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Units of a person's mental lexicon and the nature of connections between them

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Abstract

In the modern world, the interest of the scientific world on the interdisciplinary basis of speech perception on the part of psychology and Philology has increased significantly. It should be noted that, despite the increasing role of the English language in Kazakhstan at the present time, this problem is probably the least developed. The purpose of the article is to describe the results of scientific research on the process of entering a foreign word into the system of internal lexicon of a student at the level of professional training. Methodology used: experimental (identification of the threshold of the "educational" lexical minimum) and comparative (comparison of associative fields of English words of the profile for students of the direction, in general 1500 lexical units) were used. From the results the data obtained allow us to identify the specifics of the entry of a foreign language word into the system of the student's internal lexicon at the professional level.

Keywords: psycholinguistics, mental lexicon, internal dictionary, foreign language, connections

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1. Introduction

Understanding the nature of human thoughts is both ambitious and exciting tasks, and the solution of which a researcher must inevitably turn to the achievements of various sciences dealing with the problems of human consciousness, his cognitive abilities: cognitive linguistics, psychology, psycholinguistics, philosophy of mind and neurophysiology.

Due to the specificity of meanings that do not depend on the language code and are associated with the general laws of the work of human memory, early assimilation and connection with procedural knowledge, units of the core of the human lexicon, play the role of a kind of functional reference points (supports) in the processes of identifying other words. Units of the core of the lexicon are used as 'typical examples', through the correlation with which the identification of less typical units that are not included in the core occurs (Zolotova, 2005). This phenomenon underlies the study of a foreign language, which is the choice of the native language.

Due to the arrival of new information from the outside into the mental lexicon, some random deviations (fluctuations) arise, which can increase and bring a stable structure into an unstable state. At the first stage of the identification process (due to evolutionarily determined possibilities), the word enters the field of vision of the individual, the stimulus passes through the layers of the retina and reaches the visual receptors, in which the energy of the stimulus is converted into nerve impulses that travel through the fibres of the optic nerve to the brain.

It seems to us that the movement of energy in a situation of recognising an unfamiliar word is directed from the individual to the word and is expressed in the individual's search for supports and familiar elements that can bring it to meaning. Another flow of energy comes from the word as the impact of the external environment, its associative potential, which in turn is 'fertilised' and created by the perceptual, cognitive and affective experience of a person.

Thus, the life of a word is continuously connected with the person who perceives it; outside of interaction with him, it remains a chain of graphemes or sound noise.

In this context, the words of Eko (2004) will sound convincingly that if a person participates in the process of communication, then we should talk about the world of meaning and the process of meaning, because the signal is no longer just '... a series of discrete units calculated in bits of information, but rather a meaningful form, which the addressee-person must fill with meaning'. According to Eko (2004), at the moment of reaching the addressee the message is 'empty'. But this emptiness is presented as '... the readiness for the work of some signifying apparatus, on which the light of the codes I have chosen to highlight its meaning has not yet fallen'.

The use of nuclear units as identifier words when explaining the meaning of some words through others, which can often be observed in the results of experiments (especially in reactions that are usually classified as 'subjective definitions'), is an implementation of the metalinguistic function of the units of the core of the mental lexicon. Such units serve as supports for activating inferential knowledge and as starting points for internal reference (Zolotova, 2005). Normally, such metalinguistic activity is latent, but in experimental situations the identifier can be verbalised.

2. Method

The purpose of the article is to describe the results of scientific research on the process of entering a foreign word into the system of internal lexicon of a student at the level of professional training.

The methodologies used were experimental (identification of the threshold of the 'educational' lexical minimum) and comparative (comparison of associative fields of English words of the profile for students of the direction; in general, 1,500 lexical units). The study was based on data obtained from

English teachers who participated in the experiment and from third-year students who participated in a series of free association experiments.

3. Research results

The mental lexicon, as a concept, goes back to the term mental dictionary, proposed by Treisman (1961, cited in Coltheart et al., 2001) to denote a repository of words with their meanings in human memory. If one follows the metaphor of the dictionary, then the mental lexicon should have its own 'dictionary entries' and 'dictionary entries', which would contain information about the pronunciation, spelling, meaning and grammatical characteristics of the word, which would be activated when a person reads or hears a certain word. Unfortunately, the inconvenience of transferring the device of the dictionary in the mental lexicon is that the unit of the dictionary – the lexeme, which is an abstraction from its word forms – is not directly observed in speech. Therefore, the question arises as to which significant linguistic units are stored in it: word forms, morphemes or both. In addition, it is important for the researcher to understand how the storage of linguistic units is organised, whether they are connected in any way with each other. If, when answering the second question, the majority is inclined to organise the mental lexicon according to the principle of a semantic network, in the nodes of which linguistic units are located, then when answering the first circle of questions, a unified point of view has not yet been developed.

Consider the basic models of mental lexicons.

1. Lexical search model, developed by Forster (1976), assumes that several representations are stored in a person's memory for each word: phonological appearance, graphic appearance, meaning as well as basic grammatical information (part of speech). In parallel with these representations, the units of access to the mental lexicon are stored in a separate 'file': spelling representations of a word for reading, phonological representations for listening to speech, and semantic–syntactic representations for generating speech and writing. Each representation in a file that stores access units is associated with the main representations of the lexical units of the mental lexicon.

This model was most detailed at the level of access files for spelling representations. According to Forster (1976), the spelling representations in the access unit file are organised according to the shape and frequency of the word: words that have the same letters in the same places will be stored together in special subfiles. For example, for the English language, one subfile labelled sp### (the hash sign in this case means any letter, the number of lattices corresponds to the number of letters that is different for all words of this subfile), such as the words spade, spank, spoil, speed, etc. will be stored. The representations that are access units are stored in descending order of frequency.

When a person sees a word, it first retrieves information about its spelling. Then a cyclical search process is started, starting with the most frequent words and gradually moving to the desired one in decreasing frequency. The search process compares the representations stored in the file and the graphic appearance of words. When they match, access to the main store is opened. This frequency-based search explains why frequency words are recognised faster than low-frequency words.

