Semantic Models of English Environmental Protection Terms

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Abstract. The present paper deals with semantic models which can serve as examples for formation new Environmental Protection terms. The parallel analysis of structure and semantics of terms may become a possible criterion for standardization of Environmental Protection terminology. Semantically terms of Environmental Protection have been divided into three groups and their semantic models have been analyzed. Some regularities (rules) between structure and semantics of the researched terms have been identified.

Keywords: *term, terminological phrase, semantic model, structural model, lexical-semantic category*

Introduction. Linguistic standard covers interconnection between structure and semantics of the term. We refer to standardization as the kind of terminological work during which documents containing a list of recommended terms are compiled and approved in a specific order. During standardization the mechanism of standardization itself is built, which may include the standardization of rules and procedures of the construction of terminological systems [1, p. 227].

Analysis of the structural and semantic peculiarities of Environmental Protection terms is important because thanks to thoughtful process of term-formation scientists and specialists are capable of forming the terminological units of the same type according to the same semantic-derivational characteristics for describing the same scientific concepts. Therefore, we consider it necessary to analyze the structural and semantic models of the Environmental Protection terms in order to help standardize the researched terminology.

An important step in terms of research of Environmental Protection (EP) terms is the analysis of their semantic models that will help to clarify the semantic relations between the components of the one-word terms and terminological phrases.

A brief review of publications on the subject. In 1936, the International Federation of the National Standards established a technical committee of the national standards (ISA), which two years later passed a resolution on international technological terminology, which stated the need to develop common rules for formation international terms from different scientific branches, supplemented by a list of commonly used affixes and roots [3, p. 175].

Semantic models of English Environmental Protection terms haven't been analyzed yet. It makes our research actual and new. For building and analyzing semantic models of terms we have used the technique proposed by full professor Taras Romanovych Kyyak which is described in his work "Linguistic Aspects of Terminology" [2].

Researchers refer to semantic model as "categories of objects and relations between them which are reflected in the internal form"[2, p. 49]. E. F. Skorohodko claims that semantic model reflects lexical-semantic categories of components of the word or terminological phrases and type of semantic relations between them [5, p. 46-47].

The goal. The present study is aimed at building and analyzing semantic models according to which Environmental Protection terms are formed. Moreover, our aim is to compare structural and semantic models of terms and identify some regularities between them, thus, making contribution into the process of standardization of Environmental Protection terminology.

Materials and methods. For building semantic models the language of RX-codes is used in which the system of semantic relations is identified as a set of formulas, the main components of which are the symbols X and R with relevant indexes. The first ones represent lexical-semantic category (we call them "material" models), and the second – semantic relations (i.e. they reflect the type of semantic relations between the components of one-word term or terminological phrase. We call them "relational models"). Thus, we distinguish between "substantial" categories X020 ("action"), X040 ("body") and X060 ("property"). This technique is described in the work by T.R. Kyyak [2].

The relations between lexical-semantic categories are marked with symbol R and relevant indexes, indicating the type of relations. For example, the symbol R001 corresponds to "to be part of the class".

The opposite relations are marked with the help of stroke in the upper index (for example, R061 – "to be the attribute of", R'061 – "to have the attribute"), negative relations are indicated by the help of symbol ┐ (┐R061– "not to be the attribute of", ┐R'061 – "not to have the attribute") [2, p. 49-50].

The most common types of semantic relations are: 1) R001 – "to be the subclass"; 2) R002 – "to be the part of"; 3) R'002 – "to have the part of"; 4) ┐R002 – "not to have the part of"; 5) R003 – "to be designated for use"; 6) R050 – "to be the subject of the action"; 7) R'050 – "to have the subject"; 8) R051 – "to be a potential subject"; 9) R052 – "to be designated for"; 10) R053 – "to be the object of the action"; 11) R'053 – "to have the object"; 12) R055 – "to be the result of"; 13) R'055 – "to have the result"; 14) R057 – "to be the place of"; 15) R061 – "to be the attribute"; 16) R'061 – "to have the attribute"; 17) R'067 – "to have the name"; 18) R100 – "to be similar to"; 19) R'121 – "to have the object of the action"; 20) R'123 – "to have the tool"; 21) R150 – "to be the place of the action"; 22) R'150 – "to have the place of the action" [2, p. 50].

