CHAPTER-III

RHETORICAL FUNCTIONS
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3.1 Rhetorical Functions in EST Discourse:

The basic rhetorical functions commonly found in EST discourse are fundamental parts of organization of scientific and technical information. These rhetorical functions represent different writing styles and multiple organizational frameworks that are recurrent in scientific texts. In addition, the rhetorical functions are also related to certain grammatical elements. In fact, these grammatical elements provide the major bases for the procedures that allow students to discover which lexical, grammatical and rhetorical features writers have chosen to represent best their information. The use of specific grammatical elements which appear to be governed by the rhetorical functions that the writers choose to carry their information help readers understand why a particular piece of grammar, for example, a verb tense, mood or definite article is used in a particular text. Each rhetorical function provides readers with different kind and different amount of information. As a result, each function is clearly separable and identifiable. The determination of lexical items enables readers to get the full meaning from a piece of text and thus in conjunction with the other steps in the procedure, provides a clearer understanding of the unit of discourse being
analyzed. The rhetorical functions and their sub-functions as discussed by Selinker and Lackstrom\(^1\) (1973) are outlined below.

1. **Description**: it includes physical, function and process description.

2. **Definition**: formal, semiformal, non-formal and expanded definition.

3. **Classification**: complete and partial classification.

4. **Instruction**: direct instructions, indirect instructions and instructional information.

5. **Visual verbal relationship**: text information, text placement and placement of visuals.

### 3.2 The Rhetoric of Description

Description is an inclusive term. It is widely used in scientific and technical writing because it covers the major portions of scientific text. In EST discourse description is comprised of three major types of descriptive information: Physical description, function description and process description. It is interesting to note that when a text is developed mainly by physical description, it also contains some function description and when a text is

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elaborated mainly by function or process description, it contains some physical description.

3.2.1 Physical Description

In physical description, the writer discusses at length the physical properties of machines or technological equipments. He also describes how various parts of a machine are linked to one another and how they function together to carry on the activities and expedite the procedure. The physical characteristics most frequently described are dimension, shape, weight, material, volume, colour and texture. These features are taken into account in order to give a clear picture of an equipment. As far as the linkages of various parts of a machine are concerned, they include for general description the position which is indicated by the terms such as above, below, the right and close to etc. For a specific description they include the position which is indicated by terms such as perpendicular to, from the centre, at an angle of 380 etc. An example of general physical-description is given below:

An autorickshaw is a form of transport which does not depend on human muscles yet is cheaper than a taxi, both to run and use. It consists essentially of a motor cycle engine mounted on a
three-wheeled chassis, with space for passengers and a driver.

The single steering wheel is at the front, below the windscreen with the two driven wheels at the back. The passengers are protected from the weather by a canvas hood, but there are no doors.

The driver sits in front with the engine beneath his seat and the handle bars in front of him. The passenger compartment is at the back and has a bench type seat which can hold up to four people. Between the passengers and the driver, there is a steal framework which separates the two compartments and supports the canvas roof.²

In the above text the writer describes the essential features that an autorickshaw must have to be an autorickshaw. The text contains the description of inside and outside of the vehicle. Such description of interior and

exterior parts of the vehicle is the logical pattern that the writer has used to illustrate the entire mechanism of the vehicle. In the first paragraph the writer compares an autorickshaw with taxi. In the second paragraph he describes the functions as well as the positions of the wheels, just by adding two adjectives such as 'steering' and 'driven'. In the same paragraph the writer mentions the function as well as the existence of the hood. Throughout the text the writer has used Simple Present Tense.

3.2.2. Function Description

Function description gives the reader information relating as a rule to the purpose and functioning of various devices of the machine. These bits of information are also associated with causality and result, for example:

When the rotating chuck reaches the welding speed, the parts are brought into contact under a light axial load. As the abutting faces rub together, friction between them generates heat, and localized hot plastic zones are produced. With the end load maintained, heat continues to be generated until the whole interface has reached a uniform temperature...... When
sufficient heating has occurred, the relative rotation of the parts is stopped rapidly, and the end load may be increased.

