



Baffling body illusions

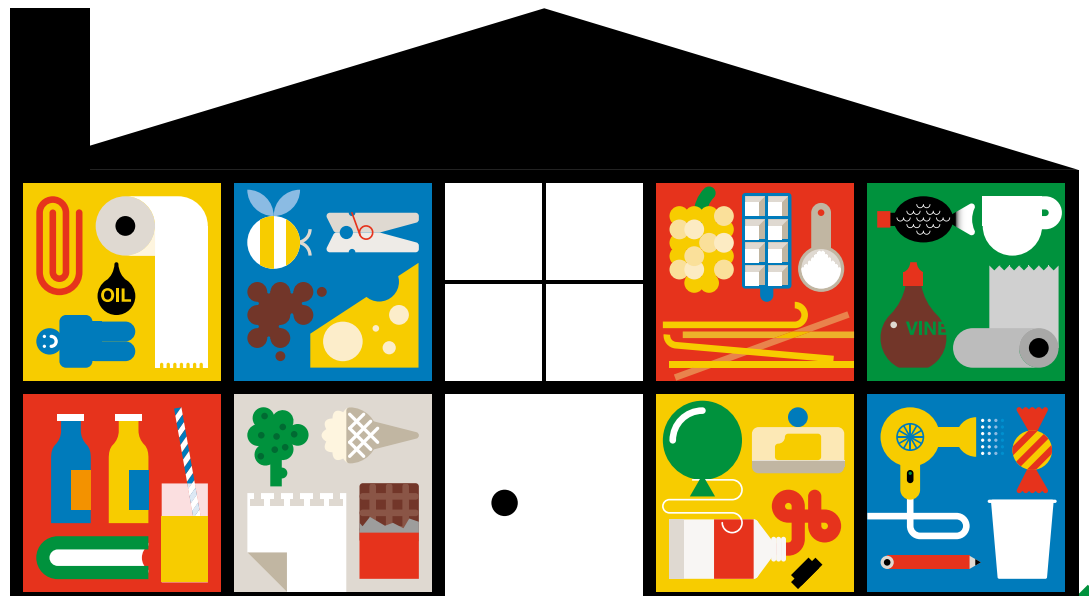


The activity

Make a series of body illusions.

ExpeRiment with your own body and senses.

Learn how our senses need to work together.





What you'll need

Special materials

You can print off a card to record your results at rigb.org/ExpeRimental.

There are eight illusions to try. Some don't require any equipment, but to do all eight you'll need:

- Paper
- Pencil
- A free-standing mirror
- Something to block your view, a cereal box will probably do.
- 2 x paint brushes (same size) or similar
- Stuffed rubber glove
- Blanket or sleeve
- Fork (optional)
- One large and one small cardboard box
- Two things that weigh the same, eg. 2 tins

What to do

Introduction:

Ask your children if they can touch their own nose. Now get them to close their eyes and try again. It shouldn't be any more difficult. Now though, ask them to close their eyes and touch someone else's nose. This should be far more difficult. Ask your children what the difference is between touching their own nose and someone else's.

Also ask them what senses they know. They will most likely know sight, hearing, smell, taste, and touch. You can introduce them to proprioception. This is our sense of our own body and by working with our senses of sight and touch it helps us know where our body parts are.

Tell your children that you have some body illusions that will test if we can fool our senses.

Activity:

There are eight illusions for you to try, set them up and perform them as described below.

Either print off the card from rigb.org/experimental or draw your own table to record how confusing you find each of

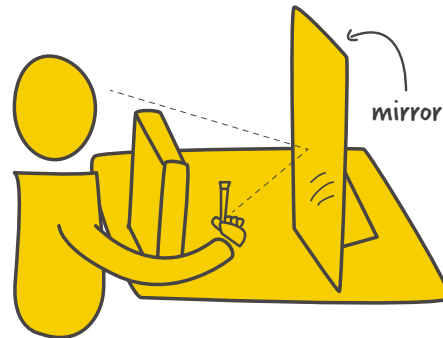
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What to do (continued)

these illusions. Record which sense you think are being fooled in the illusion, sight or touch, and rate how confusing you think it is out of ten.

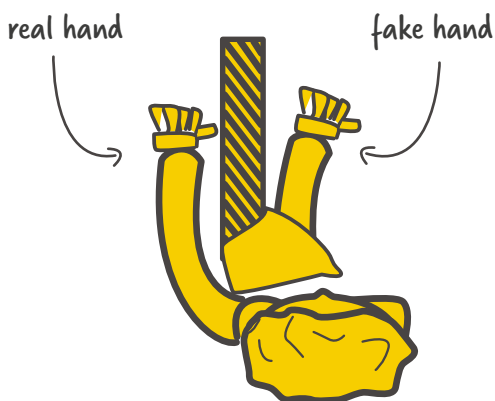
Working in a mirror



Sit at a table with paper and a pencil in front of you. Between you and the paper should be something that you can see over, but not well enough to see the paper. Beyond the paper is a mirror that you can see the reflection of the paper in. Now, by only looking in the mirror, pick up the pencil and try writing something or drawing a picture. It should be quite challenging.

