GRAMMATICAL METAPHOR IN SCIENTIFIC DISCOURSE

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The term grammatical metaphor is new in linguistics. It was introduced by M.A.K. Halliday in his monograph "An Introduction to Functional Grammar" (1985).

The present paper concentrates on nominalized non-gerundive material processes, their semantic and syntactic functions in scientific discourse.

Semantically, the sentence functions as a grammatical device for describing a situation. A situation typically consists of three components: processes, participants and circumstances. Sentences which encode the information are of two types: semantically congruent, when the semantic functions play primary syntactic roles, and semantically non-congruent, when semantic functions play secondary syntactic roles. This type of change of semantic functions is called **grammatical metaphorization,** *and the syntactic unit that demonstrates this change is a* **grammatical metaphor.**

Grammatical metaphors can be inherent (obligatory) and non-inherent (non-spatial and spatial). Non-inherent semantic functions are more common in scientific discourse.

The pragmatic usefulness of the process of metaphorization can be accounted for by the fact that it allows us to make more participants. The use of such participants has the effect of condensing information within the sentence; it contributes to language economy and often serves as a means of cohesion.

1. Introductory observations

The paper pursues two objectives. The first objective is to explicate the phenomenon of grammatical metaphor (i.e. a nominalized proposition). The second objective is to establish functional peculiarities of grammatical metaphors included in the simple sentence. Attention is focused on one type of grammatical metaphor – non-gerundive nominalizations based on *material* (doing) processes. For the analysis we selected texts (1.500 pages including 10.500 nominalizations) from different genres of scientific discourse – linguistics, history, philosophy, and economics. As the study is not aimed at a typological investigation of nominalizations, the analysis is based on the evidence drawn from the texts without considering the incidence of the structures in the genres.

The paper consists of three parts. In the first part an attempt is made to present the phenomenon of grammatical metaphor; in the second part, attention is concentrated on the inherent (non-circumstantial) functions of the grammatical metaphors and in the third part, attention is concentrated on the non-inherent (circumstantial) functions.

2. The phenomenon of grammatical metaphor

Since the publication of *"The Grammar of English Nominalizations"* by Lees in 1960 and *"Remarks on Nominalizations"* by Chomsky in 1970, nominalization has been the object of numerous research papers.

In the 1980s, Functional Linguistics produced two markedly different directions in the study of nominalizations: one, more theoretical, represented by Givón (1984, 216) and McCawley (1999, 34-60), who focused their analysis on the study of nominalizing transformations, the other, a less 'formalist' direction, which leads towards Halliday's general theory of the phenomenon of nomonalization referred to as *grammatical metaphor.* The research and publications of Halliday (1985), Martin (1993), Thompson (1997), Downing and Locke (1992), Eggins (1994) are the most prominent. The term *grammatical metaphor* was first introduced by Halliday in his monograph *"An Introduction to Functional Grammar"* (1985). According to the scholar, the sentence functions as a grammatical device for describing a situation. A situation typically consists of three components: *processes, participants* and *circumstances*.[1] Sentences which encode the said information are of two types: semantically congruent and semantically non – congruent. In semantically congruent sentences, the semantic functions play primary syntactic roles: *John arrived yesterday,* where the Agent *John* is the *Subject*, the Process *arrived* is the *Predicate*, the Circumstance *yesterday* plays the role of the *Adjunct*. In non-congruent sentences, the semantic functions play other, secondary, syntactic roles: *John's arrival took four hours.* The Agent *John* and the process *arrived* function as the *Subject*, the Circumstance *four hours* as the *Objective Complement*. Such being the case, the semantic units having been turned into participants can now perform other semantic functions: *John* is now the *Restricter, arrival* is the *Affected.* This type of change of semantic functions is called *grammatical metaphorization,* and the syntactic unit that demonstrates this change is a *grammatical metaphor* (Halliday, op. cit., 321).

