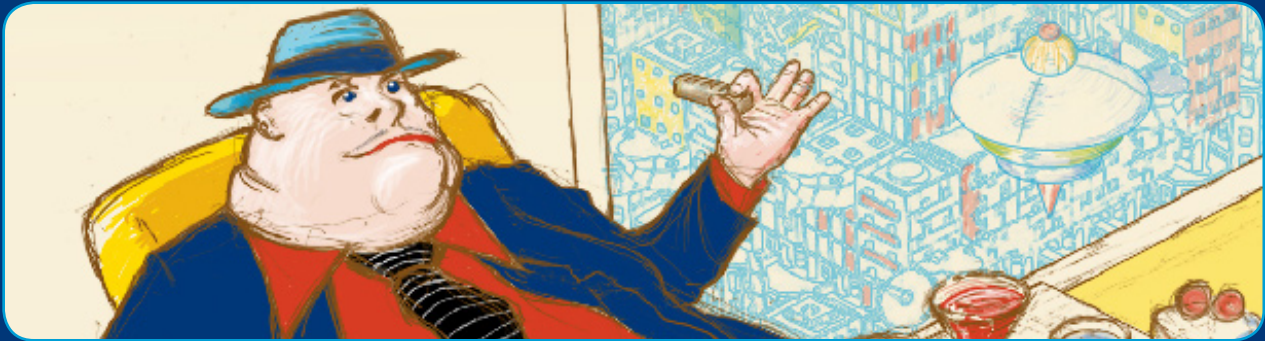


Science Theatre



Professor Jumpalot's Mission

Guidelines

These guidelines explain how to tackle the work on the performance, how to carry out the experiments, and how to prepare for the performance.

There are specific guidelines for each individual scene in the manual.

Introduction: Science Theatre

The facilitator is the person who helps and guides the pupils through the performance. The facilitator says what is going to happen, introduces the scenes, and reflects with the pupils on what they have just done. In other words, the facilitator is the pupils' guide in everything that they do when you are out of character.

Ideas to help get the brainstorming going:

What is it to be healthy? What is it to be unhealthy? Is health only about food and exercise? Why do we eat unhealthily? How can we live healthily? How can we make living healthily fun? Can you be too thin? Why is it unhealthy to be too fat?

Ideas for how you can introduce the Health Academy:

The Health Academy is the place where most of the scenes take place. It is where the health experts work and carry out their health research. Here they read thick books, write long reports, hold discussions, invent things and carry out experiments – all related to the experts' favourite subject of health. The Health Academy has a food laboratory and an exercise laboratory where experiments are carried out on food and exercise respectively.

Prelude: Still Images

Still images are frozen or fixed positions that are adopted either individually or in groups and depict or express a mood, a situation or a concept. They can also be referred to as statues or images that you form with the body. The aim is to motivate the pupils to actively enter into their roles and use their imaginations to create a universe around their roles.

The work with still images is a simple and effective preparation for entering into a role. The still images introduce the pupils to the imaginary universe and they begin to assume their roles.

How it works:

- The pupils stand in a line at one end of the room.
- You must now make a statement on the health experts in a given situation (the situations are described in the manual, eg 'health experts who have just done a physics experiment that succeeded'). When you give the signal, the pupils run to the opposite wall, turn around and portray a still image of what you have just said.
- The activity continues with you stating a new situation, giving the signal, and the pupils again running to the opposite wall and portraying a new still image.

Remind the pupils that they must stand completely still in the image and remain still until you say they can move. They may only speak if you ask them a question. They must be aware that the still image is easily lost if they move.

Scene 1: Jumpalot's Arrival

You will need:

- Jumpalot's speech
- The poster of Simon Sugarmore

How it works:

Read the speech out loud to the pupils. Display the poster of Simon Sugarmore on the wall (or get an assistant to do it) when the speech mentions him. Go out of character when you have finished the speech.

Useful tips:

- Prepare well for the speech at home.
- Remember to speak slowly and leave pauses.
- Remember that you are Professor Jumpalot. Play the role!
- Imagine the story in your head as you are reading.
- Lift your eyes from the speech and look at the audience as often as you can.

Scene 2: The Test (Red Cabbage Indicator)

The Red Cabbage Indicator uses a fun chemical effect that you can create with everyday materials. It is a good idea to try out the experiment at home first before you do it with the pupils.

