

CHILDREN LOOK AT SCIENCE

Episode N° 2

"WHY AREN'T WE ALL ALIKE?"

Montreal, september 22, 1989

201 (10)

VOICE 1: Why do some people have yellow skin and others red skin?

VOICE 2: Why do birds have wings and people don't?

VOICE 3: Why aren't we all alike?

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201 out

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202 (48)

VOICE 1: All living things, all living beings...start somewhere... in other words, they are born.

VOICE 2: Before Jessica was born, she was just a single cell. We all start from a single cell. If cells didn't exist, nothing would exist. A cell is a teeny-weeny thing. To see it, you have to use a microscope. Cells come in different shapes, they can be square, or round, or any other shape at all.

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203 (81)

VOICE 3: Often, a cell looks like a fried egg.

VOICE 4: In the middle of the cell, inside the nucleus, there's something that looks like a long necklace, two coloured snakes that wrap around each other. A sort of circular staircase in the shape of a double helix. This double helix is called deoxyribonucleic acid - DNA for short.

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203 out

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204 (114)

VOICE 1: DNA is like an architect. Instead of building houses, it builds living things.

VOICE 4: ttt agg ccgtacgtt aaa cgt tgg tgcacc

VOICE 1: It builds them by communicating. It talks to the cell. It speaks a very strange language. It doesn't have twenty-six letters like our alphabet, but only four.

VOICE 4: And I know what they are ACGT.

VOICE 3: GGG

VOICE 2: AAA

VOICE 1: CCA

VOICE 3: GAT

VOICE 2: CAG CGC

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- 2 -

VOICE 4: With these four letters, DNA can form three-letter words and whole sentences.

VOICE 1: TTA

VOICE 3: GGT

VOICE 1: GAT

VOICE 2: AAA

VOICE 4: These four letters form an alphabet that is always the same for every living thing.

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205 (148)

VOICE 2: DNA needs an awful lot of material to do its job. With its little three-letter words, it makes a list. AGT

VOICE 1: GGT

VOICE 4: It has a personal messenger nearly just like itself, sort of like a brother: messenger RNA

VOICE 2: RNA copies down the sentences that DNA gives.

VOICE 1: UCACCA GGG

VOICE 2: Leaves the nucleus... goes into the cytoplasm of the cell, which is like a warehouse and collects everything that DNA has ordered.

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205 out

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206 (189)

VOICE 3: DNA can do practically everything. Feed the cell..

VOICE 2: (swallowing) yum yum yum yum yum

VOICE 3: Give orders, tell the cell the work it has to do, reproduce itself and the cell two, four, eight, sixteen, thirty-two, millions of times!

VOICE 1: We are built of millions of cells that live and work. Like our dads go to work, they go to work too.

VOICES: Tick, tock, tick, tock,...

VOICE 4: The DNA's know what they have to do and how much time they have to do it.

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207 (227)

VOICE 3: According to what the DNA's communicate, the number of words, the sentences they use.

VOICE 2: CGT

Suite 207

VOICE 3: They can create a virus.. and ant..

VOICE 2: GCATAC CGATAG

VOICE 3: A flower, a cat, a man.

VOICE 1: CCCCAGAAAT CCG ATA

VOICE 4: They establish that a baby has to have two legs, a mouth and not a tail or horns like a cow!

VOICE 2: They make people tall or short.

VOICE 4: Give them blue or brown eyes.

VOICE 1: Flat feet.

VOICE 3: Create different races.

VOICE 1: Everything different.

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207 out

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208 (270)

VOICE 2: When the DNA's have finished building us, they've still got a lot of talking to do.

VOICE 3: They've got to make us grow and live.

VOICE 4: They make us get sick sometimes.

VOICE 1: They help us get well sometimes.

VOICE 2: And sometimes they even make us die.

VOICE 3: AATGGC...

