Chapter 2

Observing and Describing

2.1 Observing Purposefully

Suppose we are walking down the street, and hear a noise to our side. We turn our head, and ***notice*** a bird, with a blue body, bright red wings, and a long hooked beak. We wonder what bird it was, but keep walking. We saw the bird in passing, *incidentally*. We just happened to see it, and notice the colour of its body and wings and the shape of its beak. We didn't look at it intentionally, or observe it with any purpose in mind.

But suppose the bird catches our eye, and we stop to look carefully. By placing our ATTENTION on the bird, we are shining a beam of mental light on it. We are becoming *aware* of it. When we place our attention where we wish — on the sound of a bell, or the smell of a flower, the taste of a fruit, or the feel of sandpaper between our fingers, or on a story we are reading, we are ***training our attention***. When we begin to do this, we are training our ability to focus, to concentrate.

Now, suppose someone asked, "How are the leaves of a rose bush and a hibiscus bush similar? How are they different?" We want to find out. For this, we would have to ***observe*** leaves of the two types with AWARENESS, and ***describe*** their *similarities* and *differences*. This would be *purposeful observation* to look for an answer to a question. And if our observation is guided by a set of concepts to identify the similarities and differences (e.g., size, shape, pattern of the veins, and so on), it would be *systematic*. We arrive at scientific knowledge through PURPOSEFUL, SYSTEMATIC OBSERVATION, even though our inquiry might have been triggered by an incidental observation.

To develop the ability to observe purposefully and systematically, it is often useful to guide our attention with a *set of concepts* within which we can organize our observations. We call such a set of concepts an OBSERVATIONAL FRAMEWORK.

Here are some exercises that can help with such practice. They are designed to guide attention, and to help you develop the ability to ***describe*** or ***report*** what you observe. If you have done any laboratory work in school, you have probably written lab reports. The descriptions needed here are like those lab reports: they are meant to be descriptions that ***clearly and precisely communicate*** what you observe. In addition, these exercises also demand awareness and attention.

EXERCISE 1 What are their Similarities and Differences?

For each of the following 'pairs', observe them carefully, and describe their similarities and differences. For each one, make a list of the properties you are using. In making such a list, you will be creating the starting point of your observational framework.

a. flowers from two different types of plants/trees

b. two of your friends (ask them to stand in front of you)

EXERCISE 2 What is Unique about each of them?

a. Gather a whole flower each from ten different kinds of plants/trees. Observe each flower, and describe one of them in such a way that, from among the ten, based on your description, someone else can pick out the one that you are describing.

b. Pick five or six of your friends to watch. Observe each one under similar conditions (at lunch, for example, or over for a cup of tea). Write a description of one of them such that, based on your description, someone else can pick out the person you are describing.

2.2 Describing Systematically

Suppose we want to describe the similarities and differences between two dogs A and B. We might say something like this:

Similarities: A and B both have a head, a neck, a torso, four legs, and a tail.
A and B both have two eyes, a nose, a mouth, and two ears on the head.
A and B both have hair on the body, and not feathers.

Differences: A's hair is black; B's hair is brown.
A has short legs; B has long legs.

If we were to describe the similarities and differences between the dog A and a person C, we might say something like this

Similarities: Both A and C have a head, a torso, and four limbs.
Both A and C have a nose, a mouth, two eyes, and two ears on the head.
Neither A nor C has feathers on their body.

Differences: A has a tail; C doesn't.
A's forelimbs are legs; C's forelimbs are arms.
A's hair is brown; D's hair is black.

When we say that a particular creature has brown hair while another has black hair, we are using an OBSERVATIONAL FRAMEWORK where *hair colour* is a *parameter*. A PARAMETER is a category of properties, with two or more VALUEs.

A dog may be black, brown, or white, or some other colour. We say that dogs may vary along the parameter of hair colour, and the available *values* of that parameter are black, brown, white, and so on. Similarly, a creature may have a tail or it may not. When we say that C has a tail while D doesn't, we are using the presence/absence of a tail as a parameter in the framework. For C, the value of this parameter is 'PRESENT' (has a tail); for D, it is 'ABSENT' (doesn't have a tail). If we take the number of legs as a parameter, its value for a parrot is two; for a cat is four; and for a spider, it is eight.

Sometimes, academics use the term VARIABLE to refer to *parameter*. Thus, 'number of legs' is a variable, and its values are two (for a parrot), four (for a cat), eight (for a spider), and so on.

Now, to be useful, an observational framework must satisfy two requirements:

An observational framework must be capable of expressing

a. all the similarities and differences between two things (or sets of things) being compared (as in Exercise 1); and
b. what distinguishes one thing from everything else (as in Exercise 2).

