A Comparative Study of Ideational Grammatical Metaphor in Scientific and Political texts

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Abstract

Language, science and politics go together and learning these genres is to learn a language created for codifying, extending and transmitting scientific and political knowledge. Grammatical metaphor is divided into two broad areas: ideational and interpersonal. This paper focuses on the first type i.e. Ideational Grammatical Metaphor (IGM), which includes process types and nominalization. The main objective of the current work is to analyze a corpus comprising 10 scientific and 10 political texts. The IGM framework was used to carry out an analysis on these texts to pinpoint their similarities and dissimilarities. The analysis indicates that IGM has dominated political and scientific texts and surprisingly is used exactly with the same frequency in both genres and the prevailing process types in both are material and relational types. Consequently, the tone of the writing is more abstract,

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pretentious and formal. In science, instances of IGM enable technicalizing and rationalizing; and in politics they deal with dominance, provocation and persuasion toward an intended objective. Based on the findings of this study, some implications can be drawn for academic writing and reading as well as translators and teachers involved in writing and reading pedagogy.

Keywords: Systemic Functional Linguistics, Grammatical metaphor, Ideational Grammatical Metaphor, Nominalization, Process types, Scientific and Political texts.

Introduction

Functional linguistics emerged out of the Prague School in the 1920s. From this school, two major linguists influenced the emergence of functional linguistics: Bronislaw Malinowski and J.R. Firth. Malinowski coined the phrase context of situation. To Malinowski, in order to understand an utterance, an individual must know not only the literal meaning of the words uttered, but the social situation wherein the phrase is uttered. This phrase and its attendant meaning greatly influenced both Firth and, later, Halliday. Systemic-Functional Linguistics (SFL) or Systemic Functional Grammar (SFG) is a theory of language centered on the notion of language function (Garber, 2001).

Developed mainly by Halliday (1985, 1994), Grammatical Metaphor (GM) is a substitution of one grammatical class, or one grammatical structure, by another. GM is conceived as an incongruent realization of a given semantic configuration in the lexico-grammar. Halliday and Matthiessen (1999) maintain that GM has its unique performance characteristics as a kind of grammar phenomenon.

Halliday (1985, 1994) classified grammatical metaphor into ideational metaphor and interpersonal metaphor, in which the ideational Gramatical Metaphor (IGM) includes process and nominalization. IGM is an incongruent representation of the experiential meaning. It is mainly represented by the transitivity system. IGM mainly uses the form of the noun to express the process or quality which should be expressed by the verbs and adjectives.

Nominalization is the most common form of IGM, particularly in science, technology, political discourse etc. Halliday and Matthiessen (2004) point out that lexical density, nominalization and GM are as the main lexico-grammatical characteristics of the written (academic) language. They also state that nominalization has been known as the single most powerful resource for creating GMs. In short, the main manifestation of the IGM is nominalization, for instance, *alcohol impairment* is a metaphorical variant of *It is impaired by alcohol* in which the process (verb) *impaired* is rendered in a nominal type of construction. In the English transitivity system, there are six main types of process: material, relational, mental, verbal, behavioral and existential processes.

Review of Literature

Taverniers (2002, 2003) asserts that the concept of realization and especially the inter-stratal coding relationship between semantics and lexico-grammar play an important role in the recognition and understanding of GM as a specific phenomenon of language. The notion of GM represents an original and innovative contribution that identifies and describes the fact that all genres, in particular, political, scientific and academic registers in writing and in speaking, are functionally oriented to accomplishing *objectification* and *abstraction* of their content. They achieve this functional goal through the linguistic means of GM, a resource that condenses information by expressing experiences and events in an incongruent form, as contrasted with the more customary congruent form that prevails in everyday language use.

A previuos study has reported that (Thompson, 2004) the possibility of re-setting the relationships between meanings and wordings, which is a central resource for expanding the meaning potential of language, is known as GM. When we analyze texts, especially when we work on transitivity, we are likely to run up against problems in deciding how best to code certain wordings: the transitivity labels, that seem most easily applicable, do not seem to capture all the meanings. These problems arise for a number of reasons; but one of the most common sources of difficulty is metaphor.

In IGM, lexico-grammatical features are re-arranged to put forth a certain view of reality. One type of clause is expressed as another type and the processes and qualities are construed as if they were entities, through the process of nominalization. By Nominalization, processes (verbs) and properties (adjectives) are reworded metaphorically as nouns; instead of functioning in the clause, a process or attributor functions as thing in the nominal group (Halliday, 1985, 1994).

Thus, nominalization refers to the use of a verb or an adjective into a noun, with or without morphological transformation, so that the word can now act as the head of a noun phrase. In English, some verbs and adjectives can be used directly as nouns, for example, *change* and *good*, while others require some form of morphological transformation requiring a suffix, for example, *nominalization* from *nominalize; movement* from *move; investigation* from *investigate; difficulty* from *difficult; carelessness* from *careless* and so on. When a verb is nominalised, it becomes concept rather than an action (Webster, 2002, 2003).

According to Thompson (2002) and Eggins (1994), one important function of nominalization is *encapsulation*. Cooperative text typically introduces new meanings in the form of clauses, since clauses are negotiable, they represent claims by the writer that the reader can reject. Once a meaning has been introduced in this way and has been accepted (i.e. the reader has continued reading), it can then be used as a basis for the next step in the argument. Nominal groups have two qualities: **First,** a noun typically refers to a *thing*, that is, something that exists. By *nouning* a process, writers can reflect the fact that they have negotiated and established the meaning of clause centered on the process-in other words, that meaning can now be treated as having existence. **Second**, the nominalization is itself available to function as a participant in another process. It can also function as Theme. One reason why nominalization is in harmony with the ideology of scientific, academic, and formal writing in general, is that it makes it easy for processes to be objectified- to be expressed without the human doer. Consider the following examples by Eggins (1994, p.57):

2.1. a. I submitted my essay in late, because my kids got sick **(Congruent).**

b. The reason for the late submission of my essay was the illness of my children **(GM).**

It can be said that the same content, the same set of actions and events in the real world get related in two very different linguistic forms according to whether we are speaking or writing. In sentences (2.1. b), we see that the message has somehow been condensed to fit into only one clause. Thus, nominalization makes an action or process become concept and also, it reduces the number of clauses and more information is compressed into each nominal group. Each metaphorical domain has its congruent wording. Metaphorical domain explains the situation more interesting and formally in comparison with congruent one (Thompson, 2004).