3.2.3 Process description

Process description refers to a series of steps or stages to be undertaken to lead towards a definite goal. The purpose of such a composition is to describe how something is done, sometimes by using analogy to facilitate the understanding of the readers. Very often when a writer is describing a process he also needs to include sections of arguments in order to explain a series of steps to be taken for the completion of a task. It also needs to be mentioned here that technical writers often describe processes such as methods of testing or evaluating, methods of installing, flow of material through a plant, the schedule for implementing a proposal and the method for calculating depreciation. Manuals and reports contain many examples of process descriptions. Processes can be described either in Present Tense or in Instructional form. An example of process description where the writer uses Present Tense is given below:

The combustion of a flammable charge

generates heat in an internal combustion engine. Most heavy combustion engines use a gas fuel or diesel oil. A spark ignites the fuel, and this produces heat energy. A piston connected to a crank shaft converts this heat energy into mechanical energy. Such engines use petrol. Petrol and air form the mixture for the charge. A spark from the distributor ignites this mixture, and the ignition of this mixture produces heat energy.

3.2.4 Process Description in Instruction

The description of process in instruction states a series of steps in chronological order. Imperative sentences are used to suggest a series of steps that have to be taken for performing a task. A simple example of the description of process in instruction is given below:

**Banana Puri:** Peel and mash the banana. Sieve the maida and rub in the ghee. Add the banana pulp, sugar and salt and knead into a stiff dough. Keep aside for one hour. Knead again, and divide into equal size portions. Form into balls. Roll these out into puris and

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Here we have sequence of 14 steps in instruction form which can be rewritten in the usual style of a process, beginning with informative sentences, such as, bananas are peeled and mashed. Here it also needs to be mentioned that as compared to informative sentences, the use of imperative sentences is more direct and understandable.

3.3 The Rhetoric of Definition

There are two broad categories of definition: simple definition and complex (or expanded) definition.

By simple definition is meant a definition in one sentence which may be further divided into three basic types: formal definition, semi-formal definition and non-formal definition. Each of these provides information in different amounts and at different levels of precision.

3.3.1 The Formal Definition

The formal definition is one sentence that contains three parts: the term that needs defining, the class to which the item belongs, and the differentiation of that item from all other numbers of its class. To define a term, the writer, first, places it in a class. The class, which is the large
group to which the terms belongs, can be either broad or narrow. For example, a pen can be classified as a 'thing' or as a 'writing instrument'. Similarly 'a carburettor' can be a 'part' or a 'mixing chamber'. The narrower the class the more meaning it conveys. Jordan (1984) illustrates the term by making an equation such as, species = Genus + Differentia or \( T = C + D \). \( T \) is the term being defined, \( C \) is the class and \( D \) is the sum of the differences which distinguish it from all other members of the class, for example. 'An arachnid is an invertebrate animal having eight legs extending at equal intervals from a central body.'

Three pieces of informations that emanate from a single sentence are:

1. \( T \) the term = arachnid
2. \( C \) the class = invertebrate animal
3. \( D \) the differences (That is the difference between our term and all other invertebrate animals.) =

   a) an arachnid has eight legs and
   b) these legs at equal intervals or a central body.

Both these differences are necessary since other invertebrate animals – the octopus – also have eight legs;

however the arachnid is (in so far as we know) the only eight legged invertebrate animal that has its legs extending at equal intervals from a central body. Thus the formal definition gives the reader three kinds of information:

1. The theme of the term being defined
2. The class to which the term belongs
3. The difference(s) between the term and the other members of the class; these differences are essential characteristics of the term.

