THE INFLUENCE OF THE SCIENCE RESEARCH ARTICLE GENRE ON SOME LANGUAGE MEANS

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INTRODUCTION

The text is a multi-faceted unit. Numerous attempts to define it within the framework of existing theories have resulted in a wide range of definitions, ranging from the text as something that happens in the form of talking or writing, listening or reading (Halliday, 1985, 290) to the text as a dominantly-verbal relational semiotic-object with a hand-written or printed manifestation (Petöfi, 1990, 210). The majority of the text definitions, however, focus on two main aspects: the internal structure of the text and the external factors influencing the text. The external factors concern the relationship between the text and the context of situation. The relation between the context of situation and the text is usually described by using three concepts: field, mode and tenor, the terms proposed by Halliday, McIntosh and Strevens (1964). The three terms were redefined by Halliday and Hasan (1985, 12) in the following way: 1) the field refers to what is happening to the social nature of the social action that is taking place; 2) the tenor refers to who is taking part, the nature of participants, their statuses and roles; 3) the mode refers to what part the language is playing, what it is that participants expect the language to do for them in the situation. The linguistic features which are typically associa-ted with the configuration of situational features – with particular values of the field, mode and tenor – constitute a register (Halliday and Hasan, 1976, 23). With regard to the situational features, texts can be attributed to different registers.

The studies of different registers gave rise to the so-called theory of register which aims "to propose relationships between language function, determined by situational or social factors, and the language form" (Leckie-Tarry, 1995, 6). Although there exist various definitions and classifications of registers, practically all theorists working within the framework of register theory agree that they have been influenced by Halliday and Hasan's (1985) definition of register and their division of registers into two major types: open-ended and closed, or restricted, registers. According to Halliday and Hasan (1985, 38–39), an open-ended register is a kind of register in which the range of possible meanings is wider. A closed register is a kind of register in which there is no scope for individuality or for creativity, and the range of possible meanings is fixed. The traditional registers of narrative and spontaneous conversation are the most open-ended kinds of register, whereas the registers of legal documents and science texts are the most restricted kinds of register.

Working within the frame of register theory, some text analysts found the category "register" inadequate to explain the relationship between the text and the context and to demonstrate differences in the relationship between the participants taking part in the linguistic activity. These analysts began to employ the category "genre".

Swales (1981) was the first to point out the inadequacy of register analysis. He claimed that studies in genre analysis "differ from traditional register or sub-register analysis in the importance they attach to communicative purposes within communicative setting" (Swales, 1987, 13). These speculations led to studies of the text within the framework of the theory of genre. The term "genre" caused certain confusion, since it was used in stylistics to name different categories such as a poem, tale or story. This was not what the modern genre analysts meant by the term "genre". The category of genre is best reflected in Swales's (1981, 1985 and 1990) definition as referred to by Bhatia (1993, 13): "genre is a recognisable communicative event characterised by a set of communicative purpose(s) identified and mutually understood by the members of the professional or academic community in which it regularly occurs. Most often it is highly structured and conventionalised with constraints on allowable contributions in terms of their intent, positioning, form and functional value".

From this definition it is obvious that the nature of genre is primarily characterised by the communicative purpose that it is intended to fulfil. This communicative purpose shapes the genre and gives it an internal structure. To quote Bhatia (1993, 13), "any major change in the communicative purpose is likely to give us a different genre; however, minor changes or modifications help us to distinguish sub-genre". The division

of texts into genres according to the communicative purpose makes the category of genre more "flexible" with respect to register. For instance, register theorists distinguish the register of science and subdivide the register into sub-registers such as those of history, physics or zoology. Presumably, for a register analyst, a science research article on chemistry is as good an instance of the sub-register of chemistry as is an extract from a chemistry textbook. For a genre analyst, the two texts represent different genres, since the communicative intentions of the producers of those texts are different.

An attempt to resolve the conflict in terminology between register and genre has not been very fruitful yet. As proposed by Leckie-Tarry (1995, 11), "both terms register and genre have their place for linguistic theory and analysis". Therefore, register and genre can be interpreted as two categories supplementing each other: register embodies a range of field-specific lexical choices which allow language users to vary within a fixed structure of genre. Though features of the register may vary, the underlying genre pattern is usually maintained.

