Reading
and
Thinking
in English

Discovering
discourse
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Unit 4  Definitions

Preview
This unit is concerned with the use of definitions to convey information in passages.

Part 1
draws attention to the nature of definitions and how they are used in communication.

Part 2
deals with different types of definitions.

Part 3
practises ways of expressing definitions.

Part 4
shows how simple definitions can be expanded in paragraphs.

Part 5
provides practice in applying reading strategies to a passage concerned with the definition of several concepts.
Part 1  THE NATURE OF DEFINITIONS

Part 1
The nature of definitions

Read the following passage in order to find out about the device shown in the picture. Then answer the questions after the passage.

Methods have recently been elaborated to measure food crushing sounds so that foods can be manufactured to produce the exact level of noise considered desirable. After a considerable amount of preliminary study a technique was developed which records the sounds of food being masticated. The instrument is similar to a transistorized hearing aid and is inserted in the ear of the experimenter. The hearing aid picks up the noise produced and transmits it via an appropriate circuit to a magnetic tape and the recording is subsequently analysed for frequency and amplitude.

Use the diagram to answer these questions.
1  What does the masticometer consist of?
2  What are its dimensions?
3  How much does it weigh?

Now use the passage to answer these questions.
4  What is its function?
5  Where is it placed?
6  What does it resemble?
7  How does it work?

The masticometer is an instrument. In order to define it we have to choose the characteristic which makes it different from other members of the same class (other instruments; for example, a barometer or a stethoscope). Which of the following statements expresses the defining characteristic of a masticometer?

a  It is 5 cm long and weighs 20 grams.
b  It consists of an amplifier and a plastic tube.
c  It is connected to a magnetic tape.
d  It measures food crushing sounds.
e  It is used in experiments on food.

∴ we can define a masticometer as an instrument which …….
In making a definition we normally give:

a the specific concept being defined
b the class to which the specific concept belongs
c the specific characteristics of the concept which make it different from other members of the same class.

Use the following diagram to write a definition of an amplifier

An amplifier .......

Notice that we can make a generalization about amplifiers in the following way:

An amplifier makes signals bigger.

Activity 1

Draw a diagram for each of the following statements to show whether it is a definition or a generalization.

1 A stethoscope is an instrument for studying sound generated inside the human body.
2 Hearing aids enable deaf people to hear sounds such as normal speech.
3 A frequency changer is a machine designed to receive power at one frequency and deliver it at another frequency.
4 Food technology is concerned with the processing of food.
Part 2
Types of definitions

Activity 2

We can identify two main types of definitions. The two types occur in the following passage. Read the passage carefully and then answer the questions concerning the definitions found in it.

Parasitology may be defined as the branch of biology which deals with the nature of parasitism and its effects on both the parasite and the host. Broadly defined, a parasite is an organism which lives for all or part of its life on or in another organism from which it derives some benefit, such as food, shelter or protection. Organisms living on the host are known as ectoparasites; those living within the host organism are called endoparasites.

1. Complete the following diagram to show the general and specific terms mentioned in the passage.

   ![Diagram of organism and host]

2. Which of the words in your diagram are defined in the passage?

3. What is the difference between the two kinds of parasites mentioned?

4. Complete the following diagrams to show the structure of two of the definitions in the passage.

   ![Diagram of concept, class, and characteristics]

   ![Diagram of concept, class, and characteristics]

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Notice that the structure of these definitions is:
\[
\text{CONCEPT} = \text{CLASS} + \text{CHARACTERISTICS}
\]

5 Use the information in the passage to complete the following diagram.

\[
\begin{array}{c|c|c}
\text{CONCEPT} & \text{CLASS} & \text{CHARACTERISTICS} \\
\hline
\text{host} & & \\
\end{array}
\]

Now write a definition of host based on the diagram.

6 Identify the concept, the class and the characteristics in the following definition.

Organisms living on the host are known as ectoparasites.

This definition therefore has the structure:
\[
\text{class} + \text{characteristics} = \text{name of concept}
\]

We will call the definition with the structure
\[
\text{concept} = \text{class} + \text{characteristics}
\]

a real definition. A real definition specifies the nature of a concept. The nature is specified by giving the class and characteristics.

We will call definitions with the structure
\[
\text{class} + \text{characteristics} = \text{name of concept}
\]

nominal definitions. A nominal definition states the nature of a concept and then identifies it by giving its name.

Activity 3

This activity practises recognition of real and nominal definitions. Study the following passage and identify the definitions in it. Decide whether they are real or nominal definitions.

