

# Types of Complements and Their Realizations in Scientific Texts

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**Abstract**— The following paper was undertaken to further understand the syntactic realizations of one of the major clause constituent, namely the complement C in scientific texts of academic level, (312) sentences all of them were chosen from Geology, Chemistry, Biology and Physics, symbolized as G, C, B and P were analysed. The model adopted in this study was Quirk et al.'s of (1985) to see the effectiveness of the above mentioned constituent realizations and their occurrence in such texts. The complement is restricted in some approaches like Quirk et al.'s model to refer only to the complementing function of structures following verbs "to be" in the case of subject Complement symbolized as (Cs), in the intensive type (SVCs) and the complex-transitive verbs in the case of object Complement symbolized as (Co), in the (SVOCO) where the intensive relation is implied between O and Co.

It is hypothesized that the complements occurrences were prominent in the intensive type (SVCs) in comparison with their realizations in the complex-transitive one (SVOCO). The percentages of the Cs, distributed in the SVCs, patterns were very close in the four disciplines. The adjectives with complementation scored the highest rate. The highest rates among these adjective complementation categories were realized by that-clauses, to-infinitive clauses and prepositional phrases. The majority of subjects occurring in the analysed texts were with anticipatory "it".

Finally, the Co, in the SVOCO type scored the lower percentage. The contributed percentages were to some extent related. The adjective phrases were dominant with different categories of complementation which were also hypothesized to be an additional characteristic of scientific writing. The findings of the study were found to be in agreement with the hypotheses.

**Keywords**—Subject and Object Complements, Intensive Complementation, Complex-transitive Complementation, Adjective Complementation Types.

## I. INTRODUCTION

Understanding the core structure of the English sentence is important to identify the relationships among the major parts of the clause which are important in the definition of the clause elements (Allerton, 1995: 30). many modern grammarians refer to the items of information necessary to turn a bare verb into a plausible, intelligible predicate as the

'complement of that verb, thus it is used in its broadcast sense to comprise all the obligatory features of the predicate other than the verb (Lester, 1976: 83) and (Matthews, 1981: 101). in some approaches, like quirk et al, the term complement is given a more restricted definition to refer only to the complementing function of structures following the verb "to be" in the case of the Cs, and the complex-transitive verbs in the case of Co. in addition, they assign sentences and clauses to classes based upon the sort of "complementation" required by the verb, on this occasion, the term "complementation" is restricted to the function of a part of a phrase or a clause, evidently, suitable types of complementation can follow verbs, adjectives, prepositions and abstract nouns such as intensive, mono, complex and ditransitive ones (quirk et al, 1985: 65). verb complementation categories (types):

- |                       |                               |
|-----------------------|-------------------------------|
| 1. Coupler            | (1) John is only a boy.       |
| 2. Monotransitive     | (2) I have caught a big fish. |
| 3. Complex transitive | (3) She called him a hero.    |
| 4. Ditransitive       | (4) He gave Mary a doll.      |

## II. SYSTEMIC CORRESPONDENCE BETWEEN INTENSIVE AND COMPLEX-TRANSITIVE COMPLEMENTATION

The systematic correspondence may be broadly defined as a relation between two structures, the relation is often of a semantic equivalence or paraphrase. The intensive relations refer to structures where there is a close semantic identity between elements of structure, such as between S and Cs, S and A in the intensive types, where the verbs are linking and between O and Co O and A in the complex-transitive types where the intensive relations are implied in the last mentioned types.

*A. Variants of Copular Complementation Types (SVC, and SVA)*

1. Adjectival Cs
  - (5) The girl became very restless. (resulting copular)
  - (6) The girl seemed restless. (current copula)
2. Nominal Co
  - (7) William is my friend. (current copula)
  - (8) William becomes an expert. (resulting copula)

3. Adverbial Complementation

- (9) The kitchen is downstairs.

*B. Variants of Complex Transitive (Types SVOC and SVOA)*

1. Adjectival Co
  - (10) That music drives me mad.

## 2. Nominal Co

(11) They named the ship 'Zeus'. core structure of the English sentence is

## 3. O+ adverbial

(12) I left the key at home.

## 4. O+to-infinitive

(13) They knew him to be a spy.

## 5. O+ bare infinitive

(14) I saw her leave the room.

## 6. O+ -ing clause

(15) I heard someone shouting.

## 7. O+-ed clause.

(16) I got the watch repaired.

