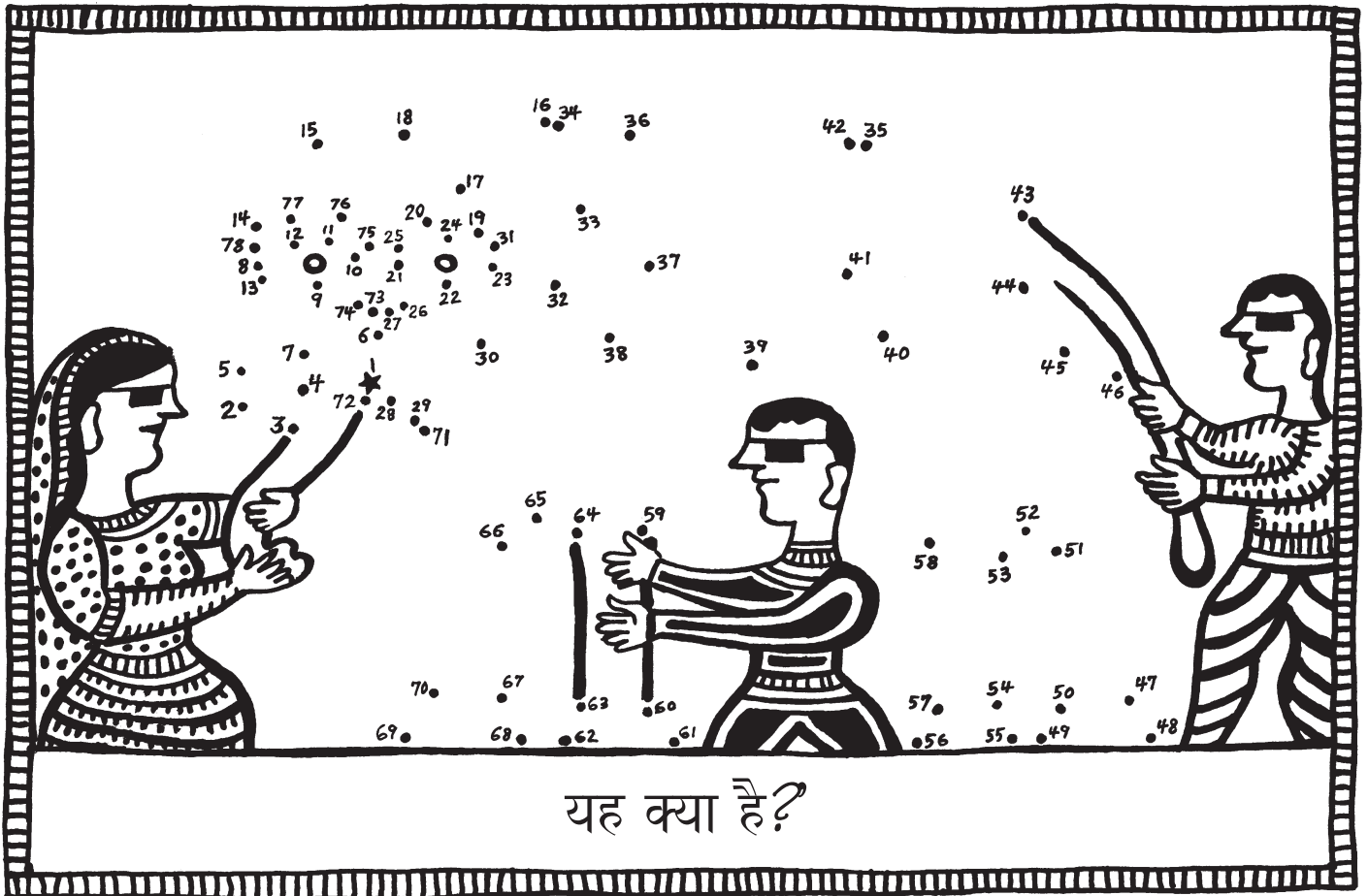




What is Science?

Vinod Raina and D.P. Singh

illustrated by Satyanarayan Lal Karn



What is Science?

Vinod Raina and D.P. Singh



Once there was a king. He had everything: a beautiful palace, delicious food to eat and attractive clothes to wear. He had a large number of servants who were always ready to fulfil all his desires. He even had a little son. But despite all this sometimes the king was not satisfied!

The real problem was that the little prince, whom the king loved very much, sometimes asked questions that the king could not answer.