3.3.2. Semi-Formal Definition

A semi-formal definition in scientific discourse relatively provides the readers with less information. It has only two basic defining elements such as the term being defined and the statement of differences. It indicates that the information is not complete because one class is left out. As a rule the writer leaves out a statement of class because it is assumed to be either obvious or it is so large as to be meaningless, for example if we drop the class from our previous definition of arachnid, what remains is the typical structure of a semi-formal definition. *An arachnid has eight legs projecting at equal intervals from a central body*. This is clearly a definition by description of all the arachnidae, but it leaves out the
An important definition given by the class, *invertebrate animal*. An arachnid has eight legs extending at equal interval from a central body and is invertebrate.

### 3.3.3 Non-Formal Definition

A non-formal definition aims to simplify the information by an easy substitute word rather than to provide basic and precise defining information. In other words, the information is elucidated by another word or phrase having the approximate meaning of the term, or giving an outstanding characteristic of the term. This word or phrase can be stated positively, as a synonym or negatively as an antonym. Hence, a non-formal definition or our previously defined term *arachnid* would be ‘An arachnid is a spider; this definition is not, strictly speaking, true. Thus, the definition is not substituting a term that is on the same level of generality. However, since, precision is not the writer’s aim and since the spider is the most well known form of arachnids, the definition adequately satisfies its purpose of giving readers a clear idea of the meaning of arachnid, and they can continue reading with little loss of comprehension.

Another frequently found method of defining non-formal definition is to give a term and then define it
by its most common or most outstanding characteristic. We can define helix; in this way: *A helix is spiral.*. Although any spiral form or structure can be called a helix, not all helixes are spiral, some are cylindrical, as for example, our definition of helix; then gives a characteristic of the most common form of helix rather than an accurate synonym.

3.3.4. Complex Definition

A complex definition includes those special types that are found frequently in written EST discourse. These are definitions 1. By stipulation,. 2. By operation and 3. by explication,. As a rule, all three are forms of expanded definition and so are found in full paragraphs or in group paragraphs.

3.3.5. Stipulation

Stipulatory definitions are found only in connection with other types of definition which are usually but not necessarily formal in form. The purpose of a stipulatory definition is to set limit-in time, in place, in field, in meaning to the main definition.

In written EST discourse three types of stipulatory definitions have been explored; mathematical stipulation, legal stipulation and general stipulation.
i The basic aim of mathematical stipulation is to identify the symbols in a formulae or an equation or the set values to variables:

'In this formulae X represents the vertical vector; 'Pi, in this equation, has the value of 3.14159;

ii Legal stipulation is found mostly in contracts and similar business documents: 'The term "special tooling" as used in this clause, includes all jigs, dies, fixtures, moulds, patterns .... and other articles of equipment.

iii General stipulation is governed by scientific and technological invention. New scientific and technological discoveries give rise to new words. The coinages of the terminologies are made in order to name the scientific and technological equipments and to assign new terms in new ways to activities, processes or objects resulting from research and similar investigations: for example entropy in formal English means a state of disorder or confusion but in scientific discourse it refers to the
relation between the total amount of heat and the temperature.

\[ Entropy = \frac{\text{heat}}{\text{temperature}} \]

3.3.6 Operational Definition

An operational definition gives the meaning of an abstract word for one particular time and place. Scientists and managers use operational definitions to give measurable meanings to abstractions. According to Fahnestock et al. (1982), an operational definition creates a test for discriminating in one particular circumstance. For instance, to determine whether a marketing programme is a success, managers need to define success. If their operational definition of success is to increase sales by 10% and if the increase occurs, the programme is successful. On the contrary, in science, the reader, with the help of operational definition, learns to know what to do in order to experience physical and mental activities while acquiring the actual import of whatever is being defined. Most operational definitions in written EST discourse refer to physical and mechanical activities. Often does the text of such a definition contain a set of instructions with verbs

usually in the indicative rather than in the imperative form. An example of operational definition is given below:

The sound [F] is a voiceless, labio-dental fricative, formed by placing the lower lip lightly against the upper teeth, closing the vellum, and forcing the breath out through the spaces between the teeth or between the teeth and the upper lip.  

This example contains a single sentence definition with the 'operational' element coming in the statement of differences. This type of operational definition in a single sentence is not at all common. Most of texts of this type develop the information in, at least, one paragraph.