Rubber hand illusion

Participant sits at a table with a screen slightly to their left. They place their left hand on the far side of the screen, such that they cannot see it. In front of them, and in their view, is a rubber glove stuffed with tissue or similar. A blanket covers the place where the rubber glove's 'arm' would be.



Make sure the person being tested can't see their real hand.

The participant is instructed to not move their left hand.

The "tester" then takes the two paint brushes and strokes the participant's hand and the glove in the same places at the same time. This is done for a few minutes until the participant should begin to feel as though the rubber glove is actually their hand.

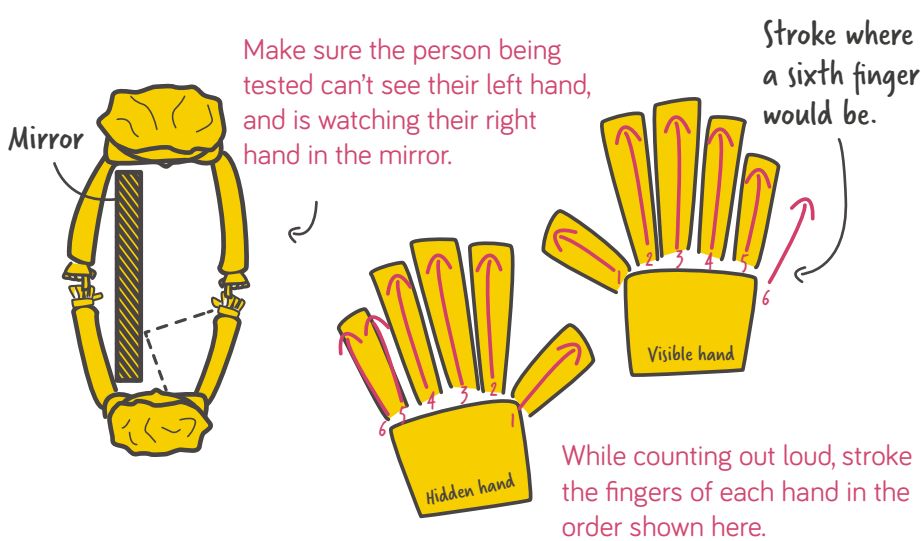
At this point the tester can slam their hand onto the rubber glove or stab it with a fork, and the participant should react by pulling their real hand away from the perceived danger.



What to do (continued)

Extra finger

A mirror is placed perpendicular to the table edge, such that it sits in front of the participant. They are asked to place their hands equal distances from the mirror on either side, and look at the reflection of a hand in the mirror. They should be unable to see the other hand behind the mirror.



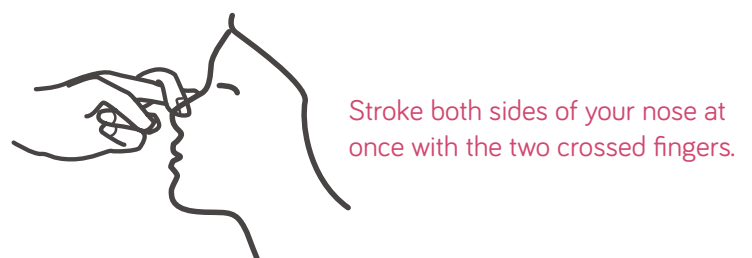
The tester then strokes the top of the participants digits from thumb to little finger, stroking from the knuckle to the fingernail on matching digits on both hands. The strokes should match as precisely as possible and the tester should count “1,2,3,4,5” as they go.

They then repeat this, but, when they get to the little finger they stroke differently on each hand. On the

concealed hand, stroke 5 should be on the inside of the little finger, while on the visible, and hence reflected hand, the stroke should be on the top of the finger as all the others. Then a sixth stroke is performed along the outside of the concealed little finger and on the table next to the visible hand.

Double nose

Cross your index and middle fingers and stroke them across your nose, so that your nose sits in the gap between the tips of your fingers. You should begin to feel as if there are two noses.





What to do (continued)

Confused fingers

Stretch your arms out in front of you and position your hands so that your palms are facing outwards and your thumbs pointing down. Now cross one arm over the other, so that your palms now face each other. Interlock your fingers. Now rotate your hands down, under and up towards you so that you are looking down at your clasped hands.

Have a friend point to, but not touch, one of your fingers. You must try to wiggle that finger. It should be confusing.