Sometimes the prince asked, "Dear Father, how do birds fly?"

Or sometimes he would say, "Dear Father, why do things fall down to earth? Why don't things go up? ... See - I threw a stone and it came down."

A few years ago, whenever the prince saw the moon he would keep on asking many questions about the moon.



The king did not have the answers to all these questions. Sometimes he got tired of listening to so many questions and he scolded the little prince. Later he would feel sorry about it. But the prince started distancing himself from the king to avoid his scoldings.

All those questions also remained in the king's mind and kept bothering him.

Finally one day the king called his most competent and intelligent minister and said to him, "Dear minister, the prince is asking me lots of questions that I am not able to answer. Now my mind is full of so many different questions. . . I have heard that maybe these questions can be answered through science. You are wise and intelligent. Kindly tell me, what is science?"

The minister started thinking it over. It was true that he had studied science to some extent, but had never thought much about what science is. Besides, the other problem was to explain what science is to a person like the king who was science-illiterate.

The minister spent a whole week thinking it over. Then he reported to



the king, "Your Majesty, you have raised a big question by asking what is science. Before I respond to this it is important to analyse what kinds of questions are bothering you and the prince. All these questions are related to the world around us and arise out of a basic human curiosity to understand our surroundings. Your Majesty, science starts with this curiosity, which is generated by seeing, touching, smelling, tasting or listening. Curiosity catalyses questions and science tries to answer them. This way science helps us in making sense of our surroundings."

The king responded, "Dear Minister, this is all very fine, but tell me - how can science answer these questions?"

The minister said, "To understand this we will have to look at how scientists work. First of all they observe and compile information related to the problem area. They gather all this data together and hypothesize an answer to the question - forming a picture in their minds. Often it happens that they do not have enough data, so they do more experiments to test

these theories. In the process more unanswered questions arise, and they again search for better mental pictures and more theories. This process continues until no theory can be thought of that will give a better answer to the problem."

The king said, "Dear minister, I did not understand your explanation. Can't you clarify yourself by giving a simple example?"

The minister replied, "Yes sir, why not? Let us take one of the prince's own questions. He had asked why do objects always fall down. This question is connected to our everyday experience that whenever we drop an object in the air, it falls down. Does this observation apply to all objects and all places? To find out, we need to do experiments with many different objects in different places. If we try this, we might find that all kinds of things like stones, coins, needles, clothes, and pieces of paper - whether they are heavy or light - generally come down, no matter where we drop them. Many years ago one scientist had experimented like this and had reported that this is what happens."

By now the king had really become interested in this question. He asked, "What was his answer?"

The minister said, "The answer is quite straight forward. Things fall down because the earth has a force that pulls everything towards itself."

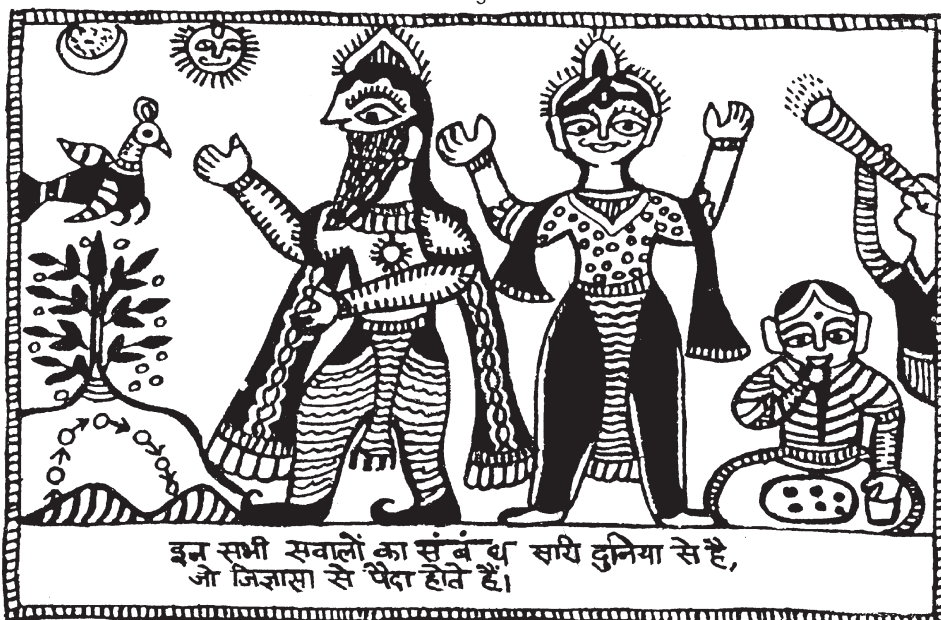
The king jumped in delight and said, "Oh, it's so simple!. Why couldn't I have thought of that?"