'Be' as a verb is merely a linking, there is no action referred to (Matthews, 1981: 116). This verb links the nonverbal predicates nouns, adjectives and certain adverbs with their subjects and serves as a carrier for tense and subject-verb agreement, the linking verbs are either current or resulting (Muric and Freeman, 1983: 33) (Quirk et al., 1985: 1172). The subclassification of other copular verbs is done according to the role of the C, which either functions as a current or as a resulting attribute the adjectives after linking verbs occur either with or without postmodification, thus certain adjectives require complementation by a postmodifier. The adjectives differ in accordance with their complementation categories, however, six types are distinguished. The adjectives can be postmodified by:

a) Prepositional Phrases: The adjectives form a lexical unit with a following preposition. These adjectives can be described as prepositional adjectives, like: averse to, conscious of, etc. The lexical bond is strongest with the adjectives of the kind that the core structure of the English sentence is

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complementation categories, however, six types are distinguished. The adjectives can be postmodified by:

a) Prepositional Phrases: The adjectives form a lexical unit with a following preposition. These adjectives can be described as prepositional adjectives, like: averse to, conscious of, etc. The lexical bond is the complementation is obligatory. These adjectives are either participle as in (17) or non-participle as in (18):

(17) He is worried about her.

(18) They are angry with our principles.

b) That-clauses: Which are like that-clauses following the verbs in having one of the following verb types, the indicative, subjunctive and the putative 'should' as in (19), (20) and (21) below:

(19) I am sure that he is here.

(20) They were insistent that we be ready.

(21) I'm sorry that he should have left.

According to Quirk et al's model, the majority of adjs followed by that-clauses are concerned with truth or knowledge, the verb in the finite clause (ie. that-clause), which is actually a subject postponed by extraposition is an indicative verb as in:

(22) It is very important here that wave mechanics offers a theoretical method of studying the electron distribution in a molecule.

That the wave-mechanics offers a theoretical method.....

Many adjectives have introductory 'it' as subjects. It is used to indicate the formal style (Broughton, 1990: 79) and (Eastwood, 1994: 37). (Quirk et al, *ibid.*: 1223), differentiate between adjectives with experienter and adjectives with anticipatory "it" as subject.

c) Wh-clauses The less frequent types of adjective complementation

d) Than-clauses categories are "wh-clauses", "than-clauses" and the -ing

e)-ing particle particle clauses as in the examples below

(23) It is not yet clear whether this should be interpreted as a synthesis or a condensation of the secretion globules

(24) It is worth verifying directly that I/r and cos Qr do satisfy Laplace's equation everywhere except at r=0.

f) To-infinitive clauses: These categories of complementation represent

the second highest rate. Most of the adjectives in these structures are with anticipatory 'it' as subjects and they also carry the following meaning

1. Truth or knowledge, eg: apparent, evident, likely, possible, untrue, certain, implicit, obvious, true, clear, plain and unlikely.

2. Modality or volition, eg: essential, important, necessary, impossible and proper.

3. Degrees of ease or comfort, eg: hard, convenient, difficult and easy.

4. Volitional or modal meaning like ability, possibility, or liability, eg: able, due, likely, unable, worthy, important.

5. Evaluative of human behaviour, e.g.: un/wise and wrong.

(25) It is impossible to represent the curved surface of the earth on a flat piece of paper without distortion.

(26) It is however necessary to return to Maxwell's equation to obtain the relations between their functions.

(27) It is convenient to consider a molecule with respect to its I-effect and resonance (mesomeric) effect separately.

(28) It is easy to see that the solution is given by  $2n-1$  images point charges.

Complex-transitive complementation occurs in the patterns SVOC and SVOA and the other clause patterns in which the O is followed by anonfinite clause like to-infinitive, bare infinitive, -ing participle and -ed participle. The objective complement is an adjective, a noun or an equivalent of either, which completes the action expressed in the verb and refers to the O. If it is an adjective, it describes or limits the O, if a noun it is in a sense identical with the Object.

Quirk et al. (1985: 1198) classify these verbs into current and resulting, the verb and the C, form a collocation. The obligatory C occurs after the verbs carry the meaning of the following:

A) Current verbs of:

1. General meaning: like, hold, keep and leave.

2. Factual speech act: call, confess, profess, pronounce and report.

3. Volitional state: believe, presume, rate, reckon, suppose, consider, deem, find, hold, imagine and judge.

B) Resulting verbs of:

1. General meaning: drive, get, make, prove, render, send and turn.

2. Verbs of performative force of declaration: certify, declare and proclaim.

While in the SVOA type the A, are object-related adverbials where in this pattern the intensive relationship which exists between the O and C, is still maintained between O and A. Many verbs related to this pattern are causative verbs of motion and those without causative meaning. A few verbs can occur with C, but not with C., the noun represents a new status or designation results from the action of the factitive verb although certain nonfactitive verbs require the assistance of the C, for full predication like the verbs find, leave, think, believe and call (Huddleston, 1984: 194).

