmerman's study participants mostly gave correct answers about two (28.4%) or three (29.5%) derivatives out of the possible four in a word family. All four forms of derivatives were produced in only 18.2% of the cases. However, a more detailed analysis showed that productive knowledge of derivatives of their 20 advanced participants (students completing a master's degree in English language teaching) was similar to that of the participants in our research, group G2. They produced all 4 derivative farms of the word families in 42.9% of the cases and 3 farms in 35.0% of the cases.

In summary, although the productive knowledge of the Lithuanian participants is significantly better than that of the participants in the Schmitt and Zimmerman's (2002) study, the results of the study still do not support the strong version of facilitative effect among word family members, i.e., that knowing one member of a word family implies productive knowledge of other members of a word family as all derivative forms were produced in only a half of the cases. This suggests that a word family as a counting unit tends to overrate learner's vocabulary knowledge but in the case of Lithuanian participants the extent of overvaluation was smaller than in Schmitt and Zimmerman's (2002) study. Higher test scores of the Lithuanian participants studying English imply that explicit learning of word parts and word building techniques is effective and leads to a better productive knowledge.

3.2.2. Four derivative classes produced

The results show that the participants had productive derivational knowledge of some word classes better than others (see Table 6). Noun derivatives were best known to participants as they produced 86% of all possible nouns, or almost 14 nouns out of 16. Verbs were next, with 82% forms produced. Adjective and adverbs were less well known, participants were able to produce 78% and 77% of cases, respectively. Productive knowledge of different parts of speech in group G1 was more consistent, meanwhile, participants in group G2 demonstrated a greater derivational skill of nouns than adverbs, that is, 84% versus 71%.

The most typical mistake Lithuanians made while producing derivatives was using the wrong suffixes. When participants were not sure what suffix to use, they tended to apply the most common suffixes of English, for example, for nouns *-tion*, *-y*, and *-or* (**accession*, **cohecency*, **precisivty*) and for adjectives *-ive*, *-ious*, *-ing*, *-able*, or *-ed* (**accessive*, **acceptive*, **accessing*, **authorizing*, **authored*, **precised*, **precising*, **precious*, **preciseive*, **persistive*, **persisted*, **persisting*, **cohesive*). Another error was to confuse suffixes between parts of speech, for instance, to use noun suffixes *-or* and *-tion* to produce adjectives (e. g. **selection*, **selector*, **survivor*), to fail to utilize suffixes at all, i.e., leave the form without alteration (e. g. *select* instead of *selection*, *ethnic* instead of *ethnicity*, *persist* instead of *persistence*), or to produce non-existing derivatives, especially adverbs, by applying adverbial suffix *-ly* (e. g. **survively*, **survivally*, **releasably*, **releasingly*, **relesently*, **assumingly*, **assumedly*, **assumely*). Another observable fact worth mentioning was that the participants in group G1 showed significantly better spelling skills. The most difficult derivative class to spell for all participants was adverbs; the most systematic error was to write *-ll-* instead of *-l-* (e. g., **selectively*, **preciselly*), or to spell the word with *-l-* where *-ll-* was needed (e. g., **liberaly*, **philosophically*, **ethnically*, **minimally*). The word families in which the most spelling mistakes occurred were produced from target words such as *persist* and *coherent*.

Table 6. *Derivative forms produced according to word class*

Group	Total no. of responses analysed (1 item = 4 words)	Derivative forms produced according to word class											
		Noun			Verb			Adjective			Adverb		
		No.	%	<i>M</i>	No.	%	<i>M</i>	No.	%	<i>M</i>	No.	%	<i>M</i>
G1	480	421	88%	14.0	403	84%	13.4	385	80%	12.8	386	80%	12.9
G2	288	242	84%	13.4	226	78%	12.6	212	74%	11.8	204	71%	11.3
G1+G2	768	663	86%	13.8	629	82%	13.1	597	78%	12.4	590	77%	12.3
Schmitt and Zimmerman's study													
All students	1656	1041	63%	9.8	1112	67%	10.5	903.0	55%	8.5	863	52%	8.1

Note. G1, n=30; G2, n=18; Schmitt and Zimmerman (2002), N=106

Comparing the results of the present study with the results of Schmitt and Zimmerman's (2002) study, a clear difference can be seen. In contrast to this research, the participants in their study were best at producing verb derivatives, with noun derivatives in second place, demonstrating productive derivational knowledge in only 67% and 63% of the cases, respectively. Similarly to Lithuanians, participants of the previous study were struggling to produce adjectives and adverbs.

The results of the present study show that nouns and verbs are generally best-known word classes and adverbs and adjectives are less known word classes, coincide not only with results of the Schmitt and Zimmerman's (2002) study but also are in line with other previously conducted studies. And one of the explanations of the results is "that the class of noun or verb carries semantic information (e.g., nouns are names of places, persons, or things, verbs represent actions) that is fundamental to meaning" (Schmitt & Zimmerman, 2002). According to Gentner, Dedre, et al. (1982, p. 319), other linguistic factors influencing vocabulary learning sequence are such as word frequency and morphological transparency. Nouns and verbs are more frequent in spoken and written language than adjectives and adverbs. Nouns and verbs have a clearer morphological structure: it is generally easy to identify the root, inflectional forms are quite regular. Nouns and verbs have a limited number of possible derivational suffixes compared to adjectives. Verbs are usually word stems and do not need any derivational affixes to produce an appropriate verb, unlike in the case of an adverb, often several suffixes have to be added to the stem to get the required grammatically correct adverb form.

To sum up, Lithuanian participants have good derivational knowledge of English, however, the results of the research do not support the idea of a word family because the participants were able to produce all members of a word family for the given target word just in 50.5% of all cases. The best-known word classes of derivatives of Lithuanian participants are nouns and verbs with productive knowledge of adjectives and adverbs lagging behind. The results of the productive task suggest that using word family as a counting unit may overestimate the learner's vocabulary knowledge. Higher test scores of English learners than participants of other study programmes in the present study indicate that productive skills are of an incremental nature and that explicit teaching of word formation methods leads to better mastery of derivative forms.