The minister said, "Sir, it's true that generally many answers are simple in nature, but finding them is not always easy. A lot of observations, experiments, analyses etc. are needed in order to come to a concrete conclusion or establish a theory. Sometimes scientists keep on searching throughout their lives, but the answers to their questions are not found until long after their death."

Now the king had started understanding something about science and he was getting interested in finding out more and more.

The next day the king said to the minister, "I am very happy with what you explained about science. But things will be more clear to me if you can explain them through some experiment. I want to see an experiment for myself. You can take two or three days to design an experiment that will show me what science is all about."

Now the minister felt that he had got stuck in a complicated situation. How could he show the king a real science experiment? Certainly it was a serious problem. But actually, the minister was an intelligent person with an inquisitive mind. After a lot of thought he came up with a plan, and he turned up in the palace the next day with an elephant and three blind people.



This attracted the king, the prince and all the people in the palace.

The minister said, "Your Majesty, may I now start the experiment as per your order?" The king thought the minister must be just having some fun. He said, "What kind of a joke is this? What does science have to do with three blind people?"

The minister replied, "Sir! I am not joking. The blind people cannot see what I have brought. Now you will see how they will find out through their curiosity."

Then the minister asked each blind person to go to the object (the elephant), touch it and say what it was.

The first blind person moved ahead. She picked up the tail of the animal and declared, "It's a rope". The second person caught hold of its trunk and shouted, "It's a snake."

The third one touched the leg of the elephant and reported, "It's a tree."

The audience started laughing at their answers. The poor blind people felt embarrassed. The minister had to pacify them all. Everyone waited to see what his next move would be.

The minister said, "We saw that these three people gave three different answers about what is one single thing. Now we will tell them to work together and discover what it really is."

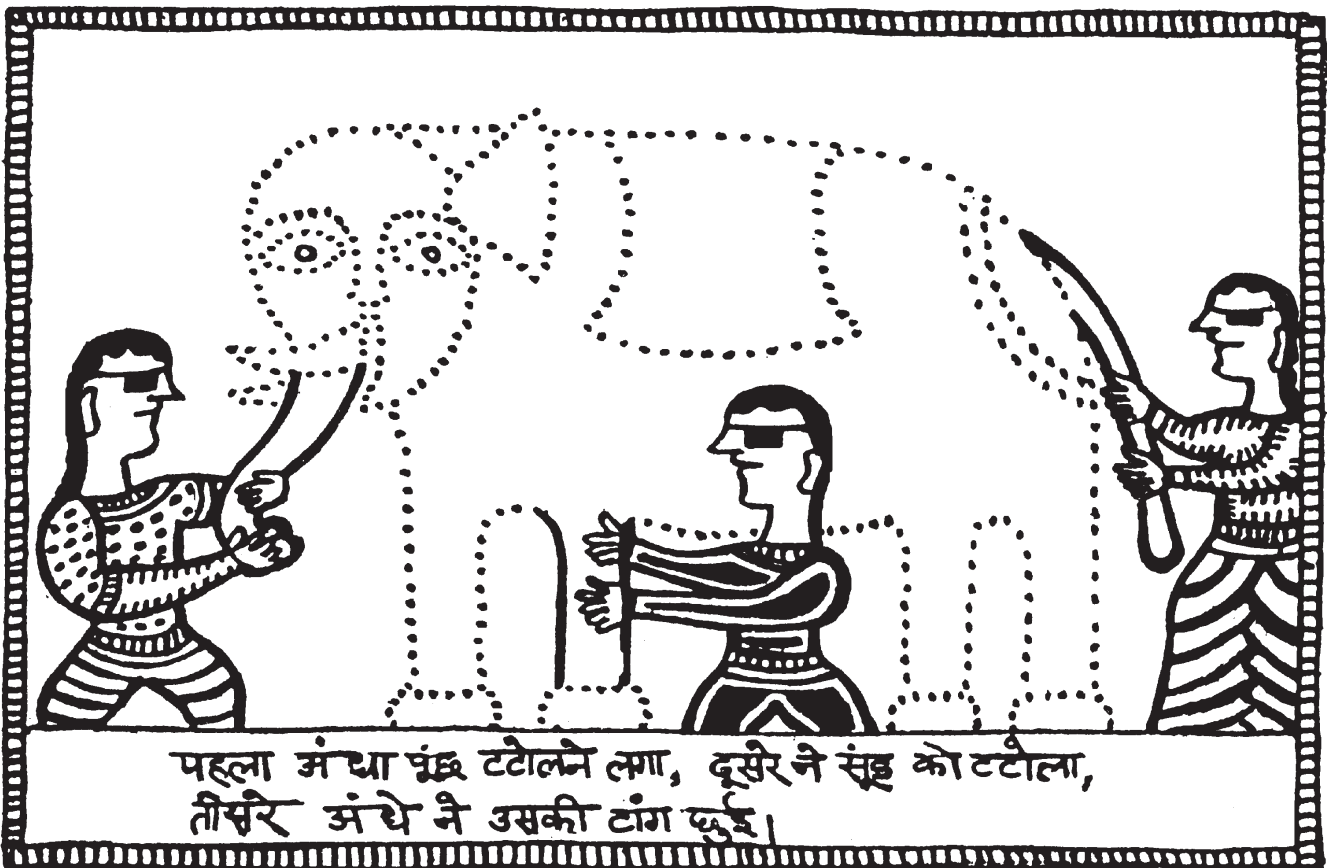
And he asked the blind people to work together. All of them were surprised to hear each other's statements. They wondered about what kind of object could appear to be a rope, a snake and a tree trunk all at once! They kept on discussing among themselves for a long time, but could not reach any conclusion. Defeated, they decided to make more observations. They also decided that

