NOMINALIZATIONS IN RESEARCH ARTICLE ABSTRACTS: A COMPARATIVE STUDY

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ABSTRACT

Most studies on nominalizations in research articles tend to exclude the abstracts, which undoubtedly contain the thesis of the articles. The assumption is that abstracts are rather short in comparison with the main articles and that their language too is rather simplistic to warrant any serious research attention. This has resulted in a dearth of studies in the language of abstracts, especially nominalization. To plug this hole, this paper sought to explore whether or not abstracts draw on nominalizations to achieve information density, and also compare the use of nominalizations, if any, in abstracts of research articles in the humanities and the sciences. A corpus of 50 abstracts was drawn from the humanities and the sciences and analyzed quantitatively for instances of nominalization tokens, and the linguistic processes used to achieve nominalization. The findings of the study revealed that abstracts employ nominal style in writing. It was also found out that there was a higher frequency of nominal structures in the sciences than the humanities. Also, intra-discipline analysis showed a divergent use of suffixation in the realization of nominalizations. The findings of the study have implications for the teaching of nominalizations as a feature of academic writing.

Keywords: Nominalization, deverbal, tokens, gerundive nominals, derived nominals.

INTRODUCTION

An important feature of academic writing is its information density and its attendant complexity of language which is achieved mainly through a linguistic process known as nominalization, otherwise referred to as grammatical metaphor (Halliday, 1985) where verbs and adjectives are linguistically realized as nouns. The use of nominalizations in academic writing calls for considerable linguistic dexterity, artistry and finesse to transform verbs and adjectives into abstract nouns to encode quite complex meanings (Downing and Locke, 2006). Junic also (2010) describes nominalization as "a type of grammatical metaphor whereby processes, which are congruently realized by verbs are metaphorically realized by nouns expressing the same process as those verbs" (p.251).

Since the abstract component of a research article is the sign post of the entire article, we cannot afford to jettison any scholarly studies on its language. The abstract informs the reader about the direction of the article, and more important, gives the reader a foretaste of what is to come. Thus the abstract does not only sell the article to the prospective reader (Dzung 2008), it also becomes a surrogate for the entire article (Holtz, 2009). The present paper seeks to investigate whether or not the language of research article abstracts employs nominalization for the achievement of information density; and if any, find out the extent of nominalization density in research article abstracts of science and humanities; and also the dominant linguistic process (es) used to achieve nominalization in both domains. The following examples illustrate the process of nominalization:

1a.The Dean has <u>to authenticate the document</u> before <u>it is accepted</u>.
                    becomes

1b. *The authentication of the document has to be done by the Dean before its acceptance.*
2a. *Very soon we shall see businesses collapse because the cedi is depreciating fast*
                          becomes
2b. Very *soon we shall see the collapse of many businesses because of the fast depreciation of the cedi.*

In the above examples, the underlined group of words in (a) are verbal structures that have been transformed into nominal structures in (b) through the process of nominalization. When a verb is metaphorically realized as a noun that verb is said to be deverbalized as in:
discuss - discussion, transform – transformation, remove – removal manage – management

RELATED LITERATURE
Theoretical Framework

The present paper is underpinned by the lexicalist approach to nominalization associated with Chomsky (1970). A justification for the lexicalist approach as the framework for the present paper stems from the fact that apart from being influential in the discussion of nominalization (e.g, Jezdinska 2008, Newmeyer 2005, Jurk 2001, Stekauer 2000) it was also found out that most of the nominals in the data were derived nominals that could be analysed using the lexicalist approach.

In his paper "Remarks on Nominalisation", Chomsky bases his arguments on the lexicalist hypothesis. The lexicalist hypothesis entails that syntactic transformations operate on syntactic constituent only, and can only insert or delete elements. There are two versions of the lexicalist hypothesis. The first is the weak lexicalist hypothesis which posits that transformation cannot be used in derivational morphology. The strong lexicalist hypothesis, which is the second, suggests that transformation can also not be used in the domain of inflection. Chomsky argues that among the various nominalizations in English, two which are of particular importance are gerundive nominals i.e verbal nouns (2) and derived nominals i.e. regular nouns (3) as the transformation of the sentences in (1).