3.3. Receptive knowledge of members of a word family

The third objective of the research was *to determine learners' receptive knowledge of members of a word family*. To find out the answer to the third question, the analysis was performed using the same methods as in the case of the productive knowledge test. The two main points of interest were the number of correct translations of members within a word family and the structure of correct derivative translations from English to Lithuanian grouped by the four main parts of speech.

3.3.1. Number of derivatives translated

The descriptive statistics (mean and standard deviation) and proportion of correct translations are reported in Table 7. For all participants of the research, the average number of derivatives translated was 47.4 words ($SD=6.6$) out of a possible 56 (8 word families with 4 members and another 8 word families with 3 members), or 84.7% of the words. There was one participant who showed full receptive mastery and 2 who provided correct L1 translation for 55 L2 words. The data shows that participants' receptive knowledge of derivatives within a word family was higher than productive knowledge (80.7%). However, in contrast to the derivative formation task, the difference in receptive knowledge between the two groups was very small. Participants in group G1 provided the L1 meaning of 47.7 ($SD=6.9$), or of 85.1% L2 words, while participants in group G2 were able to give the L1 meaning of 47.4 L2 words ($SD=6.2$), or of 83.9% L2 derivative forms in the translation task.

Table 7. *Receptive knowledge of derivative forms*

Group	Total no. of responses analysed	No. of correct translations	Proportion of correct translations, %	M	SD
G1	1,680	1,430	85.1%	47.7	6.9
G2	1,008	846	83.9%	47.0	6.2
G1+G2	2,688	2,276	84.7%	47.4	6.6

Note. Maximum score = 56; G1, n=30; G2 n=18

More detailed analysis revealed that the high score of receptive knowledge in the G2 group was determined by the test results of university graduates. Their translation test results even slightly exceeded those of the English students' group G1: the mean number of derivatives translated was 48.7 words or 86.9%. The scores of the translation test of students in other programs were 45.3 words, or 81.0%, respectively which is a still pretty high result. These differences among Group G2 participants can be explained by the fact that university graduates are older, have had more exposure to English, and most of them use English at work. These trends within group G2 participants were not observed in the productive knowledge task.

Table 8. *Word families for which participants translated zero, one, two, three, and four derivative forms*

Group	Total no. of word families	Derivative translations									
		0		1		2		3		4	
		No.	%	No.	%	No.	%	No.	%	No.	%
4 words in a word family (8 word families)											
G1	240	6	2.5%	2	0.8%	19	7.9%	76	31.7%	137	57.1%
G2	144	1	0.7%	6	4.2%	18	12.5%	40	27.8%	79	54.9%
G1+G2	384	7	1.8%	8	2.1%	37	9.6%	116	30.2%	216	56.3%
3 words in a word family (8 word families)											
G1	240	5	2.1%	13	5.4%	65	27.1%	157	65.4%	X	X
G2	144	4	2.8%	9	6.3%	34	23.6%	97	67.4%	X	X
G1+G2	384	9	2.3%	22	5.7%	99	25.8%	254	66.1%	X	X

Note. G1, n=30; G2 n=18

In addition, analysis of the translation test results showed that the participants could not provide any L1 derivative meaning for 16 out of 768 analysed L2 word families (8 word families with 4 derivative classes and 8 words families with 3 derivative classes), which accounts for 2.1% of all word families analysed (see Table 8). Participants provided translations of all members of the family in 56.3% cases for word families with 4 members and in 66.1% cases for word families with 3 derivative forms.

To conclude, the results of the translation task also did not confirm that the knowledge of one family member determines the knowledge of other members of a word family because the study participants provided correct translations of all members of a word family in only 61.2% of the cases; the proportion of correct translations was higher in word families with 3 members than in word families having 4 members. Data also implies that greater exposure to the English language has a significant impact on receptive knowledge of members of a word family because older participants who used English in their daily work activities scored higher in the receptive knowledge test.

3.3.2. Four derivative classes translated

The results indicate that one derivative class within a word family was undoubtedly better known receptively than others. Table 9 shows that in 91.3% of the cases the participants were able to link the L2 form and L1 meaning of the verb. On average, they could provide translation for 10 verbs out of 11. The second-best known part of speech was noun because in 84.4% of the cases correct translations of nouns were provided. Receptive knowledge of adverbs and adjectives lagged slightly behind as the participants recalled L1 meanings for 83.7% and 81.3% L2 words respectively.

Participants in group G1 demonstrated better receptive knowledge in three word classes, namely verb, noun, and adverb. Group G2 was better at translating adjectives. However, the difference between the groups was quite insignificant (see Table 9).

Table 9. *Derivative translations according to word class*

Group	Noun (16 words)			Verb (11 words)		
	Total no. of words	Total no. of correct responses	%	Total no. of words	Total no. of correct responses	%
G1	480	428	89.2%	330	303	91.8%
G2	288	250	86.8%	198	181	91.4%
G1+G2	768	678	88.3%	528	484	91.7%
Group	Adjective (16 words)			Adverb (13 words)		
	Total no. of words	Total no. of correct responses	%	Total no. of words	Total no. of correct responses	%
G1	480	416	86.7%	390	332	85.1%
G2	288	253	87.8%	234	199	85.0%
G1+G2	768	669	87.1%	624	531	85.1%

Note. G1, N=30; G2 N=18

It was also explored if the most frequent member of the family, or in other words, selected for the research target word, was the best-known member of the word family. In 11 out of 16 word families the most frequent member of the family was the best-known receptively to participants. In all six word families in which the most frequent member of a family was a verb, it was the best-known member in a word family. When the other part of speech was the most frequent member of a word family, this did not necessarily mean that the participants knew its L1 meaning best. For instance, the adverb *inevitably* was the most frequent member of the word family, but the participants provided more correct responses of L1 meaning for the adjective *inevitable*, or the noun *tradition* was better receptively known than adjective *traditional* which was the most frequent member of the word family. These results are in line with Ward and Chuenjundaeng's (2009) research that "learners may tend to acquire certain derived forms from basewords, but not vice versa" (p. 467). It means that generally learners first learn base words and later acquire knowledge of their derivatives but not another way around.