Results and discussion. As two-component terminological phrases prevail among the Environmental protection terms (our researched corpus contains 2256 terms) [4] we consider it necessary to analyze their semantic models.

Our corpus includes 1150 two-component terminological phrases (TPs), formed by 31 semantic models.

Thus, the terms with lexical-semantic category of the main component "body" (529 TPs) are formed according to 16 semantic models.

For terms with the lexical-semantic category "action" (414 TPs) 9 semantic models have been identified.

Terms with lexical-semantic category "property" (207 TPs) are represented by 6 semantic models.

Terms with lexical-semantic category of the main component "body" constitute 46% of all the researched two-component TPs (1150) and are often formed according to such semantic models:

1) The most productive semantic model is R001 X040 R'061 X060 – "body, which has the property as the attribute" according to which 136 TPs are formed: *fresh water, radioactive waste;*
2) R001 X040 R052 X020 – "body which is designated for action" (87 terms): *filtration system, cooling water;*
3) R001 X040 R'150 X040 – "body, which is the action place of another body" (52 terms): *forest fire, sewage fungus;*
4) R001 X040 R121 X040 – "body which is the object of the action of the other body" – 43 terms: *stabilization pond;*
5) model R001 X040 R050 X020 – "body, which is the subject of the action (doer)" forms 31 environmental terms: *effluent producer, sedimentation clarifier;*
6) less representative is model R001 X040 R'002 X040 – "body, which has a another body as a part" - 26 terms: *atomic waste;*
7) model R001 X040 R002 X040 – "body that is the part of another body" forms 24 terms: *landfill cell, ozone layer;*
8) less productive is model R001 X040 R'060 X040 – "body, which has another body as a material" (20 terms): *glass waste, soil amendment;*
9) R001 X040 R'067 X040 – "body, which has another body as a name" (18 terms); this category includes eponymic terms: *Imhoff tank, Ekman dredge; Nessler reagent;*
10) R001 X040 R053 X020 – "body which is the object of the action (operand)" (17 terms): *security area, forest reserve;*
11) R001 X040 R057 X020 – "body, which is the place of the action" (15 terms): *oxidation lagoon;*
12) model R001 X040 R150 X040 is less productive – "body, which is the place of the action of another body" (13 terms): *animal feedlot;*
13) R001 X040 R100 X040 – "body which is similar to other bodies" (12 terms): *bucket elevator, looping plume;*
14) R001 X040 R055 X020 – "body, which is the result of the action" (10 terms): *decay product;*
15) terms of the model R001 X040 R052 X040 – "body designated for another body" (7 terms): *disposal pond;*
16) R001 X040 R'150 X040 – "body, which has another body as the place of the action" (5 terms): *overland flow.*

Quantitative calculations show that the last models are not productive in English terminology of Environmental Protection.

The analysis of terms with lexical-semantic category "action" (414 TPs) revealed the following semantic models:

1) model R001 X020 R'053 X040 – "action which has the body as the object", (254 terms) is the most productive model of the given lexical-semantic category: *refuse incineration, water chlorination, stream sanitation, waste processing;*
2) according to the model R001 X020 R'061 X060 – "action that has the property as the attribute" 73 environmental terms are formed: *biological pollution, intentional pollution, complete treatment;*
3) model R001 X020 R'050 X040 – "action which has the body as the subject" forms 19 terms: *glacier thawing, volcanic eruption;*
4) model R001 X020 R'123 X040 – "action, which has the body as a tool" participates in the formation of 17 terms: *water flushing, saltwater intrusion;*
5) model R001 X020 R'053 X060 – "action which has the property as the object" forms less number of terms (14 terms): *risk assessment;*
6) R001 X020 R'123 X060 – "action, which has the property as a tool" (12 terms): *ultrasonic filtration;*
7) model R001 X020 R'055 X040 is also less productive – "action that has the body as a result" (7 terms): *land slide; soil dehumidification;*
8) R001 X020 R'150 X040 – "action, which has another body as the place of the action" (4 terms): *surface pollution, sea dumping;*
9) R001 X020 R'050 X060 – "action which has the property as the subject (doer)" (4 terms): *pollution accumulation.*

Analysis of two-component TPs of Environmental Protection shows that the terms with the lexical-semantic category "property" (207 terms (18%)) are characterized by such semantic models:

1) the most productive model of this category is R001 X060 R061 X040 – "property that is an attribute of the body". According to this model 78 terms are formed: *water aggressiveness, soil moisture, effluent quality, air quality;*
2) model R001 X060 R061 X020 – "property that is an attribute of action" includes 43 terms: *emission rate, flow velocity, elimination rate;*
3) semantic model R001 X060 R'061 X060 – "property that has another property as an attribute" forms 37 terms: *acute hazard, short-term toxicity;*
4) R001 X060 R'067 X040 – "property which has the body as the name" – 28 terms: *Coriolis effect, Rankine scale;*
5) R001 X060 R061 X060 – "property that is an attribute of another property" (11 terms): *climate fluctuation, weather forecast;*
6) model R001 X060 R'150 X040 – "property that has another body as the place of action" is less productive (4 terms): *city maladour.*

Thus, 31 semantic models for two-component Environmental terminological phrases have been built. Each semantic model includes a number of terms that can range from 4 to 254 TPs.

It should be noted that the structural features of the two-component environmental TPs have been singled out into six structural models: N + N, A + N, Ven + N, Ving + N, N + Ving, A + Ving, the most productive of which is the model N + N, according to which 603 Environmental Protection TPs are formed [4].

Analysis of the structure and semantics of two-component environmental TPs enables us to distinguish certain structural models specific to certain semantic models and, vice versa, semantic models specific to structural models. In other words, our task includes the possibility of establishing certain regularities between structure and semantics of two-component environment TPs and identifying some correspondence between them. Thus, it could be identified by which language means some semantic relations between the components of the TPs are expressed.

The most productive semantic models with lexical-semantic category of the main component "body" are represented by such structural models:

1) R001 X040 R'061 X060 – A + N (78 terms out of 136): *hazardous substance, discoloured water;*
2) R001 X040 R052 X020 – N + N (54 terms out of 87). This structural model is often characterized by verbal noun as the main component, which in its morphemic structure contains suffix *-er* or *-or*, that is used in the

researched terminology to refer to devices designed to perform the specific action: *dust collector, air filter*. In addition, the proposed semantic model is expressed by the structural model Ving + N, where present participle serves as an attribute: *bathing water;*

3) R001 X040 R'150 X040 – N + N (47 from 52 terms): *air contaminant;*
4) R001 X040 R'060 X040 – A + N and N + N (8 and 12 out of 23 terms). The adjective in the first structural model is formed from the noun: *gaseous waste, mineral waste,* and the first noun-component in the second model serves as an attribute: *coffee wastewater;*
5) R001 X040 R053 X020 – N + N and A + N (12 and 5 out of 17 terms): *biosphere reserve, national park.*

Such following structural models characterize semantic models of two-component Environmental Protection terminological phrases with lexical-semantic category "action":

1) R001 X020 R'053 X040 – N + N, N + Ving, A + Ving (133, 64 and 43 terms out of 254): *trash disposal, river upgrading, environmental monitoring, fauna protection;*
2) R001 X020 R'061 X060 – A + N and A + Ving (48 and 8 out of 73 terms): *dry cleaning, chemical conditioning;*
3) R001 X020 R'050 X040 – N + N and N + Ving (8 and 11 out of 19 terms): *oil effluent, glacier thawing;*
4) R001 X020 R'123 X040 – N + N and N + Ving (9 and 8 out of 17 terms): *water irrigation, water flushing.*

It should be pointed out that semantic models with lexical-semantic category "action" are often presented by structural models in which the second component is expressed by a verb ending in *-ing*, which corresponds to gerund, and refers to the process or action.

