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The experiment in linguistics

Експеримент в лінгвістиці

Summary. *The article deals with the role and significance of the experiment in linguistics. Human perception of the world largely depends on language to provide a semantic connection between different spheres of human existence. Language is a social phenomenon. Language acts as a means of communication because language units are realized, coded and accepted by a human. Language is a special phenomenon with its own secrets. The language itself expresses various human worldviews, which are reproduced in the language with the help of vocabulary. The world in the mind of the speaker is reflected linguistically and conceptually. The structure of the conceptual worldview is reproduced by the system of associative connections. The linguistic worldview is formed by the lexical meaning of the corresponding word concepts. Phenomena in language can be investigated with the help of experiments as the most productive method to obtain material in this way. The goal of an experimental study is to investigate how some element or elements, the independent variable(s), affect some behavior or outcome, the dependent variable. There are four types of association experiments: pair associations; serial associations; verbal differentiation; free*

associations. There are following steps in carrying out an experimental: formulate the hypothesis; determine the experimental design; get participants and run the study; analyze and interpret the data. The obtained data can be studied with the help of various techniques involving digital media. Using the experiment has advantages: the concept of active dictionary implies an assessment of the degree of mastery of relevant words, which can naturally be obtained by interviewing an average speaker; the experiment can be used when other methods are not very effective; it is easier to conduct an experiment than to do a painstaking analysis of dictionaries. The worldview is a fundamental concept that expresses the specificity of human existence. Its formation is influenced by all types of human mental activity and takes place in the language. The results of the experiments make it possible to reproduce the worldview and reveal specific features in the language. The prospect of further research is in a detailed study of the experiment in linguistic practice.

Key words: *experiment, language, linguistic, data, participants, worldview.*

Анотація. *Стаття стосується ролі та значення експерименту в лінгвістиці. Сприйняття світу людиною значною мірою залежить від мови, яка забезпечує смисловий зв'язок між різними сферами людського існування. Мова – явище суспільне. Вона виступає як засіб спілкування, оскільки мовні одиниці усвідомлюються, кодуються та сприймаються людиною. Мова – особливе явище зі своїми таємницями. Мовні засоби створюють різноманітні світоглядні уявлення людини, що віддзеркалюються в мові за допомогою лексики. Світ у свідомості мовця відображається лінгвально та концептуально. Структура концептуальної картини світу відтворюється системою асоціативних зв'язків. Мовна картина світу формується лексичним значенням відповідних словесних понять. Мовні явища можливо досліджувати за допомогою експерименту як найпродуктивнішого методу отримання матеріалу у цьому напрямку. Мета експериментального дослідження полягає в тому, щоб дослідити, як певний елемент або елементи, незалежна змінна(и), впливають на певну поведінку чи результат, залежну змінну. Розрізняють чотири види асоціативних експериментів: парні асоціації; серійні асоціації; словесна диференціація; вільні асоціації. У проведенні експерименту є наступні етапи: формулювання гіпотези; визначення плану експерименту; залучення учасників для проведення дослідження; аналіз та інтерпретація дані. Отримані дані можна вивчати за допомогою різних методик із застосуванням цифрових носіїв. Застосування експерименту має ряд переваг: концепція активного словника передбачає оцінку ступеня володіння релевантними словами, яку, природно, можна отримати шляхом опитування середньостатистичної людини; експеримент можна використовувати, коли інші методи не дуже ефективні; легше провести експеримент, ніж аналізувати словники. Світогляд є фундаментальним поняттям, яке виражає специфіку людського буття. На його формування впливають усі види психічної діяльності людини і він відображається у мові. Результати експериментів дають змогу відтворити картину світу і виявити особливості мови. Перспектива подальших досліджень полягає у детальному вивченні значення експерименту в лінгвістичній практиці.*

Ключові слова: *експеримент, мова, лінгвістика, дані, учасники, світогляд.*

Introduction. Language as a form of thinking activity covers all spheres of individual and social life of a person and is an integral part of human nature. Studying linguistic processes in the human psyche, the researcher receives material for the analysis of individual phenomena. Thus, the study of associations and the establishment of associative links between concepts in the minds of respondents, it makes possible to reveal individual perception of the world around, to find out the semantic structure of words, to reproduce the associative meaning of concepts, and to build a fragment of the worldview. Human perception of the world largely depends on language to provide a semantic connection between different spheres of human existence. The most productive method to obtain material in this way is an experiment.

