

Unit 1: The Concept of Traits

Traits

Suppose a friend of yours is travelling to a city nearby, and you want your cousin to pick her up from the airport. Your friend and your cousin haven't met before, so neither of them knows what the other looks like. How will they identify each other?

One solution would be to send a photograph of each of them to the other. If this is not feasible, you can describe them. For instance, you might say:

My friend is 5' 8" tall, and thin, with dark brown hair. She has a long nose, light brown eyes, full lips, and a receding chin. She walks with a slight stoop.

My cousin is 5' tall, and somewhat fat. He is completely bald, and has a beard but no mustache. He has a small nose, dark eyes, thin lips, and a prominent chin.

Terms such as "is 5' 8" tall", "is thin", and so on are *traits*:

Friend's traits: 170 cms tall; thin; dark brown hair; long nose; light brown eyes; full lips; receding chin; slight stoop.

Cousin's traits: 151.7 cms tall; somewhat fat; completely bald; beard, no mustache; small nose; dark eyes; thin lips; prominent chin.

What we have here is an unorganized list of traits. Suppose we want a systematic way of describing human beings, such that someone can complete a 'description form' that would allow strangers to identify her/his friends. Such a general form would say something like:

Height: (specify in centimeters)
Horizontal size: (say whether fat, medium, or thin)
Baldness: (say whether bald or non-bald)
Hair colour: (say whether black, brown, red, yellow, or gray)

The traits that you specify on the dotted lines are organized in terms of the *parameters* to the left of the dotted lines. Height, horizontal size, baldness, hair colour, and so on are parameters. The parameter of baldness as given above has two *values*, namely, bald and non-bald; someone filling the form has to pick one of them to describe their friend. This parameter is *binary valued*. The parameter of horizontal size has three values, namely, fat, medium, and thin; it is *ternary valued*. The parameter of height has many values; it is *multivalued*. [We will discuss the difference between *discrete multivalued* and *continuous multivalued* in a later unit.]

Notice that the two descriptions given above do not specify whether the person is male or female. This is because these terms refer to *categories* and not to traits. Man, woman, boy, girl, cow, bull, oak, and the like are categories of living organisms. In contrast, having two legs and having four legs are traits, and so is having leaves or roots. [We will discuss the relation between traits and categories in a later unit.]

Some academics use the term *variable* to refer to parameter, and *value* to refer to trait. Height is a variable whose value for your friend is 178.5cms. In biology, parameters/variables are called *characters*. Eye colour is a character; the value of eye colour that most Indians have is black. In mathematics, a parameter might be called a *coordinate* or *dimension*. Such diversity of terminology can be bewildering. Don't be confused by it.

Exercises

For these exercises, which are in the form of games, begin by forming two teams, A and B, each with two sub-teams A1, A2, B1, B2.

EXERCISE 1: organisms

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

RULE: The description can use *traits*, but not *categories*. (e.g., if the word is ‘dog’, the observer can say, ‘has a tail,’ but not ‘is a mammal,’ as mammal is a category. If the word is grasshopper, the observer can say ‘has eight legs’ (a trait) but not ‘is an insect’ (a category).

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 applies to ‘cat’ or ‘mouse’).

If the description fits some other category, team B loses its point.

Part 3: Team B can argue that the description does not 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.

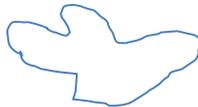
Repeat Parts 1-3, with the teams reversed. Continue the rounds as long as you can/want.

EXERCISE 2: shapes

Part 1: Instead of categories of living creatures, use two dimensional figures that you can draw on a piece of paper. For instance, team A may decide to draw one of the figures given below:



(i)



(ii)



(iii)

As with exercise 1, only the describing team sees the picture. They give a precise description, such that the guessing team can draw a shape that is congruent with the original figure.

(Remember, two figures are congruent iff their boundaries coincide when one is placed on top of the other.) As in exercise 1, the describing team is allowed to use traits in the description, not categories. (e.g., for iii, ‘is bounded by straight lines’, but not ‘trapezoid’ or ‘polygon’).

Parts 2 and 3 of exercise 1 apply to exercise 2 as well.

Note: This is a very challenging game, and can be frustrating for beginners. To make it simpler, we might begin by restricting the figure to, say, polygons.

EXERCISE 3: abstract concepts

Part 1: Moving from biology and mathematics to philosophy, this exercise uses abstract concepts such as truth, honesty, intelligence, science, and so on. Follow the steps (Part 1, 2, and 3) given in exercises 1 and 2. As in the case of exercises 1 and 2, 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, team A loses a point.