Halliday (1985, 1994) considers that there are two kinds of expressions: *congruent*, also called non-metaphorical or non-marked; and incongruent, metaphorical or marked. In general, it is considered that people, places and things are realized by means of a noun; actions are realized verbally and so on. However, all meanings may have more than one way of realization, and sometimes, in written language and especially in the *language of science*, the realizations of the semantic functions of the clause are not typical, but marked. The general characterization of GM in terms of alternative realizations is stated more precisely as alternative lexico-grammatical realizations of a choice in the semantics (Vandenbergen, Marie, Taverniers & Ravelli, 2003).

Halliday (1994), Vandenbergen et al. (2003) and Taverniers (2006) maintain that traditionally metaphor is viewed as variation in the use of words, i.e. variation in meanings and hence the consequence of lexical or lexico-semantic processes. This is a view *from below*, taking the words as starting point and then saying something about the meanings these words realize. Metaphor is, however, employed in SFL in a relatively new sense to refer not to *the variation in the use of words* with a transferred meaning but to *variation in the expression of meaning* (Halliday, 1985, 1994). Unlike the former view, this one is a view *from above* where the starting point is a particular meaning and the relevant question is how it can be expressed or realized. Taking this from *above view*, it is recognized that metaphorical variation is lexico-grammatical rather than purely lexical, and that lexical

selection is just one aspect of lexico-grammatical selection or wording; the other aspect is grammatical. The two alternative views are represented in Table 2.4.1 adopted fromVandenbergen, et al (2003, p. 7) & (Halliday, 1985, p. 342):

Table 2.1

Two perspectives on metaphor: from above and below.

meaning	'View from below'		'View from above'
	Literal meaning	Metaphorical meaning	starting point: one meaning ↓
expression	**'a moving mass of water'**	'a moving mass of feeling'	'many people protested'

a large number of protests	**a flood of protests**
Congruent form	Metaphorical form

To justify the need for a new and complementary interpretation of the term metaphor, Halliday (1985, 1994) provides the following instance: the expression *protests flooded in* can be realized as *protests came in in large quantities, protests were received in large quantities* or *very many people protested*. In none of these is the variation purely lexical; there is also a difference in the grammatical configuration: in *protests came in in large quantities*, a prepositional phrase is added; in *very many people protested* the noun *protest* is now represented by a verb (Taverniers, 2002, 2003). This brings Halliday to GM, and in fact, convinces him to claim that grammatical variation does even play a more important role than lexical variation in the expression and realization of meanings.

flood
starting point: one lexeme

Transitivity choices involve selections from various *process types* that are realized in *verbal groups*; the associated participant roles are realized in nominal groups and the circumstances are realized in either prepositional

phrases or adverbial groups as follows (Cehan, 2004). Process types may be material (2.2. a), mental (2.2. b), behavioral (2.2. c), verbal (2.2. d), relational (2.2. e) or existential (2.2. f):

2.2.   **a.** *We drew a house.*

b. *Just think about it.*

c. *We are writing a story about a past event.*

d. *Tells about what you did in the weekend.*

e. *France is a big country.*

f. *There is someone waiting for you outside.* (Cehan, 2004)

Halliday (1985, 1994) views **transitivity** as an ideational feature which serves to linguistically construct the goings-on of the real world. According to his theory of SFL, transitivity configures linguistic elements to represent inner and outer experiences of the world. Halliday explains:

> Our most powerful conception of reality is that it consists of *goings-on:* of doing, happening, feeling and being. These goings-on are sorted out in the semantic system of the language, and expressed through the grammar of the clause.... The transitivity system construes the world of experience into a manageable set of PROCESS TYPES (p. 106).

The following table represents the process types in English:

Table 2.2

process Types in English from Martin, Matthiessen, & Painter (1997, p. 228).

Process types	Category meanings	Example
Material : Action Event	'doing' 'doing' 'happening'	*The mayor dissolved the committee.* *The mayor resigned.*
Behavioral :	'behaving'	*She cried softly.*
Mental: Perception Affection Cognition	'feeling' 'sensing' 'emotive' 'thinking'	*I heard a noise outside.* *The boy loved the girl.* *You can imagine his reaction.*
Verbal:	'saying'	*I explained to her what it meant.*
Relational: Attribution Identification	'being' 'attributing' 'identifying'	*This bread is stale.* *Pat is her brother.*
Existential:	'existing'	*Maybe there's some other darker pattern.*

Vandenbergen et al. (2003), Webster (2005) have investigated that throughout the history of language, de-metaphorization occurs: GMs gradually lose their metaphorical nature, and in this way become *domesticated*. In all discussion of metaphor it must be borne in mind that some metaphors are living, i.e. are offered and accepted with a consciousness of their nature as substitutes for their literal equivalents, while others are dead, i.e. have been so often used that speaker and hearer have ceased to be aware that the words are not literal. *Dead metaphors* are metaphors which have passed into practice from long overuse, and are no longer read as metaphorical substitutions. Examples include common expressions such as *have dinner* and *take a bath* (Vandenbergen et al. 2003; Webster, 2005).

The predominant lexico-grammatical feature in all academic writing, in particular, in political and scientific texts of the study is the extensive and elaborate use of the nominal group, represented by nominalization. Every sentence of a written text contains some lexical and some grammatical components that form its existence as a meaningful context. This meaningful context contains grammatical shifts or GM, especially in the IGM where these meaningful changes are obvious. Knowing how to use GM in academic registers is an essential part of developing academic language. Realizing the similarities and differences between English and other languages can help bilingual students, translators to transfer these features from one language into the other (Taverniers, 2002). Besides, many times, students relate metaphor to the lexical domain of language and literature and don't know the important role of metaphor in a grammatical sense. Secondly, students think that there is only one way to convey their intended meanings, as a reason they express their meaning in informal and simple ways. It is hoped that identifying and comparing IGM in political and scientific texts raise students' awareness regarding the role and function of GM in written text and help them to know different ways of expressing the same meaning and convey their meanings in a more interesting and vivid way.