The aim of the article is to define the role of experiments in linguistics as a practical introduction for the linguist who is beginning to conduct experiments as well as for readers of experimental papers. The object of research is an experiment as one of the methods of collecting material in linguistics. The subject of research is the role of the experiment and the stages of the organization of the experiments.

A descriptive method was used at all stages of the research (continuous sampling, linguistic observation, comparison, and generalization). To determine the content of concepts is the analysis of lexicographic definitions, elements of component analysis, as well as methods of comparative and historical-etymological analysis.

Research analysis. The experiment is one of the oldest and most popular methods of experimental linguistics. The first to conduct this experiment in practice at the end of the 1970s was the English psychologist F. Galton. The next ones who also used the free association method were W. Wundt, H. Münsterberg, D. Kettel, and others. In the second half 20th century, associative studies based on comparison began to develop intensively. Ukrainian researchers N. Butenko and D. Terekhova worked in this direction. Recently, many studies have appeared on associative material (O. Horoshko, N. Dmytriuk, T. Nedashkivska, O. Zahorodnia, O. Denysiuk, and others). However, there is a need to analyze those aspects that have been left out of the attention of linguists or have been little researched. It includes the phenomenon of an experiment in linguistics, its role and its significance, which determines the relevance of our research.

Results and discussion. Language is neither a mechanism nor an organism, nor a living thing, nor a dead thing. A physical object is understood under this term. This is not a thing at all. '... language is not ergon, it is energy'. "... not just a collection of words. ... we cannot create meaning by arranging words in sequence. Language consists of sounds, words, and possible sentences. Knowing our language means that we also know the

sounds, words and their combination rules in that language" [7, p. 1339]. 'Language is a social phenomenon. ... language, which is the wealth of the masses, is the only means of expression for them' [3, p. 75]. Language is a very complex and at the same time multifaceted institution". It is both an individual and a collection of society, and in a sense an abstract being. Therefore, the role of language in speech and hearing, which is one of the important aspects for the existence of human language, is great. This means that language should be accepted as a leading tool in the communication process. Language acts as a means of communication because language units are realized, coded and accepted by a man. Listening plays a leading role in the language communication as well as speaking. Depending on the strength and frequency of the sound, air waves enter the listener's ear, become a mechanical process, reach the nerves, and the nerves create arousal in the same auditory center. Thus, the transmitted information is understood and the communicative function of language is fulfilled. In the communication model, 4 components must be distinguished from each other: the linguistic base of communication; articulatory base of communication; acoustic communication base; perceptual base of communication [7, p. 1339].

Language is a special phenomenon with its own secrets. Phenomena in language can be investigated with the help of experiments.

The goal of an experimental study is to investigate how some element or elements, the independent variable(s), affect some behavior or outcome, the dependent variable. The independent variable defines groups across which we look for differences, and we can intentionally manipulate these groups to test our hypothesis. The independent variable in this case is the quantifier; that is, we compare participants' behavior with one quantifier to their behavior with the other. Each quantifier represents a level of the independent variable, and the segment of the experimental procedure testing each level is called a condition. Dependent variables are the outcome measures of the experiment – their value depends on the independent variables – and are specific, measurable behaviors. Dependent variables common in linguistics include reaction time (RT) and direction of eye gaze. Some dependent measures are on-line measures, which tap into language processing as it is happening, and others are off-line measures, which tap into the outcomes of that processing. RTs, obtained while the participant reads a sentence phrase-by-phrase, are an on-line measure. Acceptability ratings, which the participant provides after having read and processed a sentence, are an example of an off-line measure. Both measures are useful and can in fact be used in the same experiment, with online measures used to study the time course of interpretation, and off-line measures used to identify what interpretation was ultimately arrived at [5, p. 222].