(1)   a. John is eager to please.
         b. John has refused the offer.
         c. John criticized the book.

(2)   a. John's being eager to please
         b. John's refusing the offer
         c. John's criticizing the book

(3)   a. John's eagerness to please
         b. John's refusal of the offer
         c. John's criticism of the book   (p.187)

According to Chomsky there are striking differences between the two types of nominalizations. These include the productivity of the process in question, the generality of the semantic relation between the nominal and its proposition, and the internal structure of the nominal phrase.

With regard to productivity, transformation applies quite freely in gerundive nominals, from subject-predicate form, but there are many restrictions on the formation of derived nominals.

In the following examples, as presented by Chomsky, it is possible to transform the structures underlying (4) into gerundive nominals of (5) but not to the derived nominals of (6).
(4) a. John is easy (difficult) to please.
    b. John is certain (likely) to win the prize.
    c. John amused (interested) the children with his stories.

(5) a. John's being easy (difficult) to please
    b. John's being (certain likely) to win the prize
    c. John's amusing (interesting) the children with his stories

(6) a. *John's easiness (difficulty) to please
    b. *John's certainty (likelihood) to win the prize
    c. * John's amusement (interest) of the children with his stories (p.188-189)

Chomsky admits that some of the derived nominals superficially resemble those of (6), citing those of (7) which match with the gerundive nominals of (8).
(7) a. John's eagerness to please
    b. John's certainty that Bill will win the prize
    c. John's amusement at (interest in) the children's antics

(8) a. John's being eager to please
    b. John's being certain that Bill win the prize
    c. John's being amused at (interested in) the children's antics

Regarding the relation of meaning between the nominal and its proposition, Chomsky asserts that there is some regularity in gerundive nominals, but "the semantic relation between the associated proposition and the derived nominals are varied and idiosyncratic" (p. 188). Extending the idiosyncratic nature of the relation between the derived nominal and the associated verb further, Chomsky considers its discussion as trite. He cites nominals such as *laughter, marriage, construction, actions, activities, revolution, permutation … etc* as having "their individual ranges of meaning and varied semantic relations to the base form" (p.189).
Another difference is that derived nominals have the internal structure of an NP while the gerundive nominals do not have the internal structure of an NP. Thus it is possible to have *the proof of the theorem* as against * *the proving of the theorem* (gerundive), and *John's unmotivated criticism of the theorem* as opposed to *John's unmotivated criticizing the book* (gerundive). Also correspondingly, derived nominals do not contain aspect. In addition, many derived nominals can be pluralized and occur with the full range of determiners (e.g *John's three proofs of the theorem*, *several of John's proofs of the theorem*) Besides, derived nominals have the potential to appear freely in the full range of noun phrase structures (p. 188). Chomsky argues,

> It is difficult to see how a transformational approach to derived nominals
> can account for the fact that the structures in which they appear as well
> as their internal structure, and often, morphological properties, are
> those of ordinary noun phrases (p.190)

He observes that gerundive nominals do not give rise to any of these problems, and adds that the features of derived nominals are consistent in large measure with the lexicalist approach, and can partly be explained from this point of view. Chomsky further maintains that "the strongest and most interesting conclusion that follows from the lexicalist hypothesis is that

derived nominals should have the form of base sentences, whereas gerundive nominals may in general have the form of transforms" (p.212).

A closer look at lexicalist approach to nominalizations indicates that derived nominals are simply listed as nouns in the lexicon, and that nouns like *refusal, rejection, growth* and a lot more are nouns throughout in the entire lexicon. In contrast, gerundive nominals are best accounted for by the transformationalist view, suggesting that gerundive nominals are desentential in that they display the characteristics of sentences: they admit aspect, negation and adverbs (Newmeyer 2005).