Political and scientific texts have always been an interesting area for analysis and discussion, especially in terms of GM. The reason for choosing scientific texts is that, as Halliday & Webster (2009) argued, nominalization

probably evolved first in scientific and technical registers and then gradually spread to other areas of adult discourse and become a mark of prestige and power. GM has been of particular importance in the evolution of scientific writing, especially in the form of nominalised processes. And the reason for selecting political texts is the elaborate use of GM by politicians and political writers to provoke and persuade the audience and reader and/or dominate them. Employing Halliday's & Matthiessen's model (1999) of analyzing some sentences regarding GM, this study aims at analyzing and comparing two different kinds of texts and investigating the possible similarities and discrepancies in scientific and political texts in terms of IGM and their respective frequencies. It is also worth mentioning that to date there are few comparative studies related to GM and IGM and none to compare political and scientifc texts, and nearly all of the studies have exclusively investigated one genre, and if there are any, thay have confined themselves to a small number of texts. Comparatively speaking, this study is the first one investigating IGM in political and scientific texts with a large number of texts.

Research questions and hypotheses

Based on the main purpose of the research and the scope of the study, the researcher would try to find logical answers to the following research questions.

1. Are there any similarities in terms of ideational grammatical metaphor embodied in Political and Scientific texts **and what are the respective** frequencies?

2. Are there any discrepancies in terms of ideational grammatical metaphor embodied in Political and Scientific texts and what are the respective frequencies?

3. If such similarities and differences exist, how are they realized in terms of process types?

And the following hypotheses, accordingly, were formulated,

1. There are similarities between scientific and political texts in terms of ideational grammatical metaphor.

2. There are discrepancies between scientific and political texts in terms of ideational grammatical metaphor.

Methodology

Corpus

Due to the paramount importance of selecting authentic and native texts in political and scientific genres, an effort was made to choose political texts from various sources such as *Time Magazine* (2007), *Political insight* (2012) and some on-line magazines titled *Global affairs* (2008, 2009). Scientific texts are also selected from different sources such as some on-line magazines titled *Atlantis Rising Magazine* (2012), *Penn State Ag Science* (2010, 2011), *Penn State Agriculture Magazine* (2008), *and Scientific American* Magazine (2012).

Because of time constraints, only 10 scientific and 10 political texts, approximately 6000 words of each genre, were used as the corpus in order to pinpoint and analyze the frequency of Nominalization and process types for each nominalized word, and also to compare and contrast to find similarities and discrepancies between two genres in terms of IGM. It should be noted that almost all selected texts from the aforementioned sources amount to roughly the same numbers (about 600 words per text). This research is a comparative study and both texts should comprise the same number of words to be investigated appropriately. Thus, it is the same number of words that acts as our yardstick and can able the researcher to say, for instance, how many instances of grammatical metaphor are used and which process type is dominant in either of the genres.

Procedure

In order to compare and contrast possible similarities and dissimilarities and also to find metaphorical and congruent expressions as well as process types, in these 20 texts, it was essential to choose a model or models to analyze the data. Therefore, the ideas of Halliday (1994), Halliday & Matthiessen (1999) and Martin et al. (1997) as the most comprehensive ones were utilized as the main theoretical foundation of the present research. As aforementioned, processes are central to transitivity. They center on the part of the clause which is realized by the verbal group and by nominalization; processes (verbs) and properties (adjectives) are reworded metaphorically as nouns. Processes are also regarded as what *goings-on* and suggest many different kinds of goings-on which necessarily involve different kinds of

participant in varying circumstances, while participants and circumstances are essential upon the doings, happenings, feeling and beings. Processes can be subdivided into different types. There are six different process types identified by Halliday (1985, 1994):

1) Material (doing), **2)** Mental (sensing), **3)** Relational (being), **4)** Verbal (saying), **5)** Behavioral (behaving), and **6)** Existential (existing).

According to Halliday (1994), each metaphorical wording must have its equivalent congruent wording. So, in this research not only process types but also congruent domains of extracted IGM instances were discussed.

To identify the instances of IGM in political and scientific texts, the researcher read the texts thoroughly and pinpointed IGMs. It was noticed that nominalization is the most dominant feature of both scientific and political texts that leads to IGM. After establishing and extracting IGMs, an effort was made to render metaphorical expressions in congruent expressions because elaborating both the congruent and metaphorical domains lead us to fully grasp the concept of transitivity system.

It is worth noting that unpacking metaphorical wordings into congruent forms are based on inventories represented by Eggins (1994), Halliday (1985), Halliday & Matthiessen (1999), Martin et al (1997), and Thompson (2004). Comparing metaphorical and congruent wording indicated that in most of the cases both of them allow us to explain the same situation, but the metaphorical wording describes the situation in a more encapsulated, brief, precise and concise way. Since IGM is closely tied with transitivity system which enables us to construe the world of our experience into a limited set of process types, an attempt was made to identify process types in all the extracted and rendered IGM instances. It is noticed that some metaphorical words are frequently used in each texts. Thus, the frequency of each metaphorical word in each text was scored separately. Tables were drawn based on metaphorical and congruent expressions, a certain type of process as well as frequency and percentage of process types in per text.

Design

This research is a quantitative study. The design of the present study was descriptive-analytic which concentrated on the frequency of occurrences of IGM and their congruent wording in scientific and political texts. As a

model of analysis, Hallidyan SFL's model of text analysis is utilized as a yardstick to analyze the process types of clauses.

Data Analysis

Introduction

As aforementioned, the main goal of the present study is to investigate IGM and their respective frequencies to find similarities and discrepancies in both political and scientific texts, as well as to analyze a corpus comprising 10 scientific and 10 political texts, approximately 6000 words of each genre. These texts were analyzed in order to see how many instances of IGM are used in them and what the respective frequencies are. Moreover, the data has been investigated to find out the role and function of IGM in these texts.

Ideational Grammatical Metaphor in Political Texts

In reviewing the literature, it is mentioned that the special function of nominalization is the condensing function, which can make more information as much as possible in the fewer clause. The feature just corresponds to the fact that the clause and texts use fewer and unpacked words in sentences to express more messages. Besides, It is noted that the grammatical simplification is simultaneously accompanied by the lexical density, which refers to the fact that the fewer clauses are used to accommodate the lexical items. Nominalization increases the density of the information and enriches the content of expressions through making the small sentence into a noun or noun phrase (Eggins, 1994; Halliday & Matthiessen, 1999).