Since each word has two types of representations (for access and for storage), only partial representations can be stored in the file with access units. For example, for the word rhinoceros, from the point of view of the author of this model, it is enough to store only the *rhin* segment. This is consistent with experimental data on the perception of words by ear: words are recognised the moment they become distinguishable from other words stored in the mental lexicon, i.e., the moment when the recognition point has been reached (recognition point) (Marslen-Wilson, 1989). The concept of partial representation is also based on the fact that a desirable property of any linguistic information processing system is very quick access to the mental lexicon by the word seen. Otherwise, if the processing is slow, it would be difficult for the reader to follow the message.

As candidates for partial representations, along with traditional units such as the root and the first syllable of a word (Taft & Forster, 2012), a unit is considered that had not previously been distinguished in traditional linguistics, basic orthographic syllabic structure or abbreviated BOSS. Taft defines BOSS as a group of consecutive letters of a word, starting with the first letter of the root and ending with the cluster of consonants following the first vowel of the root. In this case, the resulting unit should form at least a pseudoword, i.e., obey the typical spelling rules of the given language and be easy to read, but it does not have to be semantically meaningful. So, for example, for the words lantern and rhubarb, BOSS is strings of letters *lant* and *rhub*, respectively. The examples show that BOSS does not have to match either the root morpheme or the first syllable.

2. *The Logogen model* (Morton, 1970) implies the simultaneous storage of complete lexical information and separate representations of the word intended for access to the mental lexicon. In this model, two components are distinguished: a logogenic system corresponding to the access level and a cognitive system corresponding to the storage level of complete lexical information. Like Forster and Morton focuses on the problem of access to the mental vocabulary and almost does not focus on the structure of the cognitive system.

The logogenic system, which provides access to the mental vocabulary, consists of logogenes, as its name implies. Logogen activation is a passive response to stimulus. As soon as the information stored in the logogen (phonological / semantic / morphological) coincides with a part of the stimulus, an increase in the level of activation of the linguistic unit occurs. In addition, the logogen takes into account information about the frequency of the word and the most common contexts in which this word occurs.

Each logogen is characterised by a specific critical activation threshold corresponding to the volume of activation that is required for word recognition. The lower the threshold, the more frequent the word. As soon as there is a complete coincidence of the information contained in the stimulus word and the information stored in the logogen, the required activation threshold for access to the cognitive system is reached. Since the logogenic system is activated passively, the activation process simultaneously involves all logogens, in contrast to the lexical search model, in which access is provided per unit of time to only one representation of a word.

3. *Interactive activation model*, developed by McClelland and Rumelhart (1981) within the framework of connectionism, involves several levels of representation of linguistic information. This is the level of individual features [those elements that make up the letters. For example, for the letter '*n*' these are two vertical ('|') and one horizontal ('–') lines], the level of letters and the level of words (when perceiving a chain of letters, all letters are processed in parallel and simultaneously). Each perceived unit has its own node at each level. Nodes can be connected to each other, i.e., to be 'neighbours', then the relationships are established between them, which slow down activation if there is no direct connection between them, or exciting, if there is a connection. The activation of one node leads to the activation of neighbouring nodes. But downward and upward interactions are possible only between adjacent levels.

The level of activation of verbal representation is calculated as a function of two variables: the frequency of the word and the degree of similarity of its graphic appearance with the graphic images of other words. The higher the level of activation of one word, the more it can suppress the activation of representations of other words.

According to the connectionist approach, the system of connections in the lexical system is a consequence of the frequent coexistence of certain structures in the language (Sandra, 1994). If some perceptual units (for example, letters) are often found together, then the connections between them will be the stronger, the more often they are used side by side. Thus, connections between letter representations that form a cluster will be stronger than connections between letters that rarely follow each other in writing in a given language. The same rule applies to units of different levels. For example, if a certain sequence of letters more often performs a certain function or expresses a certain

meaning, then the links between this sequence of letters and this function, this value will be activated sooner than competing links..

4. Cluster models are a hybrid of pomorphic and whole-word storage, in which both or all derivatives of one root and the root itself are stored, but not individual affixes. In a partial form, this hypothesis is presented in the work of Stanners et al. (1979), according to which access to English prefixed derivatives stored in their entirety is carried out only after morphemic analysis. The model of Cole et al. (1986; 1989), developed for the French language, assumed linear processing of a word from left to right, in which prefix words are recognised entirely (in this case, the activation of the root occurs after access to mental lexicon), and in suffix words; on the contrary, access is carried out after extraction of the root during morpheme decomposition. In its pure form, the cluster model is proposed for Hebrew, where derivational and inflectional derivatives are grouped around their root (Deutsch & Meir, 2011; Feldman & Bentin, 1994).

5. Two-level morphology models are two-tier models with two types of access. In the augmented addressed morphology model, full-word recognition is carried out for familiar words and morphemic analysis for unfamiliar words (Caramazza et al., 1988). In a later version of the same model, the scope of morpheme analysis was expanded to include frequency affixes rarely found in pseudo-affix words (Laudanna et al., 1994).

The morphological race model assumes that when a word is recognised, two processes are launched in parallel: one is responsible for constructing a word form directly from spelling (or phonological) units and searching for its meaning at the semantic level, and the other first selects morphemes from a chain of letters (sounds) and then tries get from the meanings of these morphemes the interpretation of the whole word (Frauenfelder & Schreuder, 1992). Depending on which of the two processes will take less time (if you stay within the framework of the metaphor of the races, who ran first), access to the mental vocabulary will be complete or due to morphemes. But in any case, the word will be recognised as quickly as possible, which is a significant advantage, especially for understanding oral speech. However, such a model requires a lot of resources for both storing language information and processing it.

As a trade-off between saving resources and access speed, we can consider a model in which two types of representations are stored only for frequency words (Schreuder & Baayern, 1995).