(29) Refined mechanical aids have made it possible to learn a great deal about the physical nature of the external members of cells.

(30) Organic chemistry nowadays drives me mad.

(31) Ingold called this phenomenon mesomerism.

(32) We refer to the block of rock below an included fault as the foot wall.

(33) We think of the earth's crust as solid.

It is apparent that C, is realized also as nominal clauses which according to Quirk et al (1985: 1047) are functioning approximately to those of NPs, their occurrences are more limited than that of NPs, because from a semantic point of view, the clauses are normally abstract.

(34) The idea is to find image charges that make the surfaces of the conductors equipotentials. The C, realizations as clauses are also very restricted as in:

(35) A wave equation cannot tell us exactly how fast it is moving

(36) The location of atomic orbitals will tell us how to put these together.

### III. FINDINGS AND DISCUSSION

The statistical findings of this paper indicate the results of analysing the distribution of complements as follows:

1. The highest rate of complement distributed as C, in the SVC, pattern. The percentage is 74% (ie. 231) while the C, in the SVOC, pattern contributed the percentage 25.8% (ie. 81). It is clear that the complement realizations as current attributes are more common than the resulting ones, as in table (I):

TABLE I  
COMPLEMENT DISTRIBUTION

Discipline	Realization	SVCs		SVOCo	
		No.	%	No.	%
G	C	47	14.87	15	4.76
	R	3	0.96	6	1.92
C	C	58	18.8	18	5.72
	R	1	0.32	6	1.92
B	C	55	17.06	12	3.84
	R	1	0.32	5	1.56
P	C	65	21.28	13	4.16
	R	1	0.32	6	1.92
<b>Total</b>	<b>R / C</b>	<b>231</b>	<b>74.00</b>	<b>81</b>	<b>25.8</b>

C / stands for current attribute R/ Stands for resulting attribute

2. It is apparent that the percentage of the C, distributed in the SVC, pattern are very close in the four disciplines the contributed percentages are 21.28% (ie. 65), 18.8% (ie. 58), 17.06% (i.e. 55), and 14.87% (i.c. 47) in P, C, B and G respectively, the percentage of the C<sub>1</sub>, whether realized as NPs, Adjps or nominal clauses are very close in the analysed texts. They scored the percentages 36.81% (ie. 115) as adjective phrases, 24.92% (i.c. 76) as noun phrases and 12.68% (i.e. 40) as nominal clauses, see table (2):

TABLE II  
CS DISTRIBUTION

Disciplines	Realization	NP		Adjp				Clauses		Total	
		No.	%	With C		Without C		No.	%	No.	%
				No.	%	No.	%				
G	C	30	9.61	11	3.52	4	1.28	3	0.92	47	14.87
	R	1	0.32	1	0.32	1	0.32	/	/	3	0.96
C	C	18	6.00	21	6.72	7	2.23	12	3.84	58	18.8
	R	/	/	1	0.32	/	/	/	/	1	0.32
B	C	15	4.80	21	6.26	9	2.88	10	3.12	55	17.06
	R	/	/	1	0.32	/	/	/	/	1	0.32
P	C	12	3.84	23	7.84	15	4.80	15	4.80	65	21.28
	R	1	0.32	/	/	/	/	/	/	1	0.32
Total		76	24.99	79	25.30	36	11.51	40	12.68	231	74.00
Total		24.99% (i.e. 76)		36.81% (i.e. 115)				12.68% (i.e. 40)		74% (i.e. 231)	

3. In the four disciplines, the adjectives with complementation are dominant. They scored 25.30% (ie. 79). They are distributed as follows:

"That-clauses" contributed the highest percentage among the other adjective complementation categories. They scored 11.46% (i.e. 36), the other categories are the "to-infinitive" and "the prepositional phrases". They contributed the percentages 9.36% (i.c.29) and 3.53% (i.e. 11), the other complementation categories, "Wh-interrogative" and "-ing participle" are very few, while "than-clauses" scored no occurrence. The realization of C, as NP in the disciplines G, C, B and P respectively, contributed the percentages 9.61% (i.e. 30), 6% (i.e. 18), 4.80% (i.c. 15), and 3.84% (i.e. 12).