VOICE 2: DNA always talks to the cell night and day for all of its life. It chatters and chatters but we don't understand a word it's saying.

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209 (294)

VOICE 1: But scientists try to understand its language. They want to talk to DNA.

VOICE 4: But it's possible that they could make a mistake.

VOICE 1: CAG AAT GGA TGT

VOICE 4: If they start fooling around with DNA, things can go wrong - get really botched up.

VOICE 2: But if scientists help it, then all goes well.

VOICE 3: The scientists should not order it around. When

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- 4 -

VOICE 3: DNA comes up with a sentence.. they could correct
it in the same language.

VOICE 1: Scientists would like to talk to all DNA's to get
rid of sickness in people. In trees, in animals.

VOICE 2: To help all living beings with their problems, to
respect all life.

VOICE 4: Then perhaps all living things could live together
in peace and harmony dancing, singing, playing.

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E N D

CHILDREN LOOK AT SCIENCE

Episode N° 3

"WHAT HOLDS THE SOLAR SYSTEM TOGETHER?"

Montreal, september 22, 1989

301 (416)

VOICE 2: Why doesn't the earth fall down?

VOICE 1: What holds the sun, the earth, the planets, the solar system together?

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301 out

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302 (442)

VOICE 1: The sun is our private star, the star that gives us life every day.

VOICE 3: With its mass force, it keeps all the planets in place: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, the solar system. It's like a big game, but as we all know, games have rules.

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303 (476)

VOICE 1: Can you guess how many rules this game has?

VOICE 4: Our solar system has four rules.

VOICE 1: The first rule is known as the force of gravity. It's a friendly force.

VOICE 2: It calls out, it helps planets spin, it holds them all together.

VOICE 3: It keeps us from floating away from the earth. It holds us and everything in place. Even if we're upside down. It's like holding hands in ring-around-the rosies- all playing together.

4 VOICES: Ring around the rosies, a pocketful of posies, ashes, ashes, we all fall down. Ring around the rosies, a pocketful of posies...

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304 (518)

VOICE 1: The second rule is that positive and negative attract each other.

VOICE 4: Like two magnets.

VOICE 1: This is called electromagnetic force. It holds the atoms of all matter together. The atoms of the planets, the atoms of everything on the planets.

VOICE 2: Even the atoms that make up a child.

VOICE 4: It also keeps the atoms of one thing from penetrating the atoms of other things.

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305 (550)

VOICE 4: It's also inside every atom.

VOICE 2: It holds together the plus nucleus and the minus electron.

VOICE 1: I call it plus and minus force.

VOICE 2: It's just like my friendship with Sophie. Even though we have different personalities, we like sharing and spending time together.

VOICE 1: The third rule comes from the very heart of the atom, in the nucleus itself.

VOICE 4: It holds the core together. It holds the particles together, even when they are plus and plus. It's like glue, very strong glue that makes all the pieces stick together very tightly.

VOICE 3: It's like little children hugging each other very tightly.

VOICE 2: It's the strongest force of all. It's like love.

VOICE 1: And since it's in the nucleus, it's called strong nuclear force.

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305 out

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306 (615)

VOICE 1: The last rule is the force that controls the tiniest particles in the nucleus, and keeps them from causing problems.

VOICE 4: Sometimes these particles try to transform themselves, create confusion, collide, and smash to pieces.

VOICE 1: So our fourth force, called weak nuclear force, is sort of like a kind referee. Very wise, very much on the alert day and night. It says...

VOICE 4: Take it easy otherwise we'll all explode here.

VOICE 2: Armando, the cop, is a little like the weak nuclear force, keeping all the cars from crashing into each other.

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307 (662)

VOICE 4: So the whole solar system from the biggest to the tiniest things are held together by these four forces.

Suite 307

VOICE 1: But now, let's stop to think for a moment. First we have the force of gravity: the desire to play together.

VOICE 2: Secondly, we have electromagnetic force that is like friendship.