6. Models with lemmas. A number of authors adhere to the point of view, according to which additional levels should be laid in the architecture of the mental lexicon, the storage units of which are abstract units. At the same time, to describe the introduced intermediate storage units, linguistic terms (lexeme, lemma) are used in non-traditional linguistic uses that vary from researcher to researcher.

In the models of Allen and Badecker (1999, 2002) and Badecker and Allen (2002), at the level of lexemes, separate morphemes and irregular forms (their phonological representations) are stored, and at the level of lemmas, abstract representations for the root and its allomorphs arising in irregular word forms. Both the lexeme level and the lemma level are associated with semantic level representations. Also in this approach, it is allowed to store two identical phonological representations of homonymous morphemes at the lexeme level, in contrast to the approaches described below.

A similar understanding of the lemma is presented in the paper by Crepaldi et al. (2010). In this model, developed to explain the processes of understanding, there is a morpho-orthographic level of morphemes, an orthographic level of word forms, a level of lemmas and a semantic level; in this case, the lemma is an abstract representation of all forms of one word (lexeme in purely linguistic terminology), but not derivational derivatives, and opens access to the meaning of the word.

In the spreading activation model (Levelt et al., 1999; Roelofs et al., 1998), originally developed to describe the generation, the mental lexicon distinguishes the level of syllables, the level of individual

sounds, the level of the morphophonological appearance of the word – lexemes (in fact, individual morphemes), and then the syntactic level, which presents the lemmas for each lexeme and associated grammatical information, is the level of concepts that accumulates semantic information about the corresponding lemmas. In addition to constant grammatical information (for example, gender for nouns) at the syntactic level for a lemma of a lexeme, a set of potential grammatical meanings of inflectional affixes that are combined with a given type of stem (for example, number and case for nouns) is indicated. The mapping between concepts, lemmas and morphemes is not a one-to-one correspondence: several morphemes (compound words and word forms) can correspond to one lemma and two lemmas can correspond to one concept (the case of English verbs like look up 'look'). Since inflectional indicators do not have their own lemmas, they are mapped at the syntactic level into the stem lemma of the word in which they are encountered. Irregular forms not dividing at the morphophonological level have the same lemma representations as regular forms. For productive word formation affixes, this group of authors allows decomposition at both the morphophonological level and the level of lemmas and concepts, while unproductive affixes are not separated at any level. Similarly, not all compound words have two representations, but only those in which the presence of a morphemic border is critical for the formation of syllable boundaries, regardless of the (non)transparency of the meaning (for example, the semantically opaque Dutch oogappel 'dear baby' from oog 'eyes' and appel 'apple' is decomposed into morphemes, since the syllable border passes between morphemes – oog-ap-pel – and the semantically more transparent 'aardappel' potato 'aard' earth 'and appel' apple 'do not, since the syllable boundaries in it do not depend on morpheme – aar-dap-pel).

In this approach (Taft & Nguyen-Hoan, 2010), continuing the sublexic tradition, the level of lemmas is also an intermediary between the level of form (spelling / phonological) and the level of semantic and grammatical functions. At the level of form, representations of individual sounds / graphemes and morphemes obtained from them are stored. Each morpheme is associated with its own lemma, and the lemmas of morphemes, in turn, are associated with lemmas of the words in which they occur. The meaning of the lemmas at the level of functions is represented by a bundle of attributes. With this approach, at the level of forms, the storage of two homonymous morphemes is not allowed; instead, one morpheme is associated with two lemmas related to different sets of values.

7. Hybrid models. Models positioning themselves as containing lemmas are adjoined by hybrid models that also contain a level intermediate between form and semantics, but, unlike previous models, allow both types of access (Diependaele et al., 2005; Giraudo & Voga, 2014). In addition to the morphographic level, at which the spelling / phonological representations of individual morphemes (morph in the terminology of Giraudot and Vogue), there is a level of whole word forms (lexical in the terminology of Dipendal and his colleagues) and a level of meaning (semantic, according to Dipendal and his colleagues; conceptual, by Girodeau and Vogue), as well as a level intermediate between them.

In the hybrid model of Dipendal and his colleagues, this mediator level is called morphosemantic and connects whole word representations with the meaning of their components, while morphemes do not have a direct access to semantics.

In the hybrid model, Girodeau and Vogue, on the contrary, are associated with the conceptual level as individual morphemes and whole words. Words belonging to the same morphological family, at the intermediate level, are mapped into one 'base lexeme', which coincides in form with a monomorphic word of the same root, and for languages such as French or English, it is, in fact, a root.

The adequacy of a particular architecture of the mental lexicon in relation to a particular language can be checked, in particular, experimentally on the speakers of this language. An important contribution to this area is made by studies of language acquisition by children and the formation of a mental vocabulary in people who study a foreign language in adulthood, studies of its structure in bilinguals, as well as data on the breakdown of the language system in various types of aphasia. In

addition, the strengths and weaknesses of the potential structure of this phenomenon allow us to see computer models that simulate the processes of language acquisition, understanding and generation of speech. The structure of the mental vocabulary of the native language in healthy adult speakers is actively studied using both neuroimaging (EP, MEG and fMRI) and behavioural methods.

Exploring the structure of the lexicon in a person's head, a scientist deals with a kind of black box, about which it is only known what is 'at the entrance' and what is 'at the exit'. Of course, the characteristics of communicative situations and the properties of the resulting texts are very revealing material. Yet, the very work of the brain remains hidden from direct observation.

Special experiments come to the aid of scientists.

The associative experiment seems to be the most common experimental way to study the connections between words in linguistic consciousness (Norman, 2011). He is known to have come to linguistics from psychology and forensics. Initially, the experiment was used to study the mental activity of mental patients. The first collection of associative norms was a dictionary of American psychologists Kent and Rosanoff (1910). They also proposed a standard list of 100 stimulus words. It included, in particular, English words AFRAID, BEAUTIFUL, BUTTERFLY, FRUIT, GREEN, HARD, KING, MAN, RED, TABLE, TROUBLE, WISH, WORKING etc.