Huddleston (1984: 185) states that there are grounds for regarding the Adj<sub>p</sub> as somewhat more central in as much as there are greater restrictions on the occurrence of NPs than of Adj<sub>p</sub>s in this function. This might be due to the fact that there are syntactic restrictions in the occurrence of C, in which the C, normally should have concord of number with the S and also between 5 and V on the one hand and between the verb and CV, on the other. The type of concord arises naturally from the semantic role of C, as in (38) The non-metallic elements are hydrogen, oxygen, sulfur, phosphorus, iodine, bromine and chloride. It is likely that the C, realizations as nominal clauses are not significant in the whole disciplines. They contributed the percentages 4.80% (ie. 15). 3.84% (ie. 12), 3.12% (ie. 10) and 0.92% (ie, 3) in P. C, B and G respectively, see table (IV). The lowest percentage in table (III) is contributed by the realization of the C, as Adj<sub>p</sub> without any complementation type. The contributed percentage is 12.68% (i.e.40) (Al- Hasso, 1982: 62).

4. The verb occurring in the SVC, patten is "be" which occurred more than other current copula verbs and the verb "become" is the representative of the resulting copula verb in the analysed texts. The majority of subjects occurring in the analysed texts are with anticipatory "it" especially when the C, are realized as Adj<sub>p</sub>s followed by that-clauses with indicative verbs

5. Finally, the C, in the SVOC, type contributed the lowest percentage. It has the percentage 25.8% (ie. 81). In the

analysed disciplines, the contributed percentages are closely related, they are 5.72% (i.c. 18). 4.76 (ie. 15), 4.16% (ie. 13) and 3.84 (ie. 12) in C, G, P and B respectively. The percentage of the C, realizations are related in the case of CC, and as prepositional C, the contributed percentages are 4.16% (ie. 13), 6.72% (ie. 21) for C, and 2P prepositional C. The majority of C, are followed by different complementation types, they contributed 13.68% (i.e. 43) the highest percentage, the to-infinitive contributed the highest percentages, it scored 6.64% (ie. 21). The prepositional phrases scored the percentage 1.92% (i.e. 6), other complementation types occurred less frequently along with the nominal clauses as C, which scored the percentage 1.24% (i.e. 4), see table (V)

TABLE III  
ADJECTIVE COMPLEMENTATION CATEGORIES

Discipline	Realization	Pp		To-infinitive clause		Wh or Interrogative clause		Than- clause		That- Clause		-ing participle clause		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
G	C	1	0.32	5	1.60	1	0.32	/	/	4	1.28	/	/	11	3.52
	R	/	/	1	0.32	/	/	/	/	/	/	/	/	1	0.32
C	C	1	0.32	8	2.56	/	/	/	/	12	3.84	/	/	21	6.72
	R	/	/	1	0.32	/	/	/	/	/	/	/	/	1	0.32
B	C	5	1.60	6	2.00	1	0.32	/	/	9	2.34	/	/	21	6.26
	R	/	/	1	0.32	/	/	/	/	/	/	/	/	1	0.32
P	C	4	1.28	7	2.24	/	/	/	/	11	4.00	1	0.32	23	7.84
	R	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Total		11	3.53	29	9.36	2	0.64	/	/	36	11.46	1	0.32	79	25.3

TABLE IV  
C, AS CLAUSES

Discipline	Realization	That-clause		Interrogative clauses		Subordinate interrogative clauses		Nominal relative clauses		To-infinitive		-ing infinitive		Bare infinitive		Other clauses		Total		
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
	C	2	0.60	/	/	/	/	/	/	/	/	/	/	/	1	0.32	3	0.92		
	R	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	C	6	2	1	0.32	/	/	/	/	3	0.92	/	/	/	2	0.60	12	3.84		
	R	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	C	3	0.92	/	/	/	/	/	/	5	1.60	/	/	/	2	0.60	10	3.12		
	R	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	C	9	2.80	2	0.60	/	/	/	/	4	1.28	/	/	/	/	15	4.68			
	R	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Total		20	6.32	3	0.92	/	/	/	/	12	3.80	/	/	/	5	1.52	40	12.56		

