Children's language development doesn't just happen through words

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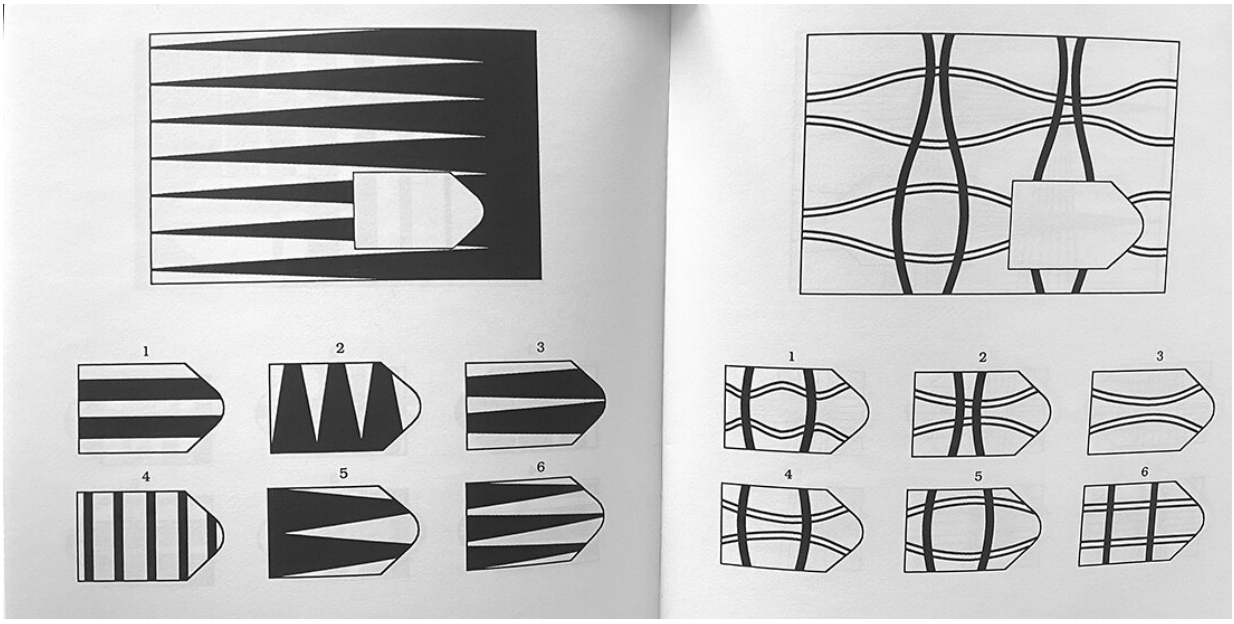

Language difficulties in children—and their severity—should be identified early. The right training and support can then be put into place and contribute to better language development. Credit: Idun Haugan / NTNU

Children learn to understand language and to speak largely independently of cognitive functions like spatial awareness, working (short-term) memory and perception (interpreting and organizing sensory impressions), according to established theory and tradition within linguistics.

Professor Mila Vulchanova heads NTNU's language laboratory and conducts research on language learning. Her research findings over several years have challenged this linguistics assumption and demonstrated clear associations between language development and cognitive skills.

New links

Vulchanova's latest research is based on data from the largest cohort study conducted in Norway. The Mother, Father and Child Cohort Study (MoBa), under the auspices of the Norwegian Institute of Public Health, is one of the world's largest health surveys, with data from 114,500 children, 95,000 mothers and 75,000 fathers.

Mila Vulchanova and research colleagues from NTNU, the University of Oslo, Statped and the University of Melbourne have now catalogued new links between language development and cognitive skills.

Cognitive skills are a collective term for our ability to concentrate, pay attention, remember, our sense perception, logical reasoning and problem solving.

Non-verbal tests reveal a lot

Language comprehension tests are used, naturally, to investigate whether children have language development challenges. Vulchanova's research shows that non-verbal tests are also very important for cataloging language difficulties, what types of language challenges the child has, and in particular the severity of the language difficulties.

Researchers analyzed data from more than 500 8-year-old children in the research project. The findings are published in the *International Journal*

of Language & Communication Disorders.