This list (and its translations into other languages) is now accepted by psycholinguists from different countries as the basis of an experimental technique. This then makes it possible to compare the reactions received from speakers of different languages, representing different social groups (by age, sex, professional interests, health status etc.). Most often, however, such an experiment is conducted with groups of students or schoolchildren – who are the most 'accessible' audience in this regard.

The associative experiment technique is simple. The subject is presented with a list of stimulus words, to each of which he must respond with the first reaction word that comes to his head.

Thus, a native speaker sequentially builds a chain of responses: stimulus – response and stimulus – response. For example, a person is told: TABLE, and he answers: a chair. And another subject to the same stimulus TABLE will answer: it is standing, the third one will say: round and the fourth one will say covered or the food, or the table is empty (phrases are also allowed) – as to whom it occurs. (For clarity, the stimulus will then be depicted in large, uppercase letters and the reaction in small, lowercase.) It can be considered that the general, so to speak, strategic principle of the subject's activity in such situations is the imitation of text generation. Responding to a word stimulus with a verbal reaction, a person somehow creates some primitive text (Sakharny, 1991). Of course, the conditions of the associative experiment are artificial; the subject does not have a full stimulus for speech activity and there are many embarrassing and distracting factors.

In addition, it is clear that the reaction of an individual in a particular case is individual. Each subject has his own feelings and ideas and his own volume of knowledge; he is at the mercy of his mood and his worries. He may have a different attitude to the experiment or to a particular experimenter etc.

As a particular example, we can cite a comparative analysis of only one fragment of the associative verbal network, carried out by Smirnova in the Russian-speaking and English-speaking (USA) environments. A comparison of the reactions received by the stimulus PUNISHMENT and PUNISHMENT, which is synonymous with it, revealed a number of differences in national consciousness related to discipline, to the traditions of raising children and even to natural and climatic conditions. For example, only in the answers of the Russian-speaking subjects there were reactions such as rain, frost, snow and taiga.

It is logical to assume that the results of the associative experiment should correlate with the data of frequency dictionaries. Attempts at such a comparison have already been made. In particular, Yokoiama investigated the distribution of 1,000 most frequent words (nouns and adjectives) of the Russian and English languages (the latter in the American version) by thematic areas (semantic fields).

It turned out that the general distribution of this vocabulary over seven semantic fields coincides, with the exception of the topic 'religion and morality' (for Russians it is in the sixth place and fourth among Americans). But the internal 'filling' of some fields differs markedly. Thus, the field 'ideology, history and politics' for Russian subjects is formed by 36 concepts; the most frequent of them are struggle 903, party 532 + party 158, power 364 + force 986, class 423 + class 136 etc. For Americans, the same field includes only 16 concepts, and the most common words are power 342 + 73 + strength 136 + 4, programme 394 + 139, government 417, law 299 + 88 etc. (Yokoyama, 1987, p. 294–295). The great 'ideologisation' of the Russian linguistic consciousness becomes understandable if we consider that the material basis for the analysis of Russian vocabulary was provided by the 'Frequency Dictionary of the Russian Language' published in 1977. Obviously, these data are subject to change over time.

An important role in the history of the development of the method of free associations was played by the study of linguist Tumba and psychologist Marbe, which demonstrated that verbal association is not only a psychological, but also a linguistic phenomenon. They believed that verbal associations are connections not only between representations of the language, but also between representations of elements of the language. In their opinion, 'the problem of the formation of linguistic analogies' is intimately connected with associative processes. The task of their associative experiment was to establish whether there are coincidences between stimuli and responses in content and in grammatical categories. Eight people took part in the experiment. Each of the subjects was presented with a list of 60 stimuli. It included 10 nouns denoting family persons and 10 adjectives, 10 pronouns, 10 adverbs of time and 10 adverbs of space, as well as 10 numerals. The experimental data showed that in most cases the subjects reacted to the stimulus with the same part of speech to which the stimulus belonged: to the noun – to the noun, to the adjective – to the adjective etc. In the experiment, the frequency of reactions was also calculated. Thumb and Marbe established a functional relationship between the frequency of responses and the duration of the latency period: the more often the response occurred, the shorter was the association time, i.e., association time became a function of response rate. Then this position entered the linguistic paradigm as Marbet's law. Thus, the study of Tumba and Marbe showed that there are individual differences between the subjects in the time of reactions and in the grammatical coincidence of the category of stimulus and reaction, as well as in the generality of responses.

The purpose of associative experiments, firstly, was to clarify the general laws of the associative process and the task was to find the optimal procedure for its implementation. Secondly, the experimenters wanted to find out by what parameters the subjects' reactions would differ from each other, for which various classifications of reactions were used. The classification of reactions was mainly associated with psychophysiological personality traits (conformity; Thumb and Marbe) and the existence of three types of psyche (Munsterberg). It should be noted that already at that time the classification of reactions became one of the weakest aspects of a free associative experiment, greatly reducing the validity of its results. When developing the classification principles, there were no clear criteria for attributing reactions to a specific type. There was a mixture of logical, linguistic and psychological classification bases (Sukhodolsky, 2004).

In our study, a free associative experiment was used to study and assess the perception of reality by native speakers of foreign words by analysing the identified conceptual systems of respondents. These include the most emphasised components of concepts and ideas about objects of reality, as well as subjective emotional and evaluative characteristics attributed to these concepts and which are a reflection of the emotional perception of the environment by subjects and themselves in it.

The experiment took place in two stages. At the first stage, 143 neologisms were selected (mainly words from the field of names of clothing, food and computer technology) (see Appendix 1). The subjects were asked to rate words from the list on a 5-point scale (1: I hear it for the first time; 2: I heard (a), but I do not know the meaning; 3: I know, but do not fully understand the meaning; 4: I understand the meaning, but I do not actively use the word; and 5: I understand and actively use the word). The experiment made it possible to select incentives that are most understandable. After the

first stage, 35 stimulus words from different spheres of life were selected. All words were selected from the English–Russian dictionary by Muller (2011).