You will need:

Preparation at home:

- 1 fresh red cabbage
- Water, saucepan, knife, chopping board, strainer
- A large storage jar and lid

Preparing the red cabbage juice:

- Chop the red cabbage into small pieces.
- Place the cabbage in a saucepan.
- Add boiling water until it covers the cabbage. Leave to stand for at least one minute.
- Strain off the dark-blue juice into the storage jar and put the lid on.
- Keep the juice refrigerated until it is to be used (it can only be kept for a few days in the refrigerator).

NB: The storage jar must be clean and dry because the smallest variation in pH will colour the juice. If the diluted juice has a mauve or greenish colour, the tap water is not pH-neutral. In this case, you should prepare a fresh batch of juice using bottled water throughout the process (the pH value will be stated on the label of the bottle).

Take to the classroom:

- Red cabbage juice
- 1 clear plastic cup per pupil + five extra
- 1 straw per pupil
- Approx. 2 litres of water (pH-neutral)
- Trays
- Lemon juice
- Soft soap

Everything is prepared and poured into cups (one cup per pupil) before the role-play begins:

- Place a number of plastic cups on a pair of trays and fill the cups with water (if necessary, bottled water – see above).
- Add red cabbage juice until the liquid has a clear blue colour. It should not be so dark that you can no longer see through the cups.
- Insert a straw into each cup so that the liquids now look like nice blue cocktails.

Starting the experiment (during the role-play):

In the framework story the experiment acts as a test to reveal whether Sugarmore's robot agents have concealed themselves among the health experts. These agents want to prevent Jumpalot carrying out her mission. If the juice turns red, the pupils have passed the test.

- Hand out the cups to the pupils, who have to blow through the straws into the liquid for 2–3 minutes. The juice now turns visibly mauve.
- While the children are blowing, Jumpalot and an assistant (the facilitator goes into character as the assistant if you only have two people) go around and squeeze a little lemon juice into all the cups, except two to which soft soap is added instead (or some other alkali). Liquids with lemon juice now assume a red colour, while liquids with soft soap assume a green colour.
- Jumpalot asks everyone to lift up their cups so that she can see the results. The two pupils with green liquid are hauled out immediately and searched; pulse, eyes etc are checked to find out whether they are Sugarmore's robot agents.
- No signs are found that they are robot agents, so they are allowed to take the test again. This time lemon juice is added and the pupils pass the test.

Summarising after the test:

Talk with the pupils (out of character) about what happens in chemical terms (find inspiration below).

Get a pupil to blow through a straw into a cup of red cabbage juice, another pupil to add lemon juice to another cup, and a third pupil to add soft soap to yet another cup, while you explain what is happening in each case.

Background information:

In chemistry pH is a measure of a solution's acidity, ie an indication of the amount and strength of the acid or alkali in the solution. The pH scale describes whether a solution is acid ($\text{pH} < 7$), neutral ($\text{pH} = 7$) or alkaline ($\text{pH} > 7$).

p stands for 'potens' and H stands for the hydrogen ion H^+ . This means the weighting of hydrogen ions, which is what determines whether the solution is acid, neutral or alkaline.

As the pupils blow through the straws into the juice, the CO_2 in their exhaled breath gradually dissolves in the water. This forms carbonic acid, which is the same as the carbonic acid in soft drinks but at a much lower concentration. The pupils' exhaled breath actually produces a thin fizzy drink solution in the cups. The carbonic acid lowers the pH value of the red cabbage juice from 7 to approximately 6, thus producing a mauve colour.

When the lemon juice is added, the pH value is lowered further and the colour of the juice changes to red-mauve. And adding soft soap raises the pH value so that the colour of the juice changes to green.

The substances that make the red cabbage juice blue at neutral pH are called antocyanines. They are found in, among other things, red cabbage, blackberries and beetroot. The colour of antocyanines depends on the pH value that they are exposed to. The antocyanines in red cabbage are especially sensitive and can turn many different colours depending on pH.

Alternative experiments:

If you want to show the various colours that red cabbage juice can turn or let the children do some more experimenting, here is a list of suggestions for what you can add to produce the different colours:

pH value	Colour	Produced by
Approx. 1–2 (very acidic)	Bright red	Lemon juice
Approx. 4–5 (slightly acidic)	Mauve	Fizzy drink, household vinegar
7 (neutral)	Blue	Grape sugar
9–10 (slightly alkaline)	Green	Soft soap, ammonium carbonate
12–14 (very alkaline)	Yellow	Potash (must stand longer)

NB: When carrying out these alternative experiments, you must wear protective goggles. It can be very uncomfortable getting these substances in your eyes, and in the worst case you could damage your eyes.