Thus, the best receptively known members of a word family to participants were verbs and nouns and they faced some difficulties translating adverbs and adjectives. Besides, the test results

revealed that in two-thirds of the word families the target word was the best-known member of the word family. This suggests that the most basic and the most frequent words are usually learned before more complex derivative forms.

3.4. Relationship between receptive and productive knowledge

The third research objective focused on the relationship between receptive and productive knowledge of the members in a word family. To establish a relationship between receptive and productive knowledge the following instruments and indicators were applied: a gap between receptive and productive knowledge, correlation coefficient, paired and one-tailed t-tests.

3.4.1. The gap between receptive and productive knowledge

To measure the gap between receptive and productive knowledge receptive and productive knowledge ratios were used. The productive knowledge ratio shows the proportion of correct answers in the Test of English Derivatives (Task 2) and the receptive knowledge ratio measures the share of correct answers in the translation task (Task 3). The results indicate that receptive knowledge of the members of a word family is larger than productive knowledge of the members of a word family, which means that participants had better knowledge of L1 meaning than L2 form of the members within a word family. This was evident in both groups of participants (see Table 10).

Table 10. *Derivative translations according to word class*

Group	M (words per participant)	Ratio (proportion of correct responses, %)	Correlation coefficient
G1			0.34
receptive knowledge	47.7	85.1%	
productive knowledge	53.2	83.1%	
G2			0.55
receptive knowledge	47.0	83.9%	
productive knowledge	49.1	76.7%	
G1 + G2			0.41
receptive knowledge	47.4	84.7%	
productive knowledge	51.6	80.7%	

Note. G1, n=30; G2 n=18; maximum score receptive knowledge =56 words; maximum score productive knowledge =64 words

The gap between the receptive knowledge ratio and the productive knowledge ratio for both groups was narrow 4.0%. An analysis of the data of each group showed that the difference between receptive and productive ratios of the participants in group G1 was even smaller, only 2.0%. In group G2, the difference between the two ratios was equal to 7.2%. The results support previous findings of other researchers (e. g., Melka, 1982; Webb, 2008; Sukying, 2020) that receptive knowledge exceeds productive knowledge.

3.4.2. Correlation coefficient

The relationship between receptive and productive test scores of individual participants is presented in Figure 1.

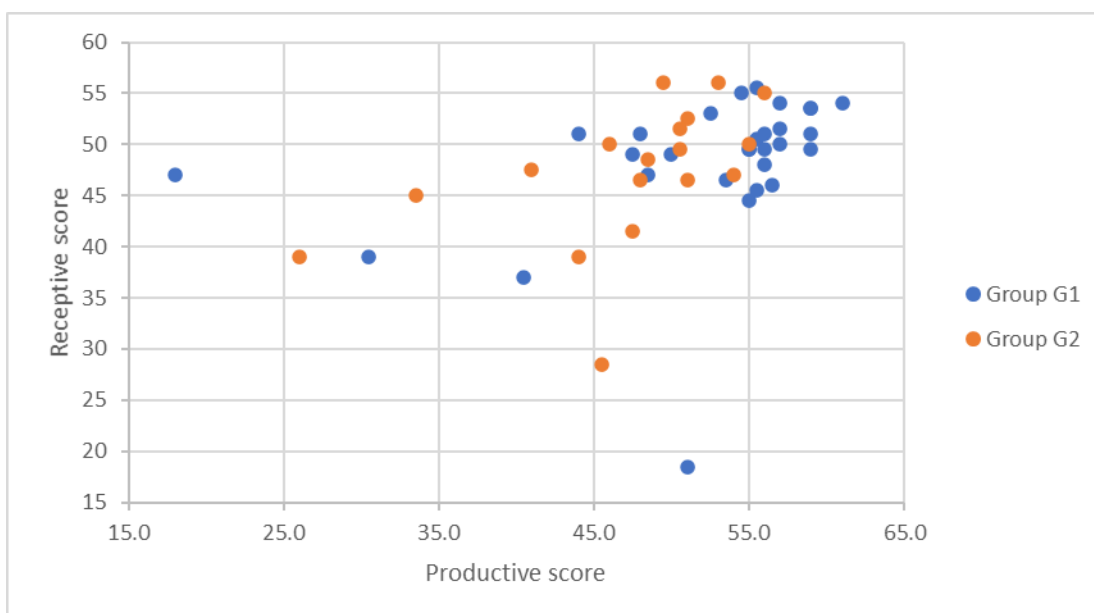


Figure 1. Relationship between receptive and productive scores

To assess the strength of the relationship between receptive knowledge and productive knowledge of members of a word family the correlation coefficient was calculated (see Table 10). For the calculation of the correlation coefficient, individual scores of the translation task and the Test of English Derivatives were used. The correlation coefficient calculated from all participants' scores was 0.41, which indicates a moderate positive correlation between receptive and productive knowledge scores. It means that two types of knowledge are related and that study participant having higher productive knowledge should also have higher receptive knowledge and vice versa but they are not equal. The correlation coefficient was lower in group G1 than in group G2, 0.35,

and 0.55 respectively. The analysis of source data showed that a lower correlation score in group G1 was caused by two outliers: one participant which had a high productive test score and low receptive score and another participant which had a high productive test score and low receptive test score. If the data of these two participants were excluded, the correlation coefficient of the participants in group G2 would be 0.66, and of all participants 0.61.