The respondents were 108 third-year students of Aktobe Regional State University named after Zhubanov. The words were read out with the same length (15 seconds). In response to one stimulus word, the recipient had to write down the first reaction word, which, in his opinion, is associated with the name. Free selection, which was provided to the recipients, allows us to identify the variety of associations that arose in them in connection with the stimulus word (Table 1).

Table 1. A set of words of 35 stimulus words from different spheres of life (English–Russian dictionary by Muller (2011)

avatar [ˈævətɑːr]; activation [ˌæktɪˈveɪʃn]; affective [əˈfektɪv];
beach [ˈbiːtʃ]; bicycle [ˈbaɪsɪkəl]; blab [blæb]; boarding [ˈbɔːrdɪŋ]; bracelet [ˈbreɪslət]; brain [ˈbreɪn]; baby [ˈbeɪbi];
cabbage [ˈkæbədʒ]; caftan [ˈkæftæn]; calcium [ˈkælsiəm]; call [ˈkɒl]; chaffy [ˈtʃæfi]; cinematography [ˌsɪnəməˈtɑːgrəfi];
daddy [ˈdædi]; didder [ˈdɪdə]; draft [ˈdræft]; dwelt [ˈdwelt];
eagerness [ˈiːgərnəs]; ebullition [ˌebəˈlɪʃən];
face [ˈfeɪs]; fiddlesticks [ˈfɪdlstɪks]; fillip [ˈfɪləp];
gender [ˈdʒendər]; gladness [ˈglædnəs];
habiliment [həˈbɪləmənt]; headmaster [ˈhedˈmæstər];
idealise [aɪˈdiːˌlaɪz]; inaction [ˌɪˈnækʃən];
jelly-fish [ˈdʒelɪfɪʃ]; judder [ˈdʒʌdər];
knew [ˈnuː]; key [kiː];
reality [rɪˈælətɪ]
security [səˈkjʊrətɪ|]
lazagna [lazanja|]

It should be noted that in works of this kind, similar associations to the same stimulus are usually generalised (for example, associations of water, drink, alcohol and cocktail to the sambuca stimulus are reduced to the word liquid and their frequency is summed up), and individual associations are not taken into account. In our work, such associations were not generalised so as not to lose the meaning of the word that arose in the mind of the respondent. This approach allows for a clearer description of the semantic components of the studied words, as well as a deeper analysis of the linguistic picture of the world and the features of the conceptual picture of the world.

In our work, we used the classification of Terekhova, which distinguishes such associations:

I. Syntagmatic:

1. Neutral;
2. Emotionally evaluative;
3. Functional characteristics;
4. Social role;
5. Associations related to the profession or type of activity.

II. Paradigmatic and categorical:

1. Reactions that belong to the semantic field of the stimulus and are its synonym;
2. Reactions–properties that characterise the stimulus;
3. Reactions in which the stimulus is an indicator or one of the characteristic properties of the reaction;
4. Reactions–comparison.

III. Thematic – reactions that form or, as a result of grammatical change, can form phrases with an incentive, as well as those that can be used within a thematic limited context.

IV. Phonetics – reactions in tune with the stimulus.

V. Word building – reactions formed with a common root of stimulus and reaction, as well as complex words, one of the bases of which is the word stimulus.

VI. Grammatical responses, which represent the grammatical form of the stimulus.

VII. Reminiscent (quotation).

VIII. Reactions of the phraseological type.

IX. Personalities (names, surnames of heroes, historical figures, celebrities of the past and present).

Consider the following results.

1. ACTIVATION: 97 different reactions organise the associative field. The associative field is mainly expressed by nouns, although nominative phrases, adverbs and adjectives are occasionally presented.

A significant number of respondents (27) did not find a verbal response for the stimulus.

Syntagmatic reactions include windows, cards, Bourne, hormones, something and services.

Paradigmatic categorical reactions enable, start, action, code, virus, launch, antivirus, program, process, internet, opening, entrance, software, work, activity, active, asset, key, application, activate, file, game, system and Winchester.

Phonetic reactions are tasting, motivation, modification, closure, maximisation, degradation, multivariate, archiving, registration, integration, deactivation, reservation and deportation.

A number of associations do not find a place in the named classification, therefore, into a separate group, we singled out reactions with different relationships between stimulus and response: brain, sim card, acceleration, bomb, knowledge, explosion, sport, door, structure, efficiency, money, rebirth, telephone, success, new, physical education, forward, zombie, coal, designation, start, movement, deposit, energy, adaptation, green, removal, coffee, speed, activity, word, event, resources, thoughts, rocket, fast, dog, film, memory, physics, vkontakte and remote control.

In a separate group, we also highlight the phrases: IP address, starter package and washing machine.

The associative meaning of the neologism ACTIVATION is very clearly indicated, since the frequency of nuclear reactions is high (in the range of 8–27), the components of the meaning are mainly interconnected due to the seme 'loading'– turn on, start, start and enter. Some of the nuclear reactions are indirectly combined with the key topic, and they call the stimulus-related attribute 'computer'.

2. REALITY: the associative field is represented by 38 different reactions, mainly expressed by nouns, although sometimes they are represented by phrases, adverbs and adjectives.

A significant number of respondents (10) did not find a verbal response for the stimulus.

The following reaction belongs to syntagmatic: show.

Paradigmatic categorical reactions: man, life, people, bright, now, modern, truly and present.

The following reactions belong to word formation: reality, real and real.

Paradigmatic comparative reactions: fantasy, competition, sleep, abstraction, play, matrix, mess and fear.

Phonetic response: unrealistic.

A number of associations do not find a place in the named classification, therefore, in a separate group, we singled out reactions with different relationships between stimulus and response: soap, event, TV, meaning, argument, television, business, view, programme, cartoon and something.

We also distinguish phrases into a separate group: something real and something interesting.