Some Empirical Studies

Nominalization has been studied extensively from different perspectives by scholars of all linguistic persuasions: Halliday (1985), Biber & Gray, (2013), Holtz (2009), Sunsinkiene (2010), Norouzi et al. (2012) to name but a few. Biber and Gray (2013) suggest that the heavy reliance on nominalizations in academic writing is mostly a 20th Century development. According to them the 19th Century saw a gradual increase in the use of nouns, then a dramatic increase in the 20th Century while verbs experienced a corresponding decrease in the same century. Biber and Gray (2013) contend, in their study, that in academic writing, it is common to use nominalised structure than verbal structure, arguing that there has been a reduction in particular verbs in 20th Century research articles owing to a decrease in the use of high frequency verbs, and that the copula "be" is by far the most important verb that has experienced a decrease in use during the 20th Century. This view is supported by Norouzi et al. (2012) that there is a high frequency of deverbalised nominalization in academic writing. Thus academic writing makes use of nominal structures more than verbal structures. The implication here is that modern-day academic writing relies more on nominal style. Holtz (2009) found out that nominalizations occurred much more often in abstracts than in research articles. Again, abstracts manifested much wider vocabulary range regularly in the use of nominalizations than research articles. Similarly, I-Wen Su's (2011) study indicated that nominalization serves the communicative purposes of different moves in the abstract sections of medical journals. Findings from other studies indicate that nominalization occurs more frequently in written texts than in spoken texts (Norouzi et al. 2012), more in native speaker writing than in non-native speaker writing (Terblanche, 2009), more in science related articles than social science or humanities related articles (Holtz 2009), and there are more deverbal nominalizations than adjective-derived nominalization (Norouzi et al. 2012).

Nominalization has the capacity to distance the writer from the event by raising the representation of a situation to a higher level of abstraction. In this way, there is objectivity and depersonalization to the extent that we can conceptualize the event or abstraction "as if it had temporal persistence, instead of the transience associated with the verb" (Downing and Locke, 2006: 163).

In so far as users of any particular language are not limited to any one way of speaking or writing, we do not use the same linguistic structure any time we use language. Language makes it possible for people to select from several sets of options, and the moment we choose from alternative wordings we do so to enable us to meet a communicative need, and that all the options are organized. Nominalization is one of such alternatives that offer a writer the opportunity to restructure or rephrase a linguistic item such as a verb and turn it into a noun. In this way,

Nominalization is viewed as a type of grammatical metaphor whereby

> processes which are congruently realized by verbs are metaphorically
> realized by nouns expressing the same process as those verbs
> (Junic, 2012: 251)

One feature of nominalizations is their function of treating processes and events as abstractions and reducing human participation thereby making the text detached and objective. Thus the rhetorical device employed by the writer masks his involvement and interpretation which are subjective in nature, I- Wen Su (2011). The argument is extended further by Downing and Locke (2006) who assert that in several cases of nominalizations, normal human agents and experiences are absent. Instead they are replaced by abstractions that are related to them in some way. This, according to them, makes grammatical metaphor a very powerful alternative in the presentation of information. Grammatical metaphor as they put it, "reconceptualises an event as a participant with the consequent restructuring of the rest of the clause, which influences the way the information is perceived" (p. 164). Downing and Locke, further posit that an entire state of affairs that is in its congruent form could be transformed into a clause and be seen as an entity and expressed by a nominal as in:
Because people feared that oil would not be supplied as usual from the Gulf, the price of oil rose dramatically is transformed into: _Fears of disruption to oil supplies from the Gulf_ helped push crude oil prices up dramatically. (p.165)

However, it is not all scholars who hail the complexity of language in academic discourse emanating from nominalizations. Giltrow (1999) decries the tendency of nominalizations to cause ambiguity and observes:

> Criticism of scholarly expression has sometimes focused on
> what has been called its heavy nominal style …. Students new
> to a discipline, for example, may find the nominal style of scholarly
> writing difficult to read (p.228).