3.3.7 Explication

An explicated definition is a reader oriented definition. It aims to facilitate the understanding of the readers by giving additional information about a key term found in the original definition.

The new information is usually in the form of synonym-words and phrases that substitute for the original defining words or the phrases that the writer wishes to

explicate. The writer gives a simpler definition which explains the key term found in the original definition. The use of synonym is more effective as a definition only when it is better known than the term being defined. Such as people are more familiar with 'loudspeaker' than with 'electroacoustic transducer', the technical term that has the same meaning. If audience knows less about the topic then common words may be used to clarify technical terms. While using synonyms the writer can put the common word or the technical term in parenthesis or set it off with dashes, as in the following examples.

1. Parentheses: The maps are drawn in a projection that enlarges the areas near the edges (called limbs) of the moon, which are otherwise too foreshortened to be seen clearly.

2. Dash: At the edges of some of the maria we find indentations, each known as a bag-or sinus.

3. Many of the craters have central peaks - round regions at their centres.⁹

3.4. The Rhetoric of Classification

Classification is an important entity in the development of both describing and defining the paragraph. It is the main function of the paragraph and is capable of being isolated and studied on its own. Likewise definition, classification is basic to human thinking and so to scientific expression, but definition deals with only one member of a class while classification deals with all or the most important members. In written EST discourse classification is actually a two way process. If we have one or more members of a class, the procedure is to find the class to which those members belong. If we have a class, we then try to find out the members that make up the class. After finding a class for an item, we find it necessary to determine what other items, if any, are also the members of this class. In EST discourse, Close¹⁰ (1965) has identified three types of classification:

I. Complete classification. II. Partial classification and III. Implicit classification.

3.4.1 Complete Classification

A complete classification provides the readers with three kinds of information.

I. The item (or items) being classified—i.e., the members of the class.

II. The class to which the members belong

III. The basis for classification.

The first gives us the name of two or more terms and suggests that there is a relationship between them but it does not specify precisely what in fact this relationship is. The second names the class to which the members belong and gives the additional information on the relationship between them. The third tells us what way the members of the class differ from one another or how they are similar. An example of a complete classification with a finite number of members is given below:

Abnormal beliefs usually denote the presence of a psychiatric illness. There are two major examples of abnormal beliefs: (1) Paranoid delusions and (2) Nihilistic delusions. Paranoid delusions are further divided into subparts: delusion of persecution, delusion of grandeur and delusion of poverty. Similarly nihilistic delusions are also divided into subparts: delusion of love, infidelity, influence and delusion of reference. These delusions are
further classified into abnormal perceptions and abnormal experience. Abnormal perceptions contain distortion, illusions and hallucination. Abnormal experiences, on the other hand, are reflected by Capgras syndrome, depersonalization and derealization.¹¹

Two levels of classification have been adopted in the above paragraph. The largest class in the paragraph is 'abnormal beliefs'. The abnormal beliefs have been classified into two major parts: (1) Paranoid delusions and nihilistic delusions which have become classes in turn. Each of the classes has further specified numbers of 'abnormal delusions' as its members. Therefore the above paragraph is marked with complete classification.

3.4.2 Partial Classification

A partial classification does not incorporate the core basis for various classifying terms but it emerges from the context itself. The writer sometimes deliberately presents a paragraph of such classification that has no stated basis because he feels that it can be easily made out from the context itself. An example of such partial classification which does not possess explicit and absolute classification

is given below:

In considering speech disorders, it is essential to distinguish between defects of articulation and enunciation of speech called dysarthria, and disturbances of the structure and organization of language itself, aphasia. There are four main types of dysarthria: cerebellar, pseudobulbar, bulbar and cortical dysarthria. The word 'aphasia' means a disturbance of the ability to use language whether in speaking, writing or comprehending. There are several different classification of aphasia, but in practice, these are largely of theoretical interest. 12

The above paragraph starts with two major kinds of speech disorders: the first is called 'dysarthria' and the second is 'aphasia' in medical discourse. Dysarthria has further been classified into four major disorders: cerebellar, pseudobulbar, bulbar and cortical dysarthria but the classification of 'aphasia' has not been mentioned.