The associative meaning of the neologism REALITY is very clearly indicated, since the frequency of nuclear reactions is high (in the range of 8–223), the components of meaning are mainly interconnected due to the seme 'reality' – 'modern', 'reality', 'real', 'real', 'natural' and 'life'. Some of the nuclear reactions are indirectly combined with the key seme, which calls the attribute 'life' associated with the stimulus, the subjects 'people' and 'human'. In the associative meaning, a variant is presented that has nothing to do with the lexical – 'soap'.

3. AVATAR: the associative field is organised by 59 different reactions, mostly expressed by nouns, although sometimes represented by adjectives and pronouns.

A significant number of respondents (10) did not find a verbal response for the stimulus.

The syntagmatic (emotiona–evaluative type) reactions include the following reactions: blue, bad, drunk, beautiful, great, mine and elements.

Paradigmatic categorical reactions: film, cinema, cartoon, man, game, animal, monster, hero, alien, blockbuster, crank, creature, anime and fantasy.

Reactions–personalities: Mukhtar, Kang, Cameron and Pandora.

A number of associations do not find a place in the named classification, therefore, in a separate group, we singled out reactions with different relationships between stimulus and response: photo, bruise, VKontakte, photoshop, ava, face, Internet, Facebook, icon, universe, friends, sky, paints, kindness, freedom, horror, classmates, message, future, elves, like, computer, guitarist, mummies, baba, system, water, tasting, terrible and substance.

We also distinguish the phrase social network into a separate group.

The associative meaning of the neologism AVATAR is very clearly indicated, since the frequency of nuclear reactions is high (in the range of 10–119), the components of meaning are mainly interconnected due to the seme 'film' – film, fantasy and blockbuster. Some of the respondents replace the meaning of the word 'avatar' with the meaning of the word 'ava', so there are reactions that relate more to the word 'ava': photo, vkontakte and friends.

4. KEY: the associative field is organised by 43 different reactions, mainly pronounced nouns, adjectives, less often verbs and nominative phrases.

A small number of respondents (5) did not find a verbal response to the stimulus.

The syntagmatic (emotional–evaluative type) reactions include the following reactions: yellow, license, crane, access, activation, second, violin, gaich and bass.

Paradigmatic categorical reactions: open, password, login, key and computer.

Reactions–personalities: Pinocchio.

A number of associations do not find a place in the named classification, therefore, in a separate group, we singled out reactions with different relationships between stimulus and response: lock, riddle, heart, master key, door, knowledge, house, bear, message, happiness, box, apartment, Photoshop, crack, stream, motorcycle, car, water, thing, nickname, answer and safe.

We also distinguish phrases into a separate group: keyhole.

The associative meaning of the neologism KEY was understood because the majority chose the reactions 'lock', 'door' and 'heart'. The neologism itself is associated with the seme 'code': password, entry and activation.

5. SECURITY: the associative field is organised by 75 different reactions, mainly expressed by nouns, although adverbs and adjectives are occasionally presented.

A significant number of respondents (28) did not find a verbal response for the stimulus.

The syntagmatic (emotional–evaluative type) reactions include the following: strong, broad-shouldered, super and special. Syntagmatic reactions (kind of functional characteristics): beat. Syntagmatic reactions (neutral): accompanying.

Paradigmatic categorical reactions: security, safety, security, password and access.

Phonetic reactions: Sesyuriti.

Reactions–personalities: Budun, Bearded and Whitney Houston.

Non-verbal associations: m–m–m.

A number of associations do not find a place in the named classification, therefore, we separated into a separate group reactions with different relationships between stimulus and response: umbrella, suit, hotel, bag, staff, office, club, man, friend, guys, dudes, mystery, face control, special forces, entrance, sun, representative, jock, bank, word, assistant, equipment, people, thing, false, good, reliability, officer, dad, medallion, position, table, power, handsome, secretary, help, satellite, amble, agent, reception, president, bouncer, wardrobe, lantern, Internet, restaurant, group, t-shirt, secret, money, go, show, chief, antivirus and star.

The associative meaning of the neologism SECURITY is very clearly indicated, since the frequency of nuclear reactions is high (in the range of 9–122), the components of the meaning are mainly interconnected due to the seme 'security' – security, safety, protection, password and access.

6. LAZAGNA: the associative field is organised by 49 different reactions, mainly expressed by nouns, adjectives, verbs and adverbs.

Eight respondents did not find a verbal response for the stimulus.

The syntagmatic (emotional–evaluative type) reactions include the following: beautiful. Syntagmatic reactions (types of functional characteristics): bio.

Paradigmatic categorical reactions: food, tasty, noodles, casserole, dish, eat and cook.

Phonetic reactions: mazunia.

Reactions-personalities: Garfield.

A number of associations do not find a place in the named classification, therefore, in a separate group, we singled out reactions with different relationships between stimulus and response: sauce, rock, cheese, pizza, bacon, fish, borscht, 'FRIENDS', Mario, Italy, luxury, porridge, good, bath, mivina, kitchen, green, do not want, Americans, drooling, vegetable, lunch, fat, supper, chupa chups, place, tree, disgrace, fu, carrot, dessert, sweets, France and scrambled eggs.

We also distinguish phrases into a separate group: New Year, birthday.

The associative meaning of the neologism LAZAGNA is very clearly indicated, since the frequency of nuclear reactions is high (in the range of 8–101), the components of the meaning are mainly interconnected due to the seme 'food' – food, dish, lunch, dinner and cook.

4. Discussion

At the moment, there are no complete model ideas about the mental lexicon. Although this term has been widely used in publications of recent years; there is, however, virtually no common interpretation of the content of the relevant concept. We will proceed from the simplest and 'rectilinear' interpretation of a concept of a mental lexicon: the mental lexicon is a declarative component of language. If all the language and speech knowledge of a person is divided into declarative and procedural, then the former will make up what is called a mental lexicon. In other words, those units that are stored in memory without being generated in individual speech acts belong to the lexicon regardless of their format, the degree of complexity of the internal device etc. Of course, establishing boundaries between what is 'stored' and what is 'generated' is a particularly complex problem, primarily because these boundaries can be mobile, changing in accordance with the chosen speech strategy. As a kind of illustration of such variability, we can turn to the experience of learning a foreign language: depending on the conditions of communication, a complex word form for us, apparently, can be extracted directly from memory or generated (and not always correctly).