Scene 3: Sugarmore Leads the Way

You will need:

- The poster 'Sugarmore's Life Rules' and a copy to read out
- The Sugarmore mask
- A printout of the article *Sugarmore Leads the Way* for each pupil

Reading the article:

Hand out the article *Sugarmore Leads the Way* to the pupils and read the article aloud. We recommend that a teacher reads the article. As this is a dramatic performance, it is important that the story should be as clear to all the pupils as possible. It might also therefore be a good idea to have a short discussion on the content of the article after the reading to make sure that everyone understands it.

The scene:

Find a volunteer to play Simon Sugarmore. Instruct the pupil that he/she has to enter the Lazy Festival wearily and read out the Life Rules. After each Life Rule there should be a pause in the reading so that there is time for applause from the audience.

Instruct the rest of the pupils that they should crowd round Simon Sugarmore and worship him as a hero when he enters. After each Life Rule has been read out, the pupils should cheer and applaud.

It may be a good idea for the teachers to enter into character as the audience together with the pupils so that they can control when to cheer and when to listen out for the next Life Rule.

If the class is keen to play special roles, you could invent more characters. For example, Sugarmore's bodyguards (Body Bill, Cool Chris, Muscle Molly etc), who make sure that no one gets too close to him. Or Sugarmore's fan-club (Candy Caroline, Lazy Lizzie, Sweet Susan etc), which is the hard core of his fans who faint and scream when he enters.

Scene 4: Sugar Stacking

You will need:

- Highly concentrated red, sugar-containing cordial
- Orange juice containing bits of fruit (cold)
- Green fizzy drink (cold)
- Organic full-cream milk
- 1 large clear jar
- 1 tablespoon (for pouring the liquid over)

The experiment begins (during the role-play):

In the framework story this experiment serves as an introduction to the sugar experiments that Jumpalot and all the health experts will now be doing. Jumpalot has kept statistics of what is drunk in the future and has discovered that liquids can be stacked on top of one another.

- Pour the concentrated cordial into the jar until it is approximately $\frac{1}{5}$ full.
- Carefully add the orange juice. If you pour it very carefully, the juice will float on top of the cordial without mixing in. Add juice until the jar is approximately $\frac{1}{2}$ full.
- Carefully add green fizzy drink until the jar is $\frac{3}{4}$ full. The difference in sugar content between the juice and the fizzy drink is not great, so the fizzy drink must be added extremely carefully.
- Finally, very carefully add a little organic full-cream milk. The milk will float on top due to its low sugar content and high fat content. (At the interface between the milk and the fizzy drink the milk will separate due to the carbonic acid in the fizzy drink).

NB:

- The liquids must be added slowly and carefully! Keep the jar at an angle as you pour, or pour the liquid over the back of a tablespoon so that you get a dispersed, soft stream.
- The cordial must be as concentrated as possible. 'Light' cordial will not work.
- Juice containing bits of fruit makes the experiment easier because the bits reduce the risk of the liquids mixing (for example, if you pour too quickly).
- Organic full-cream milk is unhomogenised. The fat globules in the milk are therefore intact, which gives a better floating effect. The fatter the milk, the easier it is to make the experiment work.

Background information:

The more sugar a liquid contains, the heavier it becomes in relation to how much space it takes up. A liquid with lower sugar content will therefore be able to settle on top of a liquid with higher sugar content. The greater the differences in sugar content, the easier it is to get the liquids to stack.

Juice:

NB: The sugar content of fruit juice is higher than that of fizzy drink. A lot of people will no doubt be surprised by this because fruit juice is usually regarded as healthy. It is correct that freshly squeezed juice is healthy in the sense that it contains vitamins and nutrients that the body needs. But because it takes a lot of fruit to produce a small glass of juice, the sugar content is high. Normally we do not eat very much fruit in one go, so it is not a problem in terms of calories. But with juice we consume the sugar content of maybe six oranges in a very short time.

Juice only counts as one portion of fruit or vegetables in the Danish Veterinary and Food Administration's '6 a day' campaign irrespective of how much you drink. This is because the body needs vitamins, minerals and fibre from different types of fruit and vegetable.

Scene 5: Sugar Water Tasting

This experiment gives the pupils a concrete experience of how much sugar there is in fizzy drink. Divide the pupils into groups of 4–5.

