

Excerpts from observations analyzed in the paper

Exploring sound waves (4–5-year-old children)

The children are watching a short movie about experiments, talking to each other and to the teacher during the film. Afterwards, the teacher has prepared bottles filled with water at a table, where they all gather.

- Do you remember that we made mug-phones the last time? Now we're going to experiment with bottles and water, like they did in the film. Does anyone want to try? Several children answer positively and start blowing into the bottle but have problems getting sounds. They discuss and try to help each other. The teacher shows how they can hit the bottle with a stick or a spoon. The children test and discuss their results.

- What do you think is happening here? asks the teacher. She once more reminds of the mug-phone and after a while brings more bottles, water and a funnel. The children help each other to distribute the bottles and to pour water in each bottle.

- Why don't we hit one at a time? Let's first listen to Vivi. One child at a time tests. A child succeeds in blowing a tone in the bottle but the teacher asks him to wait with the blowing.

- Could anyone explain what is happening? the teacher asks. No? When you blow there are vibrations. The more air there is, the lower the tone will be. She tries to show this by hitting the bottles but since the bottles as well as the sticks are all different sizes, this fails.

- I don't understand, a child says.

- I think it's like the megaphone, another child answers.

The children now pour more water into their bottles and start doing music by blowing, ping-pong, stomping on the floor, and patting the table.

Counting (5-year-old children)

The teacher sits on the floor with three children. One child is rolling two dices. The other two are waiting their turn, trying to find things to do in the meantime.

- What does this add up to? the teacher asks. The child counts the dots on the dice and points at each:

- One, two, three, four. Four!

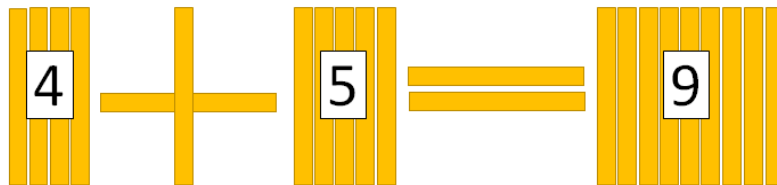
- That's right. Can you take four sticks? The child takes four wooden sticks from a box and puts them on the floor.

- Can you choose the right digit too? the teacher asks. When the child hesitates, the teacher counts the digits aloud and points at them, they are laying in order: 1, 2, 3...

- 4, the child fills in and takes the digit four and puts it on the four sticks.

- And now put the plus sign there, the teacher says. Do you know what it looks like? The child crosses two sticks. Now you can roll once more, the teacher says. The child rolls the dices and counts the dots aloud to five. She takes five sticks and puts them on the floor, counts the digits to find five and put it on top of the sticks.

- Now there's the equal-to-sign, the teacher says. The child looks questioning at her. Do you know what it looks like? The teacher gives her two sticks. The child crosses them. No, that's a plus, the teacher corrects, this is how it should be. She puts the two sticks parallel. This is where it should say how many sticks there are altogether. Can you count? The child counts to nine sticks and puts nine sticks on the other side of the equal-to-sign. Supported by the teacher, she finds the digit and puts it on top. Now one of the other children is in turn. The procedure is repeated. When this child doesn't know how the addition-sign or the equal-to-sign looks the first child is asked to show.



The final display of sticks and digits on the floor.

Parking cars (3-year-old child)

A boy is driving little cars into a garage, talking to himself about what he is doing:

- This goes all the way up, it's very quick!

The teacher, seated beside him leans forward and asks:

- What color is that car? The boy looks surprised at her and then answers:

- Green.

- Yes, that's right, it's green.

Playing family (4-year-old-child)

- Is this the mother or the sister? The teacher points at a human figure that the child has chosen from a box.

- Da mom, the child answers.

- Are there any more in this family?

- Dad, bro, girl, the child answers and picks some figures from the box.

- Oh, a dad, a brother and a sister. Where do they live? The child points towards the city that has been built in the preschool project. In the city? the teacher confirms. Where there – show me!

The child and the teacher move to the city.

- Tha live, the child says and points to a house she has made earlier. Shop!

- Are they going to the shop? Will all come?

- No, on'y child'n. The child takes the two smaller figures and "walk" the to the candy store.

- Aha, so this is where they are going to shop, I see. What are they shopping in the candy store?

- Candy!

Coloring easter-eggs (4-year-old children)

A group of children are coloring color-book pictures of easter-eggs with pencils. The eggs are large, and cover most of the page. A girl has colored the tip of a star on the egg and a little of the left corner of the egg. Now she is sitting with her hands in her knee. A teacher sits down at the table.

- What nice stars, she comments, pointing at another child's drawing. The first girl glances shortly at the commented picture and then takes up a pen and studies it closely.

The building room (4-year-old children)

In the small building room, four boys are playing. Outside, in the larger room, a teacher sits at a table with two children who puzzles. At another table a teacher and three children are playing a board game. A third teacher stops by the entrance to the building room and asks:

- What are you really doing in there? and then she walks on. After a while one of the sitting teachers rises and glances in at the boys but soon returns to her table.

- You can't have that, one of the boys says, pushing one of the others.

- He can so! You can't decide! says the boy who wasn't pushed. One of the children seated at the table rises and shuts the door to the building room. Through the door window one of the observers sees a boy blubbing at another and one boy holding a piece of lego so that the others can't reach it.

Exploring air (1-2-year-old children)

A group of the youngest children and two teachers explore blowing soap bubbles and moving and lifting things, using a hairdryer. They are in a relatively small room. On the wall there is a projection of a piece of ice with frozen bubbles. The children move among the activities and test different ways while the teachers create and change the conditions, as well as denominate what the children are discovering. The children are engaged in the testing. The teachers encourage with questions:

- Are there any bubbles coming? Shall we try another? A child succeeds with blowing a bubble.

- Look, there you have a bubble! How did you blow? Test once more!

- Shall we test this? A child experiences the airflow from the dryer. Shall we blow soft or hard?

- Look, what happens now? This is too heavy; the air cannot lift it. Can you try a lighter thing? Yes, the ball might work. The conversation continues about why some things lift and some don't and the children are responding through sounds and gestures. They also go to get more things to test with.