A similar view is shared by Gforge (2010) who argues that nominalization is a source of ambiguity, and that the absence of semantic information in nominalization increases the degree of ambiguity and the difficulty in correctly encoding a sentence. The concerns expressed by Giltrow and Gforge might be genuine. However, these could be isolated instances of ambiguity attributable to poor proofreading. What is more, anecdotal evidences from refereed articles suggest that they are perfect examples of good writing devoid of such infractions as ambiguity. Again, if a text is complex it does not mean it is ambiguous.

There is no doubt that the literature, and empirical studies on nominalization are unanimous in the view that it is by far the dominant linguistic tool that scholars apply to achieve grammatical metaphor, raising academic writing to a higher linguistic pedestal than non-academic writing characterized by simplicity of language.

METHODOLOGY

The data for the study comprised a corpus of research article abstracts drawn from the domains of humanities and the sciences. Since the paper is a comparative study, 10 journals, 5 each were selected randomly from the humanities and the sciences. Again, using the same random sampling 5 article abstracts were picked from each journal, amounting to 25 abstracts from the humanities and 25 from the sciences giving a sample size of 50 abstracts. The selection of equal number of abstracts from the two major domains was to ensure balance. The journals from the humanities were selected from English language, linguistics, social

science and business while those from the sciences were picked from molecular biology, climate change, medical physics, information engineering and applied science. The total number of words in each abstract was manually counted and recorded. This was followed by selection of instances of nominalization from each abstract, which were also manually counted after the selection

Also to find out the dominant linguist processes for the achievement of nominalization, all derived nominals were manually counted, studied and coded by assigning labels such as – *ment nominals, -ity nominals, -ion nominals, -ness nominals.*

The underlined noun phrases in the following sentences are examples of nominalization as captured in the corpus.

1. The <u>study</u> was conducted on 180 pregnant women allocated into two groups having <u>the same inclusion and exclusion criteria</u>
2. We present "network histories" that map out <u>network participation of four scholars.</u>
3. <u>The distribution of the ACE – I/D genotypes</u> and <u>allelic frequencies</u> in the present study….
4. First, it presents <u>a detailed description</u> of the <u>peculiarities</u> of the object clitic paradigm…
5. <u>Climate change</u> and <u>potential adverse impacts</u> on <u>water availability</u> for the purposes of sustaining competing demand uses.

In the examples above, the underlined nominal structures enable processes to be transformed into entities. In other words, verbal structures denoting actions have been turned into noun phrases through the process of nominalization, thus:

 include and exclude becomes <u>*inclusion and exclusion*</u>
four scholars participate becomes <u>*participation of four scholars*</u>
to distribute ACE – I/D genotypes becomes <u>*the distribution of the ACE – I/D genotypes*</u>
to describe in detail becomes <u>*a detailed description*</u>
 water is available becomes <u>water availability</u>

 It could be seen that the underlined nominals are all derived nominals, mostly from verbs, and this is in line with the lexicalist approach as they exhibit characteristics such as internal structure of a noun phrase and admission of determiner, (e.g <u>*the distribution of the ACE – I/D genotypes*</u>) pluralization (detailed <u>*descriptions*</u>)

RESULTS

After the compilation and manual processing of the corpus, the distribution of word tokens across disciplines and abstracts was calculated to provide an overview of the raw frequencies. Table 1 offers a pictorial representation of the text sources and the corresponding number of tokens per each discipline.