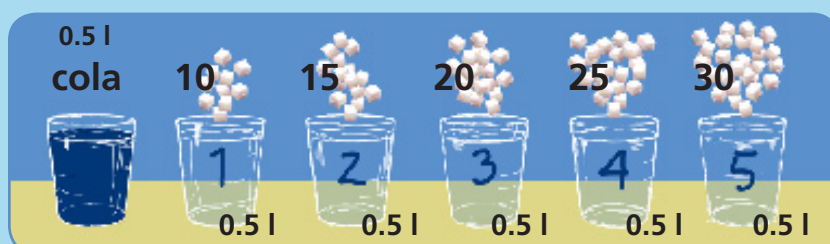
Each group will need:

(Place cups and other props ready on the group tables before the role-play begins)

- 5 x ½ litre cups numbered 1–5
- An unnumbered cup containing cola (not diet) without fizz
- 100 sugar cubes distributed into five small bowls in the following numbers: 10, 15, 20, 25 and 30 and 30
- Spoons for stirring
- 2½ litres of water
- Straws for all pupils

How the experiment is carried out (by the pupils):

- Pour ½ litre of water into each cup.
- Add the sugar cubes to the water: 10 cubes in cup 1, 15 in cup 2, and so on.
- Stir the contents of the cups until the sugar has completely dissolved.
- Alternately taste the cola and the sugar water (each pupil using their own straw) to find out which cup of sugar water is as sweet as the cola.
- Take a small mouthful each time and let the liquid stay on the tongue for a while so that you can taste the correct result.



The experiment begins (during the role-play):

In the framework story this experiment is part of the experts' work to help Professor Jumpalot. In the future Sugarmore has decided that drinking-water should be as sweet as cola. But Jumpalot has not yet managed to find out how much sugar is actually added to the water, and this is what she now wants the experts to help her establish.

During this experiment in particular it is easy to forget to maintain the fiction and stay in character. Always remember that the experts know more than Jumpalot. If they need help carrying out the experiment, Jumpalot can say, for example:

"Well, you know more about this than I do, but is it possible that... (proposed solution)?"

Useful tips:

- Carry out the experiment at home first before you ask the pupils to do it so that you know exactly what they have to do.
- Remove the fizz from the cola before the experiment begins. This is done by shaking it and letting it fizz – several times. It is easier if the bottle is only half full when it is shaken. The fizz has to be removed because it comprises carbonic acid, which tastes sour and therefore makes the cola taste less sweet than it actually is. The less carbonic acid there is in the cola, the more easily the pupils will be able to taste the correct result.
- Make sure that the pupils dissolve the sugar cubes completely in the water before the tasting.
- The water and cola must be at roughly the same temperature because cold and heat affect the taste.

The results:

How we perceive taste differs greatly from person to person, so there will probably not be complete agreement on which sugar water is as sweet as the cola. There are approx 25 sugar cubes or 50 g of sugar in ½ litre of cola. The correct result is therefore the sugar water in cup no. 4. It may be that the amount of sugar is underestimated because the taste of carbonic acid offsets the sweetness in the cola.

Background information:

Among other things, it is sugar that gives cola and soft drinks taste. Sugar contains lots of energy and acts as fuel for the brain and the body. But sugar can also be harmful.

Sugar is energy

Sugar is not in itself unhealthy because it is energy that the body can use. But if you do not burn off the energy you consume, it stores up in the body as fat and you get overweight.

It therefore makes sense to eat sugar if you have a high activity level like an athlete. However, if you have a moderate activity level, it is better to get your calories through food that gives more nutrition than sugar because sugar contains nothing but energy. For this reason sugar is called empty calories.

The function of sugar in the body

When you consume sugar, the body's cells prefer to use the energy from the sugar rather than from the other food you eat. This is because the body's cells are 'lazy' in terms of the way that it is easier for them to extract sugar from the blood than to extract energy from fat and protein. This means that the energy from fat and protein is not burnt off and is instead stored as fat in the body.

At the same time, sugar affects the body's blood sugar level. When you consume sugar, your blood sugar level rises, which means that you become energetic or even hyperactive. However, after a short time the blood sugar level falls again, which means that you feel tired and lethargic.

This can be a problem if, for example, you go to school and have to concentrate on learning. The brain acts best with a stable blood sugar level.

Scene 6: Pulse Rate and Calorie Burn

In this experiment the pupils learn about energy content, energy consumption and calorie burn.

You will need:

- A watch with a second-hand
- Music that is good to relax to
- Music that is good to jump to (16 beats per 6.5–8.0 seconds)
- The table-poster 'Pulse Rate and Calorie Burn'
- A CD player

The experiment begins (during the role-play):

In the framework story this is one of the experiments that the experts carry out with Jumpalot. The aim of the experiment is to learn about pulse rate and calorie burn, and it takes place in the Health Academy's exercise laboratory.