Separately, it makes sense to dwell on what we mean by language, defining the mental lexicon as a declarative component of language. In psycholinguistic studies of the structure and functioning of the mental lexicon is the central provision about its entry into the idiolect (individual language of personality) or the data obtained on a plurality of subjects (in other words, a plurality of idiolects) can reveal some general patterns? Apparently, the answer to the proposed question depends on the goals and objectives of the study: from the particular characteristics that characterise specific individuals to the signs responsible for the successful conduct of speech activities in speakers of certain national languages.

Experimental data on the units of the human mental lexicon and the nature of the connections between them can be obtained using a number of methods: psychophysiological, associative, experiments for free reproduction, subjective scaling, classification, priming etc.

The method of conducting an associative experiment perhaps most clearly illustrates the traditional scheme of a psycholinguistic experiment: S→■→R, where S is a stimulus, R is the reaction of the subject and between them the connection through the 'black box', which symbolises the incomprehensibility of the person under study, an active participant in speech–thought activity. It is not for nothing that when describing this experiment the terms 'stimulus' and 'reaction' become frequent and obligatory.

5. Conclusion

The study of the associative experiment showed the following results:

The level and nature of the comprehension of individual concepts among the respondents are not the same, since for one stimulus word there were many variants of reaction words [from 43 to 107 (was there not more?) depending on the word]. Therefore, it can be assumed that a person's consciousness and thinking are influenced by various extra linguistic factors (both individual psychological and socially determined).

The associative field of the respondents was mainly expressed by nouns and adjectives; there was also no single use of adverbs and verbs.

The classification of Terekhova was taken as a basis, but we also distinguished into a separate group of reactions with different relationships between stimulus and response. In addition, phrases are not

excluded from the analysis, despite the fact that such reactions are usually rejected. The nominative nature of word combinations, essentially equating them with a word, allows for a more expressive presentation of the associative field of stimuli.

The core elements of the conceptual system are the following (Figure 1).

A fragment of the linguistic picture of the world of the respondents shows the originality of the perception of the mental vocabulary, especially the semantic ones: for example, the new meaning of the word tank – 'type of clothing' – was not perceived, meaning tank was associated with the meaning 'type of combat vehicle'.

Emotional perception of the realities of the surrounding reality does not always coincide with the semantics of the word.

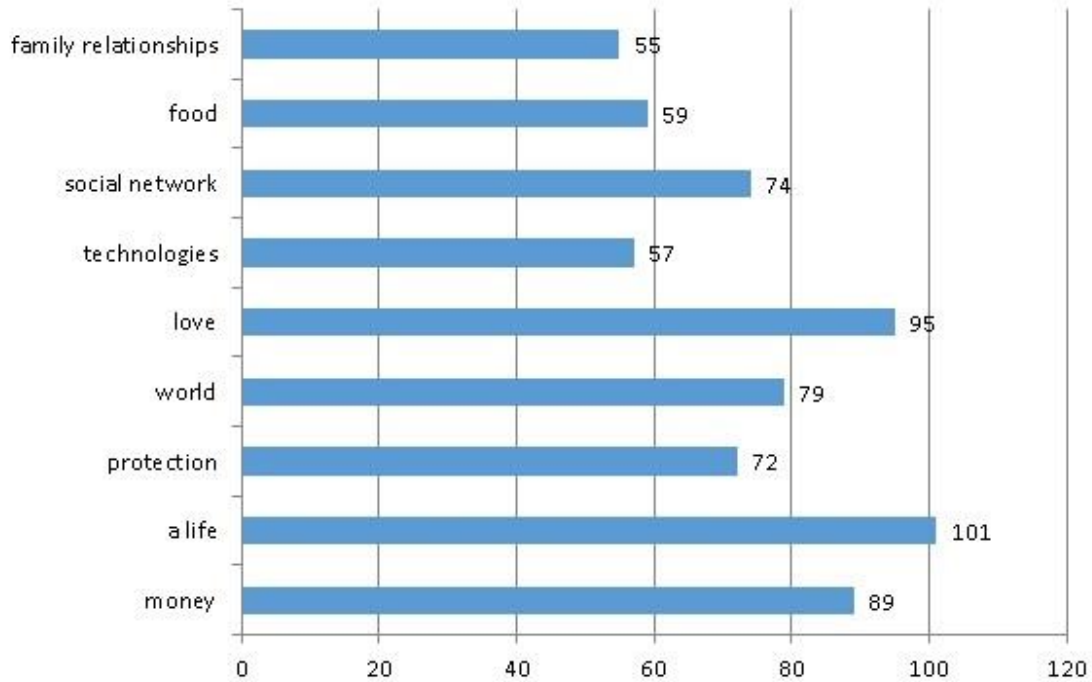

Figure 1. Nuclear elements of the conceptual system most commonly used by students

Students are prone to negative evaluative and emotional reactions to the world around them, but since people's consciousness is more focused on a positive attitude to reality, there are more positive reactions to words.

The vocabulary of neologisms is not clearly structured in the picture of the world of native speakers, since a significant number of respondents did not have a verbal reaction.

Thus, we examined the main models of the mental vocabulary, gave a scientific and theoretical characteristic to this concept, conducted an experiment with students of the Aktobe Regional State University named after Zhubanov. It should be noted that for the Kazakh psychological and linguistic science, the associative experiment is used extremely rarely, mainly its elements are used, which cannot give a complete picture of the formation of the mental vocabulary in the subjects.

6. Recommendations

The variety of psycholinguistic tasks dictates the need to use a variety of associative experiment techniques. In accordance with the conducted research, we recommend the following types of associative experiments on the mental vocabulary:

- Free associative experiment: the subjects are asked to respond with the word that first came to mind when presented with the stimulus word;
- Directed associative experiment: some restrictions are imposed on the choice of a reaction using additional conditions (for example, indicating the part of speech of the required reaction).
- Choice of modality (visual and / or auditory): oral and oral; oral and written; written – written; written – oral (possibly);
- Allocation of associative norms.