Experiments study the effects of one variable on another. The main idea is to systematically vary conditions in order to determine their effects onto measures of language processing. Those variables which are measured (in dependence on the experimental conditions) are called dependent. Those which are manipulated directly by the experimenter and constitute the experimental conditions are called independent. The aim is to reveal causal or conditional relations between independent and dependent variables. Accordingly, the idea is to deliberately produce occurrences [8].

Linguists are increasingly embracing experimental methods to augment traditional approaches. Well-designed experiments can offer insight beyond that available from grammaticality judgments alone, for example by providing converging evidence from multiple types of data, or testing subtle phenomena for which grammaticality judgments are difficult. Experimental work also contributes to a complete cognitive model extending beyond the competence–performance divide to investigate not only the nature of linguistic representations but also the computations involved when speakers, hearers, and readers access and manipulate these representations [4, p. 221].

Conducting an experiment, we create the appropriate state – the state of causing potential answers; sequences of responses reflect a temporally related selection among these potential ones.

In the article, the associative experiment is defined as a project experimental method.

Studying the history of experimental research, it was noticed that at the beginning of the XX century a free associative experiments become means to penetrate into the subconscious layers of the human psyche. Diagnosis using associative techniques is similar to the technique of hypnosis, but during associative techniques the patient's consciousness is not turned off by force. Only silence is required from consciousness, and deeper layers of the psyche are invited to speak [2, p. 22–23].

 An important place in the history of the development of the association method is occupied by the research of linguist A. Thumb and psychologist K. Marbe, which demonstrated that verbal association is not only a psychological, but also a linguistic phenomenon. Scientists believed that verbal associations reveal connections not only between represented languages, but also between representations of language elements. In their opinion, the problem of formation of linguistic analogies is related to associative processes. The study made it possible to draw a conclusion about the existence of individual differences between the interviewees in reactions and in the grammatical coincidence of stimulus and reaction categories [2, p. 24].

Word for a speaker exists as a unity of all connections that intersect and with the help of which there is a transition to an individual world-view, which ensures mutual understanding in the process of communication. At the same time, the associative experiment is the tool that helps to look at a small slice of the associative component of the real and non-verbal meaning, preserved in the bottom and to which the individual himself sometimes cannot reach.

There are 4 types of association experiments: pair associations; serial associations; verbal differentiation; free associations.

O. Horoshko interprets the associative experiment as a technique aimed at revealing the associations formed by an individual in his previous experience and defines three types of the associative experiment:

• free, where the interviewee is offered to answer with the word R (reaction), the first thing that came to mind when presenting the word S (stimulus), without limiting either the formal or semantic features of the word R;

• targeted, in which the experimenter limits R's choice in some way (for example, to respond only with nouns or verbs);

• chain, when the interviewee answers with an unlimited number of R words, without limiting either the formal or grammatical features of the words in any way [2].

Each experiment could have single/multiple and free/controlled associations. Depending on their combinations one could differ such kinds of associations: single-response free association (the respondent is asked to write the first word that comes to his/her mind); single-response controlled association (the difference from previous one is that the respondent is asked to write specific type of association, e.g. synonym or antonym); multiple-response free association (the respondent could use any number of words); multiple-response controlled association (almost the same as previous one, but with some limitations on the type of response) [6].

