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VERB-FORMING SUFFIXES IN ICT TERMINOLOGY - A SEMANTIC APPROACH

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Abstract. *The present paper offers a study of the verb-forming suffixes -ate, -ify and -ize in ICT (information and communication technologies) terminology in English, the focus of investigation being their semantics. The study relies on the current theoretical background in semantics, and was performed on the latest articles in this field as found in the most renowned journals in the ICT area of expertise. The reason for commencing this investigation was the authors' finding that in ICT register suffixation is highly present as one of the primary characteristics and demands. The paper proposes novelties in semantic interpretation of the verb-forming suffixes by distinguishing among four semantic categories followed by the appropriate functions. We have explored the issue of suffixal polysemy and have shown the existence of the suffixes with the same range of meaning.*

Key words*: verb-forming suffixes, lexical semantics, ICT terminology*

1. INTRODUCTION

With the development of new technologies, specialized vocabulary is increasing. As practitioners of ESP, English for Science and Technology in particular, we are highly aware that suffixes are neither described nor investigated closely enough, and that in our area of expertise they are highly present for a very important reason. Their use is directly linked to the basic premises of the language that is characteristic for today's fast developing information and communication technologies.

Among a variety of suffixes, we are particularly interested in the verb-forming suffixes -ate, -ify and -ize in ICT register. Their widespread use in this register has led us to investigate them more closely. Considering the meaning, it should be mentioned that it is a crucial factor in many scientific disciplines, and the most intriguing aspect of language (Nida 1975: 9). Meanings are expressed by a formal level of linguistic description - called semantic representation, and proposed in the framework of generative semanticists (Kats and Fodor 1963).

The outline of this paper is as follows: Section 2 outlines a framework of semantic representation which is composed of semantic categories and functions revealed in ICT register. In section 3 we focus on the analysis of the verbs with the suffixes under investigation. Section 4 reviews the conclusions drawn from the research and also contains a short presentation of some of the most relevant works in this area, and how we have proven the theses they put forward.

2. SEMANTIC CATEGORIES

In this paper we have developed a descriptive system of lexical semantics which is very much like that of Plag's (1999) theory on lexical semantics and is a decompositional part of lexical semantic representation. Semantic structure represents a general pattern of the semantic categories. The level of conceptual structure must contain a range of ontological categories corresponding to different categories of projected entities. The basic semantic categories are expected to be general and quite abstract (Lieber 2004: 36). Within semantic categories there are semantic functions (or semantic primitives of conceptual structure – Kiparsky 1997; Lieber 2004; Jackendoff 2010) which represent ontological categories, and have been used to describe the verbs' internal semantic structure.

On the basis of research findings, the following semantic categories (according to Plag's terminology) have been revealed and presented in ICT register. They are:

CAUSATIVE (found also in Dowty 1991; Levin 1993; Levin and Rappaport Hovav 1994; Beard 1995; Lieber 2004) expresses the cause of the action described by a verb (causing something to take place), or, it consists of an activity which brings about the effecting of a result (acting as a cause) (Lieber 2004: 82). She adopted for the CAUSATIVE a form of the bipartite representation. CAUSE (XYZ) is associated with causative, which is detectable exclusively in the transitive verbalization (Beard 1995: 181). It has occupied a prominent place in recent literature on lexical semantics. CAUSE is a kind of accomplishment construction called factitive (a cause produces an effect/result) in traditional grammar (Green 1972 in Dowty 1991: 93).

LOCATIVE expresses location, indicates place of the state or action, marks location (to put something in a certain place), or 'to arrange things into classes or categories', or to be in a certain place (to be placed); LOCATION, as an internal structure, represents the semantic interpretation of locative verbal function.

RESULTATIVE shows 'the state of a result from the completion of the action expressed by a verb, or identifying the result of an action'. Like causative class, it has been widely discussed in the literature on lexical semantics. RESULT, as an internal structure, is the semantic interpretation of resultative verbal function.

INCHOATIVE (found also in Dowty 1991; Levin 1993) shows a process of beginning (an action, state or occurrence). BECOME (XY) is the semantic interpretation of the inchoative verbal function, and may be detected into all verbalizations (Beard 1995: 181).

ANALYSIS

3.1. The suffix -ize

From the research findings we come to a conclusion that the suffix -ize is a polysemous one, and it adopts the following meanings in ICT register (according to Plag's terminology 1999):

A) CAUSATIVE 'make (more) X' ex. anal-yze 'make (more) analysis'

According to Plag (1999) there are two interpretations of CAUSATIVE verbs. They denote an action and an entity that brings that action. As Plag states, the LCS (lexical-semantic structure) for CAUSATIVES is the following:

1) CAUSE ( ]i, GO ( ]theme; TO]base])])
2) CAUSE ( ]i, GO ( ]base; TO]theme])])

LCS for the verb analyze is:
1) CAUSE ( ]i, GO ( ]theme; TO analysis]base])])
2) CAUSE ( ]i, GO (analysis]base; TO]theme])])

Let us consider examples with the verb analyze in sentences 1. and 2:
1. Programmers analyzed computer programs. - THE CAUSING EVENT
2. Computer programs analyzed. - THE CAUSED EVENT

Two actions take place in these sentences, namely, the action executed by programmers, i.e. the CAUSING EVENT, and the action executed by computer programs – the CAUSED EVENT (Comrie, 1976). The CAUSED EVENT cannot take place without the CAUSING EVENT.