"We analyzed extensive data on the language and cognitive status of children with language difficulties and compared them with children who have typical language development. The analyses show that the severity of the language difficulties can also be predicted based on cognitive markers. These are discoveries that pave new paths for research in this field," says Vulchanova.

Cognitive markers include logical reasoning, such as recognizing similarities between concepts or discovering connections between graphic patterns. Cognitive markers are catalogued based on both verbal and non-verbal tests.

How the balance between verbal and non-verbal cognitive skills affects language skills is a field that has been relatively unexplored in the past.

Which cognitive measurements and methods best predict the severity of language disorders in children is not yet well known, either.

The new research findings are contributing to finding answers to these questions.

Early and correct assessment is important

An early assessment of a child's language difficulties and correctly identifying the severity of the language difficulties is key. The right training and support can then be implemented, such as via a speech therapist, and contribute to better language development.

"Our findings support the importance of measuring both verbal and non-verbal cognitive skills. In this way, we can identify which dimensions are affected and require special attention in children with language

difficulties," Vulchanova said.

"Our findings also point to the potential for training cognitive skills as a strategy to support language skills," says Vulchanova.

Different testing methods

One of the six testing methods used to assess the 8-year-olds is called block design and involves recognizing patterns and seeing which patterns fit into the context.

Another test assesses the child's ability to recognize similarities and serves as a bridge between verbal and non-verbal skills. A sample question could be, "What is the connection between a sea and a river?" Here, the child needs to understand what the words mean and also connect that they both involve water.

"We identify specific verbal and non-verbal cognitive tests that differentiate between typical children and children with language difficulties, as well as the severity of language difficulties," says Vulchanova.

"What distinguished the group with mild language impairment from the group with typical language development were the scores on the pattern recognition test (block design) and the similarity test (the similarity between, for example, sea and river), as well as performance on logical reasoning, vocabulary, understanding daily sequences and tasks and non-word repetition," she says.

In the non-word test, the children have to read short words and sort them as being either real words or non-words.

"All the verbal cognitive results could predict severe language problems

versus typical language development," says Vulchanova.

Providing training to others

Three people are gathered in Vulchanova's office to plan training sessions in language testing. They plan to hold courses for educational professionals, including kindergarten staff, people in the schools' PPT service, speech therapists and kindergarten pedagogues and teach them methods that they can use to survey the children's language skills.

The course holders are Vulchanova, Berit Sivertsen, educational leader at Berg kindergarten in Trondheim and Ellen Saxlund, a lecturer at a secondary school in Bærum. Both Sivertsen and Saxlund have taken master's degrees at NTNU's Department of Language and Literature and have had Vulchanova as their supervisor.

The researchers use various objects in their course, such as a picture book, toys and stuffed animals—including a little monkey. All these items are included in the new Reynell test that Vulchanova and colleagues have adapted and standardized for the Norwegian language.

Stuffed animals are part of testing

"We perform different actions with the monkey, like making it jump, and then we ask the child to tell us what it's doing. We're looking for the child to identify the action and use the correct verb," says Saxlund.

Sivertsen pulls out a rabbit from the bag of testing materials.

"We also test children's understanding of prepositions by asking them to place the rabbit on top of, next to or below another object," she says.

Mila Vulchanova takes out a picture book with pictures of figures performing various actions, including a rabbit brushing a monkey. Here the children have to point out the correct pictures based on questions about what the figures are doing and who is doing what. The use of verbs in active and passive voice is key for this test.

Vulchanova stresses that language proficiency is linked to all cognitive abilities.

In their analysis, the researchers summarize:

Our findings support the importance of measuring both verbal and non-verbal cognitive skills in order to identify the most vulnerable dimensions in children with language difficulties, but also with regard to diagnosis.

The findings also point to the potential for targeting underlying cognitive skills as a strategy to support language skills.

We suggest that future interventional studies focus on the effect of non-verbal cognitive skills on language development in children with language difficulties.

More information: Fufen Jin et al, The association of cognitive abilities with language disorder in 8-year-old children: A population-based clinical sample, *International Journal of Language & Communication Disorders* (2023). DOI: 10.1111/1460-6984.12861

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