In political texts, lexis and grammar are re-arranged in a clever way in order to provoke and invite a majority of people into certain states of political action. It is suggested that the authors of such discourse are deliberate in using GM for reasons which might include making everyday experience inaccessible and remote (Halliday & Matthiessen, 1999; Woods, 2006). Due to efficiency and convenience of being able to compact large amounts of information into a single word, nominalization is a widely exploited linguistic technique in news, scientific and political discourses. The following table represents IGMs in political texts selected randomly from texts 1, 2, 3, 4 and 5.

Table 4.2.1

Samples of IGMs in Political Texts 1, 2, 3, 4 and 5.

No.	Metaphorical wording	Congruent wording	Process type	Frequency in per text
1	urban disorder	the urban area was disordered	material	8
2	cause shock	people were shocked by	mental	1
3	he examines the riot	he examines why people rioted against ...	material	8
4	and a demonstration at the police station	and people demonstrated at the police station	material	1
5	strident demand	to demand something stridently	verbal	1
6	Queen's coronation	and the queen was coroneted	material	2
7	constituency over the issue	to be constituent over ...	relational	1
8	immigration to the UK	people have immigrated to the UK	material	1
9	development of the international organization	to develop international organization	material	1
10	a dedication to goals of social	to be dedicated to goals of social	relational	1
11	UK's ongoing constitutional turbulence	UK's ongoing constitutional is turbulent	relational	1
12	the continued use of	to use continuously	material	1
13	the simultaneous growth of	to grow simultaneously	material	1
14	the intense frustrations	to be intensively frustrated	mental	1
15	in explanation	to explain it	verbal	1
16	the Hakim delegation	someone was delegated by Hakim	material	1
17	He has a real presence	he is really present	relational	1
18	an agreement to keep meeting	they agreed to keep meeting	relational	2
19	battles between the Sadr and Hakim forces	the Sadr and Hakim forces battled together	material	1
20	they feel a deep connection to	they feel that they are deeply connected	relational	1
21	her eight-month tour in Iraq	she toured for eight months in Iraq	material	1
22	a physician's assistant	to assist the physician	material	1

IGM instances in Table 4.2.1 indicate that nominalization is frequently utilized in these five texts. Out of 309 IGMs in these five texts, 188 are material, 84 relational, 16 mental, 13 verbal, and 7 are behavioral processes and 1 is existential process.

Woods (2006) argued that Nominalization in political texts has the effect of making the second expression sound more *impersonal* or *remote* than the first; our attention is diverted from the process that is actually occurring and directed instead to the product of the process. Discourse analysist would say that the process is backgrounded and the effects foregrounded. Notice the device of nominalization used by Tony Blair when he speaks about *change* extracted from Woods (2006, p 73):

4.2.1 We are simply being tested by the force of *change*. The pace of *change* can either overtake us, or make our lives better and our country stronger. So what is the *challenge*? It is that *change* is marching on again (Woods, 2006, p. 73).

Change and *struggle* here are the nominalizations; they have the syntactic forms of the noun, and the force of these forms divert our attention from such question as: *What is changing*? *Why is it changing*? This nominalization also supports the idea presented here that *change* is somehow separate from human agency: *change can overtake us*. It is, in fact, something that happens to us, rather than something that we can control. Woods also adds that some words on the language of politicians are metaphorized in a manner that suggests they are inevitable and inescapable. A similar concealment can also be achieved by the use of a kind of syntactic metaphorizing, and particularly by means of nominalization (Woods, 2006).

In revising literature, several studies (Eggins, 1994; Halliday, 1985, 1994; Taverniers, 2003, 2004, 2006 & Woods, 2006) have analyzed and revealed one or some distinguished properties of Nominalization by fits and starts, but Vandenbergen et al (2003) and Wang (2011) have investigated and classified all characteristics of Nominalization in details in the following way in which it has six features and also most of these characteristics are apparent in all the extracted nominalized expressions in political and scientific texts of this study as follows:

1. Nominalization makes actions or processes (verbs) become concepts (nouns).

4.2.2   **a.** Pennington's eight-month *tour* in Iraq in 2006 earned her the Bronze Star (Text 5). (**Metaphoric**)

b. Pennington *toured* for eight month in Iraq in 2006 and it earned her the Bronze Star (**Congruent**).

In the above examples, when a verb is nominalised, it becomes a concept rather than an action. As a consequence, the tone of the writing sounds more abstract and also more formal.

2. With nominalization, a single sentence packs in several complex abstract ideas.

4.2.3   **a.** The situation in Iraq worsened, and his key domestic *proposals* social *security* and *immigration reform*-flopped (Text 6). (**Metaphoric**)

b. The situation in Iraq worsened, and he has *proposed* some domestic key points about society which is *secure* and to *reform* the law that how people can *immigrate* - flopped. (**Congruent**)

By comparing the above two sentences, we can see that several complex abstract ideas are packed into one single sentence or two.

3. Nominalization builds long noun phrases to produce a lexically dense style as follows:

4.2.4   **a.** the *award* honors women who have changed the state and nation with their *courage, strength* and *wisdom* (Text 5). (**Metaphorical**)

b. Honorable women are *awarded* and they are those who have changed the state and nation and are *courageous, strong* and *wise* (**Congruent**).

Table 4.2.2

Samples of IGMs in Political Texts from Tables 6, 7, 8, 9 and 10.