As CAUSATIVE relates pairs of TR (transitive) and INTR (intransitive) verbs, the verb analyze has both TR and INTR use, illustrated in (1) and (2).

Hence, the TR use describe the CAUSATION of the state. The causative alternation relates causative and inchoative verbs, and is called the CAUSATIVE/INCHOATIVE alternation, whereas, the INTR use describes an eventuality in which the theme participant (computer programs) undergoes a change of state, becoming analyzed, and it is called INCHOATIVE.

According to Levin and Rappaport Hovav (1994) the semantic representation corresponding to the intransitive variant is derived from that of the transitive variant through a detransitivization process from a representation:

[[x do-something]cause[y become STATE]]
[[programmers analyze]cause[computer programs]]

to a representation: [[y become STATE]]
[[Computer programs analyzed]]

B) LOCATIVE 'put (in)to X' ex. *computer-ize* ‘put (data) (in)to computer’

Locative verbs involving the base [ ]base and the suffix -ize (-ify, -ate) are transitive and denote an Event in which the subject causes the transfer of what is denoted by the object NP to the entity that is denoted by the base (Plag, 1999). As proposed by Plag (1999), the LCS for LOCATIVE -ize verbs is represented in the following way:

[[ ]base -ize]v
for the verb *computerize* it looks like the following:
[[ ]computer -ize]v

{ NPi ___ NP Theme}
CAUSE ([ ]i, [GO ([ ] Theme; [TO [computer] Base])])

Consider the example of the verb computerize ‘put (data) into computer’ which is interpreted in the following way in a given sentence:

1. Computerists computerize (data) into computer’
CAUSE (computerists]i, GO (data]theme; TO computer]base])])

However, in English LOCATIVES alternate between two frames (Levin, 1993):
1. change of location
Computerists computerize (data) in the computer
2. change of state
Computerists computerize with (data) in the computer

These examples represent two variants (change of location and change of state), and each makes a different participant (Location and Locatum - Levin and Rappaport Hovav, 1994). Location (data) denotes the location where the direct object has moved onto, locatum (with data) denotes the element that has been moved onto a location expressed by the direct object.

C) RESULTATIVE – 'make (into) X', ex. rasterize 'make (into) vector image'
1. 'make X' ex. 'make vector image'
2. 'make into X' ex. 'make into vector image'

If we consider the previous examples (1. and 2.), we can notice that there are two related semantic patterns, namely, RESULTATIVE (2) and CAUSATIVE-RESULTATIVE (1). As Plag (1999) argues, RESULTATIVE and CAUSATIVE formations go into one category. The explanation for this state is that the distinction between 'make X' and 'make into X' is conceptually unmotivated and paraphrases are treated as if they were direct representations of meaning.

Take another example, the verb digitize. This verb can be analyzed as CAUSATIVE–RESULTATIVE, because of its interpretation:

1. 'create digital form' in a sentence
ex. Developers create digital forms.
2. 'create into digital form'
ex. Developers create into digital forms.

The LCS for the verb digitize looks like this:
CAUSE ( ]i, GO ( ]theme; TO thing digit]base])])
CAUSE (developers]i, GO (digit]base; TO]theme])])

D) INCHOATIVE 'become X' ex. normal-ize 'become normal'

LCS for the verb normalize is:
GO ([ ]Theme; [TO [normal]base]

As Plag (1999) claims, all of the meanings are derived from one single semantic representation, the underspecified Lexical Conceptual Structure (LCS) of possible -ize verbs.

With regard to LCS of -ize verbs, we have proposed the one as in Plag 1999):

[[ ]BASE -ize]V - [[ ]normal -ize]V
{ NPi ___ NP Theme, NP Theme ___ , NPi ___ }
CAUSE ([ ]i, [GO ([Property, Thing] Theme / Base; [TO [Property, Thing] Base / Theme])])

According to the previous LCS, -ize verbs may occur either transitively, in the syntactic frame { NPi ___ NP Theme}, or intransitively, in the frame {NP Theme ___ } (Plag, 1999).

3.2. The suffix -ify

Considering the meaning of the suffix -ify, Zandvoort (1969: 372) notes that it is a suffix expressing 'to make' (what the main element expresses). On the other hand, some researchers (Plag 2003, Štekauer and Lieber 2005) illustrate the variety of meanings with this suffix. Our investigation shows that this suffix exhibits the same range of meanings as -ize does: i.e. there is an overlap between these two suffixes. They are synonymous (Plag 1999). Hence, Plag proposes the same LCS for -ize and -ify suffix. Here, we present the semantic categories with representative examples.