The pragmatic usefulness of the process of metaphorization can be accounted for by the fact that it allows us to make more participants. Being 'liberated' from its original function, the unit can now perform other semantic and syntactic functions in the sentence. Besides, the new participants are not ordinary nouns but nouns which have inherited the original semantic information from the underlying process expressed by the finite form of the verb. The use of such participants has the effect of condensing information within the sentence; it contributes to language economy and often serves as a means of cohesion. Important as grammatical metaphor is, it has not been given a comprehensive treatment.

In what follows, grammatical metaphors expressed by verbal nouns are referred to as nominalized propositions. A proposition, as noted by Jackson (1997, 137), is composed of a situation type together with its associated participants and circumstances. Participants involved in the propositional frame are entities, i.e. things that have definite, individual existence in reality or in the mind of the speaker. They may be persons and non-persons (animate and inanimate), concrete and abstract. In the semantic structure of the sentence, they function as inherent (obligatory) and non-inherent (non-spatial and spatial) participants.

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[1] The terminology and the classification of processes, participants and circumstances have been taken from Halliday (1985).

3. Inherent semantic functions of nominalized propositions

The process covers the central part of a situation. In the surface structure of the sentence, processes function in two modes: congruent (expressed by the finite form of the verb) and non - congruent, or metaphorical (expressed by a nominalized form of the verb). To cite Lyons (1995, 21 – 22), "many everyday English nouns derived from verbs are like 'performance', in that they can be used to refer both to a process and to its product or products". The use of one or the other mode is determined by pragmatic factors and language economy requirements: the speaker or writer, depending on his/ her intentions, in referring to a complex situation (a situation based on more than one proposition), can use either the congruent form of the realization of the situation or the non-congruent one. As already pointed out, in the congruent form, the process is mapped onto the Predicate; in the non-congruent form, it is turned into a participant and, consequently, it can perform other semantic functions. As noted by Lester (1971, 24), "The nominalization process produces a variety of surface forms with the same underlying meaning". Reducing the proposition to a participant, we can include it in the simple sentence and thus express a complex situation more economically.

Nominalized propositions, or participants derived from processes, can perform a variety of semantic functions in the sentence. First, they can function as *Agents*. On a syntactic level, *Agents* function as *Subjects* and *Agentive Adjuncts* (i.e. *Indirect Objects* in the passive sentence). Consider:

(1) *Reconstruction made important contributions to the efforts of former slaves to achieve dignity and equality in American life.* (Brinkley, 443)

(2) *...when the science of phonetics in Europe was in fact strongly influenced by the discovery and translation of the Indian linguistic treatises by Western scholars.* (Lyons, 20)

The second semantic role is the *Affected*. When the process extends to an *Affected Participant*, the representation can be made in two forms, either active (the *Agent* is realized as the *Subject* and the *Affected* as the *Direct Objective Complement*) or passive (the *Affected* is realized as the *Subject* and the *Agent* is realized as the *Agentive Adjunct*). Consider:

(3) *Petrarch and his followers ridiculed the language of the schoolmen for its 'barbarism', and took Cicero's usage as their model of good Latin style.* (Lyons, 16)

(4) *A sentence is a grammatical unit between the constituent parts of which distributional limitations and dependencies can be established...* (Lyons, 172)

The *Effected* participant is what is traditionally called 'object of result'. Halliday (1985,104) calls this process 'creative', and the participant that results from it is called the *Goal.* In the surface structure, the *Effected* participant is realized by the *Direct Objective Complement* in the active sentence and as the *Subject* in the corresponding passive sentence. Consider:

(5) *France founded its first permanent settlement in America at Quebec...* (Brinkley, 22)

(6) *... tobacco cultivation created pressure for territorial expansion.* (Brinkley, 31)

Furthermore, the process can be associated with a participant which receives 'goods'. Such a participant is called the *Recipient,* which is typically realized in the surface structure by *the Indirect Objective Complement*. Consider:

(7) *In recent years, there has been a good deal of work devoted to the investigation of lexical systems in the vocabularies of different languages.* (Lyons, 429)

(8) *...any general theory of the parts of speech...must give explicit recognition to the distinction between deep and surface structure...* (Lyons, 319)

In addition to the said semantic functions, nominalized propositions can perform the functions of the *Senser* (the *Recipient Experiencer*), the *Phenomenon*, the *Sayer*, the *Verbiage*, the *Carrier*, the *Attribute* and the *Existent*. Consider:

(9) *When Anthony Crosland declared that the party is over, he cannot have realized that the Government's cuts presaged a long period...* (MacGregor, 8) (the *Senser*).

