EXPLICIT WAYS OF RENDERING THE CATEGORY OF INCLUSIVENESS IN SCIENTIFIC DISCOURSE

Bedrych Ya.V.
PhD, senior lecturer,
Research and Educational Center for Foreign Languages
National Academy of Science of Ukraine
ORCID 0000-0001-8634-3124

Our research deals with the category of inclusiveness in the language of science (empirical material selected from Anglo-American articles in the field of information and communication technologies). Some issues of inclusiveness have been studied in philosophy, pedagogy and linguistics, but there is any complex research of this phenomenon as a separate category of written scientific discourse. We want to study cognitive structure, ways of rendering as well as discursive features of the category of inclusiveness. Why do we research the category of inclusiveness within articles of information and communication technologies in Anglo-American scientific discourse? Scientific article is one of the main genres of scientific written discourse. It is used to exchange information and knowledge in scientific community. The main goal of Information and Communication (ITC) technologies is to change the world for better life. The main advantages of ITC are: improvement of world trade and development of world economic market; globalization of culture and communications; possibility for people to have an access to education, health, culture, etc. Category of inclusiveness is regarded as a cognitive-discursive category of scientific discourse. It can be expressed verbally and visually. We distinguish explicit, implicit as well as semi-implicit ways of rendering inclusiveness. Explicit ways of rendering can be defined as linguistic devices, which express inclusiveness clearly. We've classified five main groups of explicit inclusiveness, such as: verbs and phrasal verbs, nouns, adjectives, grammatical constructions as well as negative phrases with inclusive negation. Quantitative analysis shows that explicit inclusive lexical units are three-fourth of all inclusive lexical units (implicit and semi-implicit).

Keywords: *language of science, explicit inclusiveness, information and communication technologies, scientific discourse, lexical unit, quantitative data.*

ЕКСПЛІЦИТНІ ЗАСОБИ ВИРАЖЕННЯ КАТЕГОРІЇ ІНКЛЮЗИВНОСТІ В НАУКОВОМУ ДИСКУРСІ

Бедрич Я.В.
кандидат філологічних наук, старший викладач,
Центр наукових досліджень і викладання іноземних мов НАН України

В статті досліджується категорія інклюзивності в мові науки (на матеріалі англо-американських статей у галузі інформаційно-комунікаційних технологій). Деякі аспекти інклюзивності розглядалися в філософії, педагогіці та лінгвістиці, хоча комплексне вивчення інклюзивності, як окремої категорії писемного наукового дискурсу, відсутнє. Маємо на меті дослідити когнітивну структуру, засоби вираження та дискурсивні властивості категорії інклюзивності. Чому матеріалом дослідження слугують саме англо-американські статті в галузі інформаційно-комунікаційних технологій? Наукова стаття є одним з головних жанрів наукового писемного дискурсу. Вона використовується для обміну знань в науковій спільноті. Основним завданням інформаційно-комунікаційних технологій (ІКТ) є зміна світу на краще. Головними превагами ІКТ є: покращення міжнародної торгівлі та розвиток світового економічного ринку; глобалізація культури та комунікації; надзвичайно широкі можливості для людей мати доступ до навчання, охорони здоров'я, культурної діяльності та ін. Ми розглядаємо категорію інклюзивності як когнітивно-дискурсивну категорію наукового дискурсу. Вона може втілюватись вербально та візуально. Основними засобами вираження-

ня категорії інклюзивності є експліцитні, імпліцитні та напівімпліцитні лексичні одиниці. Експліцитні засоби вираження – це лексичні одиниці, в яких міститься явно виражена сема інклюзивності. Ми виділяємо п'ять основних груп експліцитної інклюзивності: дієслова та фразові дієслова, іменники, прикметники, граматичні конструкції та заперечні звороти із експліцитним запереченням. Кількісний аналіз показав, що експліцитні лексичні одиниці інклюзивної семантики становлять три четверті усіх засобів вираження цієї категорії.

Ключові слова: мова науки, експліцитна інклюзивність, інформаційно-комунікаційні технології, науковий дискурс, лексична одиниця, кількісні дані.