No.	Metaphorical wording	Congruent wording	Process type	Frequency in per text
1	presidential debate	to debate to be a president	verbal	3
2	social security	to be socially secure	relational	1
3	The Democrats' takeover of both houses	The Democrats take both houses over	material	1
4	we've seen progress	we have progressed and seen it	material	1
5	slaughter in Darfur	people are slaughtered in …	material	2
6	interference from Darfur neighbors	neighbors of Darfur interfere in/ with	material	3
7	The gross negligence of certain regions	certain regions were grossly neglected/negligent by	mental	1
8	The real fear threatening Sudan	the real problem that threatens and fears Sudanese is	mental mental	1 1
9	at an election rally	people had rallied to elect someone	material material	1 3
10	change we can believe in	we can change and we believe in it	material	2
11	small donations on the internet	people donated a little bit on the internet	material	1
12	the anniversary of North Korea's founding on September 9th	the anniversary of North Korea which was founded on …	material	1
13	by the death of Kim Jong II	when Kim Jong II died	material	2
14	the gossip over the Democratic …	people were gossiping about …	verbal	1
15	to endorse his candidacy	to endorse that he is a candidate	relational	1
16	the return to Pakistan	she returned to Pakistan	material	1
17	capable of charming the Western	is capable to charm the …	mental	1
18	for unity	to be united	relational	1
19	media attention	the media is attentive	relational	1
20	dominating life in North Korea	and to dominate life …	relational	1
21	facilitating the	to facilitate the	material	1
22	the use of every new media	to use every …	material	1

As it is apparent from Tables 4.2.2, IGM continues to permeate in every part of the political texts. In these five texts, there are 249 IGMs in which 147 go for material, 63 for relational, 14 for mental, 18 for verbal, 1 for behavioral and 6 for existential. Here it is the role of GM that condenses the sentence and not only does it adds to the beauty of the clause but also helps the politicians and political text writers to convey their message in a more interesting and vivid way.

4. Nominalization reduces the number of clauses and more information is able to be compressed into each nominal (noun) group.

  4.2.5   **a.** Benazir's *assassination* at a *campaign rally* has had ripples around the world. (**Metaphoric**)

        b. Banazir was *assassinated* when people had *rallied* and *campaigned* for her and it has had ripples around the world (Text 8). (**Congruent**)

The original sentence (b) has four clauses while the nominalised sentence has only two.

5. When verbs are nominalised they become concepts rather than actions; as a result, the writer is able to increase in the amount and density of information to make further comment or observation about the concept in the sentence. For example:

  4.2.6   a. Kim Jong II had suffered a stroke in September; *speculation* has abound as to the *health* of the reclusive dictator (Text 10). (**Metaphoric**)

        b. Kim Jong II had suffered a stroke in September; people have *speculated* more about whether the reclusive dictator is *healthy* or not. (**Congruent**)

In the above examples, the verb is nominalised in the first sentence; therefore the writer can add more information commenting upon the newly formed concept. A survey conducted by Knowles and Moon (2006) has shown that, ideologically, nominalization allows the writer or speaker to avoid mentioning the agent or doer of the action.

6. Eventually, Nominalization enables an academic writer to concisely refer to recurring abstract ideas.

As it is argued above, GM serves several important functions like condensing, compacting and creating short interesting texts etc. The main reason that causes politicians and political text writers to resort to IGM is that they tend to convey their message in a more convincing and powerful way. As it is indicated in all above Tables and examples, these ten texts are replete with instances of IGM. Without IGM political texts are incomplete to some extent and political texts writers can't produce certain effects, provoke and convince a majority of people into certain political outlooks and worldviews. The function of IGM is vital here in convincing people and capturing the minds of the audience. The success of political texts somehow relies heavily on the GM. In all ten texts in Political genre of the study, some sentences employ more than one grammatical metaphor in order to produce a desirable effect; they are named *compound grammatical metaphor* by Vandenbergen et al (2003). The following example employs six grammatical metaphors in a single sentence:

4.2.7 It is seen as an ***aberration*** perpetrated by irresponsible and criminal elements, motivated by ***greed*** or ***excitement***, the ***dupes*** of political extremists, or ***imitating*** the ***behavior*** of others (Text 1).

Motivated by greed or excitement… is a compound grammatical metaphor. The writer couldn't possibly and apparently express and capture his intended meaning through the congruent domain using the phrase: *by those who are greedy and those who are excited, and those who are duped by…*, so he brings in the metaphorical form for ease of transmitting the intended message to the readers and makes it impressive, vivid and interesting for them to digest it. The role of GM is very essential here in the way that it is put and is fixed into the mind of the readers.

4.3 Ideational Grammatical Metaphor in Scientific Texts

Halliday & Martin (1993) investigated and analyzed scientific discourse and concluded that it is commonly known that complexity in scientific language is achieved mainly through specific terminology and

nominalization, which is part of grammatical metaphor. Scientific discourse is thus a functional variation of language with its own technical terminology and grammar. Unlike the language of everyday spontaneous speech, scientific language is functional for construing special realms of scientific knowledge and beliefs. As such, it embodies a unique worldview and way of thinking and reasoning (Halliday & Martin 1993).

It should become evident by now that scientific writing has a particular preference for nouns, especially the extended and nominalized ones. According to Halliday and Martin (1993), the evolution of scientific language has been one that foregrounds participants and backgrounds actions and processes.

To identify the distinctive features scientific English possesses and what functions they have in the discourse, Vandenbergen et al. (2003) believe that although technical terms are part of this overall effect, the difficulty lies more with the grammar than with the vocabulary. The problems with technical terminology usually arise not from the technical terms themselves but from the complex relationship they have with one another. Halliday and Martin (1993) suggested seven headings which can be used for illustrating the characteristics of scientific English: (1) interlocking definitions, (2) technical taxonomies, (3) special expressions, (4) lexical density, (5) syntactic ambiguity, (6) grammatical metaphor (GM), (7) semantic discontinuity:

In scientific writing, the *lexical density* (4) may go much higher and the language appears complicated because it involves a large number of inter-relating technical terms and each of which has been defined and contains information the reader is expected to already understand. Among these features, they regard GM more significant because they state that the items (4) and (5), mentioned above, are both by-products of GM. Moreover, Vandenbergen et al (2003) stated that GM in scientific texts enables *technicalizing* and *rationalizing* and theses processes are dependent on the clausal to nominal shift which most strongly characterizes GM. Technicality by itself would be of little value unless accompanied by a discourse of reasoning. The same functions mentioned in Political texts are applicable in scientific texts as well. The following table represents ideational grammatical metaphors in scientific texts selected haphazardly from texts 1, 2, 3, 4 and 5:

Table 4.3.1
Samples of IGMs in Scientific Texts from texts 1, 2, 3, 4 and 5.