12. Ibid; P. 283.
Another example of partial definition is "Razor blades, which can be classified as single edge or double edge. Here we have the name of the class and of its two members but no statement of the basis for classification has been mentioned. The basis for classification would be: "Razor blades can be classified according to the number of the edges a blade has. These are single-edged and double edged blades.

3.4.3 Implicit Classification

Implicit classification contains only limited categorization which may be further enlarged through the repertoire of the readers' knowledge. The intensive knowledge of the reader makes him capable enough to explore some more qualities in addition to those already mentioned in the paragraph. The classification becomes more explicit when the reader has enough knowledge to analyse the paragraph thoroughly. Implicit classification possesses all classifying information inherently though explicitly they are not stated in rhetorical function. Classification information is present in the discourse but not in the classification terms. The reader applies his own insights to explore the classifying information in a paragraph that possesses no overt purpose. The reader can then extract information and rearrange them into a new
paragraph. The paragraph which is cited below gives a better idea of such paragraph:

A similar need for research exists in the branch of hydrology that deals with the quality of water. In nature, there is no water like the pure water defined by chemists made up only of hydrogen and oxygen. River water, ground water and even rain water always contain other dissolved or suspended elements and these even when present in small quantities, play an important role.\(^{13}\)

The above paragraph contains two levels of generality: the class of the first level is ‘water’ with the two members-‘man made’ and natural. ‘Man-made’ water is implied by the second sentence of the paragraph. The class ‘man-made’ is shown with only one member; however there can be obviously other kinds of water alongwith pure water such as impure water, saline water, heavy water etc. Also the water gives us only three members of the class ‘natural water, even though there are several other natural resources. Finally it will be worthwhile to mention that other forms of water can also be gauged from the context.

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though the writer has failed to give us the bases for classification.

3.5 The Rhetoric of Instruction

The rhetoric of instruction is a common phenomenon in occupational English discourse. Its frequent occurrence has given a distinguishing feature to the practical manuals of engineering and medical sciences. Instruction may be defined as discourse that tells someone to do or not to do something. Hence it is used for a series of steps necessary to be undertaken for accomplishing a task. Instructions may be direct or indirect. Direct instructions are characterized by the use of imperative sentences in the form of vertical list that is often headed by a statement indicating the goal of instruction, such as:

**Procedure**

1. Select six rats weighing 120 to 150g.

2. Administer sodium pentobarbitone 30 mg/kg. to five rats by different routes as shown in table below. The sixth rat is administered equal volume of saline and serves as control.

3. At intervals gently place the rat on its back. Inability of the rat to resume upright posture indicates loss of righting reflex.
4. Note the time of drug administration, loss of righting reflex and the time when the reflex is regained.\textsuperscript{14}

This is an example of good instruction writing. Each instruction is closely separated from the others. Each is written in the same style.

In indirect instruction non-imperative verb forms are used. The most frequent forms used within direct instructions are passive verbs and modals. It is usually in the paragraph form. It assists instruction or instructional information by providing corollary information, cautions, warnings, specifying statements, description and theoretical consideration. e.g.

The rating of the fuse should be equal to slightly higher than the rated full load current of the other power supply. The fuse is a protective device which opens the circuit if the load becomes shorted to prevent applying a continuing reverse voltage to 382 A.\textsuperscript{15}

1. Cautions: This circuit will short out under any overload

2. Warning: Do not use the intake duct as a shelf for tools.

3. Notes: Ripple functions to provide a path for AC voltage

To sum up, both imperative and non-imperative sentences are used in scientific discourse in order to give necessary information to the trainees.

More particularly, imperative sentences are preferably used when it is to quickly bring to the knowledge of the users, the information about how to use an equipment. As a matter of fact instructional information gives an easy grasp of the procedures to the users.