As Jumpalot doesn't know very much about the subject, she has asked the fitness instructor Susie Shape-up (played by the other teacher) to help her. She therefore hands over to Susie Shape-up, who takes charge of the experiment.

Measuring resting pulse rate

- Susie Shape-up first asks the experts to find their pulse, either on the inside of the wrist or on the side of the neck. This is done to prepare them for the experiment so that they can more easily find and measure their pulse when the experiment begins. The experiment then begins.
- Susie Shape-up asks the experts to find a space on the floor and lie down. They must not lie too close together. Tell them that they now have to lie and relax to the music.
- Put on a piece of music and let the experts lie and relax for about one minute.
- Ask the experts to find their pulse without moving around too much; it is important that it is their resting pulse that they measure.
- The experts now have to count their pulse beats for one minute until Susie Shape-up says stop (or you can let them count for 30 seconds and then get them to multiply the result by two).
- Listen to the experts' results and mark them with black crosses on the table-poster. Eventually there will be a number of crosses on the poster and you can take your starting point in an estimated average.

Measuring jumping pulse rate:

- Repeat the experiment, but this time get the experts to jump to the music instead of resting. Get them to really push themselves so that they get their pulse rates up.
- The experts measure their pulse rates in the same way as before.
- This time mark the results with red crosses on the table-poster.

The results:

- When the experts' pulse rates have been written on the table-poster, you can compare how long it takes to burn off an apple or a bag of crisps or chips at the various pulse rate levels.
- You can also talk about what would happen if you never burnt off the food that you eat. This happens all the time in the future that Professor Jumpalot comes from.

Background information:

If you eat food that contains more energy than you expend, it will deposit in fat stores in the body. It doesn't matter whether the energy comes from protein, carbohydrate or fat; if the energy is not used, it is converted to fat deposits. You can avoid weight gain by burning off the energy through physical activity. The higher your pulse rate during activity, the greater the calorie consumption.

Seen in isolation, you do not burn off very much through, for example, a cycle ride. But the fact that you generally get fitter means that your resting metabolism increases, which means that you burn more calories throughout the day (and night). At the same time, there will be an increased burning (afterburn) for a while after the physical activity has ended. So overall your calorie consumption increases significantly if you exercise.

The better your fitness, the lower your pulse rate will be for a given activity. This is because the heart pumps more blood per beat and does not therefore need to pump so many times per minute. However, a given pulse rate will probably feel just as hard for a person in good shape as for a person in poor shape. This is because it takes more for a person in good shape to get his or her pulse up compared with a person in poor shape.

Scene 7: The Conference

You will need:

- The agenda
- Paper and pencil for minutes

Before the conference begins, you must:

- appoint a pupil as host. The host must welcome everyone and hand over to Professor Jumpalot. The welcome is written on the agenda. When the host bids everyone welcome, you encourage the health experts to clap.
- appoint a pupil as minute-taker. The minute-taker has to take notes of the health experts' debate on a piece of paper or on a whiteboard. Choose a pupil who can write quickly.
- appoint a pupil as reader. The reader has to read the items on the agenda out loud.

Jumpalot is the chairwoman and ensures that the conference is constructive.

Scene 8: Bidding Farewell

You will need:

- CD player
- Atmospheric farewell music (eg Erik Satie's *Gymnopedie no 1.*)

The scene:

In this scene the health experts say goodbye to Professor Jumpalot and her assistants. The pupils have 30 seconds to come up with a farewell sentence that they will say to Jumpalot and the assistants when they shake hands.

The health experts stand in a line, after which Jumpalot and the assistants shake their hands and say goodbye to them one by one.

Turn on the music and the scene begins.

Conclusion: Take a step every day

The song *Take a step every day* was written by the Danish jazz orchestra Djanzz, which produces music for children, especially jazz music. On the website you will find Danish, English and instrumental versions of the song for free use in teaching.

The song reflects the message of the performance; that living healthily should be fun.

You will need:

- CD player
- CD with the song *Take a step every day*

How it works:

- The pupils stand in a circle
- The music is turned on
- The pupils have to follow your movements, or you can let them come up with their own dance steps for the others to follow
- In the chorus you can dance out what is being sung:

*Take a step each day, come and sing this song
Call it 'one small step for man'
Clap your hands to show the world we can
Spin around, spin 'round
It's so good for you*

-
*Jump because this is a jumping song
Shake your hips and ting-a-ling
It's such an easy thing*