No.	Metaphorical wording	Congruent wording	Process type	Frequency in per text
1	for orchid fungi abundance	for orchid fungi which is abundant	relational	1
2	to environmental changes	when the environment is changing	material	1
3	could support germination	could support them to germinate	material	1
4	have no fruiting structures	they are not structured to fruit	material material	1 1
5	promote growth in each orchid	each orchid will be promoted to grow more	material	1
6	mysterious activity	to act mysteriously	material	1
7	it adjusts the cadence of breathing to …	it adjusts the cadency when we breathe based on …	relational	1
8	have the voluntary ability	are voluntarily able to	relational	2
9	before muscular exertion	before it exerts our muscles	material	1
10	hyperventilating his lungs	he hyperventilates his …	behavioral	1
11	and inventing the calculus	and when he invented the …	material	1
12	accumulation view of science	to accumulate and view scientific fields	material mental	1 1
13	what makes a scientist is ignorance	scientist is ignorant/ ignores	behavioral	7
14	every new discovery	every new thing which is discovered	material	2
15	come as something of a relief	come as something to relieve you	relational	1
16	growing pains	she is painful and it grows	material relational	1 2
17	disease control and prevention	which controls and prevents disease	material material	2 1
18	128, 000 hospitalizations	128, 000 people were hospitalized	material	1
19	with absolute certainty	to be absolutely certain	relational	1
20	the ancient Egyptian civilization	the ancient Egyptians were civilized	relational	2
21	monetary gain	to gain money	material	1
22	fleeing from Troy	they fled from Troy	material	1
23	urinary tract problems	urinary problems which are tractable	relational	1

Out of 301 nominalizations in Texts 1, 2, 3, 4 and 5, 134 are material, 99 are relational, 19 are mental, 23 are verbal, 22 are behavioral and 4 are existential processes. By comparing the congruent and metaphoric versions in above instances, it implies that unpacking a text often involves re-inserting human actors, often rendered unnecessary by nominalization. The ability of nominalization to condense meanings is also clearly shown, when we simply compare the length of the original nominalized text with the length of the unpacked version. Significantly, this unpacked version has lost much of its prestigious sound (Eggins, 1994).

Nominalization can increase the information load of the nominal group, and it succeeds in condensing the information of the clause. Nominalization allows any observation, or series of observations, to be restated in summary form —compressed, as it were, and packed by the grammar— so that it serves as the starting point for a further step in the reasoning (Vandenbergen et al., 2003). In most examples, all the properties of scientific texts such as lexical density, syntactic ambiguity, GM, technicality and rationality are apparent. The more GMs in the text, the fewer processes, and consequently, the more information load and lexical density will be. Through nominalization it is possible to build up chains or sequence of logical argument (Vandenbergen et al., 2003). The following table represents IGMs in scientific texts selected randomly from Tables 6, 7, 8, 9 and 10:

Table 4.3.2
Samples of IGMs in Scientific Texts from texts 6, 7, 8, 9 and 10.

No.	Metaphorical wording	Congruent wording	Process type	Frequency in per text
1	the Mars of our dreams	we have dreamed of Mars	behavioral	2
2	circular orbits	to orbit circularly	material	3
3	the density of the air	the air is dense and …	relational	1
4	might be artificial irrigation canals	might irrigate canals artificially	material	1
5	from previous experiments	that it was experimented previously	material	2
6	absoluteness of space	the space is absolute	relational	1
7	physical manifestation of a	to manifest physically a	verbal	1
8	what that finding would mean	what they have found and what would it mean	material	2

No.	Metaphorical wording	Congruent wording	Process type	Frequency in per text
9	the Mars of our <u>dreams</u>	we have dreamed of Mars	behavioral	2
10	circular <u>orbits</u>	to orbit circularly	material	3
11	the <u>density</u> of the air	the air is dense and …	relational	1
12	from previous <u>experiments</u>	that it was experimented previously	material	2
13	for <u>pollination</u>	to be pollinated	material	1
14	the <u>presence</u> of dozens of chemicals	that dozens of chemicals are present	relational	1
15	<u>killing</u> the parasite	how to kill the parasite	material	2
16	30 percent of the world's malaria <u>infections</u>	30 percent of people who are infected by malaria in …	material	1
17	even minor <u>delays</u> in the parasite's life <u>cycle</u>	even cyclic life of parasite might be delayed and	material material	1 3
18	<u>fertility</u> to a previously	to be fertile to …	relational	4
19	technique of testicular stem cell <u>transplantation</u>	to transplant testicular stem cell is a technique and	material	1
20	allow for continuous <u>production</u> of sperm	allow them to produce sperm continuously	material	2
21	<u>susceptibility</u> to breast cancer	that they are susceptible to …	relational	1
22	after the harmful <u>effects</u> of the cancer therapy …	after that the cancer therapy which is harmfully affected …	material	1

Unlike the commonsense language used for construing everyday life experiences, scientific language theorizes concrete life experiences into abstract entities, which can then be further examined and critiqued. Such theorizing involves turning processes into nouns (Halliday and Martin 1993). In these five texts (6, 7, 8, 9 and 10), out of 257 process types, 146 processes are material, 82 are relational, 12 are mental, 15 are verbal, 2 are behavioral and none is existential. In the above Table (4.3.1 & 4.3.2), there are many processes rendered in nouns, that is, abstract entities such as *our dreams* (1), *fleeing* (22), *hospitalizations* (18), *growing pains* (16) etc. these are now no longer describing actions; they are focused on objects or concepts. In nominalized words, the tone of the writing sounds more abstract and also more formal.

Eggins (1994) draws our attention to the fact that although heavily nominalized language can sound pretentious and significant and may make

the meaning obscure, the real motivation for this grammatical process is a functional one: By nominalizing we are able to do things with the text that we cannot do in unnominalized text. Nominalization allows us to get away from the dynamic and usually real word sequencing that goes with speaking, where we relate sequences of actions in which we featured as actors. By nominalizing actions and logical relations, we can organize our text not in terms of ourselves, but in terms of ideas, reasons, causes, etc (Eggins, 1994).