ЭКСПЛИЦИТНЫЕ СПОСОБЫ ВЫРАЖЕНИЯ КАТЕГОРИИ ИНКЛЮЗИВНОСТИ В НАУЧНОМ ДИСКУРСЕ

Бедрич Я.В.
кандидат филологических наук, старший преподаватель,
Центр научных исследований и преподавания иностранных языков НАН Украины

В статье исследуется категория инклюзивности в языке науки (на материале англо-американских статей в сфере информационно-коммуникационных технологий). Некоторые аспекты инклюзивности исследовались в философии, педагогике и лингвистике, хотя комплексное изучение инклюзивности, как отдельной категории письменного научного дискурса, не проводили. Мы хотим исследовать когнитивную структуру, средства выражения и дискурсивные особенности категории инклюзивности. Почему материалом исследования послужили именно англо-американские статьи в сфере информационно-коммуникационных технологий? Научная статья – один из основных жанров научного письменного дискурса. Она используется для обмена знаний в научном сообществе. Основное задание информационно-коммуникационных технологий (ИКТ) – это изменение мира к лучшему. Основные преимущества ИКТ: улучшение международной торговли и развитие мирового экономического рынка; глобализация культуры и коммуникации; широкие возможности для людей иметь доступ к образованию, охраны здоровья, культурной деятельности и др. Мы рассматриваем категорию инклюзивности как когнитивно-дискурсивную категорию научного дискурса. Она может выражаться вербально и визуально. Мы выделяем эксплицитные, имплицитные и полуимплицитные средства выражения этой категории. Эксплицитные способы выражения – это лексические единицы, в которых содержится явно выраженная сема инклюзивности. Мы выделяем пять основных групп эксплицитной инклюзивности: глаголы и фразовые глаголы, существительные, грамматические конструкции, прилагательные и отрицательные обороты с эксплицитным отрицанием. Количественный анализ показал, что эксплицитные лексические единицы составляют три четвертых все способов выражения этой категории.

Ключевые слова: язык науки, эксплицитная инклюзивность, информационно-коммуникационные технологии, научный дискурс, лексическая единица, количественные данные.

Introduction

Categories play an important role in the human conscience. They promote us to understand the world better (Smith 1981). Categories are the main tool to classify the mind. There are lots of different categories in scientific discourse, but the category of inclusiveness hasn't been studied yet. There is a number of works that are associated with inclusiveness. Let's look through it. The background of the category of inclusiveness is the correlation "PART-WHOLE", that has been studied by many ancient philosophers, to name a few: Aristotel (2002), Platon (Vindelband, 1993), I. Kant (1993), G. Gegel (1974), E. Gusserl (2011). The latter one have considered the terms "part" and "whole" as the most universal formal subject categories (Gusserl 68: 174).

If we talk about linguistics, there is also plenty of studies of inclusiveness. First and foremost, it's Brilliant American linguist D.G. Greenberg, who has pointed inclusiveness as universal category (Greenberg 1978: 178). F. de Soussure has regarded the language as a system where the parts create a whole (Soussure 1977: 147). Professor S. Zhabotinskaya has viewed the category of inclusiveness in the context of "inclusiveness - possessiveness" and states that a part always belongs to a whole (Zhabotinskaya 2013: 47-76). Besides, researchers K. Frels and company have classified the verbs of scientific discourse. They distinguish implicit, explicit and inclusive verbs. The latter one is used for description of connection among the elements of some whole (Frels 2010).

On the other hand, category of inclusiveness deals with inclusive (politically correct, gender neutral or non-sexist) language (Jacobson 1995; Ter-Minasova 2000). Not to be left out "inclusive education", that is popular nowadays (Osnovy incluzyvnoi osvity 2012).

However, these studies haven't addressed the issue of the ways of rendering inclusiveness in scientific discourse. So, **the object** of our investigation is the category of inclusiveness in Anglo-American scientific discourse. Explicit ways of rendering the category of inclusiveness is **the subject** of the article. **The goal** of the paper is to classify and to describe the main explicit ways of rendering inclusiveness in scientific discourse.

Materials and Methods

We used the language material selected from Anglo-American articles in the field of information and communication technologies, such as Telecommunications Policy (2013-2014), The International Journal on Advances in Internet Technology (2010-2015), The International Journal on Advances in Systems and Measurements (2010-2015), The International Journal on Advances in Telecommunications (2010-2015), The International Journal on Advances in Intelligent Systems (2010-2014), The International Journal on Advances in Networks and Services (2010-2015), IEEE Communications Magazine (2008-2014). Overall number of such articles is 1686, or about 10 billion words. Dictionary definitions analysis, componential analysis, method of opposition as well as quantitative method are used in our research. We have analyzed empirical articles, since it is the most numerous genre in the realm of Information and Communication Technologies.