The idea that there may be underlying recurrent features which are prototypically present in a group of texts that belong to the same genre posits a correlation between language use and specific situations that predetermine the ascription of the text to a particular genre. According to Bakhtin (1979, 257), genre, as an invariant organisation, does not result from the linguistic choices; on the contrary, it is genre that predetermines the choice of the linguistic means. The idea that genre influences the choice of the linguistic means has not been substantiated. Analysis of various language means can help to arrive at valuable insights concerning the influence of genre on the use of language means.

This article presents the analysis of the influence of the science research article genre on the use of cohesive devices. The genre of the science research article was selected as a focus of the analysis because of the fact that the science research article had been little analysed, especially from the point of view of cohesive devices. Since cohesion is a necessary micro-structural property of the text, which is expressed by certain linguistic means, the three major classes of cohesive devices – reference, substitution and ellipsis – were analysed.

200 science research articles written by different authors were subjected to analysis. The means of the frequency of occurrence of the cohesive devices within a certain class were calculated; the relative frequency of each type of items under analysis was determined since, as noted by Bhatia (1993, 25), "linguistic analyses of frequency of syntactic properties in different genres are interesting and useful in the sense that they provide the necessary empirical evidence to confirm or disprove some of the intuitive and impressionistic statements that we all tend to make about the high or low incidence of certain lexico-grammatical features of various genres".

1. REFERENCE

Textual reference or, as referred to by Toolan (1998, 23), co-reference creates a semantic tie between the referring element and its lexical referent. It is a relation between the meanings of the two items. Items of textual reference are defined as anaphoric and cataphoric. In the case of anaphoric reference the linguistic item refers to some linguistic item in the preceding segment of the text, and in the case of cataphoric reference, the linguistic item refers to some other linguistic item in the segment of the text that follows (Halliday, Hasan, 1976, 33). From the results of the data analysis it is obvious that anaphoric reference plays a major role in the production of a connected text. Pointing back to the linguistic elements in the preceding text, it unites the segments of the text into a coherent unity. To quote Beaugrande and Dressler (1981, 60), "anaphora is the most common directionality for co-reference since the identity of the conceptual content being kept current is made plain in advance".

When things are referred to for a second time, they are not necessarily identified by simply repeating the words that were used for the first time. It is more common to use a more condensed linguistic form. In this article two major types of referential identification – personal and demonstrative – are analysed. Personal reference is a reference which is expressed through the category of person and demonstrative reference is a reference which is expressed by means of location on a scale of proximity.

1.1 Personal Reference. The specificity of the science research article genre sets limits on the use of personal pronouns. The first person singular practically was not found in the analysed texts. It was only in the case of inevitable necessity that the authors resorted to the first person, which, as a rule, took the form of the plural. The use of the first person plural instead of the first person singular can be accounted for by: 1. The author's reluctance to overestimate his personal contribution to the presented ideas. 2. The author's attempt to present his knowledge as an integral part of the existing experience. 3. The author's attempt to involve the reader in the process of communication, making him a part-

ner in the process. 4. The restrictions imposed by the conventions of the genre (Verikaitė, 1999, 48).

In texts of fiction, which present the author's personal experience of both the external and internal worlds, the first person singular and plural are used very frequently. In the analysed texts of the science research article, however, it was not the case. Thus, it can be inferred that the science research article genre requires the impersonal presentation of the so-called objective and subjective reality, which results in infrequent use of the first person pronouns.

The restricted use of the second person pronoun can also be explained with regard to the specificity of the analysed genre.

The third person pronoun use was the most frequent. The anaphoric use of the third person pronoun in the nominative form, when the textual referent was identified in the immediately preceding sentence, enjoyed the highest frequency of occurrence. Very often third person pronouns were used to form a chain of reference: each pronoun referred back to the original noun phrase via the pronouns that have intervened. However, the number of the referring pronouns was usually limited (a chain of two or three pronouns was usually formed):

1.1.1 Dove (1935) reported that certain individuals in groups of ten birds consistently initiated feeding in the group. Where the birds were choice fed he claimed that the idiosyncrasies of the "leader" could significantly bias the feed preferences of that whole group. Further, he suggested that this bias would occur in larger groups <...>.

Therefore, it may be inferred that the restricted use of the referring elements in a reference chain was predetermined by the conventions of the genre: the writer took the perspective of the reader and calculated the level and specificity of his/her understanding trying to make text comprehension easier.