3.4.3. Paired t-test

To check whether there were any significant differences between the proportion of the word family members known productively and receptively in the population (consisting of students of philology, students of other study programs, and young professionals), a paired t-test was performed. 95% confidence level was applied for the test. Two hypotheses were formulated as follows:

- The null hypothesis H_0 was: the proportion of word family members known productively equals the proportion of word family members known receptively.
- The alternative hypothesis H_1 was: the proportion of word family members known receptively is not equal to the proportion of word family members known productively.

The results of the t-test were as follows: $t = 2.35$, $p = 0.023$. As the p -value was lower than the conventional 0.05, the null hypothesis H_0 was rejected. It signifies that the t-test supports the claim that the proportion of word family members known receptively in the population is not equal to the proportion of word family members known productively.

3.4.4. One-tailed t-test

To find out if receptive knowledge of the members of word family test score in the populations of students of philology, i.e., who are explicitly taught morphology, were larger than in the population of non-linguists (consisting of students of other study programs and young professionals) one-tailed t-test was performed. In addition, the same test was applied for productive knowledge of the members of word family test scores. 95% confidence level was applied for the tests.

Receptive knowledge of word family members test scores

Two hypotheses were formulated as follows:

- The null hypothesis H_0 was: the receptive knowledge of word family members test scores in a population of students of philology equals the receptive knowledge of word family members test scores in a population of non-linguists.

- The alternative hypothesis H_1 was: the receptive knowledge of word family members test scores in a population of students of philologists is higher than the receptive knowledge of word family members test scores in a population of non-linguists.

The results of the t-test were as follows: $t = 0.336$, $p = 0.369$. As the p-value was higher than the conventional 0.05, hypothesis H_0 is accepted. It means that the t-test supports the claim that receptive knowledge of word family members test scores in the population of students of philology equals receptive knowledge of word family members test scores in the population of non-linguists.

In our research test scores of receptive knowledge task within study participants were higher than productive knowledge test scores and there was almost no difference between groups G1 and G2. Consequently, it indicates that receptive knowledge does not require very specific linguistic skills and seems to be less problematic to L2 learners of English.

Productive knowledge of word family members test score

Two hypotheses were formulated as follows:

- The null hypothesis H_0 was: productive knowledge of word family members test scores in a population of students of English equals the productive knowledge of word family members scores in a population of non-linguists.
- The alternative hypothesis H_1 is: the productive knowledge of word family members test scores in a population of students of philology is higher than the productive knowledge scores in a population of non-linguists.

The results of the t-test were as follows: $t=1.682$, $p=0.049$. As the p-value is lower than 0.05, hypothesis H_0 is rejected. This indicates that the t-test backs the claim that the population of English students would have higher productive knowledge of word family members test scores than the population of non-linguists.

In summary, receptive knowledge of word family members exceeds the participant productive knowledge of family members but the gap between the two types of knowledge was only 4%. Receptive and perceptive knowledge of members of a word family correlates positively, however, the correlation is moderately strong. T-test indicates that the proportion of correct answers in productive and receptive knowledge of word family members in a similar population would be not equal. In addition, the t-test assumes that receptive knowledge of word family members is less

problematic to L2 learners of English and explicit learning of word building has a real impact on the productive skills of L2 learners of English.

CONCLUSIONS

- There are two main groups of factors influencing the learning of L2 vocabulary: sociolinguistic factors and socio-contextual factors. Conventionally, lexical knowledge is distinguished into receptive and productive, however, the concepts are not precisely defined. This leads to divergent views on what receptive and productive knowledge is, what skills these two types of knowledge encompass, or how they are related to each other. Researchers should be very careful when choosing a lexical unit for vocabulary tests and pedagogy as it has a great impact on test results and teaching methods. Word family is the largest and the most complex lexical unit which is widely used in vocabulary studies.
- The results of the word derivative task suggest that the participants of the study have high productive knowledge of the members of a word family as they were able to produce 80.7% derivative forms. Also, the derivational knowledge of Lithuanian participants is significantly better than that of Schmitt and Zimmerman study participants, whose share of correct answers in this task was only 56.6%. In addition, data revealed that explicit learning of word building has a real impact on word productive skills as the group of participants that had a morphology course at the university showed better word formation knowledge in the test compared to the other group. The best-known derivative forms to the participants were nouns and verbs, however, they had some difficulties producing adjectives and adverbs. Furthermore, the results of the word derivative tasks do not support the idea of a word family which claims that knowledge of one member of a word family determines the knowledge of other members of a word family because only in 50.5% of the cases the participants produced all members of the word family. Consequently, the data show that word family as a counting unit tends to overrate learner's vocabulary knowledge.
- In the translation test, the participants provided correct Lithuanian meaning to 84.7% of English words. The study indicates that study participants have high receptive knowledge of word family members. All members of a word family were correctly translated only in 61.2% of the word families. Although results were better than in the derivative production task, they also contradict the idea of a word family. There was no significant difference in scores between the two groups meaning that receptive knowledge should be easier to gain than productive and exposure to English plays an important role in receptive knowledge. Participants were best at translating verbs and encountered some difficulties while translating adverbs. In two-thirds of

the word families, the best-known member of the family in the translation task was the headword proving that L2 learners of English learn the most basic and frequent forms first and derivative forms are acquired later.

- Receptive knowledge is larger than productive knowledge and the gap between the two types of knowledge is 4%. Although the receptive and productive knowledge of word family members is not the same size, they are related. The correlation coefficient of 0.4 indicates that between receptive and productive knowledge of members of a word family is a moderate positive linear relationship. Finally, based on research data, there were three hypotheses formulated and tested using the t-test. Paired t-test proved that there would be a difference between the proportion of correct answers in the receptive and productive knowledge test if the knowledge of a population would be tested. One-tailed t-tests accepted the hypotheses that receptive knowledge scores in a population of students of philology would be the same as in a population of non-linguists but productive knowledge scores in a population of students of philology would be higher compared to the non-linguist population.