Results and discussion

We regard the category of inclusiveness as cognitive-discursive category, so it deals with knowledge, categorization and conceptualization of cognition (Selivanova 2008: 377). Categorization is one of the base elements of cognition (Kubriakova 2004: 96). It's used the theory of prototypes to study cognitive structure of the category. It means that there is a prototype (cognitive reference points) and the frontier zone. Prototype – is the central part of the category, it has distinctive features of the category (Rosh 1978). We can note that explicit lexical units are prototype of the category of inclusiveness. After that, implicit lexical units are situated. Semi-implicit lexical units are placed between mentioned above lexical units. We define **explicit inclusiveness** as linguistic devices where semantic structure overtly express inclusive meaning. Let's use dictionary and

componential analysis and method of opposition to classify the main inclusive explicit lexical units into groups. We have classified five main groups:

• verbs and phrasal verbs *to include, to contain, to consist of,* to *involve, to integrate,* to combine*, to form,* to *comprise, to cover, to be composed of, to constitute,* to group*, to surround,* to exclude*,* to merge*,* to mix*,* to *encompass,* to *entail,* to *make up,* to *embrace,* to *be made up of,* to enclose*,* to blend*, to circle, to wrap up,* to encircle*,* to amalgamate*,* to envelop*;*

• nouns *system, section, (a)part, set, element, group,* network*, segment, team/crew,* container*,* portion*,* envelope*,* formation*,* circle*,* contents*, fragment, family,* inclusion*,* involvement*,* (a)whole*,* exclusion*,* constituent*,* constitution*, reservoir, makeup;*

• adjectives *complete, whole, partial, universal, comprehensive, exclusive, multi-purpose, inclusive, encompassing, all-purpose, all-encompassing;*

• grammatical constructions *let us/let's + V, to range from…to;*

• negative phrases with inclusive negation *not, no, without, neither…nor.*

We've divided each group into subgroup, according to their meaning. Let's study it more properly.

We consider collective nouns *(system, set, group, network, team/crew, container, family, reservoir, (a)whole* as the lexical units that denote some whole, consisting of a number of parts. For example:

The second **set** *of traffic pattern* **consists of** *70% RT active users and 30% of NRT active users* (IJANS, № 3-4 2011, 254).

Noun *system* is the most frequently used language unit of inclusive semantic that marks inclusiveness explicitly. We have found 10537 examples with this noun. 40 % of all examples contain the noun *system* in the "chains" of inclusive semantics. In the example below, we can see the noun *system* and the phrasal verb *to be composed of,* moreover, the noun *system* denotes some whole that *consists of* parts:

The basic module of the **system is composed of** *a Master Node (MN), which has superior computational and energy resources and is connected to a remote database via TCP/IP over UMTS* (IJANS № *1-2 2011,* 28).

On the other hand, we have studied examples, where the noun *set* is a part of a whole, for instance:

An mPlane infrastructure **consists of a set of** *components spanning over multiple domains, whose overall workflow is…* (CM, May 2014, p. 153).

Nouns of "parts" are the other nouns that mark inclusiveness explicitly, since they denote part of a whole. They are: *section, (a)part, element, segment, portion, contents, fragment,* for example:

The Automatic Dependent Surveillance Broadcast (ADS-B) system is a core **part of** *this future (CM, May 2014, p.115).*

Table II presents **the contents of the whole evaluation procedure***, which lasted from 90 to 120 minutes (IJAIS, № 3-4 2013, p.271).*

Although we have found some examples where "parts" nouns *are composed of* numbers of other parts, that is to say, parts are the whole, for instance:

The main **part of** *a person's UID* **consists of** *a hash value calculated from the person's full name, i.e., first name plus last name (IJAIT, № 3-4 2011, p. 116).*

Verbs of inclusive semantics *to consist of, to comprise, to be composed of, to be made up of, to involve, to surround, to enclose, to encircle, to envelop, to embrace, to entail, to cover, to wrap up, to circle* denote some whole that i*s composed of* a number of parts (in this case enumeration may be full or partial), for instance:

*The notion of meaning complexity **embraces** the notions of Kolmogorov complexity/information and Shannon complexity/ information/entropy (IJAIS, № 3-4 2012, p. 500).*

The verb *to include* is the most numerous unit (9992 examples) that marks inclusiveness explicitly (among other verbs of explicit semantics in the language of science) as it expresses the main meaning of inclusiveness – to consist of (some parts), to contain as a secondary or subordinate element (Ilchenko 2014: 294). It is stated that you want to mention all the parts that something has in it, use *consist of, comprise, be composed of, or be made up of,* use *include* to mention only some of the things that something has as its parts (Longman dictionary 2005: 822). For example:

*For example, Muradand Fuja proposed a composite trellis, **made up of** a Markov source, a Variable Length Code (VLC), and a channel decoder's state transitions, to exploit a priori source statistics (IJAT, № 3-4 2013, 143).*

*The non-cluster model **is composed of** five steps: peer join/leave, peer exchange information, peer selection, buffer organization and segment scheduling (IJANS, № 1-2 2012, p. 13).*

*The test track **consists of** three different track sections: straights, clothoids and curves (IJAIS, № 1-2 2010, p. 75).*

These examples include full (as well as numeral) enumeration of the parts. Let's compare with the next example, where is only one part:

*G.8031 **includes** an Automatic Protection Switching (APS) protocol (CM, March 2009, 37).*

Another group of nouns that marks inclusiveness explicitly – is the nouns of "formation". They mark the process of a formation of some whole. They are: *formation, constituent, constitution, makeup*, for example:

*The protocol of coalition **formation is composed of** two distinct steps (IJAIS, № 1-2 2013, p. 129).*

Verbs *to constitute, to make up, to form* are used to denote formation of some whole (if it is used in Active Voice) (Ilchenko, 2014: 121, 489), for example:

*The network operation system (Network OS) **constitutes** the set of fundamental functions that must be provided (CM, October 2014, p. 151).*

Or to consist of (if it is used in Passive Voice) (Ilchenko, 2014: 121), for instance:

*In LBSNs, the "spatial social network," **formed by** a combination of social and spatial elements, is leveraged in (CM, August 2014, p. 153).*

One more group of explicit inclusive verbs is the verbs of "amalgamation", such as: *to integrate,* to combine, *to mix, to group, to merge,* to blend, *to amalgamate.* They are used to denote the process of amalgamation for formation whole, for example:

*The proposed region of interest concept **combined with** the joint audio and video analysis offers the possibility to compose a video based on the detected*

persons at the receiving client (IJAT, № 3-4 2013, p.159).

We can divide adjectives of inclusive semantics on two groups: the first one, adjectives that denotes full inclusion (*complete, whole, universal, comprehensive, multi-purpose, inclusive, encompassing, all-purpose, all-encompassing),* the second group is the adjectives that mark partial inclusion *(partial),* for example:

After the timeout expires, the operation returns this **whole** *set of messages* (*IJAIS, № 1-2 2011, 4).*

Partial *aspects of the algorithms were previously presented* (*IJANS, № 1-2 2010, 42).*

Grammatical construction *let us/let's* is used to express suggestions. In another words the author propose reader to do some action together. For example:

Let us suppose *that at an instance t, the MANET* **consists of five** *nodes namely MNA, MNB, MNC, MND and MNE and their connectivity is as shown in Figure 1 (IJANS, № 1-2 2011, 58).*

In abovementioned example we can see that author propose us to do some operation with him *(Let us suppose). M*oreover, there is "chain" of inclusive semantic, to clarify, phrase (*let us suppose)* and phrasal verb of inclusive semantics *(to consist of).*

Negative phrases with inclusive negation *not, no, without, neither…nor* are used to state that there is any part, that belong to a whole:

The current paper is based on and expands a previous conference paper, **which includes neither** *the experimental results* **nor** *the proofs (IJASM, №1-2 2011, 87).*

Besides, explicit lexical units of inclusive semantics such as *circle (n, v), container, contents, encircle, enclose, envelop, envelope, family, network, range from…to, reservoir, surround as well as wrap up* is used as a metaphor of inclusive semantics, for example:

The **family** *of copters includes various platforms with vertical propellers (e.g., helicopters, quadrocopters, and hexa-copters)* (*CM, July 2014, 146).*

In the Dictionary of Contemporary English is stated: "family – a group of people who are related to each other, especially a mother, a father, and their children" (Longman Dictionary 2005: 568); while contextual meaning of this noun – is a whole that is made up of some parts (*various platforms*).

The node carrying the messages could, for instance, be a fast-moving UAS, which **circles** *a larger area and gathers information (CM, October 2013, 45).*

The verb *circle* is used as a metaphor, because it means: to draw a circle around something (Longman Dictionary 2005: 264), so the circle is a whole with its parts inside.

To receive relevant data, we have made some calculations. We have estimated word frequency of inclusive semantics per 1000 words. Overall number of explicit lexical units is 81741. It can be said that explicit language units of inclusive semantics are 87% or 8,44 language units per 1000 words.