The science research article genre requires frequent use of generic pronouns. The texts of scientific journals disclosed the problems of a particular field: hence, the solution of these problems was based on some generalised theoretico-philosophical grounds, the description of which was not possible without the use of generalised pronouns:

1.1.2 Man has been trying to alter the genetic make-up of animals for thousands of years. Not, of course, that he could express that interest in such terms until comparatively recently. Nevertheless this difficulty has not prevented him working to improve the quality of higher animals which are useful to him – the horse, cow, sheep, pig, domestic fowl and dog.

1.2 Demonstrative Reference. The items of demonstrative reference enjoyed much higher frequency than those of personal reference and accounted for 81 percent of the occurrences. The high frequency of occurrence of the demonstrative pronouns *this-these* could be accounted for by the logical structuring of the text where the subject position was interpreted as "known" and the predicate position as "new". The subject position was very often taken by the noun phrase with the demonstrative modifier *this*, which pointed back to the noun phrase in the preceding segment of the text:

1.2.1 The mean annual number of cases of gangrenous dermatitis was 15.9. This disease is thought to be a result of immunosuppression caused by gumboro. The use of the killed gumboro vaccines has the potential virtually to eliminate this disease.

Half of the occurrences of the noun phrase with the modifier *this* referred to an extended referent – a clause, a sentence or several sentences. Sometimes it was even difficult to determine whether the noun phrase referred to a particular noun phrase or a more extended unit of the text –

a clause or a sentence. The structural composition of the referent was directly connected with the number of occurrences of the referring noun phrase with the modifier _this_: it was used repeatedly to refer to the noun phrase, and it was used predominantly singly to refer to a clause or a sentence.

This functioning as head of the noun phrase (without the noun) was mostly placed in the position of subject and functioned as part of the theme in the communicative structure of the text. The place of _this_ in the structural organisation of the utterance was usually restricted to median and final position, i.e. it occurred in the middle or at the end of the paragraph. The only possible occurrence of _this_ in the initial position of the utterance was its reference to the noun phrase used as a title or subtitle of an article. It is noteworthy that _this_ functioning as head of the noun phrase practically never occurred repeatedly.

High frequency of the demonstrative _this_ in comparison to other items of demonstrative reference such as the definite article or the demonstrative pronoun _such_ could be explained with regard to specific properties of the analysed genre: the demonstrative pronoun _this_ had the power of raising the item it modified to the focus of reader's attention on a new, larger scale by contrasting this item with the one mentioned previously. The demonstrative _this_ can also signal a shift of focus, as was noted by McCarthy (1994, 272), "_this_ certainly seems regularly to function as a signal that the entity is to be understood as raised to current focus <...> for the purpose of making either a comparison or contrast with another new or re-activated focus, for the purpose of evaluation" Neither the definite article nor other demonstrative pronouns can effectively function as a focus raising or focus shifting elements. Having in mind the fact that texts of the science research article genre present many arguments which are compared or contrasted, we can conclude that the demonstratives _this-these_ function as intensifiers in the comparatively inert flow of the texts of the science research article genre.

2. SUBSTITUTION

The relation of substitution is created between a substitute and a presupposed item[1], the place of which is taken by a substitute. A substitute in the text is used as an explicit indicator that something is omitted. As a rule, the structural function of a substitute is the same as that of the presupposed item.

According to the type of substituted items, three types of substitution can be distinguished:

nominal, verbal and clausal. Nominal substitution occurs when a noun is substituted for by the nominal substitutes _one/ones_ and _the same_. Verbal substitution occurs when a verb or a verbal phrase is substituted for by the verbal substitute _do_ or its appropriate finite or non-finite forms (_do, does, did, doing, done_). Clausal substitution occurs when entire clause is substituted for by the clausal substitutes _so_ and _not_.