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KINEMATICS
Kinematics is the branch of applied mathematics that deals with the motion of bodies without considering the forces which produce such motion. When a body moves, so changing its position, the distance it has moved is measured by the length of its path of motion. Distance is therefore a scalar quantity. Speed is also a scalar quantity. Speed is defined as the rate of change of distance with time. The speed of a body measured in a definite direction is known as its velocity. Consequently, velocity is a vector quantity. If there is a change in either the speed of a body or its direction of motion, then the body is subject to an acceleration. We may therefore define acceleration as the rate of change of velocity with time. When the speed of a body decreases with time the rate of decrease of speed is known as the deceleration.

Notice that the explicit markers used to express the two types of definitions are different:

<table>
<thead>
<tr>
<th>real definitions</th>
<th>nominal definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>concept</td>
<td><em>is defined as</em> may be defined as</td>
</tr>
<tr>
<td>class + characteristics</td>
<td><em>is known as</em> is called</td>
</tr>
</tbody>
</table>

Activity 4
This activity shows how the use of real and nominal definitions depends on the context.

Compare the following definitions:

1. Semantics is the branch of linguistics which studies meaning.
2. The branch of linguistics which studies meaning is called semantics.

In the first definition the theme is 'semantics'. What is the new information? In the second definition the theme is 'the branch of linguistics which studies meaning'. What is the new information?
As we saw in Part 4 of Descriptions, an element of the sentence may be selected as theme because it has been mentioned previously in the same passage. Look again at the passage in Activity 2 of this unit. Find the two nominal definitions and identify the theme. Underline the part of the passage where the theme is mentioned previously.

Below are five sentences. Each sentence is followed by information in parentheses: (...). Use the information given in parentheses to write a definition. Make the information given in the preceding sentence the topic of your definition.

Example 1
The first communications satellites did not use stationary orbits.
(a stationary orbit = one in which the satellite travels round the earth once every 24 hours)

A stationary orbit is an orbit in which the satellite travels round the earth once every 24 hours.

Example 2
Orbits depend on gravitational attraction.
(a stationary orbit = one in which the satellite travels round the earth once every 24 hours)

An orbit in which the satellite travels round the earth once every 24 hours is known as a stationary orbit.

1 The first chapter of this book concerns cytology. (cytology = the science of cell structure)
2 Many people enjoy collecting coins. (numismatist = a person who collects coins)
3 Surveyors need to measure angles. (theodolite = an instrument for measuring angles)
4 Most countries have traditional stories and legends. (myths = traditional stories which often concern the supernatural)
5 Alcohol is produced by distillation. (distillation = process by which a liquid is evaporated and then condensed)
Part 3  WAYS OF EXPRESSING DEFINING CHARACTERISTICS

In Part 2 we studied the two main types of definitions, real and nominal definitions. We saw that in real definitions the concept being defined is the theme. In nominal definitions the new information is the name of the concept. Thus the use of the two types of definitions depends on the context. In this part we will study ways of expressing one of the elements in definitions.

Activity 5

Study the following definitions concerned with chemistry and underline the part of each definition that refers to the characteristics.

1. Elements are chemical substances that cannot be broken down into anything simpler by chemical means.
2. A neutron is a particle having the same mass as a proton but carrying no electrical charge.
3. A trace is a substance used to follow a chemical reaction or a physical process.
4. Fractional distillation is the distillation process in which liquid mixtures are separated into their components.
5. A catalyst is a substance which accelerates a chemical reaction.
6. Cracking is the process by which large molecules are broken down into smaller ones by means of high temperatures and pressures.

Note that in the above statements the characteristics and the class are connected by means of certain relative words:

<table>
<thead>
<tr>
<th>CLASS</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>that</td>
<td></td>
</tr>
<tr>
<td>which</td>
<td></td>
</tr>
<tr>
<td>in which</td>
<td></td>
</tr>
<tr>
<td>by which</td>
<td></td>
</tr>
</tbody>
</table>

Notice which and that are omitted in the following:

(class)
X is a substance having . . . . . . used for . . . . .
Activity 6

As we saw in Part 1 we can change a definition into a generalization by removing the class. For example,

<table>
<thead>
<tr>
<th>definition</th>
<th>generalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>A catalyst is a substance which accelerates a chemical reaction.</td>
<td>A catalyst accelerates a chemical reaction.</td>
</tr>
<tr>
<td>A trace is a substance used to follow a chemical reaction or a physical process.</td>
<td>A trace is used to follow a chemical reaction or a physical process.</td>
</tr>
</tbody>
</table>

Now rewrite the following definitions as generalizations. The definitions all concern electronics.