VOICE 3: Thirdly, we have the strong nuclear force which is like love.

VOICE 4: And fourthly, we have the weak nuclear force which is like the kindness of Armando the cop.

VOICE 1: Since these four feelings work harmoniously together, doesn't it seem likely that the four forces could be related, that they could be parts of just one big force?

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308 (702)

VOICE 4: Scientists, like us children, are studying to find out if there is one force, just one single force.

VOICE 2: If there were just one force, it would make it easier to understand the game. It would make it easier for everybody to get along.

VOICE 4: It would be easier for everything, atoms...

VOICE 3: Little children..

VOICE 1: The earth, the planets, the sun, to succeed in living together in peace for ever and ever.

E N D

CHILDREN LOOK AT SCIENCE

Episode N° 4

"WHAT MAKES US ALWAYS SEEK NEW GOALS?"

Montreal, september 22, 1989

401 (789)

VOICE 1: Why do people always seek new goals?

VOICE 2: Why do people always want to know more about every-
thing?

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401 out

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402 (818)

VOICE 1: The desire to discover new things...

VOICE 4: Comes from will, from the heart,...

VOICE 2: From love.

VOICE 1: It comes from curiosity. I can tell it comes from
there. From the brain, because I can feel something
cooking in my brain.

VOICE 4: The little child, when he thinks and reflects, uses
his brain.

VOICE 3: He raises his eyes to think, wonders about things
that he doesn't know about - things that he doesn't
know how to solve.

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403 (850)

4 VOICES: (ghostly woo-woo sounds)

VOICE 1: (strong ghost voice)

VOICE 2: If you don't know what you're looking at...

VOICE 4: If we don't know who it is.

VOICE 1: If nobody knows what it is. ^{if it's not familiar} we get frightened.

VOICE 4: Not only children get frightened... grown-ups
do too. All the people who live on earth and basi-
cally for the same reason.

VOICE 3: There are ways of dealing with fear. To be less
afraid of things... namely finding out who it is.

VOICE 4: Finding out what it is.

VOICE 1: Finding out if it's real.

VOICE 2: Finding out how things are made.

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404 (918)

VOICE 2: Thinking about them. Discussing them, getting to
know them.

VOICE 1: Getting to know things.

Suite 404

VOICE 2: Means looking at them.

VOICE 4: Touching them.

VOICE 3: Hearing them.

VOICE 1: Sampling them.

VOICE 2: Holding them.

VOICE 4: And smashing them.

VOICE 1: Listening to them.

VOICE 4: Trying them out.

VOICE 1: Questioning them.

VOICE 4: Carrying them away.

VOICE 2: Smelling them.

VOICE 1: Building them.

VOICE 4: Dismantling them.

VOICE 3: Rubbing them.

VOICE 4: Turning them upside down.

VOICE 3: Taking them in your hand.

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405 (954)

VOICE 3: To do these things, I think that I've got to use my body, hands, eyes, nose, feet, knees, ears, mouth and my bottom.

VOICE 1: But it takes more than just the body.

VOICE 2: It also takes will and the head and the intellect.

VOICE 3: When I want to learn something, I read books, watch television, listen to the radio, my folks, my teacher, my grandparents, go to the library.

VOICE 2: We go ask someone who really knows.

VOICE 1: To discover things that are far away stars, for example, we need a telescope.

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406 (1002)

VOICE 1: When we want to look at something very small, we have to use a microscope.

VOICE 2: You can also draw, to get a good view of things.

VOICE 1: Or photograph the, which is much more precise.

VOICE 4: You have to use instruments made especially for weighing and measuring.

VOICE 2: Sometimes you have to do experiments and you have to carefully watch what happens.

VOICE 4: Tack tack... boom

VOICE 3: Sometimes we have to listen to secrets.

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407 (1035)

VOICE 1: Afterwards, we end up with all this material, and we choose the interesting things.