(10) *The 1870s and 1880s saw an acceleration of the process that had begun in the immediate postwar years...* (Brinkley, 447) (the *Phenomenon*)

(11) *Sugar cultivation required intensive...labor and a long growing time; only relatively wealthy plant ers could afford to engage in it.* (Brinkley, 295) (the *Sayer*)

(12) *Later, when Jerusalem was the capital...messengers were dispatched from there to announce the commencement of the new month.* (Whitrow, 22) (the *Verbiage*)

(13) *This conversion of sound symbols in time to visualize symbols in space was the greatest single step in the quest for permanence.* (Whitrow, 2) (the *Carrier*)

(14) *Mensural music... seems to have been an Islamic invention.* (Whitrow, 38) (the *Attribute*)

(15) *In classical antiquity there were connections between Europe and India even before the conquests of Alexander had extended as far as the north-western part of the Indian subcontinent.* (Whitrow, 43) (the *Existent*)

4. Non-inherent semantic functions of nominalized propositions

Non – inherent semantic functions are divided into non – spatial (the *Beneficiary*, the *Accompaniment* (the *Comitative*), the *Circumstance* of *Means*, the *Role*, the *Time*, the *Contingency*) and spatial (time and place) functions. In the surface structure they function as *Adverbial Adjuncts*.

4.1. Non-spatial functions

Nominalized propositions can sometimes function as the *Beneficiary*, which is an optional participant for whom some service is done. The *Beneficiary* is anyone receiving a benefit or kindness. On a surface structure level, the *Beneficiary* is typically realized as an optional *Indirect Objective Complement*. Consider:

(16) *Componential analysis has, however, made considerable contribution to the development of semantics.* (Lyons, 480)

To quote Downing and Locke (1992,142), "The Accompaniment expresses a joint participation in the process, involving either the notion of 'togetherness' or that of 'additionality'". The *Accompaniment* is often preceded by the prepositions *with* or *without*. Consider:

(17) *In the late nineteenth century the trend to lower levels of recorded crime coincided with developments which...would lead us to expect rising levels of recording.* (MacGregor, 28)

The semantic function of the *Means* is generally marked by the prepositions *with, in, by*. Consider:

(18) *This conclusion was reinforced by the investigation of a far wider range of languages ...* (Lyons, 36)

As the term suggests, the *Role* circumstance indicates in what capacity the entity is involved in the process. In the surface structure, it is marked by the preposition *as*. Consider:

(19) *...the Egyptians retained the 365-day calendar right down to the Roman period because of its convenience as an automatic record of the passage of time in an era...*(Whitrow, 4)

The circumstance of *Time* is introduced by prepositions *after, since, by, during,* etc. Consider:

(20) *Soon after Jefferson's first inauguration, his followers in Congress launched an attack on this last preserve of the opposition.* (Brinkley, 189)

The functions of *Contingency* are divided into the circumstances of *Cause, Reason, Purpose, Concession and Behalf.* Cf.

(21) *Instead, the finger is pointed at a common moral malaise due to over – liberalization and erosion of discipline.* (MacGregor, 33) (the *Cause*)

(22) *...the Labour Party itself would be seriously threatened partly because of its association with supposedly spendthrift urban policies.* (MacGregor, 4) (the *Reason*)

(23) *The debate began when the territory of Missouri applied for admission to the Union...*(Brinkley, 209) (*Purpose*)

(24) *Despite all the changes and all the advances, America remained in the early nineteenth century an overwhelmingly rural and agrarian nation.* (Brinkley, 185) (*Concession*)

(25) *Constituent-structure grammars therefore present us with a dilemma with regard to the treatment of coordination.* (Lyons, 222) (*Behalf*)

In the surface structure, non-spatial nominalized propositions function as respective *Adverbial Adjuncts.*

4.2. Spatial functions

Spatial functions include the *Addesive,* the *Superessive,* the *Inessive,* the *Elative,* the *Illative* and the *Allative* (Valeika,1998,77–90).