1  A wafer is a piece of semiconductor used in transistors.
2  White noise can be defined as acoustic waves containing a wide range of adjacent random frequencies.
3  A parasitic aerial is an aerial which is not fed directly but which gains its energy by being close to a driven aerial.
4  Automatic frequency control (AFC) is a feedback circuit which controls the average radio frequency of an FM receiver.
5  A resistor is an electric component designed to introduce known resistance into a circuit.

Part 4

Expanded definitions

Part 3 studied different ways of expressing characteristics in definitions. Your attention was also drawn to the difference between definitions and generalizations. We are now going to study how definitions can be combined in a paragraph with descriptions, generalizations and examples.

Activity 7

Definitions expanded by descriptions
Study the following paragraph and underline the definition you find in it.
A telescope is an instrument for magnifying distant objects. It has two essential parts: the objective which collects light from the distant object and forms a real image, and the eye-piece which forms a magnified image of this image. Refracting telescopes use a convex lens as the objective and reflecting telescopes use a curved mirror of large diameter.

Which of the following pieces of information does the paragraph include?

a. function of telescopes
b. main structure of telescopes
c. invention of the telescope
d. function of the main parts of a telescope
e. some types of telescopes
f. different uses of the types of telescopes

Now complete the following diagram to show the structure of the information in the passage.

<table>
<thead>
<tr>
<th>definition</th>
<th>general description</th>
<th>description of types</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use information in the passage to complete the following definitions.

A. . . . . is a form of . . . . which uses a convex lens as the objective.
A reflecting telescope is a . . . . which uses a curved mirror . . . .

Activity 8

Definitions expanded by generalizations and examples

Read the following passage and say what concept is defined in it.

Man and most animals can only exist near the surface of the earth in the region known as the
biosphere. The biosphere is the thin layer of soil, water and air in which all life exists. On land the biosphere only goes down as far as the deepest tree roots. In the sea most life is in the top 150 metres although the biosphere can be considered as extending to the depths of the ocean. Some birds and insects fly high into the sky, but most animals could not even live on the earth's highest mountains. The upper limit in the air can be estimated to be around 10 000 metres.

From: *Man's Environment* (Macdonald Visual Books)

Now complete the following diagram to show the structure of the information in the passage.

Activity 9

This activity practises another way of expanding a definition in a paragraph.

Read the following statements carefully.

1. Price elasticity of demand and supply is the responsiveness of demand to changes in price.
2. It is useful to be able to predict the extent to which a price change will affect supply and demand.
3. Supply and demand behave in the same way as the elastic in clothes.
4. A finance minister needs to know the degree to which a new tax will reduce demand.

Decide which of the statements is: a definition, a generalization, an example, and an analogy.
Part 5  APPLICATION OF READING STRATEGIES TO A PASSAGE CONCERNED WITH DEFINITIONS

You will now find the statements used in a paragraph. Read the paragraph and answer the questions which follow it.

ELASTICITY OF DEMAND AND SUPPLY
The elastic used in clothes extends and contracts under the influence of forces applied to it. Demand and supply similarly extend and contract under the influence of such forces as changes in price. It is often useful to know the degree of extension or contraction that will follow a given price change. For instance, a finance minister who is about to impose a tax of 10 per cent on some commodity with a view to raising revenue would like to know in advance the probable contraction in demand that this new tax will inevitably cause. The responsiveness of demand and supply to changes in price has been termed 'price elasticity of demand and supply'. Price elasticity of demand is the responsiveness of demand to changes in price. Price elasticity of supply is the responsiveness of supply to changes in price.
From: G Whitehead Economics Made Simple (W H Allen and Co Ltd)

1  In what way are supply and demand similar to the elastic in clothes?
2  How will a price reduction affect demand?
3  Complete the following diagram to show the structure of the paragraph.

Part 5  Application of reading strategies
We are now going to study a passage which is concerned with the definition of a range of concepts. The passage is about systems and defines some of the concepts which are used in the systems approach to academic study. Here are some examples of things which are often considered as systems.
Now answer these questions about the three systems. Your answers will help you to predict some of the content of the passage.

1. What parts does each system consist of?
2. Which of the systems are natural and which is man-made?
3. When designing a system, such as a factory, what must be considered apart from the individual components?

Now read as much of the passage as necessary in order to find:

a. the traditional dictionary definition of system
b. the definition proposed by the writer.

Underline each definition when you find it.

Next read the passage carefully, paragraph by paragraph, and answer the comprehension questions. These will enable you to study how the different concepts related to systems are defined. The language study questions in the margins may help you.