Conclusions

In this paper we have described explicit ways of rendering the category of inclusiveness in scientific discourse. We 've classified the main groups of explicit inclusiveness, as verbs and phrasal verbs, nouns, adjectives, grammatical

constructions and negative phrases with inclusive negation. It can be concluded that explicit lexical units of inclusive semantics are three-fourth of all ways of rendering this category. These results are of practical relevance. We leave discursive potential as well as functional potential of the category of inclusiveness for future work.

References
Aristotel. (2002). *Metafizika. Perevody. Komentarii.* SPb.: "Aleteiia".
Vindelband V. (1993). *Platon.* K.: "Zovnishgorvydav Ukrainy".
Gegel G. (1974). *Entciklopediia filosofskih nauk: v 3-h t.* D. Sitkovskii (Ed.), *Nauka logiki* (Vol.1). M.: "Mysl".
Gusserl E. (2011). *Logicheskie issledovaniia. Issledovaniia po fenomenologii i teorii poznaniia* (Vol. 2, Part 1). M.: "Akademitcheskii Proekt".
Zhabotinskaja, S. (2013). Imja kak tekst: konceptual'naja chast' leksicheskogo znachenija (analiz imeni jemocii). *Kognicija, kommunikacija, diskurs: Mezhdunarodnyj jelektronnyj sbornik nauchnyh trudov*, 6, 47-76. Retrieved from
https://sites.google.com/site/cognitiondiscourse/vypusk-no6 2013/zabotinskaa-s-a
Ilchenko O. (2014). *International Communicaton: Science, Technology, Education, Journalism* (*English-Ukrainian-Russian Dictionary): Anhlo-ukrainsko-rosiiskyi slovnyk mizhnarodnoi komunikatsii: nauka, tekhnika, osvita, zhurnalistyka.* K.: Vydavnyche pidpryiemstvo "EDELVEIS".
Kant. I. (1993). *Sochineniia v 4-h tomah na russkom i* nemetckom iazykakh. N. Motroshylova, B. Tushlihg (Ed.), *Traktaty i stati* (Vol.1). M.: Izd. Firma AO "Kami".
Kubriakova E. (2004). *Iazyk i znanie: Na puti polucheniia znanii o iazyke: Chasti rechi s kognitivnoi tochki zreniia. Rol iazyka v poznanii mira.* M.: "Iazyki slavianskoi kultury".
Osnovy inkliuzyvnoi osvity: navchalno-metodychnyi posibnyk. (2012). K.: "A.S.K."
Selivanova O. (2008). *Suchasna linhvistyka: napriamy ta problemy.* Poltava: "Dovkillia".
Sossiur F. (1977). *Trudy po iazykoznaniiu.* M. Retrieved from
http://www.classes.ru/grammar/143.Saussure-linguistique/
Ter-Minasova (2000). I*azyk I mezhkulturnaia kommunikatciia.* M.: "Slovo".
Frels, K., Onwuegbuzie, A., & Slate, J. (2010). A Typology of Verbs for Scholarly Writing. *Research in the Schools*, 17(1), Sam Houston State University,
Greenberg, J. (1978). *Universals of human language: Word structure.* Stanford: "Stanford University Press".
Jacobson C. *Some Notes on Gender-Neutral Language.* Retrieved from
https://www2.stetson.edu/secure/history/hy10302/nongenderlang.html
Longman Dictionary of Contemporary English. (2005). Harlow: "Pearson Education Lim.".
Rosch E. (1978). *Principles of categorization.* Hillsdale, NJ: Erlbaum,
Smith E. (1981). *Categories and concepts.* Cambridge, MA: Harvard University Press.
References of illustrative material:
IEEE Communications Magazine (2008-2014). Retrieved from http://www.comsoc.org/
The International Journal on Advances in Intelligent Systems (2010-2014). Retrieved from http://www.iariajournals.org/intelligent_systems/index.html
The International Journal on Advances in Internet Technology (2010-2015). Retrieved from http://www.iariajournals.org/internet_technology/index.html
The International Journal on Advances in Networks and Services (2010-2015). Retrieved from http://www.iariajournals.org/networks_and_services/index.html
Journal of Telecommunications System and Management (2013-2014). Retrieved from http://omicsgroup.org/journals/telecommunications-system-management.php
Telecommunications Policy (2013-2014). Retrieved from
http://www.journals.elsevier.com/telecommunications-policy/
The International Journal on Advances in Systems and Measurements (2010-2015). Retrieved from
http://www.iariajournals.org/systems_and_measurements/index.html
The International Journal on Advances in Telecommunications (2010-2015). Retrieved from http://www.iariajournals.org/telecommunications/index.html

Стаття надійшла до редакції 3.10.2018 р.