The main function of the *Addesive* is to indicate the general location of an entity. This function is marked by the prepositions *at, by, with, near.* In the surface structure, the *Addessive* verbal noun functions as *Adverbial Adjunct* of *Time* and *Place*. Consider:

(26) *Woodrow Wilson had led the nation into war promising a just and stable peace at its conclusion.* (Brinkley, 646) (Adverbial of Time)

(27) *The point is that 'regularity' cannot be defined except in terms of the rules which specify the permissible combinations of the phonological units. And this point is valid at all levels of linguistic description.* (Lyons, 74) (Adverbial of Place)

The *Superessive* in its locative use has the meaning 'on the surface of something'. This meaning is realized in the surface structure by the preposition *on.* The surface may be either real or imaginary. In its locative function *on* is generally used with *be* or its functional counterparts. In a congruent pattern, the *Superessive* was used in two functions: non-temporal and temporal. However, in the non-congruent pattern, the nominalized material propositions were mainly used in their temporal function. In the surface structure, the *Superessive* functions as the *Adverbial Adjunct* of *Time*. Consider:

(28) *On his first entrance into the service, an oath was administered to him with every circumstance of solemnity.* (Whitrow, 36)

The *Inessive* expresses location or position within a place. The *Inessive* may express spatial and temporal relationships. However, as noted by Valeika (1998, 80), "the primary function of the

Inessive is spatial; the temporal function derives from the spatial function". Its function is marked by the prepositions *in* and *within*. In the non-congruent pattern, the nominalized proposition generally functions as an *Adverbial Adjunct* of *Place*. Consider:

(29) *His outstanding role in the development of science in the Latin West was due to his translations from the Arabic, which were of a crucial and seminal nature.* (Whitrow, 37)

The *Ablative* expresses removal from a location. Removal, in its turn, implies the existence of another location: an entity moves from a location (the *Source*) to a location (the *Goal*). Syntactically, the *Ablative* functions as the *Adverbial Adjunct* of *Place* or *Time*. However, in the corpus analyzed, the nominalized propositions expressing the said semantic role mostly functioned as the *Adverbial Adjunct* of *Time*. Consider:

(30) *On the other hand, for Heraclitus it signified the period of the world from its formation to its destruction and rebirth.* (Whitrow, 15)

The *Elative* expresses movement out of the interior of an entity. To express movement out of the interior of something, the *Elative* is preceded either by the preposition *out of* or *from*. Both non-temporal and temporal functions are expressed by *Elative* propositions. In the surface structure, the *Elative* functions as an *Adverbial Adjunct* of *Place* or *Time*. Consider:

(31) *The most important point... that emerged from Hartner's investigation was that by 503 BC the Babylonian astronomer-priests had discovered that the tropical year 9the year of the season is not of exactly the same length as the sidereal year.* (Whitrow, 11) (non-temporal)

(32) *The Roman system of dating ab urbe conditia (i.e. from the foundation of Rome) was introduced by Varro in the first century BC...* (Whitrow, 31) (temporal)

The *Illative* means 'moving into interior of something'. It can be both spatial and temporal. However, in the corpus analyzed only spatial instances were found. The constructions used with the *Illative* are based either on a verb of motion (e.g. *go, come, walk, move, get,* etc.) or on verbs having the semantic component 'go' or 'come' in their semantic structure. Often these verbs are constructed with the adverbial particle *into*, which specifies the process with respect to space. In the surface structure, the *Illative* functions as the *Adverbial Adjunct* of *Place*. Cf.