SYSTEMS
Not long ago the term ‘system’ was hardly used, but the idea of system has assumed more and more importance which is reflected in the widespread use of the term. We are surrounded by ecosystems, we create and live in political and social systems,
we use transport systems and indeed, the most important part of us is a vital and mysterious system, our brain, part of the central nervous system. The word systems, however, is a problem word. Although everyone knows (or thinks they know) what it means, it turns out to be surprisingly difficult to define precisely. Systems are commonly defined in the dictionary as 'a group of objects united by some form of interaction or interdependence; an organic or organized whole such as the solar system or a new telegraph system'. This definition suggests that there are differences in the kinds of systems. The solar system is a natural system, a telegraph system is designed by man. There are also hybrid systems which are combinations of natural and man-made systems—hydroelectric plants, for example, or modern dairies.

1 List the different systems mentioned which are:
   a natural       b man-made      c hybrid.

The dictionary definition is a good introduction to a discussion of systems. However, it is not a sufficient explanation of a special meaning of the term. The special meaning of the term 'systems' emerged during and after World War II as a result of the need for building combat aircraft. In building such aircraft, designers realized that they could not simply take an existing airplane and add weapons, bomb and fuel storage space, communication and detection equipment, and protective armour. Adding such equipment at random restricted the plane's carrying capacity, speed, manoeuvrability, range of flight, and other vital functions. What emerged from this realization was a new method of planning and development in which designers learned that they first had to identify the purpose and performance expectations before they could develop all the parts that made up the systems as a whole. It is the system as a whole—and not its parts separately—that must be planned, designed, installed, and managed. What

\[ \text{what did they realize?} \]
is really significant is not how the individual components function separately but the way they interact and are integrated into the system for the purpose of achieving the goal of the system. Generalizing from this example,⁵ systems can be defined as deliberately designed synthetic organisms comprised of interrelated and interacting components which are employed to function in an integrated fashion to attain predetermined purposes.

2. In what way did the need to build combat aircraft result in the new concept of systems?
3. What was new about the "new method" mentioned?
4. What is important about the parts of a system?
5. Which of the systems mentioned in paragraph 1 does this definition exclude?

The concept of systems has rapidly expanded into new areas. Its military, industrial and business applications are enormous. Systems surround us everywhere. In the home, for example, there is a system whose purpose is to produce meals. The components of the system consist of the cook, the cooking equipment, the lighting, heating, water supply, storage and disposal facilities, the food, the dishes and the cookbook. All these interact in the performance of the processes which are necessary to accomplish the purpose of the system.⁶ In the case of the example given, meal production, the components will interact in such processes as planning the meals, acquiring, storing, preserving and preparing food, as well as sanitation and environmental control. Systems thus have a purpose and it is the purpose which determines the components of the system and also the interrelation of the processes in which the components engage.⁷ The purpose of any system is to produce a particular outcome. Systems can have different kinds of outcomes. To go back to the same example, the outcome of a meal-production system would be edible food.
6 This diagram illustrates the system described in the paragraph. Complete it with some of the specific information given.

<table>
<thead>
<tr>
<th>PURPOSE</th>
<th>COMPONENTS</th>
<th>PROCESSES</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>storage facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The planning, the acquisition of the food, the sanitation, and so on, can be viewed as subsystems that make up the meal-production system. A subsystem is a part of a total system which is designed to carry out a purpose whose attainment is necessary in order to achieve the overall purpose of the system. Subsystems operate in an integrated fashion. In a meal-production system, planning is integrated with and influenced by food acquisition, which then interacts with storage and preservation, preparation, and the other subsystems. The effectiveness of the system depends on how well they interfunction.

From: Bela Banathy, *Systems and Education* in *Instructional Systems* Belmont, California (Fearon Publishers) 1968

7 Underline the definition in the paragraph.
8 Use information from the paragraph to complete the following table.

<table>
<thead>
<tr>
<th>Concept defined</th>
<th>Examples of concepts</th>
<th>Generalization about the behaviour of subsystems</th>
<th>Examples of behaviour</th>
<th>Importance of subsystem in relation to system</th>
</tr>
</thead>
</table>

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UNIT 4  DEFINITIONS

WRITING A SUMMARY
Answer the following questions about the passage.
Write your answers as complete statements so that
they provide a summary of the passage.
1 How can we define the concept of 'systems'?
2 What does a system consist of?
3 What determines the content of a system?
4 What is a subsystem?
5 In what areas does the concept of systems have applications?