VOICE 2: And we write it all out on a big poster. That way we can let lots of people know what we've done.

VOICE 1: When we discover something, we shout it all over.

VOICE 4: Blablabla...

VOICE 1: We repeat it. We tell our grandparents, and anybody who doesn't remember, our foks...

4 VOICES: Blabla...

VOICE 3: Younger kids.

VOICE 4: But we've also got to listen, look at other people's discoveries.

VOICE 1: If we put together all of our ideas, a real big discovery, a gigantic discovery can come about.

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408 (1075)

VOICE 1: You see, I've learned that this is the way to learn, to gain knowledge about things I've never heard of. All you have to do is study them, and think about them more, and it's a lot of fun too.

VOICE 2: We've got to help each other otherwise nothing will ever get done.

VOICE 1: I've learned that it takes courage and a lot of energy to deal with fear. When you know about things, You're no longer afraid and now I'm no longer afraid. I found out that grown-ups are just like us. They are curious too. They want to know more. They think, observe.

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Suite 408

VOICE 4: Touch and weigh mysterious things.

VOICE 2: They exchange ideas, put them together.

VOICE 3: They help each other.

VOICE 4: This is how grown-ups invent new things.

VOICE 1: Reach another planet, lead a better life, improve
the world and make it a better place to live.

E N D

CHILDREN LOOK AT SCIENCE

Episode N° 5

"WHAT MAKES THE WORLD GO ROUND?"

Montreal, september 22, 1989

501 (11)

VOICE 2: Why does the earth remain suspended in the air ?

VOICE 4: Who or what makes the earth spin?

VOICE 1: What makes the world go round?

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501 out

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502 (46)

VOICE 4: I can see that space is one enormous hole of turning stars, and turning planets.

VOICE 2: The sun turns to the left, the stars to the right, the planets turn like the sun and like the earth.

VOICE 3: The stars are all turning around the whole universe.

VOICE 1: The sun is circled by the earth which takes at least a year to get all the way around it.

VOICE 3: Because the sun is very big.

VOICE 4: The earth itself spins very quickly. In one day, it makes one rotation and in a week it makes seven.

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503 (82)

VOICE 1: So now, you must be wondering, what makes these heavenly bodies move? That's just what we're going to explain. To help you understand, I'll show you an experiment we did. First, we stretched out a sheet, pulling it tight, then we put a big ball in the middle. The ball makes a bulge in the sheet, making a sort of funnel.

VOICE 2: Then we threw a ping-pong ball in from one side. The smaller, lighter ball heard the voice of the bigger ball and gradually started swerving in and wound up around the bigger ball, around the walls of the funnel.

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503 bis (128)

VOICE 1: We did this experiment to demonstrate what is happening in outer space.

VOICE 2: Space is made up of the sky of emptiness. It isn't flat, it's everywhere, but it's like our sheet.

VOICE 3: The planets, the stars sort of make funnels in space.

VOICE 4: These funnels are like their voices.

4 VOICES: (sing)

Suite 506

VOICE 2: They all call each other, they attract each other,
but they don't collide. Each follows a path at its
own speed.

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506 out

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507 (314)

VOICE 3: Every heavenly body has compassion for the other
heavenly bodies.

VOICE 2: It's as if they have joined hands.

VOICE 4: As if they we're all playing ring-around-the rosies.

VOICE 3: They are bosom-buddies, friends that play in space.

VOICE 1: That's why the earth turns around the sun. That's
the story of the heavenly bodies. Thanks, and
good-bye.

E N D

CHILDREN LOOK AT SCIENCE

Episode N° 6

"WHERE IS INTELLIGENCE LOCATED?"

Montreal, september 22, 1989

601 (415)

VOICE 2: Where is intelligence located?

VOICE 4: What are our brains made of?

VOICE 1: Are there machines that can think like us?

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601 out

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602 (440)

VOICE 1: Intelligence is something that all living beings have.