Analysis of all types of experiments makes it possible to state that each of them has its own disadvantages and advantages. Thus, a directed associative experiment significantly limits the freedom of association and seems to direct associations in the right direction, for example, the interviewee must answer with a word that is opposite in meaning. In a chain associative experiment, the interviewee is asked to answer in a certain period of time with possible words. A chain associative reaction is understood as an uncontrolled, spontaneous process of reproduction of the content of the subject's consciousness and unconsciousness. In the chain associative experiment, the total volume of productive associations per unit of time (1 min.) is measured, without taking into account the duration of the latent period of association formation. The main indicator

of quality in this case is the structure of the associative series. But there is one significant drawback of this type of experiment – we can observe the dependence between consecutive subsequent reactions. A free associative experiment requires the subject to respond as quickly as possible with the first word (reaction) that came to mind in response to the proposed stimulus word. The free associative experiment is the simplest of the described associative experiments and at the same time quite effective. During a free associative experiment, depending on the goal and tasks, the type of reaction, the frequency of the same type of reactions, the amount of mathematical periods (the time that passed between the word (stimulus) and the answer (reaction) of the interviewee), physiological reactions are recorded [2, p. 17–18].

Our experience in conducting experiments defines the following steps in carrying out an experimental study:

1. Formulate the hypothesis.

Research hypotheses are at the very heart of the experimental method. Performing experiments means basically testing hypotheses about the effects of independent variables onto dependent variables. Where do the hypotheses to be tested come from? They can arise out of singular observations, practical needs, qualitative research, or pilot studies. However, more often than not they are derived from psycholinguistic theories and models of language processing [8].

It is worth involving material with the following characteristics: contextual conditioning (words and combinations of words that are the centers of the conceptual system); frequency (words that occur most often in textbooks); informativeness (words characterized by sufficient saturation of content); presence of the word in dictionaries and encyclopedias, because it is in such literature that both general and specific knowledge is accumulated for each separate field of research.

2. Determine the experimental design.

The parameters used for capturing aspects of human language processing include both offline and online measures. Offline measures register the results of language processing after completion of the process under investigation. Examples include frequency of production or selection of a linguistic form or structure, ratings of suitability or grammaticality, and psycholinguistic test performance. Online measures in contrast tap into the involved processes and representations in the course of processing, i.e., while language is constructed in real time. More often than not they are time-sensitive and indirect – sometimes supplemented by spatial information. Examples include reaction time measures reflecting aspects of processing such as difficulty or activation, discrimination or confusability data, eyetracking techniques, as well as neuroimaging and

neurophysiological measures. In addition to providing insight into processing steps, online measures are more sensitive with respect to group differences [8].

Our own experience shows that for experiments it is better to use a mixed form of questionnaire with oral and written elements.

3. Get participants and run the study.

Taking as basis world standards for the selection of recipients, we believe that it is worth involving about a thousand respondents to participate in the linguistic experiments. All age categories should be included in the number of respondents. In order to obtain reliable results, it is necessary to involve people of various specialties and occupations to participate in the experiment. This selection of interviewees ensures universal material.

4. Analyze and interpret the data.

The obtained data can be studied with the help of various techniques involving digital media.

The results of an experiment performed are subject to data analysis using inferential statistics. The rationale behind performing inferential statistics is to determine whether, in the population, the independent variable (in terms of the values that it takes in the experiment) has differential effects onto the dependent measures. There are two important aspects involved here. First, the experimental hypothesis predicts a difference between conditions (i.e., levels of the independent variable). This conforms to the "method of differences" proposed by John Stuart Mill as a method of experimental inquiry. Second, data analysis refers to the population from which a particular sample was drawn, and the question is whether a particular difference found in the sample can be generalized to the whole population [8].

Using the experiment has advantages: the concept of active dictionary implies an assessment of the degree of mastery of relevant words, which can naturally be obtained by interviewing an average native speaker; the experiment can be used when other methods are not very effective; it is easier to conduct an experiment than to do a painstaking analysis of dictionaries – the research price.

Conclusion. The worldview is a fundamental concept that expresses the specificity of human existence. Its formation is influenced by all types of human mental activity and takes place in the language. The language itself expresses various human worldviews, which are reproduced in the language with the help of vocabulary. The world in the mind of the speaker is reflected linguistically and conceptually. The structure of the conceptual worldview is reproduced by the system of associative connections. The linguistic worldview is formed by the lexical meaning of the corresponding word concepts. The results of the experiments make

it possible to reproduce the worldview and reveal specific features in the language. The prospect of further research is in a detailed study of the experiment in linguistic practice.

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