References

Allen, M., & Badecker, W. (2002) Inflectional regularity: Probing the nature of lexical representation in a cross-modal priming task. *Journal of Memory and Language, 46*(4), 705–722. doi: 10.1006/jmla.2001.2831

Caramazza, A., Laudanna, A., & Romani, C. (1988) Lexical access and inflectional morphology. *Cognition, 28*(3), 297–332. doi: 10.1016/0010-0277(88)90017-0

Coltheart, M., Rastle, K., Perry, C., Langdon, R., & Ziegler, J. (2001). DRC: A dual route cascaded model of visual word recognition and reading aloud. *Psychological Review, 108*(1), 204–256. doi: 10.1037/0033-295X.108.1.204

Colé, P., Beauvillain, C., Pavard, B., & Segui, J. (1986) Organisation morphologique et accès au lexique. *L'année psychologique, 86*(3), 349–365. doi: 10.3406/psy.1986.29154

Crepaldi, D., Rastle, K., & Davis, C. J. (2010) Morphemes in their place: Evidence for position-specific identification of suffixes. *Memory & Cognition, 38*(3), 312–321. doi: 10.3758/MC.38.3.312

Deutsch, A., & Meir, A. (2011) The role of the root morpheme in mediating word production in Hebrew. *Language and Cognitive Processes, 26*(4–6), 716–744. doi: 10.1080/0169096-5.2010.496238

Diependaele, K., Sandra, D., & Grainger, J. (2005) Masked cross-modal morphological priming: Unravelling morpho-orthographic and morpho-semantic influences in early word recognition. *Language and Cognitive Processes, 20*(1–2), 75–114. doi: 10.1080/01690960444000197

Eko, W. (2004) Absent structure. Introduction to semiology. *Translation from Italian. – SPb.: «Simpozium »*, 544

Feldman, L. B., & Bentin, S. (1994) Morphological analysis of disrupted morphemes: Evidence from Hebrew. *The Quarterly Journal of Experimental Psychology, 47A*(2), 407–435.

Forster, K. I., & Azuma, T. (2000). Masked priming for prefixed words with bound stems: Does submit prime permit? *Language and Cognitive Processes, 15*(4–5), 539–561. doi: 10.1080/01690960050119698

Frauenfelder, U. H., & Schreuder, R. (1992). Constraining psycholinguistic models of morphological processing and representation: The role of productivity. G. Booij, & J. van Marle (Eds.), *Yearbook of morphology* (pp. 165–183). Dordrecht, The Netherlands: Kluwer Academic Publishers. doi: 10.1007/978-94-011-2516-1_10

Giraudo, H., & Voga, M. (2014). *Measuring morphology: The tip of the iceberg? A retrospective on 10 years of morphological processing*. Cahiers de Grammaire, Equipe de Recherche en Syntaxe et Sémantique (ERSS).

Laudanna, A., Burani, C., & Cermele, A. (1994). Prefixes as processing units. *Language and Cognitive Processes, 9*(3), 295–316. doi: 10.1080/01690969408402121

Marslen-Wilson, W. D., Bozic, M., & Randall, B. (2008) Early decomposition in visual word recognition: Dissociating morphology, form, and meaning. *Language and Cognitive Processes, 23*(3), 394–421. doi: 10.1080/01690960701588004

Morton, J. (1970). A functional model for memory. D. Norman (Ed.), *Models of human memory* (pp. 203–254). New York: Academic Press.

McClelland, J. L., & Rumelhart, D. E. (1981). An interactive activation model of context effects in letter perception: I. An account of basic findings. *Psychological Review, 88*(5), 375–407. doi: 10.1037/0033-295X.88.5.375

Muller, V.K. (2011). *English-Russian Dictionary* (p. 976). Mascow, Russia.: Onyx.

Sakharny, L. V. (1989) *Vvedeniye v psikholingvistiku [An Introduction to Psycholinguistics]*. Izd-vo Leningradskogo gosudarstvennogo universiteta - Publishing house of Leningrad State University [in Russian].

Sandra, D. (1994) *Morphology in the reader's mental lexicon* (p. 21). Duisburg Papers on Research in Language and Culture. Frankfurt, Germany: P. Lang.

Schreuder, R., & Baayen, R. H. (1995). Modelling morphological processing. L. B. Feldman (Ed.), *Morphological aspects of language processing* (pp. 131–156). Hillsdale, NJ: Erlbaum.

Sukhodolsky, G. V. (2003). *Lektsii po vysshey matematike dlya studentov-gumanitariyev Sankt-Peterburga [Lectures on higher mathematics for humanities students of St. Petersburg]*. St. Petersburg, Russia: Izd-vo SPbGU. - Publishing house of St. Petersburg State University. [in russian]

Taft, M., & Nillsen, C. (2012). Morphological decomposition and the transposed-letter (TL) position effect. *Language and Cognitive Processes*, 1–22. doi: 10.1080/01690965.2012.679662

Taft, M., & Nguyen-Hoan, M. (2010). A sticky stick? The locus of morphological representation in the lexicon. *Language and Cognitive Processes, 25*(2), 277–296. doi: 10.1080/01690960903043261

Treisman, E. (1987). Objects and their properties in human visual perception. *The World of Science, 1*, 68–78.

Roelofs, A., Meyer, A. S., & Levelt, W. J. (1998). A case for the lemma/lexeme distinction in models of speaking: Comment on Caramazza and Miozzo. *Cognition, 69*(2), 219–230.

Zolotova, N.O. (2005). *Yadro mental'nogo leksikona cheloveka kak yestestvennogo metayazyka: Monografiya [The core of the human mental lexicon as a natural metalanguage: Monograph]* (p. 204). Tver, Russia: Liliya Print [in Russian].