(33) *With Labour welfarism out of fashion, and neo-liberalism in vogue, the scene was set, not only for the downgrading of local authority power...but also for the injection of national party dogma into the management of local affairs.* (MacGregor, 9)

The *Allative* denotes the place towards which the entity is going or sent. It can be both non-temporal and temporal. Usually it is marked by the preposition showing movement *to* and in the surface structure they function as the *Adverbial Adjunct* of *Place* and *Time*. Consider:

(34) *During the summer, when Sirius rises heliacally, only twelve of these divisions of the sky can be seen rising during the hours of darkness, and it was this that led to the twelve-hour division of the night.* (Whitrow, 6) (non-temporal)

(35) *The origin of Islamic interest in science can be traced back to the closure by Justinian of the Neoplatonic Academy at Athens in 529.* (Whitrow, 37) (temporal)

3. Conclusion

In the corpus examined, nominalized propositions demonstrated a functional potential similar to that of non-process participants: practically they expressed the same semantic and syntactic functions as their non-process counterparts. The difference concerned the frequency of occurrence,

only. The most common semantic functions (non-spatial and spatial) of material process nominalizations were those of the *Affected,* the *Purpose,* the *Accompaniment,* and the *Inessive.* The relative frequency of the occurrence of the inherent and non-inherent (non-spatial and spatial) semantic functions can be seen in Table 1, Table 2 and Table 3, respectively.

Table 1. The relative frequency of the occurrence of the inherent semantic functions of the material nominalizations.

Agent	Affected	Effected	Recipient	Senser	Phenomenon	Carrier	Attribute	Sayer	Verbiage	Existent
20%	39%	4%	3%	0,5%	4%	13%	15%	0,2%	0,3%	1%

As is seen from the table, the most common participant is the *Affected.* It accounted for 39% of all the occurrences of the process participants. Other relatively frequent functions are the *Agent,* the *Attribute,* and the *Carrier.* They accounted for 20%, 15% and 13%, respectively. The least frequent functions are the *Verbiage,* the *Sayer,* and the *Senser.*

Table 2. The relative frequency of the occurrence of non-inherent non-spatial semantic functions of the material nominalizations.

Beneficiary	Accompaniment	Means	Role	Time	Cause	Reason	Purpose	Behalf	Concession
2%	22%	18%	13%	10%	3%	4%	24%	2%	2%

As can be seen from the results in Table 2, the most typical and frequent functions are the *Accompaniment* and the *Purpose.* They accounted for 22% and 24%, respectively. Among the least frequent functions are: the *Beneficiary,* the *Behalf* and the *Concession.* They accounted for 2%.

Table 3. The relative frequency of the occurrence of non-inherent spatial semantic functions of the material nominalizations.

Adessive	Superessive	Inessive	Ablative	Elative	Illative	Allative
1%	10%	71%	0.5%	6%	2.5%	9%

As can be seen from Table 3, the most frequent function is that of the *Inessive.* It accounted for 71% of all the occurrences of the nominalized propositions. The least frequent spatial nominalized propositions are the *Adessive* and the *Ablative.* They accounted for 1% and 0.5%, respectively.

Comparison of the results of the research shows that non – inherent semantic functions are more peculiar to nominalized propositions than inherent.

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GRAMATINĖ METAFORA MOKSLINIAME TEKSTE

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Santrauka

Straipsnyje nagrinėjamos gramatinės metaforos, t. y. nominalizuoti materialūs procesai, jų semantinės ir sintaksinės funkcijos. Semantinės funkcijos skirstomos į inherentines ir neinherentines. Neinherentinės funkcijos dar skirstomos į erdvines ir neerdvines. Moksliniam tekstui būdingesnės yra neinherentinės nominalizuotų procesų funkcijos.

Funkcijų požiūriu nominalizuoti procesai (veiksmažodiniai daiktavardžiai) praktiškai nesiskiria nuo konkrečių daiktavardžių: jie geba atlikti visas semantines ir sintaksines funkcijas, kurias atlieka ir konkretūs daiktavardžiai. Tapdami sakinio konstituentais, nominalizuoti procesai išplečia sakinio informacinį diapozoną, leidžia taupyti kalbos priemones (t. y. sutrumpinti tekstą) ir semantiškai sieti teksto sakinius.