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SUMMARY

The aim of this study is to investigate the relationship between receptive and productive knowledge of members of a word family of native Lithuanian speakers who learn English as a foreign language. The thesis is concerned with word family members because word family is the largest and the most complex lexical unit in vocabulary studies and the relationship between family members has not been analysed yet. To reach the goal the empirical research was conducted. For data collection, the test consisting of three tasks was applied. The self-evaluation task and the Test of English Derivatives for assessment of receptive knowledge were taken from Schmitt and Zimmerman's (2002) study, and the translation task for examination of the receptive knowledge was designed for this study by the author of the paper. In order to reach larger audience, the test was placed on the Internet. The participants of the study were 48 Lithuanians who completed online tasks. The participants were split into two groups. The first group contained 30 undergraduate students of English as major from the faculty of Philology at Vilnius University and the second was made up of 18 students of other study programs or graduates of other study programs. Descriptive and inferential statistics were adopted for the analysis of collected quantitative data.

Data analysis revealed that participants of the study had high productive and receptive knowledge of members of a word family as the proportion of correct answers in both productive and receptive knowledge tests exceeded 80%, however, receptive knowledge of word family members was by 4% higher than productive knowledge. There was no significant difference in the results of the receptive knowledge test between the participants of two the groups, in contrast, productive knowledge test scores in the group of students of English were higher. This suggests that explicit learning of word formation principles is more important for productive knowledge than for receptive knowledge.

Participants in both groups demonstrated productive knowledge of all members of a word family for 50% of all word families and receptive knowledge for 61% of all word families. It means that test results contradict the main idea of a word family which claims that knowledge of one member of a word family determines the knowledge of other members of a word family. Research data suggests that a word family as a counting unit tends to overrate learner's vocabulary knowledge.

Although the receptive and productive knowledge of word family members is not the same size, they are related. The correlation coefficient of 0.4 shows a moderate positive linear correlation between the two types of knowledge.

At the end of the research, there were three hypotheses formulated and tested using the t-test. Paired t-test proved that there would be a difference between the proportion of correct answers in the receptive and productive knowledge test if the knowledge of a population would be tested. One-tailed t-tests accepted the hypotheses that receptive knowledge scores in a population of students of philology would be the same as in a population of non-linguists but productive knowledge scores in a population of students of philology would be higher compared to the non-linguist population.

SANTRAUKA

Šiame darbe yra analizuojama anglų kalbos žodžių darybos lizdo vedinių recepciniai ir produkciniai gebėjimai. Tyrimo tikslas – išnagrinėti ryšius tarp lietuvių, besimokančių anglų kalbos kaip užsienio kalbos, anglų kalbos žodžių darybos lizdo vedinių recepcinių ir produktinių gebėjimų. Sprendimą nagrinėti žodžių darybos lizdus nulėmė tai, jog žodžių darybos lizdai yra didžiausi ir sudėtingiausi leksiniai vienetai, taikomi žodyno tyrimuose, tačiau žodžių darybos lizdų vedinių tarpusavio ryšiai iki šiol dar nebuvo tyrinėti. Tikslui pasiekti buvo atliktas empirinis tyrimas. Kad būtų surinkti tyrimui reikalingi duomenys buvo paruoštas testas, kurį sudarė trys skirtingos užduotys. Savos žinių savarankiško įsivertinimo užduotis ir Anglų kalbos vedinių testas, skirtas mokinių produktiniams gebėjimams įvertinti, buvo paimti iš Schmitto ir Zimmermano (ang. Schmitt and Zimmerman; 2002) tyrimo, o vertimo užduotį recepcinių gebėjimų ištyrimui parengė šio tyrimo autorė. Siekiant pritraukti kuo daugiau dalyvių į tyrimą, užduotys buvo patalpintos internete, ir duomenys rinkti nuotoliniu būdu. Tyrime dalyvavo 48 gimtakalbiai lietuviai, atlikę internetines užduotis. Pirmoje grupėje buvo 30 Vilniaus universiteto Filologijos fakulteto studentų, studijuojančių anglų kalbą, antrąją grupę sudarė 18 dalyvių, besimokančių kitose studijų programose ar kitas studijų programas baigę asmenys. Surinkti kiekybiniai duomenys analizuoti taikant aprašomosios ir indukcinės statistikos metodus.

Duomenų analizė atskleidė, kad tyrimo dalyviai turi gerus produktinius ir recepcinius žodžių darybos lizdų vedinių gebėjimus, nes teisingų atsakymų santykis su visomis užduotimis abiejuose testuose viršijo 80 %. Recepciniai žodžių darybos lizdų gebėjimai buvo didesni, ir produktinius gebėjimus viršijo 4 %. Jei recepciniai žodžių lizdo darybos vedinių gebėjimai abiejose dalyvių grupėse buvo panašūs, tai produktiniai gebėjimai anglų kalbos studentų grupėje buvo aukštesni. Tai rodo, kad tikslingas žodžių darybos lizdų vedinių darybos principų mokymasis turi didesnę teigiamą įtaką produktiniams gebėjimams.

Abiejų grupių dalyviai produktinių gebėjimų užduotyje visus žodžių darybos lizdų vedinius teisingai sudarė pusei nagrinėtų žodžių lizdų, o recepcinių gebėjimų užduotyje – žodžių lizdų su išvertais visais žodžių vediniais dalis sudarė apie 61 % nuo visų tirtų žodžių darybos lizdų. Matome, kad gauti tyrimo rezultatai prieštarauja pagrindinei žodžių darybos lizdų idėjai, teigiančiai, kad jei mokinys žino pagrindinį ar kurį kitą žodžių lizdo vedinį, tai jis nesunkiai atpažįsta ir kitus žodžių lizdo vedinius. Kartu tyrimo duomenų analizė leidžia daryti išvadą, kad žodžių darybos lizdas kaip skaičiavimo vienetas yra linkęs pervertinti besimokančiojo žodyno dydį.