this time they would not just feel one part, but would investigate more thoroughly. For a long time they all kept on feeling their own portions thoroughly and apprised each other of their own observations.

The first one said, "Now I can feel the snake-like part. Oh, sometimes it moves up and disappears into a big hole." Suddenly he took back his hand and said, "Oh, it seems to be a face! Thank God, I realised it just in time, otherwise it would have bitten me. Now I know! That thing I thought was a snake might actually be a very long nose!"

The second person groped around and said, "I am investigating your rope-like object. It is not too long and I feel it is securely attached to a very big heavy thing. See, I can't pull it off! I don't understand what is this rope-like object. . ."

The third one said, "While I've been





same techniques that are generally used by scientists. Each blind person compiled the available data and based on that tried to develop a mental picture of the unknown thing. Because they are blind, they were able to gather rather limited data and hence in the beginning their mental picture based on this data was wrong.”

“At this stage they tried to take their own theories ahead through further enquiry and experiments. They worked together to gather more information. Each of them observed a part of the animal in an organised way and asked good questions. Along with this they shared each step of their observations with others and discussed it. Only then could they draw a mental picture of the animal. This picture was drawn as per the long nose, tail, leg, etc. The idea they had about an elephant from people’s feedbacks in their mind was now confirmed. Validating an imagination through experiments is the approach of science. This is known as science.”

This is a translation from Hindi of *विज्ञान क्या है?* written by Vinod Raina and D.P. Singh, and illustrated by Satyanarayan Lal Karn. The Hindi version is published as a booklet by Eklavya, Bhopal.

listening to you, I’ve been searching over here. This cannot be the trunk of a tree. Because at its top it has neither branches nor leaves. It grows into something very heavy and soft at the top. Oh, now this ‘tree’ rose up by itself and moved ahead also. Well I got it – it’s just a big foot!”

All three of them discussed their observations with each other.

Then the minister asked them what they had concluded. One of them replied, “Sir, the thing we investigated might be a very large animal. It has quite a long nose that even touches the ground. It also has strong legs. Its body is very heavy. Even if we try all together we cannot even begin to lift up the animal. It is much taller than us. Hence we cannot investigate the upper part of it. It has a rope like object at its back. This might be its tail. So we hypothesize that it might be an elephant or some animal like that. Because we are blind, we can just say this much, based on what we now know from all of our observations put together.”

The minister said, “Your Majesty, thus we come to the end of the experiment. I hope now you can

understand something about what science is.”

By now the king appeared satisfied and delighted with his new understanding. He told the minister, “Your attempt at explaining science to all of us in such a simple way is well appreciated. Still, could I request you on behalf of all of us to highlight the conclusions of this experiment?”

The minister said, “Dear sir, the conclusion of this experiment is this. These three blind people used the