EXERCISE 3 Polygons

a. Describe the similarities and differences between (i) equilateral triangles and squares, (ii) triangles and rectangles, and (iii) squares and regular polygons.
b. Identify what is unique about (i) triangles, (ii) quadrilaterals, and (iii) squares.

Moving to a different example, imagine that one day you were walking down the street, and you stopped in front of a house, because you saw two men running out of the house. It turns out that they had burgled the house. The police want you to help them catch the burglers, by giving a precise description of the men. How would you formulate the description?

How about a description like this?

> One of them was about 5' 8" tall, and thin, with dark brown hair. He had a long nose, light brown eyes, and a receding chin. He wore glasses, and ran with a slight limp.
>
> The other was about 5' tall, and somewhat stout. He was completely bald, and had a beard but no mustache. He had a small nose, dark eyes, and thin lips. He didn't have glasses.

What are the parameters in the above descriptions? Let us list them:

PARAMETER	VALUE PERSON 1	VALUE PERSON 2
Height	5' 8"	5' 0"
Build	thin	stout
Hair colour	dark brown	—
Beard	—	yes
Moustache	—	no
Nose	long	small
Eye colour	light brown	dark
Chin	receding	—
Lips	—	thin
Glasses	present	not present
Gait	has a limp	—

Now suppose that we want a systematic way of describing people, such that someone can complete a 'description form' that would allow anyone to identify somebody. Using the above table as a starting point, we could devise a general inventory for such descriptions.

EXERCISE 4 Creating Observational Frameworks

In Exercises 1 and 2, you described flowers. Based on your experience of writing those descriptions, create an observational framework of parameters/variables and values for describing flowers.

Take a few more types of flowers. Does your framework cover them? If not, modify the framework. This exercise is best done in groups of 3 or 4.

Exercises 5 - 7 are in the form of games that can be fun to play in a large group. For these, it might be useful to begin by forming two teams, A and B, each with two sub-teams A1, A2, B1, and B2.

EXERCISE 5 Uniqueness of Biological Species

Part 1 Team A picks a category of living organisms (e.g., rabbit, fish, eucalyptus, worm, butterfly, bird, pigeon, human, bacteria,..), writes the word on a piece of paper, and gives it to team B1 (the *describing team*). Team B1 describes the category, such that team B2 (the *guessing team*) can guess/infer the category.

RULE: Given a category (say, 'grasshopper', or 'dog'), the description can use ***properties*** (e.g., 'has six legs,' 'has a tail'), but not ***categories*** (e.g., 'is an insect,' 'is a mammal,' and so on).

Team B gets a point if they guess/infer the category correctly.

Part 2 If team B2 guesses the word correctly, team A members check if the given description can fit some other category. (e.g., if team B2 correctly guesses the word as 'dog', team A checks if the description also applies to 'cat' or 'mouse'). If the description fits some other category, it means that team B1's description was inadequate, so team B loses its point.

Part 3 Team B can argue that the description doesn't fit team A's candidate. To do this well, they will need to write down their final description, so that they can debate with team A. If team B defends its claim(s) convincingly, it retains the point.

Repeat Parts 1-3, with the teams reversed. Continue the rounds as long as you can/want.

EXERCISE 6 Uniqueness of Polygons

Part 1 In this exercise, we use polygons instead of living creatures. You know that a polygon is a shape bounded by straight lines and only straight lines. Right-angled triangles, equilateral triangles, rhomboids, and squares are all polygons. So are the shapes such as those in figures (i)-(iii)

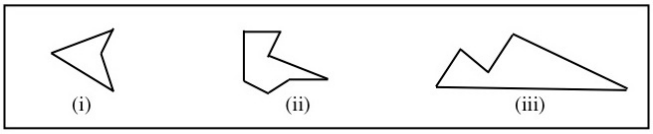

Figure (i) is a quadrilateral, (ii) is a septagon, and (iii) is a pentagon.

As with Exercise 5, only the describing team sees the picture. They give a precise description, such that the guessing team can draw a shape that is the same as the original figure. The describing team can use properties in the description, but not categories. (e.g., for (iii), 'is bounded by straight lines' is okay, but not 'trapezoid' or 'polygon').

Parts 2 and 3 of Exercise 5 apply to Exercise 6 as well.

EXERCISE 7 Extending the Scope to Abstract Concepts

We now move from biology and mathematics to philosophy. This exercise uses abstract concepts. Pick one from among these: truth, honesty, intelligence, science, inequity, justice, debt, and democracy. Follow the steps (Parts 1, 2, and 3) given in Exercises 5 and 6. As in the case of Exercises 5 and 6, the descriptions cannot use categories.