Terms that belong to the most productive semantic models with lexical-semantic category "property" correspond to such structural models:

1) R001 X060 R061 X040 – N + N (67 out of 78 terms): *soil texture;*
2) R001 X060 R061 X020 – N + N (37 out of 43 terms): *emission factor, decontamination factor, collection efficiency;*
3) R001 X060 R'061 X060 – A + N and N + N (29 and 7 out of 37 terms): *adverse effect, off-flavour taste;*
4) R001 X060 R061 X060 – N + N (9 from 11 terms): *safety factor.*

To sum up, the most characteristic structural models of two-component environmental terminological phrases are represented by such semantic models:

1) N + N: R001 X040 R052 X020 – *drainage pipe,* R001 X040 R'150 X040 – *forest fauna,* R001 X040 R'060 X040 – *paper waste,* R001 X020 R'053 X040 – *soil depletion,* R001 X020 R'050 X040 – *pollutant transportation,* R001 X020 R'123 X040 – *sewage irrigation,* R001 X060 R061 X040 – *smoke transparency,* R001 X060 R061 X020 – *pollution density,* R001 X060 R061 X060 – *sound intensity;*
2) A + N: R001 X040 R'061 X060 – *black water,* R001 X040 R'060 X040 – *gaseous waste,* R001 X020 R'061 X060 – *long-term deposition,* R001 X060 R'061 X060 – *communicable disease;*
3) N + Ving: R001 X020 R'053 X040 – *waste recycling,* R001 X020 R'050 X040 –*glacier thawing,* R001 X020 R'123 X040 – *water weathering;*
4) A + Ving: R001 X020 R'061 X060 – *chemical conditioning;*
5) Ving + N: R001 X040 R052 X020 – *purifying liquid;*
6) Ven + N: R001 X040 R053 X020 – *purified water.*

As it can be seen, there is no one-to-one (definite) correspondence between the structure and semantics of two-component environmental protection TPs. However, several regularities have been identified.

Therefore, the structural model N + N is used for the formation of the majority of the analyzed semantic models with any lexical-semantic category that is explained by the fact that a large number of environmental terms are formed with the help of two nouns.

It has been proved that some structural models correspond to certain semantic models and vice versa, which enables to use the results of the given research in the process of term-formation.

Conclusions. The conducted analysis of Environmental terms enables us to make the following conclusions:

1) Semantically terms of Environmental Protection can be divided into three groups. Terms with lexical-semantic categories of the main component "body", "action" and "property" have been singled out, among which the most numerous and productive in the given terminology are terms of the first two categories.

2) The terms of each lexical-semantic category are characterized by certain semantic models. The most typical and the most frequent semantic models for terms of corresponding lexical-semantic category have been built and analyzed. Thus, for terms with lexical-semantic category "body" 16 semantic models have been built, for terms with lexical-semantic category "action" – 9 semantic models and for terms with lexical-semantic category "property" 6 semantic models have been built. Quantitative characteristics of each semantic model have been also given.

3) The most productive semantic models of English environmental protection terms - R001 X040 R'061 X060, R001 X040 R052 X020, R001 X040 R'150 X040, R001 X040 R121 X040, R001 X040 R050 X020, R001 X020 R'053 X040, R001 X020 R'061 X060, R001 X020 R'050 X040, R001 X020 R'123 X040, R001 X060 R061 X040, R001 X060 R061 X020 etc. have been distinguished.

4) The parallel analysis of the structure and semantics of Environmental Protection terms made it possible to identify certain regularities between them and protest against unambiguous correspondence. It can't be clearly stated that certain structural model corresponds to only one semantic model and vice versa. It has been proved that each semantic model is represented by several structural models, and, accordingly, one structural model participates in the formation of several semantic models.

5) Quantitative calculations of terms that belong to certain semantic model show the productivity of certain model in formation of environmental protection terms.

6) The given research makes contribution into the process of term-formation, because the results of the analysis show certain regularities between system of concepts, proving that a wide range of word-formative morphemes is used for the expression of semantic categories.

The most representative structural and semantic models can serve, on the one hand, as examples for formation new terms, on the other hand, as a possible criterion for normalization of Environmental Protection terms. Semantic models can serve as a standard for normalization of the given terminology.

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Abstract. In this article an attempt to analyze the English Environmental terms according to their semantics has been made, making a contribution for the standardization of the researched terminology. The terms of Environmental Protection have been semantically divided into three categories: with the main component of “body”, “action” and “property”. For terms of each group their semantic models have been built. Also the parallel analysis of their structure and semantics have been made, which made it possible to notice some regularities (rules) in term-formation. The given study contributes to the process of term-formation, because the results of the analysis show certain regularities between system of concepts, proving that a wide range of word-formative morphemes is used for the expression of semantic categories.

Keywords: *term, terminological phrase, semantic model, structural model, lexical-semantic category*