

# Understanding the Units of Length Measurement Used by Tribal People in India

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## Abstract

The study presented in this paper was undertaken to get insight into the units of length measurement used by tribal people living in western part of India. Both the authors visited villages located in Sahyadri ranges of the state of Maharashtra and interacted closely with people from tribal communities. It was noticed that they used units for length measurement which can be roughly divided into four categories: 1. Units for long distances, 2. Units for medium distances, 3. Units for short distances and 4. Units for very short distances.

In telling the distance between two villages they use *Kos* (2 miles) as a unit. If they have to refer to how far the field is they use units like *hakecheantar* (calling distance meaning a distance covered by a loud voice produced by a person). When it comes to measuring the length or breadth of a field they use *Kasara* (rope used to tie the animal to the pole) as a unit. Tribal people often need to tell the depth of the well or height of a tree. In such cases the common unit used is the height of *manus* (a man) where the height of a normal man is taken as a reference. When these people are referring to the distance between two houses they would tell it in terms of *pavale* (steps) to be taken to reach the place. If the length of a cot is to be mentioned they would use *haat* (cubit) as the unit. If the entity is longer the unit used is *vav* (equal to the stretched arms). They would use *veet* (a stretched palm) to refer to very short lengths like the thickness of wooden log or breadth of a pit. For smaller distances the thickness of a flattened finger, called *bot*, is used as a unit.

The study has shown that the tribal people use convenient units for measuring distances. In the absence of a prevailing standard units these people resort to available resources like fingers, stretched palm, hand, height of a man, length of a standard rope as units of length measurement. Moreover, these units are conveniently chosen to ensure that the length of an entity can be stated in terms of integers. Young boys and girls from tribal communities acquire these skills from their elders and carry the belief that the available resource are to be used as units. Formal education, however, emphasizes on standard units of measurements accepted by international communities. There is certainly a need for using standard units but it should be brought home without ridiculing the traditional methods used in tribal communities. The appropriate pedagogy would be to bring out linkage between traditional and standard methods of length measurements.

## Introduction

In the MKS system of measurement Meter is the unit used for measuring length. Smaller distances are indicated by Centimetre (one hundredth part of a meter), whereas longer distances are mentioned in kilometres (equal to 000 meters). MKS system of

measurement forms the part of formal education in schools. What about those who do not have formal education? How do they measure distances in their day to day life? This curiosity has made us explore the units used by tribal people for estimating small as well as long distances. This paper describes the salient findings of the study.

### **Sample**

Sample for the study was chosen from tribal areas in the Sahyadri ranges of the state of Maharashtra in India. Thane, Raigad, Ratnagiri and Sindhudurg are the four districts of the state of Maharashtra that has the tentacles of the Sahyadri range commonly known as western ghat. A large number of tribal communities are found in these districts. Some of them are *katkari*, *kokna*, *thakur*, *mahadevkoli*, etc. They usually manage their livelihood through agriculture and by collecting forest products. The literacy level in these areas is very low. Due to the specific efforts of the Government to provide formal education the youths in these areas are getting school education these days. Nevertheless, the adults and old people are almost illiterate (Singh, 2010). The sample of ten illiterate persons from four villages in the Raigad district of the state was chosen for the study. They belonged to *katkari* community who make their living traditionally by making catechu (used in chewing pan along with beetle leaves). They use Marathi (language of the state of Maharashtra) for communication. However, their diction is so different that you need to have an interpreter to talk to them.

### **Nature of Interaction**

The researchers visited the villages in the district of Thane located on the foothills of the Sahyadri ranges of the state of Maharashtra and interacted with tribal people personally. Help was sought from the member of a voluntary organization working in that area to establish fruitful communication with the villagers. He not only helped us to establish rapport with the villagers but also played the role of a translator. After initial introduction an attempt was made to find out how they measured different distances in their day-to-day activities through questions and answers. There was no structured interview schedule. Depending on the situation and the nature of interaction questions were posed to the villagers. For example, at some places where a cot was offered for sitting the discussion started from the way they measure the length of the cot. At other places the initiation of the discussion was achieved by asking the depth of the well from which they fetched water to wash our feet (It is a custom in rural India to wash feet before entering into the house). If someone had come from his farms we would ask the person how far is it from the house. Thus, qualitative data was collected through informal interaction with the rural people for the study.

### **Findings**

The discussion with the tribal people led to many interesting observations. It was noticed that they used different units for length measurement depending on the length of an entity they wanted to measure. These units can be roughly divided into four categories:

1. Units for long distances,
2. Units for medium distances,
3. Units for short distances and
4. Units for very short distances.

### **Units for long distances**

Tribal people do not need to estimate the distances between interstellar objects. For example, they never feel the need to tell the distance between Sun and the earth.

Whenever they have to refer to this distance they would say that the Sun is located at a very long distance from the earth. In their day to day life, however, they need to estimate the distance between two villages. These distances are usually stated in terms of *Kos*. A *Kos* is roughly equivalent to 2 miles or 3 kilometers.