To make it both more fair and more interesting, A1 chooses the concept, without letting A2 know. If the guessing team of B guesses/infers the word, it gets a point. If team B doesn't guess/infer the word, team A2 gets a chance to guess/infer it. If they fail, nobody gets a point.

2.3 Observing Ourselves and our Sensations

The most basic way we understand the world around us is through our experience. A toddler who has bitten into a slice of lemon has *experiential familiarity* with sourness, even if he doesn't know the word for it. He associates that particular taste with lemons, projecting it as a property of the external world. With slightly older children, when we point to circular, triangular, and square shapes using the words 'circle', 'triangle', and 'square', they have experiential familiarity with the shapes that the words denote, though they have no understanding of those concepts. In both cases, the children have a sensory experience which, as part of their learning, can subsequently lead to conceptual understanding.

A still older child can hold a piece of rock in her hand and observe its size, shape, texture, and solidity. These are properties of the rock. She is observing these properties with her senses. Now ask her to shift her attention to the sensations that the rock produces on her hand. For this, she has to ignore the rock and concentrate on her hand in contact with it. Does it feel cold? Do her muscles feel its weight? If she feels its surface with her fingertips, does her skin feel its smoothness? How does it feel on her skin if she squeezes it? She is now turning her attention inward, and observing her own sensations.

Take another example. When we say, "This room is cold," we are talking about our observation of the room. When we say, "I am feeling cold in this room," we are talking about our own sensations.

Observing the world outside is a tool of inquiry. Using this tool, we can explore both human and non-human phenomena, for instance, the mind and the society of both chimpanzees and humans; or both the animate world and the inanimate world.

Observing the world within us — our own sensations, and responses to the outside world, and reporting it, is also a tool of inquiry. But it is available only for exploring human phenomena. Imagine watching a video clip of a human or an animal being tortured. As humans, we can look inward, tell if we feel disturbed by this, and report our observations using language. In the case of a

chimpanzee watching the same clip, we can arrive at conclusions about its internal state of feeling disturbed, on the basis of its behaviour. But we cannot expect a chimpanzee to look within its mind and describe what it observes. So when we study non-humans, we can use only what we observe in the outside world. When we study humans, we can use both looking outward and looking inward.

EXERCISE 8

Pick a few of your classmates (a random sample of as many as you wish, at least three), and do the following activity with each of them.

Say to them:

"Imagine you are sitting in a dark room with your eyes closed. And tell me:

"Can you see visual objects in your mind's eye? Can you consciously conjure up a specific image, say, the image of a banana, or of a friend?

"Can you hear sounds? Can you hear speech? In your mind's ear, can you hear sentences? Can you hear voices of different individuals in a recognizable way?

"Can you conjure up sensations of smell, taste, and touch in the same way?"

Make notes, and examine the reports.

Based on your investigation, try to arrive at reasonable conclusions about the human ability to imagine experiences coming from the different senses, and write a report on it.

2.4 Attentiveness in Observation

In our discussion in this chapter, we have distinguished between observing *the world around us*, and *the world within us*.

We have also distinguished between *incidental observation* and *purposeful systematic observation*. Just noticing something is an instance of incidental observation. But when we consciously observe the details, it is no longer incidental. It becomes *attentive* systematic observation.

Purposeful and systematic observation to look for an answer to a question, whether of the external world or the internal world, is an important process in inquiry. Another important process is describing what we observe.

Now, such purposeful and systematic observation may or may not be triggered or guided by a question. If we observe something in order to answer a question, it is most likely that we observe only those details that are relevant for the question. If we want to find out whether a creature sitting on a tree is a bird or a bat, we may ***focus*** on certain details, such as whether it has a beak or a mouth, ***filtering out*** other details like shape and size. But if we observe everything about the creature without a question in mind, we are opening our mind to all channels of experience without focusing on anything in particular, or filtering out anything.

As inquirers, being observant, attentive, and systematic, and being organized and precise in describing what is observed, are important assets. Equally important is the capacity to know what kind of observation to use in what context. In addition to the kinds of observation we have talked about, observation to answer a question may require counting, using instruments for measuring, doing experiments, and so on. For example, suppose we want to answer the question,

What is the average number of leaves in a compound leaf of a tamarind tree?

we will need to *count* the number of leaves in each of the compound leaves we have gathered. To answer the question,

What is the average height of an adult Indian male?

we will have to *measure* the heights of many people. To answer the question,

At what temperature does candle wax melt?

we will have to use an instrument — a thermometer. And to answer the question,

Does drinking hot water with honey soothe a sore throat?

we need to do an experiment. We will explore some of these different aspects of observation as we go along.