Table 1: Text Source of the Corpus

Discipline	Text Source	Year	Abstracts	No of Words	%
Humanities					
English Lang.	JEAP	2014	5	974	22.59
English Lang.	JESP	2010	5	906	21.02
Linguistics	JL	2014	5	786	18.23
Social Science	IJHSS	2013	5	812	18.84
Business	IJBSS	2013	5	833	19.32
Total			**25**	**4311**	**100**
Science					
Molecular Biology	AJMB	2014	5	1168	20.46
Climate Change	AJCC	2013	5	960	16.81
Information Eng.	JIEA	2102	5	1511	26.46
Applied Science	IJSBAR	2013	5	1414	24.76
Medical Physics	IJMCRO	2014	5	657	11.51
Total			**25**	**5710**	**100**

Source: From Data

As indicated in Table1, the total number of abstracts was 50 of which 25 each were from the two major domains. In all, the total size of the corpus was 10021 word tokens. Out of this number, abstracts in the humanities had 4311 word tokens as against 5710 in the sciences.

Next was the determination of the distribution of nominalization tokens in the two domains and across disciplines. This was done to compare the extent of nominalizations in the domains and the disciplines. Both domains i.e. science and humanities recorded a total of 3.35% (N=366) instances of nominalizations.

Table 2 shows instances of nominalizations in the two major domains and across disciplines.

Table 2: Instances of nominalizations in Abstracts

Humanities	Nominalization Tokens (F)	%
English Language (EAP)	33	
English Language (ESP)	28	19.88
		16.87
Linguistics	41	24.70
Social Science	36	21.69
Business	28	16.87
Total	**166**	**100**
Science		

Molecular Biology	36	21.18
Climate Change	45	26.47
Information Engineering	44	25.88
Applied Science	30	17.65
Medical Physics	15	8.82
Total	**170**	**100**
Chi – Square 250.072, df = 12, Sig. 0.000		

From Table 2, linguistics recorded the highest frequency of 24.7% nominalizations in the humanities while in the sciences climate change was highest with 26. 47%

The study also explored the process by which nominalization is achieved in the abstracts in the two domains. It was found out that suffixation was the dominant process for achieving nominalization, with the following suffixes manifesting a high frequency of occurrence: *-ity* , *-ness*, *-ion*, *-ment*, *-ism*, *-ance/cy*, *- er*, *-sis* and *–age*
The distribution of the suffixes is shown in Table 3 below

Table 3: Types of Nominalization Suffixes				
	Humanities		**Science**	
Nominalizations	**F**	**%**	**F**	**%**
-ity	12	7.23	13	7.65
-ness	8	4.82	15	8.82
- ion	78	46.99	75	44.12
- ment	30	18.07	12	7.06
- ism	10	6.02	13	7.65
- ance/ce/cy	12	7.23	19	11.18
-er	2	1.20	2	1.18
-sis	3	1.81	4	2.35
- age	3	1.81	1	0.59
Total	**166**	**100**	**170**	**100**
Chi Square	**211.610, df=16, p-value = 0.000**			

The chi – square calculated on raw frequencies (211.610, df =16, p-value (0.000) indicates a highly significant difference between the humanities and the sciences in the use of suffixes to achieve nominalization. This is because the p-value (0.000) is less than the alpha value of 0.05.

DISCUSSION

In comparison with the entire word tokens of 10021 in the corpus, the 3.35% instances of nominalization recorded in the two domains seemingly look woefully insignificant, which might lead to a wrong assumption that abstracts do not draw much on nominalizations. However, it is instructive to state that while word tokens have to do with individual words, nominalizations do not necessarily deal with individual word tokens. A nominal can be one word or a group of words. Consider the expression *participation of four scholars*. While there are four word tokens in the expression, as far as nominalization is concerned, it is considered

a single nominal structure. This explains why the 3.35% (N=366) cannot be said to be insignificant. In the light of this the conclusion is that abstracts equally employ nominalizations to achieve an informationally dense discourse.

Again, the results indicated that abstracts in the sciences employ much more nominal style than abstracts in the humanities. While the sciences recorded 46.44% (N=170) of the total nominalizations (i.e. 366) identified, the humanities registered 45.35% (N=166). There was a difference of 1.09% (N=4) nominalization tokens between the humanities and the sciences. Statistically, this would seem insignificant, but in so far as the chi-square p-value (0.000) is less than the alpha value of 0.05, it shows that there is a highly significant difference in the distribution of nominalizations between humanities and the sciences. The result is consistent with Holtz (2009) that nominalizations occur much more often in abstracts, and also the sciences have a preference for much more nominal style than the humanities. This could be attributed to the fact that the sciences employ much more technical vocabulary, most of which could be easily transformed into processes or entities.