VOICE 2: It's an important thing: sensitive, spiritual, indispensable.

VOICE 4: I don't think intelligence could exist without the brain and vice versa.

VOICE 1: The brain is its house. It's like a three-storey house. The first floor is the spinal chord. It controls the things the body does on its own.

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603 (481)

VOICE 4: The second floor consists of the brain itself. It looks like a cauliflower.

VOICE 3: It is concerned with our quality of life. It examines experiences which help us to make sound decisions.

VOICE 1: About how, for example, to build a comfortable, safe shelter, how to provide food.

VOICE 3: How to take care of the little ones.

VOICE 1: The third floor is the cerebral cortex. It looks like a rind with lots of wrinkles. It gives us intelligence.

VOICE 2: And feelings.

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604 (519)

VOICE 1: The human brain contains these three parts all very well developed. Seen from above, our brain is divided into two parts, two hemispheres.

VOICE 2: The left hemisphere, aside from commanding the right side of the body also controls logical thinking, calculations. It solves problems.

VOICE 4: The right hemisphere, which commands the left side, determines our creativity.

VOICE 3: How we make up stories.

Suite 604

VOICE 2: Drawings or poetry.

VOICE 1: Underneath the hemispheres, is the cerebellum. It's in charge of things that we've already learned, things that we do automatically.

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605 (566)

VOICE 4: All these parts of the brain always work together. They are connected by something like bridges and consist of millions of nerve cells.

VOICE 3: These nerve cells are called neurons and nearly all of them are formed within our brain from the time we are very small.

VOICE 4: They are sort of oval, with a funny, crooked shape.

VOICE 1: Each neuron has a nucleus and branchy points that are like arms. With these arms, the neurons are all connected together.

VOICE 2: With their arms linked together, the neurons exchange information.

VOICE 3: It's like one person telephoning another.

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606 (613)

VOICE 1: There are thousands and thousands of exchanges per second. These connections are known as synapses. The more synapses that take place, the clearer the reasoning. The better you'll understand, the more intelligence you'll have.

VOICE 4: The number of neurons we've got, however, remains the same. There's no way of wishing more into being.

VOICE 2: To be more intelligent, we have to make our neurons work as much as possible, make more synapses, keep the brain constantly moving. Send it lots and lots of messages. Listen, look, be alert, read, touch, think, study, invent.

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607 (668)

VOICE 1: If you put the synapses together, the thoughts of lots of people.. there will be more intelligence to put thoughts together. Words were invented.

VOICES: (pig sounds) (blabla)

VOICE 1: And books too, to pass on information. Ideas, onto others. Even television.

VOICE 2: Ladies and gentlemen, good evening, we're coming to you live from...

Suite 607

VOICE 1: Records, tape-recorders, radio.

VOICE 4: Beedee beep beep...

VOICE 1: We've invented machines with artificial intelligence. Computers to help our own memory, and our own intelligence.

VOICE 4: The machines have the capacity to contain millions of pieces of information.

VOICE 2: They make terribly difficult calculations in a half a second.

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608 (718)

VOICE 1: They help us to invent other machines and to program space flights.

VOICE 3: Machines can do longer jobs, quicker.

VOICE 2: They do our work. Saving time for us and if they are in good mechanical condition, they never make mistakes.

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609 (750)

VOICE 1: But machines don't have neurons. They don't have synapses, nor do they have feelings.

VOICE 2: They know how to calculate, but they don't know how to invent. They can't tell the difference between pretty and ugly, boring and fun, good and bad. They'll never take the place of a human.

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610 (776)

VOICE 4: Our brain, with its little mechanisms, its little functioning gears is a rare and delicate thing, an extraordinary machine.

VOICE 1: I hope that the brain, the intelligence and imagination of so many people, together with machines so useful as storehouses of information will help us make progress. No bombs or guns but only the welfare of the whole world.

E N D