In the texts of the science research article genre, of the three types of substitution, verbal substitution was used most frequently (54%), and was followed by nominal (31%) and clausal (15%) substitution. The high frequency of ver-

[1] The substituted form is often defined as a pro-form (Matthews, 1997, 361). In the present article, following Halliday and Hasan's (1976, 92) tradition, the term "a presupposed item" is used for the substituted form as well as for the ellipted form.

bal substitutes demonstrated that verb phrases tended to be substituted most often in the texts of the science research article genre. The reason for this must be sought in the structural composition of the substituted verbs. The vast majority of the presupposed verbs had simple structure, as in the following sentence where the verb _occurs_ is substituted for by the verbal substitute _does_:

2.1 *It has not been confirmed that increased production of aldosterone, antidiuretic harmone and growth harmone also occurs at this time in fowls as it does in mammals.*

The interdependence between the structure of the presupposed item and substitution was also traced while analysing other types of substitution. The less complex the structure of the presupposed item, the stronger the probability that substitution will occur. Consequently, clausal substitution, though it is one of the most effective means of language economy and text cohesion, was the least frequently occurring due to the complex structure of the presupposed item, as in the following text where _so_ substitutes for the whole preceding sentence:

2.2 *People prefer an income which is less risky to the same income which is more variable. If so, one would expect the quantity which would be supplied at any given price to be greater with stable prices.*

Another important point that can throw some light on the differential frequency of occurrence of a particular type of substitution is the distance between the substitute and the presupposed item. As a rule, the shorter the distance between the substitute and the presupposed item, the higher the probability of substitution. Since nominal and verbal substitutions occurred intra-sententially, with the substitute and the presupposed item being identified within the limits of the same clause complex, the cases of nominal and verbal substitution were more frequently used than clausal substitution which occurred inter-sententially, with the substitute and the presupposed item being identified in different sentences.

In conclusion, it can be pointed out that the genre of science research article puts certain restrictions on the use of substitution. It was more freely used if the substitute and the presupposed item were identified within the limits of the same clause complex and the presupposed item was structurally simple. This was due to the specific features of the given genre – explicitness and precision.

3. ELLIPSIS

Ellipsis is the omission of elements normally required by the grammar which the speaker or writer assumes as obvious from the context and, therefore, need not be raised (McCarthy, 1991, 431). According to strict definition, the omission of words is only to be considered ellipsis when the omitted words are "uniquely recoverable": i.e. there is no uncertainty about which words have been omitted. This means that, for instance, the non-finite clauses without a conjunction do not illustrate ellipsis since one could presuppose several possible conjunctions. However, the non-finite clause, being a major source of language economy, deserves an analysis within the frame of ellipsis. Since such instances cannot be interpreted as cases of "pure" ellipsis, they are called weak ellipsis (Chalker, 1984, 264). Therefore, according to the structural composition of the ellipted items, two types of ellipsis – ellipsis proper and weak ellipsis are distinguished in this article. Weak ellipsis denotes predetermined cases of ellipsis, whereas ellipsis proper has no structural predetermination.

Ellipsis proper and weak ellipsis were analysed within the noun phrase and verb phrase and were divided into nominal ellipsis and ellipsis of a predication.

3.1 Nominal Ellipsis.

The results of the data analysis demonstrated that the three major sub-categories of modifying elements functioned as head of the noun phrase when the noun was elipted. They were deictics, quantifiers and epithets[2]. The following texts illustrate cases of nominal ellipsis with the deictic (3.1.1), quantifier (3.1.2) and epithet (3.1.3) functioning as head of the ellipted noun phrase.

3.1.1 *The latter two types of vaccines, i.e. the HVT and non-pathogenic MDV, have been successfully used under field conditions. Both (0) are used in the cell-associated form but HVT has also been used widely in a cell-free form.*

3.1.2 *There are two major, and one minor, problems in expressing the maintenance requirement, all three of which concern the problem of scaling. The first (0) is that of scaling between genotypes at maturity, which was well described by Brody (1945). The second (0) is that of scaling between degrees of maturity for a given genotype, which was well described by Taylor and Young (1968). The third (0), which is connected with the other two (0) is the problem of the effects of different body fat contents on maintenance.*

3.1.3 *The rate of intestinal absorption of calcium depends upon many factors, and one of the most important (0) is vitamin D3.*

The distributive analysis of the occurrence demonstrated that the most frequently occurring

[2] The terms deictics and epithets were interpreted following Halliday and Hasan's (1976) tradition. Deictics were divided into specific deictics (possessives and demonstratives) and non-specific deictics (all, any, both, each, either, every, neither, no, some). Adjectives, which function as modifiers of head where the head is a noun, were defined as epithets. Quantifiers were divided into specific quantifiers which express a precise and absolute indication of quantity and non-specific quantifiers which give a relative or indefinite indication of quantity

type of modifiers functioning as head of the ellipted noun phrase was deictics (60%), followed by quantifiers (35%) and epithets (5%).