Being safe

In the 'rubber hand' illusion, if you choose to surprise your volunteer, be sure to slam your hand on, or stab, the fake hand and not their real hand.

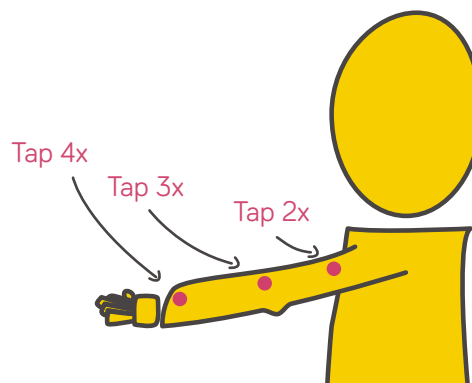
When performing 'through the floor', be gentle with your partner and be sure not to pull them up too high, or drop them to the floor.

With the 'heavy boxes' illusion, don't make the boxes too heavy to lift, 1kg should be plenty.

Cutaneous rabbit

The participant holds one arm out straight to the side, palm facing down, and closes their eyes. The tester taps the participant's arm 4 times at the wrist, 3 times just below the elbow and 2 times on the upper arm. The tester should try to keep a constant rhythm of taps.

The participant is then asked to describe what they felt. They should feel equally spaced taps moving up their arm. As if a bunny was hopping up their arm.

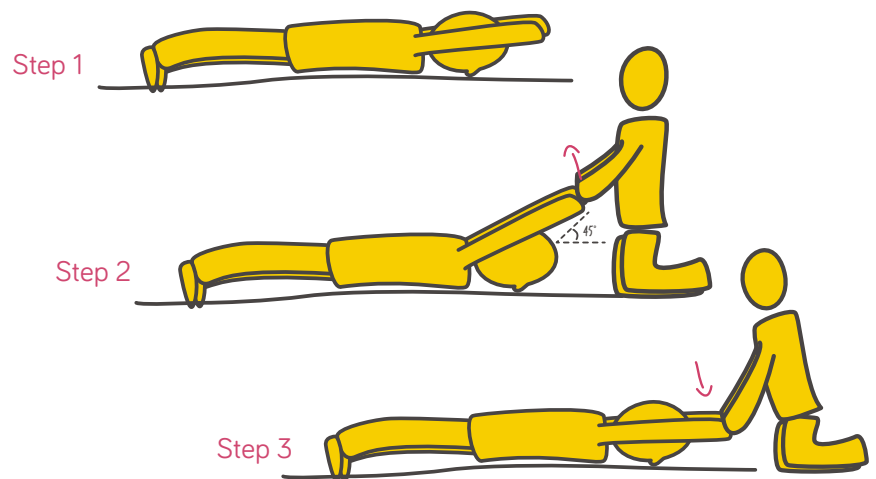




What to do (continued)

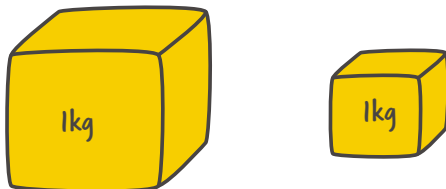
Through the floor

The participant lies face down on the floor with arms stretched straight out over their heads, eyes closed and face down. The tester lifts the participants arms up, by the wrists, till they are at about 45° . They are held there for about 1 minute, then very slowly lowered back to the floor. The participant should feel as though their arms are sinking through the floor.



Heavy boxes

The tester takes two boxes, one large, and one small. They put some weight into the boxes, such that they weigh the exact same amount.



With the boxes closed, the tester asks people to lift each box, one at a time. Then asks which is heavier. They should assume the smaller of the boxes is heavier, even though they weigh the same.

Follow up: Look over the results with your children and discuss which sense, sight or touch, seems to have the most sway over whether or not the illusion fools you about our own body. Encourage them to draw conclusions about which senses we trust the most.



Questions to ask children

Before the activity:

What senses do you know?

What other feelings do you get? (eg. hunger, temperature, balance)

During the activity:

Describe what you think is happening?

How can you break the illusion?

After the activity:

Which senses do you think are the most important?

The science

Your sense of proprioception combines information from your muscles, nerves, and joints to build an image of where the parts of your body are, so it's easy to touch your own nose with your eyes closed because you know where both your hand and your nose are and can bring them together.

However, your complete picture of the world is a combination of all your senses, so sight and touch also add to what you think your body is doing. In these illusions, you either remove one of the senses or trick what they are experiencing and so sight, touch, and proprioception are getting conflicting information. As humans rely on sight quite heavily, we tend to trust it over other senses, so when your sight and proprioception disagree, you're more likely to believe what your sight is telling you.

Going further

Try these illusions out with more people, they can be fun to try with unsuspecting participants.