Nors tyrimo duomenys patvirtino, kad žodžių darybos lizdo narių receptiniai ir produkciniai gebėjimai skiriasi, jie yra tarpusavyje susiję. Koreliacijos koeficiento vertė 0,4 rodo, kad tarp abiejų tipų darybos lizdo vedinių gebėjimų yra stebima teigiama vidutinio stiprumo tiesinė koreliacija.

Remiantis tyrimų duomenimis tyrimo gale buvo suformuluotos ir naudojant t-testą patikrintos trys hipotezės, leidžiančios daryti išvadas apie didesnę populiaciją. Porinis t-testas, patvirtinto hipotezę, kad atlikus žodžių darybos lizdo narių receptinių ir produktinių gebėjimų testus didesnėje populiacijoje šių testų teisingų atsakymų dalis abiejuose testuose skirtųsi, t. y. receptiniai gebėjimai būtų didesni nei produkciniai. Vienpusis t-testas patvirtino, kad anglų kalbos studentų populiaciją lyginant su ne lingvistų populiacija būtų gauti panašūs abiejų populiacijų receptinių gebėjimų rezultatai, tačiau šios populiacijos produktinių gebėjimų testo rezultatai būtų geresni nei ne lingvistų populiacijoje.

APPENDICES

APPENDIX A. TASKS

TASK 1. Schmitt and Zimmerman scale

Instructions: For each of the words that is listed below, select the ONE statement that best describes how well you know the word.

	I don't know the word	I have seen the word before but am not sure of the meaning	I understand the word when I see or hear it in a sentence, but I don't know how to use it in my own speaking or writing.	I know the word and can use it in my own speaking and writing
assume				
authority				
traditional				
select				
access				
philosophy				
inevitably				
liberal				
release				
survive				
ideology				
precise				
minimum				
coherent				
persist				

TASK 2. Test of English Derivatives

Instructions: Most words can be changed to different parts of speech. For example, the word STIMULATE is a verb but can be changed to a noun form (STIMULATION) or an adjective form (STIMULATING). In the case of STIMULATE, there is no adverb form, but many other words do have an adverb form. In this task, look at each word and write the correct form in each sentence. If there is more than one possibility (e.g., more than one adjective form) you only need to write one. If there is no form, put an "X" in the blank on the left. Sometimes the form will not need changing, as it is already correct (such as STIMULATE in the example below).

EXAMPLE:

stimulate

stimulation	Noun	A massage is good _____
stimulate	Verb	Massages can _____ tired muscles.
stimulating	Adjective	A _____ massage has an effect.
X	Adverb:	He massaged _____.

1. assume

Noun	He made an _____ hat she likes meat.
Verb	He can _____ that she likes meat.
Adjective	He had an _____ idea that she likes meat.
Adverb	He decided _____ that she likes meat.

2. authority

Noun	The judge had the _____ to let us view the tax records.
Verb	He decided to _____ the viewing of the tax records.
Adjective	The _____ viewing of the tax records was unpopular.
Adverb	All judges speak _____.

3. traditional

Noun	The celebration of Thanksgiving is an American _____.
Verb	Americans _____ Thanksgiving.
Adjective	Thanksgiving is a _____ American holiday.
Adverb	Thanksgiving is _____ celebrated in American families.

4. select

Noun	There was a large _____ of cars to buy.
Verb	We decided to _____ one car.
Adjective	The best cars were bought by _____ car customers who chose carefully.
Adverb	We looked at the cars _____.

5. access

Noun	The university student was given _____ to the library.
Verb	The student wanted to _____ the library.
Adjective	The helpful librarians make it an _____ library.
Adverb	The library was _____ located.

6. ethnic

Noun	The people in his neighborhood shared the same _____.
Verb	The neighborhood _____.
Adjective	The people lived in _____ neighborhoods.
Adverb	The neighborhoods were divided _____.

7. philosophy

Noun	She explained her _____ of life to me.
Verb	She was known to _____ about her life.
Adjective	She was known as a _____ person.
Adverb	She discussed her life _____.

8. inevitably

Noun A disagreement between the two politicians was an _____.
Verb A disagreement _____.
Adjective The _____ disagreement between the politicians was loud.
Adverb A disagreement _____ occurred.

9. liberal

Noun The _____ of the law was opposed by some politicians.
Verb They did not want to _____ the law.
Adjective His _____ opinions were not accepted by the politicians.
Adverb He voted _____.

10. release

Noun The _____ of the prisoner was delayed.
Verb The police had to _____ the prisoner yesterday.
Adjective The _____ prisoner left town.
Adverb The prisoner left town _____.

11. survive

Noun A young child fought for _____ after the accident.
Verb The child _____ the accident.
Adjective The child was the only _____ member of the family after the accident.
Adverb The child lived _____.

12. ideology

Noun The first politician had a different _____ from the second politician.
Verb The two politicians _____ differently.
Adjective The two _____ politicians differed.
Adverb The two politicians differed _____.

13. precise

Noun A doctor must work with _____.
Verb A doctor _____.
Adjective Medical care requires _____ work.
Adverb Doctors must work _____.

14. minimum

Noun Advanced warning of the storm resulted in a _____ of damage.
Verb The advanced warning of the storm helped to _____ its damage.
Adjective The storm caused _____ damage.
Adverb The area was damaged _____.

15. coherent

Noun The judge was impressed by the _____ of the lawyer's argument.
Verb The lawyer makes sure her points _____ with one another.
Adjective The lawyer made _____ arguments.
Adverb The lawyer argued _____.

16. persist

Noun	The judge changed his mind because of the lawyer's _____.
Verb	The lawyer would _____ until the judge changed his mind.
Adjective	The _____ lawyer persuaded the judge to change his mind.
Adverb	The lawyer argued _____.