Intra-discipline analysis also revealed that in the sciences, there was a high manifestation of nominalizations in abstracts of articles on climate change. Following from this, it could be seen that nominalizations vary across disciplines.

Among the suffixes *–ion* nominalizations (e.g. *production, regression, concentration*) recorded 41.80% (N=153) in both domains. Individually, humanities recorded 46.99% (N=78), followed by *–ment* nominalizations (e.g. *development, assessment, displacement*). In the sciences, again *–ion* nominalizations topped with 44.12% (N=75) tokens followed by *–ance/cy* endings 11.18% (N=19). This could be interpreted as both domains having a preference for *–ion* nominalizations more than any other suffixes. However, from the results, the humanities used more *ion-* nominal style than the sciences. Again, in the pattern of distribution of nominalization suffixes the results confirm Holtz's (2009) findings that "-*sion/-tion* nominalizations are throughout the most frequent ones" (p.13). Also the fact that -*ment* endings placed second in the humanities is somehow in consonance with Holtz's assertion that *–ment* nominalizations play an important role in linguistics. The point of departure, however, is that while Holtz identified *–ity* endings as the second most frequent ones in abstracts in all domains, in the present study *–ity* nominalizations did not place well on the frequency scale. This could be attributed to the difference in corpus size.

CONCLUSION

The study sought to find out whether or not nominalization is a feature of the writing style of abstracts of research articles. The results revealed that abstracts make use of nominalizations for information density just like any other academic writing. Again, the results showed that abstracts in the sciences exhibited a much more nominal style than abstracts in the humanities. Another striking feature was that both domains have a preference for *–ion* endings in the realization of nominalizations. These findings bolster the general observation that scientific writing is more nominalized and by extension more complex than writing in the humanities or social science (e.g. Holtz 2009). It was also found out there was a high preponderance of deverbal nominalizations (i.e. verbs transformed into nouns) in both domains. It is also noted that all the deverbal nominalizations fall under derived nominals, reflecting the lexicalist approach championed by Chomsky (1970).

The above findings have pedagogical implications. Language teachers must teach their students the skill of turning processes into entities by turning verbs and adjectives into nouns using various linguistic processes such as nominalization. When this is taught at the early stages, by the time students "mature" in writing, they will have mastered the skill of nominalization to enable them to pack so much information into few words, thereby elevating their language from simplicity to the level of sophistication and complexity, which typify academic writing. As Cooper (2010) observes, nominalization helps in the creation of variety in writing and prevents unnecessary repetition of the same verb or word. It is a useful skill to have in academic writing because it conveys an objective and impersonal tone. As a consequence of using nominalization, writing becomes more abstract, formal and elevated.

Notes

Journals from which the abstracts were taken

Humanities
   i.   Journal of English for Academic Purposes (JEAP), 2014 vol. 14
   ii.   Journal of English for Specific Purpose (JESP), 2010, vol. 29
   iii.   Journal of Linguistics (JL), 2014, vol. 50
   iv.   International Journal of Humanities and Social Science (IJHSS) 2013 vol. 3, N0 12
   v.   International Journal of Business and Social Science (IJBSS), 2013, vol. 4 N0 17

Science
   i.   American Journal of Molecular Biology, (AJMB) 2014, vol. 4
   ii.   American Journal of Climate Change (AJCC), 2013, vol. 2
   iii.   International Journal of Medical Physics, Clinical Engineering and Radiation Oncology, (IJMCRO) 2014, 3, 1
   iv.   Journal of Information Engineering and Applications (JIEA), 2013, vol. 3 N0 13
   v.   International Journal of Sciences: Basic and Applied Research, 2013, vol. 3

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