TABLE V  
CO DISTRIBUTION

R e s u l t s	Prepositional Co			Np as Co		Adj p as Co with complementation										Adj p as Co without Complementation		Co as a clause		Total						
	Co Adj p		Co NP	Np		To-Infinitive		PP		-ing		That clause		Wh-clauses		That clause		n o.		N O						
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
C	2	0.64	4	1.28	2	0.64	3	0.92	4	1.28	/	/	/	/	/	/	/	/	/	/	/	/	15	7.76	15	7.76
R	/	/	/	/	1	0.32	4	1.28	/	/	1	0.32	/	/	/	/	/	/	/	/	/	/	6	1.92	6	1.92
C	1	0.32	2	0.69	6	1.92	4	1.28	/	/	/	/	/	/	1	0.32	/	/	1	0.32	3	0.92	18	5.72	18	5.72
R	1	0.32	1	0.32	2	0.64	/	/	/	/	/	/	/	/	/	/	/	/	2	0.64	/	/	6	1.92	6	1.92
C	/	/	8	2.56	/	/	2	0.64	/	/	/	/	/	/	2	0.64	/	/	/	/	/	/	12	3.84	12	3.84
R	/	/	7	2.24	/	/	3	0.92	1	0.32	/	/	/	/	/	/	/	/	1	0.32	/	/	5	1.56	5	1.56
C	1	0.32	1	0.32	1	0.32	5	1.6	1	0.32	/	/	/	/	/	/	/	2	0.69	1	0.32	13	4.16	13	4.16	
R	/	/	/	/	1	0.32	/	/	/	/	/	/	/	/	1	0.32	/	/	5	1.6	/	/	6	1.92	6	1.92
R	5	1.6	16	5.12	13	4.16	2	0.64	6	1.92	1	0.32	/	/	4	1.28	/	/	11	3.5	4	1.29	81	25.8	81	25.8
	6.72% (i.e. 21)			4.16% (i.e. 13)		13.88% (i.e. 43)										1.24% (i.e. 4)		25.8% (i.e. 81)								

CONCLUSION

1. It is obvious from table (1) that the highest rate of complements distributed as C, which are more likely to be current attributes. They represent the percentage 74.00% (i.e. 231), while the C, represent the percentage 25.8% (i.e. 81).

2. The majority of verbs occurring in the SVC, patterns is the current linking verb "be" rather than the resulting linking ones. The verbs in the SVOC, pattern are complex-transitive ones which are also current rather than resulting. By comparison the pattern SVOC, is less frequent in the four analysed texts, they appeared in the passive form rather than the active one, 3. The majority of adjectives appeared in these two patterns deal with truth or knowledge. The adjectives as (C) are followed by various structural complementation types, in that the adjective complement- ations are one of the syntactic features of scientific writing by which we can distinguish this type of writing from other genre. These adjective complementation categories can be added to the features of EST, namely passivization, choice of tense, noun modification,

relativization and conditionals, which are considered as important results.

REFERENCES

Allerton, D. J. (1985). "Problems of Modern English Grammar IV Headless' Noun Phrases: How to Describe the Exceptional FINDINGS". In: English Studies, Vol.1, pp.81-91.

Al-Hasso, B. (1982). A Study of Basic Sentence Patterns in Scientific English (Unpublished M.A. Thesis) University of Mosul.

Broughton, G. (1990). The Penguin English Grammar A-Z for Advanced Students. London: BPPC Hazell Book Ltd.

Eastwood, J. (1994). Oxford Guide to English Grammar. London: Oxford University Press.

Huddleston, R. D. (1984). Introduction to the Grammar of English. Cambridge: C.U.P.

Lester, M. (1976). Introductory Transformational Grammar of English, U.S.A. Matthews, P. H. (1981). Syntax. Cambridge: Cambridge University Press. Quirk, R.; Greenbaum, S.; Geoffrey, N. L.; and Jan Svartvik (1985). A Comprehensive Grammar of English Language. London: Longman.

The Analysed Texts

Clemmow,P.C.( 1973):An Introduction to Electrgomagnetic Theory. Great Britain. Cambridge University Press.

Finar, L. I ( 1967):Organic Chemistry. Great Britain: Longman, Green and Co. Lt Volume 1, Five Edition

Kuper, Ch, M. A.(1962): The Organization of Cellular Activity. Netherlands: Else-Ier Publiishing Company.

Morrison, R and Ropert,N. B( 1973)Organic Chemistry. U.S.A.;; INC

Pearl, R. M. ( 1966): Geology: An Introduction to Principles of Physical and Historical Geology. U.S.A: Branes and Noble, INC.

Sharp, L, W. ( 1943): Fundamentals of Cytology, Japan; INC.

Weyl, H. ( 1952); Space – Time Matter. New York: Dover Publications, INC.