In each table, the probable congruent forms, types of processes and their frequency in per text both in scientific and political texts are represented. As it was mentioned formerly, GM instances in these texts serve several important functions as the following examples:

4.3.2. **a.** The Centers for Disease *control* and *prevention* estimated in 2011 that the U.S. sees million *illnesses*, 128, 000 *hospitalizations* and 3, 000 *deaths* every year from foodborne organisms (**GM**).

b. The centers to *control* and *prevent* disease has estimated in 2011 that the U.S sees millions of people who are *ill*, 128, 000 who are *hospitalized* and 3, 000 who *die* every year from foodborm organisms. (**Congruent**).

In the above examples, the processes (*hospitalized, die, control* and *prevent*) become nouns (*hospitalization, death, control* and *prevention*). It is worth noting that Nominalization, as a form of GM, allows a large amount of information to be packed into a comparatively small space (such as, a noun group). This has the effect of *condensing* information within the sentence; it contributes to *language economy*.

In the above metaphoric examples, when metaphoricity increases, semantic relations between one element and another, and between one figure and another, become progressively less explicit. Both congruent and GM are semantically and grammatically correct sentences, but they differ in the fact that expressions with GM are **formal** and **academic** and of course a little bit complex. Besides, texts with Metaphoric instances beautify them (Halliday and Martin 1993; Halliday & Webster, 2009).

4.4. Frequency of IGM Instances in Scientific and Political Texts

The frequency of process types in both of the genres are represented in tables 4.4.1 and 4.4.2 and their following graphs as follows:

Table 4.4.1
Frequency & percentage of Process types in Scientific Texts.

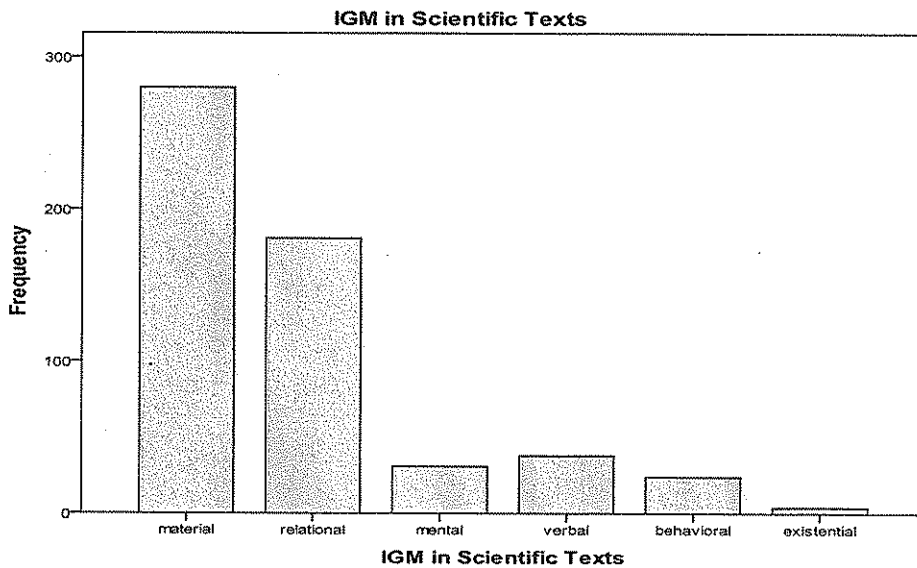| Process types		Frequency	Percent
Valid	material	280	50.2
	relational	181	32.4
	mental	31	5.6
	verbal	38	6.8
	behavioral	24	4.3
	existential	4	.7
	Total	558	100.0

Figure 4.4.1.
Frequency of process types in Scientific Texts

The above table and figure display the frequency of IGM in scientific texts. 558 instances of IGM were extracted from ten scientific texts. 280

material, 181 relational, 31 mental, 38 verbal, 24 behavioural, 4 existential process types out of 558 were obtained. The scientific texts represent the dominant textual forces of material and then relational process types than any other types.

Table 4.4.2

Frequency & percentage of Process types in Political Texts.

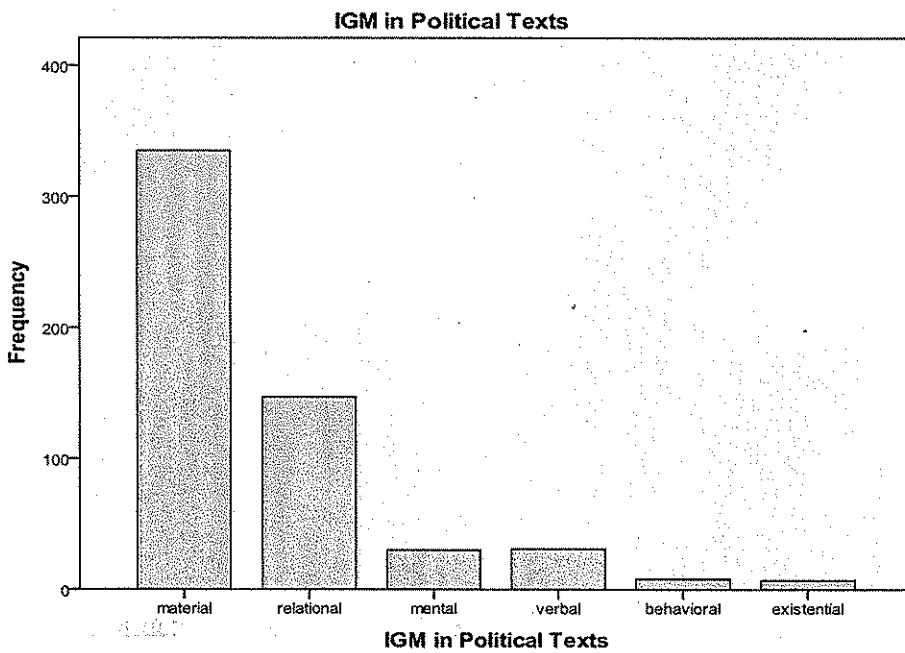| Process types		Frequency	Percent
Valid	material	335	60.0
	relational	147	26.3
	mental	30	5.4
	verbal	31	5.6
	behavioral	8	1.4
	existential	7	1.3
	Total	558	100.0

Figure 4.4.2

Frequency of process types in Political Texts

558 instances of IGM were extracted from political texts. Out of this number, 335 of them have material processes, 147 of them relational, 30 (mental), 31 (verbal), 8 (behavioral) and 7 of them are existential. Like scientific texts, political texts represent the dominant textual forces of material and relational process types. This means that in the world of politics and science some events or actions are prevalent. It should be stated that in both genres of the study, surprisingly, there are exactly the same numbers of GMs, that is, 558 nominalizations and the prevailing process types in both are material types (actions and doings) and relational types, based on being and having, (181 in scientific, 147 in political).