A) CAUSATIVE 'make (more) X' ex. *mod-ify* 'make modification'
CAUSE ([ ]i, [GO ([ ] Theme; [TO [modification] Base])])
modify – 'make modification'
(someone) make modification
(developers) make modification

B) LOCATIVE 'put (in)to X' ex. class-ify 'put into classes'
The LCS for the verb classify is:
CAUSE ([ ]i, [GO ([ ] Theme; [TO [class] Base])])

classify – 'put into classes'
(something) put into X
(computers) put into classes

Interestingly, the verb classify shows, at the same time, CAUSATIVE meaning – 'make X' 'make classes'.

Additionally, as Plag (1999) explains, if the base (in this case class) is assigned to the argument position of the TO function under elimination of the optional CAUSE function, the INCHOATIVE meaning results.

The base (*class*) could theoretically occupy the position of the argument of either GO or TO, giving rise to slightly different nuances of meaning: with the base as the argument of TO, *classify* would mean 'cause to turn into a class', which is in fact its lexicalized meaning, whereas if the base is construed as the argument of GO, the word means 'cause computer programs to become classified', as in:
Computerists classified computer programs.

So, INCHOATIVE – 'become X' 'become classified'
GO ([ ] Theme; [TO [*class*] Base])

C) RESULTATIVE 'make into X' ex. *specify* 'make (into) specific form'
(someone) make make (into) X
(developers) make software (into) specific form

D) INCHOATIVE – 'become X' ex. *modify* 'become modified'
(something) become X
(computer games) become modified

The LCS for the verb *modify* is:
GO ([ ] Theme; [TO [modification] Base])

The causative-inchoative alternation implies 'alternating verbs'. Such pairs consist of transitive and intransitive verbs that are semantically related in the following way:
a. the transitive verb (a causative-inchoative verb) denotes a bringing about of this change of state,
b. the intransitive member (an inchoative verb) denotes a change of state.

Observe the following examples containing the alternating verbs:
1. They *classified* types of data.
2. Data *classified.*

3.3. The suffix -ate

Although some linguists (Lieber 2004) have ignored the -ate suffix, the fact is that it is highly present in the computer register. Plag (2003) states that practically every suffix can be shown to be able to express more than one meaning. Our analysis has shown that this suffix exhibits the same range of polysemy as the previous ones; namely, it creates four semantic categories. They are listed below with paraphrases and, of course, with representative examples.

A) CAUSATIVE 'make (more) X' ex. *activate* 'make (more) active'
The LCS for the verb *activate* is:
CAUSE ([ ]i, [GO ([ ] Theme; [TO [active] Base])])

activate - 'make active or (more) active'
(someone) make (something) active
(computerists) make (printers) active

b. INCHOATIVE – become X - 'become activated'
(something) become X
(windows) become activated

The CAUSATIVE-INCHOATIVE alternation is evident in the following examples (1, 2):
1. *They activated windows.*
2. *Windows activated*

B) LOCATIVE 'put into X' ex. *automate* - 'put (computer data) into automatic operation'

automate 'put (something) in a certain place'
put (something) into X
put (computer data) into automatic operation

C) RESULTATIVE - make into X' ex. *integr-ate* 'make into (an integrated whole)'

integr-ate – 'make into an integrated whole'
(someone) make (something) into X
(programmers) make (computer components) into (an integrated whole)

D) INCHOATIVE 'become X' ex. *differentiate* – 'become different'

The LCS for the verb *differentiate* is:
GO ([ ] Theme; [TO [*different*] Base])

(something) become X
(computer programs) become different

The following sentences illustrate the CAUSATIVE-INCHOATIVE alternation:
1. *Computers differentiated* data.
2. *Data differentiated*.

To summarize, the strategy has been to specify semantic representations for CAUSATIVE, LOCATIVE, RESULTATIVE, INCHOATIVE formations, as well as for the alternating verb stems CAUSATIVE-INCHOATIVE verbs, showing how the INCHOATIVE verb can be derived from the CAUSATIVE.

4. CONCLUSION

In this paper an attempt has been made to put forward a unifying analysis of the verb-forming -ize. -ífy, -ate suffixes in English in ICT terminology, the focus of investigation being their semantics. We have explored the issue of suffixal polysemy and the existence of suffixes with the same range of polysemy. The suffixes -ify, -ize and -ate are claimed to have four polysemous meanings, and even more, they show the same range of meanings, namely, CAUSATIVE, LOCATIVE, RESULTATIVE and INCHOATIVE meaning. We have presented Plag's (1999) lexical conceptual structure (LCS) concerning the semantics of -ize, -ify, -ate derivatives.

Although short and in a form of an overview, the semantic investigation of the verb-forming suffixes in English related to ICT terminology, presented here, relies and adds to the already existing corpus of research existing in the fields alike. It has been our aim to support our examples with valid theoretical foundation by giving adequate references.

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