### **Units for medium distances**

If the villagers have to refer to medium distances they refer to units like 'calling distance or 'stone's throw'. The unit of calling distance is used if one is referring to a person or an animal at a distance. Calling distance is the distance covered by a loud voice produced by a person. If a person is standing at a distance from where he/she can hear the loud voice he/she is stated to be located at calling distance. The other unit of stone's throw is used if the distance of an animate object is to be mentioned. It is equivalent to the distance covered by a stone thrown by a normal man with a normal force.

When it comes to measuring the length or breadth of a field they use units like *Kasara* or *bamboo*. *Kasara* is the rope used to tie the animal to the pole. By tradition its length is almost fixed with a little variation. *Bamboo* is usually found in every house as it is used for the house or for the surrounding compound. It is also used as a unit of measurement in case of medium distances. Thus, length of a field or the distance between two fields is often told by using *bamboo* as a unit. *Bamboos* come in various lengths. By tradition people chose the *bamboo* of average length for this purpose.

### **Units for short distances**

Tribal people often need to tell distances like depth of the well or height of a tree. In such cases the common unit used is the height of a normal man (*manus*). Using this unit it is said that the well is so many men deep. When asked about the depth of the well close to the house a tribal man said that it was three men deep. It must be noted that the visit was close to the rainy season. In summer the water depth, we were told, rises to five men. They find it difficult to draw water from these wells. There was a palm Tree close to the house. During our discussion a tribal man estimated the height of a palm tree to be four men high. The approximate height was about 20 feet (or six and half metre).

When these people are referring to the distance between two houses they would tell it in terms of steps (*pavale*) to be taken to reach the place. The distance between two legs during the normal walking is taken in this case as a unit of length measurement. If the length of a cot is to be mentioned they would use hand as the unit. If the entity is longer the unit used is equal to the stretched arms (called *vav*). The length of the house or of the playground is mentioned in terms of *vav*. Many times they need to estimate the length of a rope that they need to tie to the bucket to fetch water from the well. In this case they use *vav* as a unit. Similarly, they need to estimate the length of rope required to weave a cot. In this case too they use the unit *vav*.

### **Units for very short distances**

The tribal people use their palms or fingers if they have to refer very short lengths like the height of a step, thickness of wooden strip or breadth of a pit. The distance between the tip of a small finger and a tip of a thumb in a stretched palm is called a *veet* (see figure). The length of a table, a box or *Chulha* (home furnace for cooking) can be expressed in terms of this unit.

Carpenters and iron smiths often need to measure small distances. They use their fingers to denote lengths or breadths of objects that they handle. Conventionally, the

length of the index finger is taken as a unit. If the distances are smaller, the length between two folds on the fingers are used as units. For even smaller distances the thickness of a flattened finger is used as a unit. This unit is often used if one has to tell the width of a wooden strip or a metal plate.

### **Conclusions and Implications**

It is observed that illiterate people who are unfamiliar with MKS or CGS system of measurement, use their own units for measuring distances in their day to day activities (McCoy, 2004). Measurement simply involves comparison with the standard unit. In the absence of a prevailing standard units these people resort to available resources like fingers, palms, hand, height of man, or length of a bamboo as units of length measurement. Moreover, these units are conveniently chosen to ensure that the length of an entity can be stated in terms of an integer. Many of the tribal people can count only up to 20. They often refer to bigger number in terms of 20s. For example, 45 would be described by an illiterate person as two twenties and five. Since the number knowledge is limited these people also ensure that the length description does not involve big numbers. Instead of expressing the length by a large number using a smaller unit then they prefer to use a larger unit. For example, one could state the distance between two distant trees in terms of steps or *pavale*. But the number involved would be large. In such cases they resort to using bigger units like bamboo and describe the distance by a small number. Which unit is to be used in what cases comes through experience. It is prominently noticed that there is no standardization of the units used by tribal communities. The length of a finger, a veet, a hand or a vav is different for different persons. Thus, the length measurement shows variations. Lengths measured by two different persons would give rise to two different results. These variations are, however, acceptable to the people as they do not need very accurate measurement in their day to day life. Whenever such an accurate measurement is required they seek the help of experts or learned professionals.

Young boys and girls from tribal communities acquire the skills of length measurements from their elders. They come with the belief that the available resource is to be used as a unit. Moreover, the unit needs to be changed as per the requirement. Formal education, however, emphasizes that a standard unit is to be used in all measurements. In MKS system of measurement meter is the unit of length measurement. Short distances are to be mentioned using smaller fractions of this unit like millimetre (One thousandth part of a meter) or nanometres ( $10^{-9}$  meters). For longer distances kilometre (1000 meters) is to be used as a unit. Students coming from tribal communities need to be convinced the need for using the standard unit of measuring length. In doing so care should be taken that his/her traditional methods of measurements are not ridiculed. Instead, the linkage between the traditional method and the formal method of measurement is to be brought out (Jana, 1998). Otherwise students would think of MKS system as a system with a limited applicability for formal school education. It is necessary that the knowledge gained through studies in ethnomathematics must be used for enriching the teaching of mathematics in schools (Mukhopadhyaya and Greer, 2012).

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