4.5. Discussion

With reference to the research questions raised in the study, the discussion of the findings is represented as follows: a rather vivid expectation that was construed by the analysis of congruent wording of scientific and political texts was the higher frequency and dominant textual forces of material and relational process types and low frequency of other types. Comparing metaphorical and congruent wording in political and scientific texts represents that metaphorical domain elaborates the situation in a more fascinating, energetic, colorful and desirable manner. IGM instances in both genres serve several important functions like condensing, compacting, beautifying, and creating technical terms as well.

IGM instances in scientific texts are used to create technical and scientific terms or new entities, to establish cause-and-effect relationships between various phenomena, to systematize previously stated information and are also utilized for reasoning and expanding the smooth flow of the text and invite the reader to make sense of a world structure which is tidily, carefully layered and promising in some way; it has a high density of information as well.

If we compare the metaphorical and congruent domain in the this study, we will see that GM's role is fundamental in political contexts and without it, political discourse will fall short of accomplishing and implementing their power-oriented and discursive applications. Vandenbergen et al. (2003) discuss that Nominalization, for instance, can be readily seen as a

means of showing that you have gained mastery over a discipline and you have therefore appropriated some power for yourself. Nominalization is a technique for taking a chunk of information, or even large body of knowledge, that you assume will be shared by your reader, and referring to it by a kind of shorthand. It shows that you and the reader belong to the same in-group- but it can also exclude those who don't belong to the in-group. Nominalization can be used as a device to show that the writer has power over the reader, and also as a device to exclude all those who are not experts or at least aspiring experts.

Primarily, one of the main pedagogical implications of the present research and studies of the same nature is to pave the way and provide a tool and insight for academic writings and those who tend to pursue IGM in their careers as scientific and political writers, students and teachers. Next, many students need the opportunity to learn how to read or probably how to write the political and scientific genres, so that they may effectively participate in the political and scientific processes that these genres are used for. Then, texts with a high degree of GM tend to be considered prestigious and formal in English contexts, as they are in other language contexts. GM, particularly nominalization, is a typical feature of many types of written (academic) texts and is usually associated with the notions of *abstraction* and *distance* in the humanities, politics and social sciences and with technicality in the sciences as well. Moreover, learning and knowing about GM and IGM can also shed light on the fluent and smooth process of translation to some extent, because translation requires students to possess high language ability and excellent command of English, mainly GM and IGM. Lastly, IGM helps students to reduce the number of clauses in their writing and pack more information into each nominal group. Therefore, it beautifies clause and absorbs the reader's attention to follow the writing.

Conclusion

This study investigated a particular lexico-grammatical resource, the resource that SFL refers to as IGM. Developed mainly by Halliday (1985, 1994), the notion of GM represents an original and innovative contribution that identifies and describes the fact that political, scientific and academic

registers etc., in writing and in speaking, are functionally oriented to accomplishing *objectification* and *abstraction* of their content. They achieve this functional goal through the linguistic means of GM. The predominant lexico-grammatical feature in all academic writing, in particular, in political and scientific texts of the study is the extensive and elaborate use of the nominal group, represented by nominalization. Considered as the important characteristics of written English, GMs are created through the grammatical process of *derivation* by which a verb or an adjective is converted into a noun often by adding an ending to the verb or adjective. As a consequence, the tone of the writing sounds more abstract and more formal.

In this research, the IGM framework was used to carry out an analysis on 10 political and 10 scientific texts and also to pinpoint their similarities and dissimilarities based on nominalization and process types. As it was shown, a central function of nominalization is to *remove people*, as it were. The removal enables different interpretations of this particular GM as follows: actors are no longer readily identifiable, they play a minor role, they are irrelevant for the case at hand, the writer is unable or unwilling to identify them or, coming from the other side, the end result of an action is more prominent than the action itself. As stated, a core characteristic of nominalization as a GM is that it turns actions into things, thus Nominalizations give existence to *things*; in particular, they create conceptual objects.

The main objective of this research was to discover similarities and discrepancies of both genres based on nominalization and process types. After analyzing metaphotic words and rendering them into congruent domain to distinguish the process types, the present study indicated that IGM has dominated political and scientific texts to some extent and haphazardly and surprisungly is used exactly with the same frequency in both genres (558 IGMs for per genre). The analysis of the data showed that although the frequency of the IGMs in both genres is the same but *material* process type which is based on action and doing is utilized partly more in political discourse than scientific one (280 material processes for science and 335 for politics) and it is probably because of the fact that political texts deal more with provoking, persuading and convincing people for and/or

against a particular party or group and it requires more action words and scientific texts request more abstract words. The analysis also revealed that the second dominant process type in both is *relational* which is based on being and having (181 in science and 147 in politics).

The analysis employed the theoretical model of Halliday & Matthiessen (1999) which explores transitivity as a tool of representing inner and outer world experiences. The other processes are approximately used with the same numbers. In both genres, the purpose of using IGM is to render the lexis and grammar in the way the speaker or the writer wants in order to produce or inform a certain effect on his/her reader or audience. In each text, the goal is the conveyance of the intended meaning to the reader or the audience in a vivid, tempting and interesting way. In scientific, this is done by several important functions like condensing, compacting and creating technical, expert and professional terms that are available to a quick conscious mind. In spite of all the above functions, the aim of the speaker or the political writer is to convey the intended message, prevail, persuade and provoke a particular group and carry up the job of initiating the reader or the audience into certain worldview in a quick, compact, provoking and desirable manner.

Finally, It was noticed that the occurrence of GM greatly in per text increases the general volume of information the clause or the sentence expresses: the greater the number of included nominalizations, the greater the volume of the information expressed by the sentence. Thus GMs are crucial, ideal for the political and scientific discourses which place high quality on the transference of information in an economical and condensed way. The present study has been limited to fairly small scopes; however, the phenomenon of GM proved to open new possibilities for investigating them in other types of discourses and with more numbers of texts.

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