The cases of nominal ellipsis were considered to be instances of ellipsis proper since in the majority of the cases nominal ellipsis was not structurally predetermined: the presupposed item and the ellipted noun phrase were identified in different sentences, as in the texts 3.1.1 and 3.1.2.

3.2 Ellipsis of a Predication.

The results of the data analysis demonstrated that the texts of the science research article genre rarely exhibited inter-sentential ellipsis of predication, i.e. in the majority of the cases ellipsis of predication occurred within the limits of the same clause complex and in such cases it was considered to be weak ellipsis. The typical environment of predication ellipsis was a coordinated clause.

3.2.1 *The clinical condition of the pigeons was improved by this treatment, the mortality (0) reduced and the outbreak (0) controlled.*

3.2.2 *As has already been mentioned, infection with mycoplasmas may (0) or may not cause a severe and prolonged disease under certain conditions.*

Text 3.2.1 exhibits an operator ellipsis case, whereas text 3.2.2 is an instance of a lexical verb ellipsis, when lexical verb was related to two coordinated operators that expressed different polarity.

Another source of language economy in the texts of the science research article genre was ellipsis in non-finite clauses. Non-finite clauses have no operator, and most of them have no conjunction or subject. As already mentioned, ellipsis in non-finite clauses cannot be defined as ellipsis proper since the ellipted items are not presented explicitly either in preceding or succeeding segments of the text.

Non-finite clauses, the major source of weak ellipsis, were realised in -ed clauses without a

Table 1

Type of non-finite clause	Relative frequency
-ed clause without a subordinator	56%
to -infinitive clause	15%
-ed clause with a subordinator	10%
-ing clause without a subordinator	10%
-ing clause with a subordinator	9%

subordinator, to-infinitive clauses, -ed clauses with a subordinator, -ing clauses without a subordinator and -ing clauses with a subordinator. Their relative frequency of occurrence is presented in Table 1.

Summing up, it can be said that the cases of ellipsis proper accounted only for 20% of the total occurrences, whereas weak ellipsis accounted for the majority of the cases – 80%.

CONCLUSIONS

It may be presumed that the following tendencies of the use of cohesive devices – reference, substitution and ellipsis – point to the specific communicative needs of the science research article genre:

1. The referring items in a reference chain are used restrictedly, and this demonstrates that the writer of the science research article takes the perspective of the reader and calculates the level and specificity of his/ her understanding.

2. The science research article genre requires the impersonal presentation of the so-called objective and subjective reality, which results in infrequent use of the personal pronouns of the first and the second person.

3. The comparatively inert flow of the science research article text is intensified by raising some linguistic entities into the current focus for the purpose of comparison or contrast. The demonstratives *this* and *these* are the linguistic items that function as focus-raising items most effectively.

4. Substitution is used as a text-abbreviating device, which helps the writer to present new information without repeating known. It is more freely used, however, if the substitute and the presupposed item are identified within the limits of the same clause complex, and the presupposed item is structurally simple.

5. Ellipsis serves as an effective language economy device. Structurally predetermined ellipsis (weak ellipsis) is preferred to structurally independent ellipsis (pure ellipsis).

Further quantitative analysis of the same lexico-grammatical means in the texts of other genres, and the comparison of those results with the results presented in this article would allow us to make more generalisations about the influence of the genre on linguistic means.

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MOKSLINIO STRAIPSNIO ŽANRO POVEIKIS KAI KURIOMS KALBINĖMS PRIEMONĖMS

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Santrauka

Įvairių žanrų tyrinėjimų rezultatai leidžia teigti, kad žanras yra vienalytė visuma, turinti šablonišką, visiems tekstams, priklausantiems tam pačiam žanrui, būdingą formą. Ta žanro forma ir lemia, kokios kalbinės priemonės turi būti vartojamos.

Straipsnyje analizuojama, kaip mokslinio straipsnio žanras veikia referencijos, substitucijos ir elipsės vartojimą. Tyrimų rezultatai gausiai iliustruojami zoologinių tekstų pavyzdžiais.

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