TASK 3. Translation test

Instructions: Read the sentences and translate the words in bold into Lithuanian. If there is more than one possible translation of the word (e.g., the word STIMULATE have multiple meanings (pa)skatinti, (su)žadinti, stumuliuoti) choose the meaning that is most appropriate in the sentence.

Please write a translation of only ONE word!

EXAMPLE:

The course will **stimulate** interest in the development of modern society.

stimulate

sužadinti

1. People tend to make **assumptions** about you when you have a disability. (Cambridge)
2. His tone was clear and **authoritative**. (OLD)
3. The episode was reported **minimally** in the press. (OLD)
4. The points you make are fine, but the whole essay lacks **coherence**. (OLD)
5. They have **persistently** denied claims of illegal dealing. (OLD)
6. He must betray his friend in order to **survive**. (OLD)
7. The group is pushing the **liberalization** of drug laws. (Cambridge)
8. Others left the party for **ideological** reasons. (Collins)
9. Do you think you could be a bit more **precise**? (Cambridge)
10. Live now, pay later - that's my **philosophy** of life! (Cambridge)
11. The festival is **traditionally** held in May. (OLD)
12. He refused to **release** her arm. (OLD)
13. How do you **select** people for promotion? (Cambridge)
14. **Access** to the papers is restricted to senior management. (Longman)
15. Many factors are important, for example class, gender, age and **ethnicity**. (OLD)
16. She took a long time to make her **selection**. (OLD)
17. She took the bad news **philosophically**. (OLD)

18. His created a sense of **inevitability** around his campaign. (Cambridge)
19. It's probably safe to **assume** that we'll be hearing more about this story. (OLD)
20. Several countries claim **authority** over the islands. (Longman)
21. Costs should be kept to a **minimum**. (OLD)
22. A question on **ethnic** origin was included in the census. (Cambridge)
23. This **tradition** dates back to medieval times. (Cambridge).
24. States need to understand how to **access** the federal resources that are available. (OLD)
25. Of course these leaders do more than preach and **philosophize**. (Collins)
26. They have plans to **liberalize** the prison system. (Cambridge)
27. This device helps make virtual reality a more usable and **accessible** technology. (Collins)
28. He **inevitably** orders iced tea with his lunch. (Cambridge)
29. He speaks his mind quickly and **authoritatively**. (Cambridge)
30. We're very **selective** about what we let the children watch. (Longman)
31. The **released** prisoner left town. (OLD)
32. His **assumed** innocence proved untrue. (Collins)
33. What are her chances of **survival**? (Cambridge)
34. Some old people are **philosophical** about death. (Longman)
35. She was the last **surviving** member of the family. (OLD)
36. Individualism is central to capitalist **ideology**. (OLD)
37. She gave a clear, **coherent** account to the court. (OLD)
38. This situation cannot be allowed to **persist**. (OLD)
39. The library was **accessibly** located. (Cambridge)
40. He is relatively **liberal** on social issues. (OLD)
41. It's **traditional** in America to eat turkey on Thanksgiving Day. (OLD)
42. The captain struck again with deadly **precision**. (OLD)
43. They came to see defeat as **inevitable**. (OLD)
44. The public demanded her **release**. (OLD)
45. He arrived at **precisely** four o'clock. (Longman)
46. Every effort is being made to **minimize** civilian casualties. (Longman)
47. The country exploded into weeks of demonstrations, riots and **ethnically** charged attacks.
(Cambridge)
48. Little separates the two women **ideologically**. (Cambridge)
49. They are willing to **authorize** the president to use force if necessary. (Collins)

50. The government has to convince voters it is proceeding **coherently** toward its goals. (Collins)
51. It was her sheer **persistence** that wore them down in the end. (OLD)
52. The right wing attack the media for being **liberally** biased. (OLD)
53. They **selectively** removed trees that were diseased. (Cambridge)
54. He has been a **persistent** critic of the president. (Cambridge)
55. The crime carries a **minimum** sentence of five years. (OLD)
56. All the details are there and are correct but they don't **cohere**. (Longman)

Note. Abbreviations: OLD – Oxford Advanced Learner's Dictionary, Cambridge – Cambridge Learner's Dictionary, Longman – Longman Dictionary of Contemporary English, Collins – Collins English Dictionary.

APPENDIX B. ANSWERS

TASK 2. Accepted Derivative Forms of Prompt Words

NOUN	VERB	ADJECTIVE	ADVERB
assumption	<i>assume</i>	assumed X	X
<i>authority</i> authorization	authorize	authorized authoritative	authoritively authoritatively
tradition	traditionize X	<i>traditional</i>	traditionally
selection	<i>select</i>	selective select selected	selectively
<i>access</i> accessibility	<i>access</i>	accessible accessed	accessibly X
ethnicity	X	<i>ethnic</i>	ethnically
<i>philosophy</i>	philosophize	philosophical philosophic	philosophically
inevitability	X	inevitable	<i>inevitably</i>
liberality liberalization liberalness liberty	liberalize	<i>liberal</i>	liberally
<i>release</i>	<i>release</i>	released	X
survival	<i>survive</i>	surviving	X
<i>ideology</i>	X	ideological X1	ideologically
precision preciseness	X	<i>Precise</i>	Precisely
<i>minimum</i> minimization	minimize	minimal minimum	Minimally
coherence coherence	cohere X	<i>coherent</i>	coherently
persistence persistence	<i>persist</i>	persistent	persistently

Note. The most frequently occurring member of each word family is in italics; X indicates a judgment that no typical form exists; English spelling is acceptable.

TASK 3. Acceptable Answers for the Translation Task

1. *Prielaida, manymas, hipotezė, (išankstinė) nuomonė, (išankstiniai) nusistatymai, (išankstinės) nuostatos.*
2. *Įsakmus, valdingas, autoritetingas, griežtas, įtakingas, viršininkiškas.*
3. *Minimaliai, menkai, nedaug, (labai) mažai, negausiai, vangiai.*
4. *Ryšys, sąsaja; rišumas, darna, darnumas; nuoseklumas, sklandumas, koherencija, sąryšis, aiškumas.*
5. *Nuolatos, primygtinai, atkakliai; įnirtingai, be perstojo, nepailstamai, nepaliaujamai, nuolat, užsispyrusiai, pastoviai, primygtinai, pakartotinai.*
6. *Išlikti, išgyventi, išlikti gyvam.*
7. *Liberalizavimas, (at)laisvinimas, sušvelninimas, atpalaidavimas, palengvinimas,*
8. *Ideologinis, idėjinis; vertybinis.*
9. *Tikslus, apibrėžtas, aiškus, kruopštus, skrupulingas, pedantiškas; detalus, konkretus, preciziškas, atidus.*
10. *Filosofija; koncepcija, pagrindinis principas; moto, šūkis, požiūris.*
11. *Pagal tradiciją, iš tradicijos, tradiciškai; įprastai, paprastai.*
12. *Paleisti, išleisti; išleisti, išlaisvinti.*
13. *Rinkti(s), atrinkti, išrinkti, parinkti; pa(si)rinkti.*
14. *Priėjimas; galimybė/ leidimas gauti/ naudotis; prieiga, prieinamumas, pasiekiamumas, pasiekimas, priėjimas.*
15. *Tautybė; etniškumas, kilmė, etninė kilmė, etninė tapatybė.*
16. *Atrinkimas, parinkimas, išrinkimas; pasirinkimas; rinkinys; atrinkti kūriniai, rinktinė; kolekcija.*
17. *Filosofiškai, stoiškai.*
18. *Neišvengiamumas; neišvengiamybė; būtinumas.*
19. *Manyti, tarti; numanyti, galvoti, (nu)spėti, daryti prielaidą, teigti, tikėtis.*
20. *Valdžia, įgaliojimai, kompetencijos sfera; įtaka, svoris; viršenybė, galia, teisė, teisės.*
21. *Minimumas; žemiausias lygis.*
22. *Etninis, tautinis.*
23. *Tradicija, senas paprotys; papročiai.*
24. *Gauti/ imti informaciją (iš kompiuterio); gauti prieigą, pasiekti, prieiti, gauti, (pa)(si)naudoti.*
25. *Filosofuoti, samprotauti; svarstyti.*

26. *Liberalizuoti, daryti liberalų; (at)laisvinti, sušvelninti.*
27. *Prieinamas, pasiekiamas, gaunamas; pasiduodantis.*
28. *Neišvengiamai; būtinai, be abejo, visada, visuomet, neabejotinai, visada be išimties.*
29. *Autoritetingai, patikimai; įsakmiai, valdingai; griežtai, ryžtingai, užtikrintai.*
30. *Atrankus, išrankus, selektyvus; atsirenkantys, besirenkantys.*
31. *Išleistas; paleistasis.*
32. *Tiriamas; apsimestinis, išgalvotas, fiktyvus; spėjamas, menamas, numanomas.*
33. *Išlikimas; išgyvenamumas, išgyvenimas.*
34. *Filosofiškas; giliamintis, filosofišškai galvojantis; filosofuojantys, mąslūs, mąstantys.*
35. *Gyvas, gyvenantis, išlikęs, (iš)gyvenusi, išgyvenęs.*
36. *Ideologija.*
37. *Susijęs, susietas, sujungtas; rišlus, nuoseklus, sąryšingas; aiškus, suprantamas; sklandus, vientisas.*
38. *Užsispirti, atkakliai toliau (ką) daryti; išsilaikyti, išlikti; tęstis; išlikti nepakitusi, trukti, užsilaikyti, užsitęsti, pasikartoti.*
39. *Prieinama, pasiekiamai, patogiai, prieinamai.*
40. *Liberalus, negriežtas, tolerantiškas, be prietarų; atviras, liberalaus požiūrio, laisvų pažiūrų.*
41. *Tradicinis, tradiciškas; įprastinis; tradiciška, įprasta.*
42. *Tikslumas, precizija; atida, preciziškumas.*
43. *Neišvengiamas; nuolatinis, įprastinis.*
44. *Paleidimas, išlaisvinimas (iš kalėjimo ir pan.); atleidimas (nuo bausmės, atsakomybės ir pan.); išleidimas, išvadavimas.*
45. *Tiksliai; lygiai, punktualiai.*
46. *Sumažinti iki minimumo; minimizuoti, minimalizuoti.*
47. *Etniškai, tautiškai, tautiniu pagrindu.*
48. *Ideologiškai, ideologiniu požiūriu; idėjiškai.*
49. *Įgalinti, duoti galią/ leidimą, įgalinti, patvirtinti, suteikti valdžią, leisti.*
50. *Nuosekliai, koherentiškai; aiškiai, kryptingai, rišliai, sklandžiai.*
51. *Užsispyrimas; atkaklumas; ištvėringumas; gajumas; išsilaikymas; nuolatinis būvimas, užsitęsimas.*
52. *Liberaliai.*
53. *Atrankos būdu, atrenkant; atrinkdami, atrinkimo būdu, atrinktinai, tik tuos konkrečius, atrinktinai, atsirenkant, pasirenkant, pasirinktinai.*

54. *Atkaklus, užsispyręs; nepaliaujamas; pastovus, nuolatinis*; aktyvus, amžinas, ilgalaikis, nuožmus.
55. *Minimalus*, mažiausias.
56. *Jungtis, būti sujungtam/ susijusiam, būti susikibusiam, sukibti; derintis, sietis*; atitikti, darniai jungtis, derėti, neatitikti, nedera, nelimpa, nesutampa, nesiderinti, nesijungti, nesirišti, nesisieti, nesueina, nesusiję, nesusisieti, rištis.

Note. The dictionary translations are taken from *Alkonas* (Piesarskas, 2000) and *Didysis lietuvių kalbų žodynas* (Piesarskas, 2002); dictionary translations are in italics.